

External Review

IAU Office of Astronomy for Education

2023

This document contains the report of the External Review Committee called by the International Astronomical Union (IAU) to review the work of the IAU Office of Astronomy for Education (OAE) in 2023. It includes the official replies to the recommendations given by the OAE. As stipulated in the Terms of Reference, this document is public. It is available on the OAE website astro4edu.org.

Heidelberg, 20 March 2024
for the OAE: Markus Pössel

Report for the Review of the IAU Office for Education

January 2020 – October 2023

Panel members

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1. Executive Summary

This Review is an external evaluation of the performance of the Office of Astronomy for Education (OAE) in terms of the objectives defined in the Agreement signed in December 2019.

The period covered by this review is 1 January 2020 to 31 December 2022. The Review Committee visit to the OAE took place on 16-18 October 2023 in Heidelberg, Germany. Consequently, we also looked at the OAE activities carried out in 2023. The Review Committee's Terms of Reference can be found in Section 3.

We appreciate the willingness of OAE staff, stakeholders and IAU members to provide us with comprehensive responses and detailed information. These were tremendously helpful.

The Committee's top-level recommendations are:

- Renew the International Astronomical Union - Max Planck Institute of Astronomy (IAU-MPIA) Agreement for the 5-year period 2025-2029.
- Establish an advisory board (distinct from the Steering Committee) whose members include professional educators as well as astronomers.
- Develop a strategic plan
- Develop a robust marketing and communication plan to raise the profile of the Office within the IAU community and worldwide
- Collaborate with Division C Education, Outreach and Heritage and specifically with Commission C1 and its working groups, and the Legacy Working Group
- Collaborate with regional IAU meetings and symposia organizers and the local NAECs (National Astronomy Education Coordinators) to provide teacher workshops in parallel with or adjacent to these scientific meetings. IAU symposia proposals require education/outreach component.

2. Background

2.1 IAU Strategic Plan 2020-2030

In the IAU Strategic Plan 2020-2030, one of the goals is to Use astronomy for teaching and education at school level and specifically, Goal 5 calls for the creation of an Office of Astronomy for Education “In order to provide more structured support to astronomy education in all countries, and to further encourage the use of astronomy as a stimulus for teaching in diverse areas...” . The OAE objectives will be

- *establish a network of NAECs (National Astronomy Education Coordinators);*
- *analyse the use of astronomy in teaching in IAU countries and identify accessible materials and astronomy literacy guidelines;*
- *encourage standards for teacher training activities;*
- *organise an annual International School for Astronomy Education (ISAE);*
- *build a database of volunteer IAU members.*

Subsequently, the Office of Astronomy for Education was established in December 2019.

2.2 Agreement between the IAU and the Max Planck Institute for Astronomy

The Office of Astronomy for Education (OAE) was established following a Call for Proposals. An Agreement was signed between the International Astronomical Union (IAU) and the Max Planck Institute for Astronomy (MPIA). The duration of this Agreement is from January, 1 2020 to December 31, 2024.

The OAE is hosted at the Haus der Astronomie (HdA). HdA is a Center for Astronomy Education and Outreach in Heidelberg, Germany. It is a partnership between the Klaus Tschira Foundation, the Max Planck Society, Heidelberg University and the City of Heidelberg. Haus der Astronomy is not an independent legal entity. It is operated by the Max Planck Society, which has delegated this task to the Max Planck Institute for Astronomy on whose campus Haus der Astronomy is situated.

The purpose of the OAE is “to support the contribution of the community of professional astronomers and astronomy educators worldwide to use astronomy as a stimulus for STEM teaching and education from elementary to high school level”.

The operating budget of the OAE consists of funding from the IAU, the Klaus Tschira Foundation and the Carl Zeiss Foundation. The Shaw Prize Foundation provides separate funding (via the IAU) for the annual Shaw-IAU Workshops on Astronomy for Education. The MPIA provides the IAU OAE with office space and technical, communications and IT support, as well as human resources and financial management support.

The OAE URL is <https://astro4edu.org/>.

3. Term of Reference (ToR) for the Review Committee

The purpose of the review is to assess the performance of the OAE in terms of the objectives established in the Agreement IAU-MPIA and to assess the objectives themselves.

The Review Committee members are: Dr Susana Deustua (National Institute of Standards and Technology, USA), Dr Michele Gerbaldi (Institut d'Astrophysique de Paris, France), and Robert Hollow (CSIRO, Australia).

3.1 The responsibilities of the Review Committee are to:

- a. Read all relevant material
- b. Interview the OAE staff at an in-person meeting at the OAE Headquarters
- c. Interview OAE Steering Committee members as desired during the in-person meeting or via zoom
- d. Interview targeted stakeholders via email or zoom for information that may assist them in their task of addressing the ToR
- e. Give verbal feedback of the Review Committee findings and recommendations to the OAE, IAU and MPIA leaders at the conclusion of the Review
- f. Submit a written Review Report addressing the points in Section 2 to the IAU-MPIA authorities.

The list of the interviews conducted by Zoom or by mails are given in the Annex at the end of that document.

3.2 The Review Committee was tasked to address the following:

- 1) How well the OAE has met the objectives within its resource constraints
- 2) The management of the headquarters of the OAE in terms of leadership, staffing, location, budget oversight, and funding
- 3) The organization and performance of the OAE Centers and Nodes in the context of the mission of the OAE as a whole
- 4) The organization and performance of the National Astronomy Education Coordinators (NAECs) in the context of the mission of the OAE as a whole
- 5) Collaborations and liaisons with other entities (e.g., IAU Div C on Education; partners organizing regional or international schools for astronomy education; other IAU offices, in particular the OAO and OAD)
- 6) The effectiveness of the Shaw-IAU Workshops on Astronomy for Education
- 7) The development of infrastructure (e.g. databases, best-practice collections) and resources by the OAE
- 8) The IAU-MPIA agreement with a view to its possible enhancement
- 9) The benefits that the OAE has brought to the IAU and HdA/MPIA
- 10) The OAE activities in the context of the IAU Strategic Plan for 2020-2030 and in the context of the implementation plan approved by the IAU Executive Committee in 2019
- 11) Fund-raising activities and effectiveness of third-party funding

4. OAE's stated objectives

Objective 1: Professionalize Astronomy Education:

Help astronomers, astronomy educators and teachers world-wide to gain the skills they need in order to communicate about astronomy in primary and secondary schools in a professional and effective manner.

Objective 2: Provide Access to Good Sources

Make available excellent and effective resources for teaching about astronomical topics, internationally, under open licenses, and easy-to-find.

Objective 3: Promote Astronomy in Curricula

Support efforts to include more astronomy in national or regional curricula.

Objective 4: OAE Networking

Create, maintain and grow a network of associates in support of the OAE mission.

Objective 5: Spread the News

Inform all relevant stakeholders and communities about OAE activities, and about ways of collaborating with us.

In support of each objective, the OAE developed programmes and projects which are analyzed accordingly in the coming sections.

5. Key Findings

5.1 Staff Members, OAE organization & management

The establishment of the OAE coincided with the onset of the global Covid-19 pandemic, which affected the recruitment of staff members and face-to-face meetings. To their credit, the OAE leadership were able to hire staff internationally through agreements with relevant institutions abroad, and take advantage of new ways of communication. These practices continue to the present - OAE staff are globally distributed, and as of October 2023, three are based abroad (Brazil, South Africa and the UK). This has benefitted the OAE tremendously in terms of making it possible to recruit talented individuals internationally.

OAE staff consist of the Director, Deputy Director, Organisational Assistant and additional staff who are specialists in astronomy education, evaluation, and education research, for a total of 5.3 FTE. These staff are joined by Associate researchers, volunteers who carry out specific tasks, some may have been employed by the OAE in the past. From time to time, specialists can be brought in for occasional needs, e.g. "Visualisation specialist".

OAE staff hold a formal weekly "OAE team Zoom Meeting" led by the Director. Additionally, the staff hold a weekly "OAE Team Forum" (without the Director and Deputy Director) for informal conversation. Other meetings occur as needed, although staff reported that it can

be difficult to get the attention of the Director. Staff seem not to know the role of the Deputy Director.

The Committee interviewed all current and most past staff members by Zoom during the September-October and face-to-face during the Committee visit to the OAE. We find that OAE staff are motivated, dedicated and passionate about their work. The mix of remote and local staff is working well. The Committee is impressed by what has been accomplished in such a short time, 3.5 years.

Each staff member has their own specific tasks and responsibilities, but in the months leading up to the Shaw-IAU Workshop, the whole team, plus volunteers, is dedicated to preparing for the event. Consequently regular work slows or stops. This is further discussed in Section 5.

The Organisational Assistant (Gwen Sanderson) has been with the Office from the very beginning, and is the “backbone” of OAE. She brings a unique professional background and perspective to the Office, along with infectious enthusiasm and passion for the OAE’s mission.

We are concerned that the Organisational Assistant fulfills many responsibilities - by our reckoning of order 2+ FTE, which is not sustainable in the long term – and acts in many different domains:

- recruiting of the National Astronomy Education Coordinator Teams (NAECs) and is still working on it.
- maintaining strong interaction with the NAECs, encouraging them to share their experiences, providing tech support (using basecamp), supporting them with the network either on basecamp or at the NAEC quarterly meetings,
- answering emails sent to OAE (general enquiries, NAEC enquiries, anything from the OAO or OAD),
- supporting individual team members on all their projects wherever possible (For example; TTP – support with the projects and financial issues; Curricula survey – chasing missing material; Astronomy Glossary – looking for potential translators or teacher reviewers).
- keeping track of the many details of the OAE activities, making sure everything gets documented and much more.

We recommend that

- *the OAE allocate responsibilities equitably within the Office*
- *the FTE fraction of both the Director and Deputy Director be increased by at least a factor of 2.*
- *Given that OAE staff are distributed, the Committee recommends that remote staff meet face-to-face at least once a year in Heidelberg.*

5.2 Budget

The Committee received the OAE Implementation Plan and a report on the budget overview for the years 2020-2022.

The OAE operating budget (salary, travel, supplies) is provided by direct IAU funding, and through generous grants from the Klaus Tschira Foundation and the Carl Zeiss Foundation. The OAE Director and Deputy Director are hired through HdA which provides their salary as in-kind contribution to the OAE.

Expenses of the IAU-Shaw Workshops on Astronomy and Education are covered by a grant from the Shaw Prize Foundation, but which has indicated that after 2025 it will no longer fund these workshops.

The Committee notes that as provided, the budget report for 2020-2022 was difficult to follow, however, a series of email exchanges with the OAE Director was helpful for clarifying the expenses and income balances.

In some cases there have been difficulties in transferring funds to grant recipients, e.g. TTP grant, due to either national legal regulations or the local banking system.

The Committee recommends that

- *The IAU work with its bank to find a smooth solution for money transfers that does not pose a burden to the recipients.*
- *The Steering Committee discuss with the MPIA the detailed financial balance sheet for 2000-2023 and the projection for 2024, to facilitate the establishment of a new Agreement for 2025-2029.*

5.3 National Astronomy Education Coordinator Teams (NAEC)

The National Astronomy Education Coordinator Teams (NAECs) are the “pillars” of the OAE and should be its primary focus.

One of OAE’s first tasks was the selection of NAECs and the establishment of a NAEC network. A NAEC team consists of up to five experts in astronomy education. For IAU member countries, the NCA (National Committee for Astronomy) is responsible for identifying and selecting the NAECs. Selection of NAECs in countries that are not members of the IAU follow a different process. The Office of Astronomy Outreach (OAO) gave helpful input on the selection of the NAECs, based on their experience with establishing the NOCs (National Outreach Coordinators).

By the end of 2022 there were 403 NAECs in teams representing 115 countries and territories. This is an excellent result, and the Committee noted this was well advertised on the OAE Website. The OAE asked each NAEC team to provide summaries of education systems and how astronomy fits in their country/territory curriculum. Ninety (90) countries provided descriptions - these are available in PDF on the OAE website. This is a unique database.

As said in Section 5.1, the Organisational Assistant is the person who is keeping the contact with the NAECs, all the year round, helping them in all the aspects of the projects they are running, finding out what can be done to support them such as creating tutorials on how to use basecamp effectively. The NAECs appreciate that email communication with the OA is easy and the quick responses.

The Committee noted the excellent initiative of having the “NAEC dialogues”, a 1-1 dialog with OAE staff members to strengthen the connections with the NAEC teams and learn what they need or would like to have. This has led to Wikimedia Workshops in which NAECs are trained to edit Wikipedia entries in their language, and an Evaluation Framework and Toolkit released in early December 2023.

Events like the regional meeting recently held in South Africa are invaluable for creating bonds, connecting people and strengthening the network. Several initiatives took place already.

The Committee recommends that

- *the results be widely publicized, these could be useful for the NAECs when they liaise with education authorities in their countries - ministries of education, curriculum experts etc.*
- *the OAE have more freedom to recruit or replace NAECs who are not active or not performing satisfactorily.*

5.4 OAE Activities and programmes

5.4.1 Shaw-IAU workshops on astronomy for education

The IAU Shaw Education Workshops are funded by a generous grant from the Shaw Foundation through 2025. Originally envisioned as annual, in person meetings but they pivoted to an entirely online format as a consequence of the global Covid-19 pandemic after the first meeting in Paris in 2019

Each workshop focuses on a selected topic in astronomy education. Presentations from each workshop are bundled together and are available on the OAE website as Reviews, which are meant to serve as best practice guides. (<https://astro4edu.org/oea-reviews/>)

A large amount of staff time is spent on preparing for the annual online workshops, such that all other work seems to stop at that time. The “Hopin” platform for the on-line Workshops is expensive: could another one be used?

All staff said the workshops were good and went well. Anecdotal data from participants are mixed - some do not like the pre-recorded format (“it’s like watching Youtube”), some want more live interaction. Evaluation of the metrics and analytics of the usage of the online materials from past workshops needs to be done. The OAE intends that workshop materials be useful resources, however, the Committee find these to consist of summaries of the presentations.

The Committee recommends that

- *the materials and resources produced from the workshops need to be curated, evaluated and publicised.*
- *the new Evaluation Framework and Toolkit be used to evaluate the most recent Shaw Workshop held in late November – early December and all future workshops. Feedback as to how many classroom teachers take part as compared with astronomy*

education professionals would be valuable in assessing the potential reach and impact of the workshops.

- *the IAU explore the option of having a common platform and license for online meetings that could be used by each of the Offices, IAU symposia and meetings.*

5.4.2 Regional Shaw-IAU Workshop

The first regional Shaw-IAU Workshops took place in South Africa in October 2023. It brought together NAECs from African countries, 22 participants from South Africa and 16 from other African countries. During that event Wikimedia workshops were organized in collaboration with the Wikimedia Foundation (UK) at the request of the NAECs in order to be able to produce documents in their own language.

The Committee noted that it was a positive event, and well attended. When possible a special attention should be given to the NAECs of non-IAU countries. Feedback from this event should be valuable for planning and running future regional, in-person workshops.

The Committee recommends that NAECs be encouraged to organize similar events in their regions.

5.4.3 Teacher Training Program (TTP)

The Teacher Training Program (TTP) enables a National Astronomy Education Coordinator (NAEC), together with a local teacher and if possible an astronomer, to apply for a grant in support of a Teacher Training and Development workshop in their country. This programme is inline with the IAU Strategic plan 2020-2030. It gives an overall visibility to the OAE in particular to non-IAU countries. Financial support for the TTP is provided presently by the IAU and by the Italian and Indian Centers. The involvement of the Italian Center and the Indian Center in financing this programme is gratefully acknowledged.

The first call for proposals for Teacher Training Program (TTP) grants was in April 2022, 43 applications were received and 20 were granted. A second call was issued in May 2023, from 46 applications received 23 will be granted.

According to the feedback from OAE these workshops strengthen the ties between the NAECs and their national educational community. It gives NAECs not only support in terms of funding, but also in terms of self-confidence and recognition.

The Committee sent a questionnaire to the 20 recipients from 2022. From the answers received the 2022 TTP was a real success. For example, some recipients were able to leverage additional grants and funding from their local authorities.

The Committee strongly recommends that the TTP should be continued and expanded with more funding.

5.4.4 The Astronomy Glossary – Astrophotography Contests

To provide access to good resources, under open licenses, one of the OAE stated goals is that a glossary of astronomical terms should be available along with diagrams, figures and images for anyone who wishes to write a text book or chapter on an astronomical topic. The glossary is written in English and will be available in as many languages as needed.

A significant amount of work has been spent on creating an astronomy glossary. Of over 490 terms selected, 401 terms already have a definition in English and have been reviewed by both an astronomer and a teacher. To finish the English version, the OAE needs to find enough teachers to review the remaining terms. To keep track of this process and keep volunteers engaged, the OAE has set up an efficient “review system”. The glossary has a search capability. Translations into 8 other languages have been started. A table in the Annex gives an overview of the glossary as of September 2023.

The Committee noted that this glossary is not obviously different from the many other glossaries available online, including Wikipedia, but the OAE glossary is different as it is meant to be written for school level teachers and students, and to serve as a “backbone” for OAE resources. On checking a sample of glossary entries the Committee found considerable variation in the level of entries. During exchanges with the staff member involved in the glossary webpage the Committee appreciated very much the quick reaction to do any modification/correction.

As expressed in the Self-Evaluation Report, the goal is to curate and create a "basic set" – license free - of astronomy resources that will enable stakeholders to create the custom (open-license) materials they need. One of these resources is the multilingual glossary; another key part is the images, illustrations, and animations. The plan is to have at least 80% of the needed illustrations available by the end of 2024. Production of diagrams and sketches are also planned, by OAE, relying on funds available.

Astrophotography Contests, co-sponsored by the Italian Center, were conducted 3 times to create unique images: e.g. celestial motions, smartphone sky pictures, wide-field celestial patterns. These images will be used in the glossary. The first contest was successful, but participation has dropped. The most recent contest had 430 entries from 40 countries with 39 images and videos being selected for use. Images were judged by international juries, with cash prizes awarded to the best pictures in each category (750, 500, 250 Euros). These contests are labor intensive to run.

The Committee recommends:

- *The value of the glossary should be explicit such that an internet search clearly indicates what makes the OAE glossary different from the others.*
- *The OAE should establish priorities on the work remaining to complete the glossary*
- *That before “launch” of the glossary, a thorough editorial team review of all entries be carried out, the glossary be user tested, (e.g search terms on the glossary web page need to made clearer) and NAECs involved in this process*
- *Ending the astrophotography contests.*

5.4.5 Big Ideas in Astronomy – astroEDU

This project, "Big Ideas in Astronomy", explores the issue: "What should citizens of planet Earth know about astronomy?". It was produced in 2019, within the framework of the IAU Commission C1 for Astronomy Education and Development, in particular, the Working Group on Literacy and Curriculum Development. The OAE took over management of the Big Ideas project in October 2020. "Big Ideas in Astronomy" booklet has been translated to several languages besides the original booklet in English. The Center in India is working to partially automate and speed up this process.

astroEDU: originally developed by a C1 working group became part of the OAE on May 10, 2021. A very positive decision was taken on transferring astroEDU to OAE. The rate of publication is excellent. It is well publicized.

The links with the Glossary of "Big Ideas in Astronomy" and "astroEDU" remain to be done and will be a key part of making all three programs more useful.

5.5. Centers and Nodes

There are five OAE Centers (China Nanjing, Cyprus, Egypt, India, Italy) and three OAE Nodes (France, Nepal, Republic of Korea). All Centers and Nodes are self-funded by their host institution; they choose their own field of interest but also supports OAE work worldwide.

Two centers are notably very active: the Italian Center and the Indian Center. The Committee underlines that the link to their Web pages from OAE give access to their contributions in various domains. The Italian Center generously sponsors the Teacher Training Program.

The other Centers/Nodes need to be motivated and to provide relevant information (such as for example selected resources in their language) through a link to their dedicated webpages. For example, the Committee noted that a Workshop: "Astronomie pour l'Education dans l'Espace Francophone" took place in Tunisia (9-11 Nov 2023) under the auspices of the French Node and with the participation of several NAECs from Africa among the SOC.

(<https://astroedu-fr-2023.sciencesconf.org>). The Committee does not understand why this was not advertised on the Node's Webpage as well as by the OAE.

The Committee recommends that

- *The Centers and Nodes meet quarterly with the OAE, to better integrate them into the OAE.*
- *events sponsored by Nodes and Centers be listed on their webpages, with links, as well as on the OAE website.*

5.5.1 Mediterranean Regional STEAM Astronomy Summer School (in short: STEAM-MED Workshop)

The Italian Center organized in-person workshops for NAECs and teachers around the Mediterranean Sea: "STEAM-Med Workshop on Astronomy for Education", in 2022 in Lampedusa (Italy) and in 2023 in Marrakech (Morocco). For the first one 30 representatives attended the event from 12 Mediterranean countries.

5.5.2 Workshops by Indian Center (IUCAA)

The Indian Center is also very active in this domain at the scale of India which is that of a continent, India being a federal state. A network of regional NAECs in India has been set up.

The Indian Center participates actively to the quarterly meeting for the NAECs contributing to relevant documentations for the NAECs.

The Committee recommends that Centers/Nodes should be encouraged to participate in the NAECs quarterly meetings and advertised on the OAE and Center/Node websites as done by the Italian Center.

5.6. The OAE Website

The design layout of the OAE Website was created by an external company. Website maintenance, addition of content and the creation of automated procedures, such as the implementation of received revised text in the Glossary are an important investment by a staff member who is fully devoted to it with expertise and enthusiasm. The Committee noted that some updating is necessary such as in “Events” the GA 2024 should be linked, and that information on the OAE webpage can be difficult to find, navigate and does not always follow universal design.

We recommend that

- *the OAE website should be tested by teachers, NAECs, for ease of useability.*
- *analytics on website use (from where, how long, and what is searched) should be tracked and reported on a regular basis*

5.7. Collaborations and liaison with other entities

Regular monthly meetings take place among the staff members of the four Offices: OAO (Office of Astronomy for Outreach), OAD (Office of Astronomy for Development), OYA (Office of Astronomy for Young Astronomers) and OAE.

At present there is no Collaboration with the IAU Division C (Education, Outreach and Heritage) either with Commission C1 (Astronomy Education and Development) including the Working Group on Astronomy Education Research & Methods. We noted that several members of the OAE astronomy education research group were involved at various levels in organizing the second AstroEdu Conference (May 2023) driven by Commission C1.

The Committee recommends that the OAE

- *strengthen communication and collaborate with Division C, in particular with the Working Groups Astronomy Education Research & Methods and IAU Legacy Initiatives in Education, Outreach and Development.*
- *partner with the other Offices to have a strong presence during the regional meetings and the General Assembly.*
- *take advantage of IAU events such as the regional meetings (APRIM, MEARIM, and LARIM) and other meetings to interact with potential users and to discuss their*

objectives. OAE should search, with the IAU and the Steering Committee (SC), how to create conditions to have Workshops such as TTP in parallel or after IAU Symposia. This would benefit the OAE by strengthening its visibility in education.

5.8. The Development of Infrastructure (data bases, best-practice collections) and resources.

The OAE utilises Twitter (X), Facebook and YouTube. The first two provide news and event updates and regular posts whilst YouTube is used primarily as a repository for Shaw Astronomy Education Workshop talks and other training events such as the recent TTP Proposal Writing Workshop. Subscriber numbers appear sound for the platforms. The Committee is comfortable with the relevancy, number and content of social media posts and has no specific recommendations to make regarding this.

In order to quantify and to measure the impact of the various activities developed by OAE an Evaluation Framework and Toolkit has been developed by an OAE staff member and was publicly released in early December 2023..

The Committee recommends that NAECs should be encouraged to explore and list the resources available in their countries especially in the context of non-IAU countries and to use these Evaluation Toolkits when organizing a Teacher Training Workshop.

5.9. The IAU/MPIA Agreement

The development of the OAE objectives since 2020 has demonstrated the usefulness of initiatives as the STEAM–Mediterranean Workshop, the regional Shaw-IAU Workshop, the Teacher Training Program, consequently their financial support has to be maintained and even increased. The Agreements with Centers and Nodes have to be considered in parallel and discussed according to what could have been done during these first 2 years of Agreement.

The Committee recommends that the IAU-MPIA agreement should be renewed for the period 2025-2029 to maximize the impact of the OAE to stimulate the use of astronomy for teaching and education at school.

This second agreement is essential to complete the implementation of the various structures and projects before entering a stabilized period.

5.10 Benefit to the IAU and MPIA/HdA

The establishment of the Office of Astronomy for Education, and the programs and activities developed to date benefit the IAU as a whole by systematically embedding astronomy in the context of science education worldwide. Specifically, the creation of a network of NAEC teams in IAU member countries and Non-IAU countries establishes a formal network of educators associated with the IAU in support the teaching of science in primary and secondary schools. The Shaw Prize Foundation's financial support of the Shaw-IAU

Workshops on Astronomy for Education deliberately coincided with the foundation of the OAE and recognized the IAU's commitment to astronomy education.

Benefits to the MPIA and HdA from hosting the OAE are the expansion of the HdA's reach into the international arena from a more local education, allowing MPIA/HdA to obtain increased funding and visibility in astronomy education.

5.11 OAE and the IAU Strategic Plan 2020-2030

The OAE's goals and objectives are explicitly aligned with the IAU strategic plan, as are its signature programmes.

5.12 Fund-raising activities and effectiveness of third-party funding

OAE obtained significant "start up" funding from the Carl Zeiss and the Klaus-Tschira foundations, leveraging the IAU funds. It appears that the OAE is likely to receive more support from each of these foundations for the second 5-year term of operations. This will maintain the current staffing and activity levels. We note that the Italian Center has made financial contributions to the TTP grants and for the Astrophotography contest prizes. However, it is not apparent what other funding has been or is being sought to support the international education workshops after the Shaw Prize Foundation financing ends in 2025.

We recommend that the IAU, hopefully in collaboration with the MPIA, work on initiatives to secure philanthropic support.

6. Conclusions

In response to the Term of Reference for this Review of the OAE our conclusions are following.

- The OAE created in December 2019 defined very ambitious objectives with the active participation of the Italy Center and the India Center. The Italy and India Centers contribute to sustain one of these objectives, the Teacher Training Program (TTP) with a financial contribution. More financial support has to be given to support this programme as well as the Shaw-IAU Workshop, STEAM–Med Workshop on Astronomy for Education (also under the banner of the Italian Center)
- The staff members are located in different countries due to the impact of the Covid-19 when they were to be recruited. The OAE staff is highly motivated, very enthusiastic on what they are doing. They are happy to work together. The staff management has to be reconsidered and could include a redistribution of the roles and responsibilities.
- The Committee recommends that the in-kind FTE for the Director and Deputy Director be increased.
- The involvement of the Centers and Nodes have to be strengthened; only the Italy Center and the India Center are active. Explore the European programme "ERASMUS +" for complementary funding (could be done with HdA and Centers and Nodes)

- Regional meetings for the NAECs are invaluable to strengthen their network. Two initiatives took place already. The Italian Center organized in-person workshops: STEAM–Med Workshop on Astronomy for Education in 2022 and in 2023 and a first regional Shaw-IAU Workshops, in-person, in South Africa in 2023.
- Such initiatives have to be expanded in other regions and should be financed on a stable basis for a few years.
- More collaborations with the NAECs to set up a data base of local resources effectively used and written in different languages and cultural environments.
- The TTP led by the NAECs is very valuable to encourage the use of astronomy in teaching.
- Collaboration with Division C, Commission C1, and with Commission C1 Working Group on “Astronomy Education Research & Methods” must be set up
- The IAU-Shaw Workshops provide important papers from the talks given, that are used to create resources named “Reviews” in particular to professionalize astronomy education. More work is needed in order to produce documents which can be used by the NAECs (National Astronomy Education Coordinators) in very different cultural contexts.
- The information on the OAE webpage is various and numerous but it can be difficult to find, navigate and does not always follow universal design.
- The Committee recommends that the IAU-MPIA agreement should be renewed for the period 2025-2029 to maximize the impact of the OAE to stimulate the use of astronomy for teaching and education at school. In the Agreement an Advisory board should be included with regular meetings whose members are educators, astronomers.
- For the benefit of the IAU and HdA/MPAI, the OAE should use in depth surveys for meaningful feedback on success, these being developed since 2023 by an OAE member.
- After 3.5 years the OAE is in the middle of the road, but is focused on the goals expressed in the IAU strategic plan for 2020-2030.
- The development of the OAE objectives since 2020 have demonstrated the usefulness of initiatives as the STEAM–Med Workshop and the regional Shaw-IAU Workshop. Consequently an enhancement of the funding is requested for that purpose. The financial support given to the OAE for its first period 2020-2024 has been used at its best in spite of the difficult Covid-19 context.

7. Top-level Recommendations

- Renew the IAU-MPIA Agreement for the 5-year period 2025-2029.
- Establish an advisory board (distinct from the Steering Committee) whose members include professional educators as well as astronomers.
- Develop a strategic plan
- Develop a robust marketing and communication plan to raise the profile of the Office within the IAU community and worldwide

- Collaborate with Division C Education, Outreach and Heritage and specifically with Commission C1 and its working groups, and the Legacy Working Group
- Collaborate with regional IAU meetings and symposia organizers and the local NAECs to provide teacher workshops in parallel with or adjacent to these scientific meetings. IAU symposia proposals require education/outreach component.

Acknowledgements

We are grateful to the OAE Director and Deputy Director for providing all the relevant background documents as well as our request for additional information.

We thank all the staff members and the Stakeholders for their open discussions by Zoom and insights responses to our questions. Our thanks are expressed also to those who answered our questionnaire by mail.

We appreciated the organisation of our visit to the HdA at Heidelberg (15-18 October 2023) and the face-to-face meetings with the staff members in Heidelberg and the remote conversations with those staff based elsewhere. The assistance of the Organisational Assistant prior to our visit was helpful for us.

Annex

A . Documents received from OAE

B. Glossary as September 2023

C. Acronyms

D. List of interviews

E. Interview Questions

A . Documents received from OAE

- IAU-MPIA Agreement, 2019
- Self-Evaluation Report (SER) from the OAE
- OAE Implementation Plan and budget overview
- OAE Reports for the years covered by this review
- Summaries of OAE Centers and Nodes in terms of their objectives with respect to the OAE strategic plan and mission (submitted by each Center and Node to the OAE office for transmission to the Review Committee)
- IAU Strategic Plan 2020-2030
- The approved Proposal for Hosting the IAU Office of Astronomy for Education at Haus der Astronomie.

B. Glossary as of September 2023

Approved: a glossary term is considered approved when it has been reviewed by both an astronomer and a teacher

Status of the English version of the Glossary in September 2023

Number of glossary terms:	490
Glossary Terms with definitions:	400
Number of approved terms	372
Number of unapproved terms:	118
Terms awaiting astronomer review:	78
Terms awaiting teacher review:	104
Terms awaiting revision:	9

Status of translated versions of the Glossary as of September 2023

Language	Number of terms translated	Number of terms approved
Italian	294	50
Arabic	56	0
French	61	13
Chinese	2	0
German	55	0
Marathi	71	0
Hindi	51	0
Spanish	8	0

Note added on Dec 8 2023: the glossary now has 401 terms approved. Bengali is expected to be added to the translation languages soon. They have also started translating the language of some plots, eg to Arabic though some other languages are proving problematic.

This year's astrophotography contest winners are likely to be announced on 15 Dec. They had 430 entries from 40 countries and selected 39 new images and videos for use.

C. Acronyms

APRIM	IAU Regional Meeting in the Asian-Pacific region
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FTE	Full-Time Equivalent
HdA	Haus der Astronomie
IAU	International Astronomical Union
IAU-MPIA	International Astronomical Union - Max Planck Institute for Astronomy
IUCAA	Inter-University Centre for Astronomy and Astrophysics
LARIM	IAU Regional Meeting in the Latin-American region
MEARIM	IAU Regional Meeting in the Middle-East-African region
MPIA	Max Planck Institute for Astronomy
NAEC	National Astronomy Education Coordinator
NCA	National Committee for Astronomy
NOC	National Outreach Coordinator
OAE	Office of Astronomy for Education
OAD	Office of Astronomy for Development

OAQ	Office of Astronomy Outreach
OYA	Office of Astronomy for Young Astronomers
SC	Steering Committee
STEAM	Science, Technology, Engineering, Arts, and Mathematics
ToR	Term of Reference
TTP	Teacher Training Programme

D. List of interviews

Name	Role
Division C, Commissions and Working Groups	
Richard de Grijs	President Division C Education, Outreach and Heritage
Boonrucksar Soonthornthum	President Commission C1
Urban Eriksson	Co-Chair: Commission C1 WG Astronomy Education Research & Methods
Akihiko Tomita	Co-Chair: Commission C1 WG Astronomy Education Research & Methods and National Astronomy Education Coordinator (NAEC)
Beatriz Elena García	Chair of: Division C WG IAU Legacy Initiatives in Education, Outreach and Development — Functional
OAE Centers and Nodes	
Colm Larkin - George Danos	OAE Center Cyprus Hosted by the Cyprus Space Exploration Organisation
Stefano Sandrelli	OAE Center Italy Hosted by the Istituto Nazionale di Astrofisica
Surhud More	OAE Center India Hosted by the Inter-University Centre for Astronomy and Astrophysics (IUCAA)
Suresh Bhattarai	OAE Node Nepal Hosted by the Nepal Astronomical Society
OAE current and past staff	
Markus Pössel	OAE Director
Carolin Liefke	OAE Deputy Director
Eduardo Penteado	Coordinator
Gwen Sanderson	Organisation Assistant
Saeed Salimpour	Associate Scientist, Past postdoc
Samantha Brown	Project Scientist
Niall Deacon	Coordinator

Juan Carlos Munoz	Former Coordinator
Sophie Bartlett	Astronomy Education Researcher
Tshiamiso Makwela	Astronomy Education Research Coordinator
Asmita Bhandare	OAE Associate (volunteer)
OAE Steering Committee	
Diana Worrall	IAU Assistant General Secretary (SC)
Coryn Bailer-Jones	Max Planck Institute for Astronomy (SC)
Richard de Grijs	
Offices	
Lina Canas - Kelly Blumenthal	OAO

E. Interview Questions

We interviewed OAE staff, steering Committee members, IAU Division C members, and external stakeholders from the OAE Centers, Nodes, and NAEC network, and other IAU Offices.

We include the questions we asked.

Current and past members of OAE Staff

1. What is/was your position at the OAE?
2. What are/were your duties at OAE?
3. Considering the 5 objectives of the OAE and the programmes associated with each of them, which one(s) do/did you work with most closely and in what capacity?
4. Have you received feedback on the effectiveness of the programme(s)?
5. Have formative evaluations been conducted for any of these programme(s)? If so, what were the results? If not, why not?
6. Have summative evaluation been conducted for any of these programme(s)? If so, what were the results? If not, why not?
7. National and/or Regional NAEC teams are at the heart of the OAE's goal to "promote astronomy in primary and secondary school curricula". Which activities would you recommend to help the NAECs to move forward with their objectives?
8. What do you consider to be the strengths and weaknesses of your activities as an OAE staff member according to the possibilities offered presently by the OAE? (SWOT analysis)

OAE Director and Deputy Director

1. What are the synergies between HdA and OAE?
2. What are the challenges?
3. How are the administration and financial aspects separated between the two.
4. Please explain how your budget is constructed and the financial relationship with the IAU and other sources of funding
5. What goals/objectives has the OAE met to date?
6. How do you see the activities of the next few years?
7. What resources would you need that you do not have to be successful? What plans do you have to help obtain these?
8. What is your relationship with the IAU?

IAU Division C President, Commission C1 and Working Group Organizing Committee chairs.

1. Have you and/or Commission/WG members been consulted by the OAE on any of their projects as expressed at: <https://astro4edu.org/mission-objectives/>?
2. Have you and/or Commission/WG members been involved in the selection of the OAE "Teacher Training Programme" (TTP) proposals?
3. What are/were your interactions with the OAE?
4. How would you characterize the activities of the Commission / WG compared to the objectives of the OAE?
5. How would the NAECs contribute to the activities of your Commission/WG?
6. How can you and the OAE benefit from each other's experience?

Centers and Nodes

1. What have been your interactions with the OAE over the period of the review?
2. How successfully has the Center or Node that you manage met its objectives according to the MoU signed?
3. What do you consider to be the strengths and weaknesses of your collaboration as a Center or as a Node with the OAE? (SWOT analysis)

Steering Committee Members

1. What do you consider the OAE's successes since 2020?
2. What do you think are the OAE's biggest challenges?

3. What would you like the OAE to do differently?

NAEC having a TTP selected in 2022

1. During the submission of your proposal for a TTP did you receive any support from OAE?
2. After your proposal being selected did you receive any support from OAE to set it up?
3. After your proposal being selected did you receive any support from your country (ministry of education, teacher association, etc)?
4. How have you been advertising this TTP in your country?
5. What was the duration of this TTP?
6. How many requests to participate to this TTP did you receive?
7. How many teachers have you been able to select?
8. Does this selection due (partly?) to the budget?
9. Do the participants need some official authorization to participate to it if is done on a week day when they should have been teaching?
10. What were the educational resources used during this training:
Already produced in your country?
Other origin and needed to be translated in your language?
Resources available on the OAE website? If yes, which ones?
11. Several months after the training are you in contact with the participants? If yes, how?
12. Are the documents used and/or developed during that training made available for any teachers in your country?
13. Do the participants require support/help from you to use it now? If yes, how can you provide it?
14. Does this TTP give you a better visibility as NAEC in your country?
15. Do you intend to have a TTP in 2024? If yes in which format?

OAE Response to the External Review 2023

The team at the IAU Office of Astronomy for Education would like to thank Michèle Gerbaldi, Susana Deustua and Robert Hollow for the External Review. We realise that this is a considerable workload for the reviewers, and are grateful both for the feedback in general and the specific recommendations for OAE operations.

The External Review report was discussed at the OAE Steering Committee Meeting of January 24, 2024, and our responses have been coordinated with the Steering Committee.

1 Response to top-level recommendations

We appreciate your very positive feedback regarding our accomplishments during the first years of the OAE's existence. We also appreciate your confirmation that our goals and objectives, as well as our signature programmes, are explicitly aligned with the IAU strategic plan, as well as the clear statement in the general conclusions that we put the financial support received for the OAE to very good use (and yes, did so in the face of the challenges of the Covid-19 pandemic).

That kind of validation, as the outcome of what we could see was a very thorough process involving numerous partners and collaborators, is very important for us. Your recommendation to ***Renew the International Astronomical Union – Max Planck Institute of Astronomy (IAU-MPIA) Agreement for the 5-year period 2025-2029*** directly concerns the basis for our continuing work, and we have contacted both the IAU General Secretary as well as MPIA leadership to start negotiations for that renewal.

In addition to that general recommendation, you have made a number of specific recommendations at different levels. Here are our responses, each time with the recommendation reproduced in italics and our response directly below.

Collaborate with Division C Education, Outreach and Heritage and specifically with Commission C1 and its working groups, and the Legacy Working Group.

During our first years, it was important for us to establish the OAE as an institution distinct from the self-organising IAU structure of divisions and commissions; our main interactions were on the working level, where OAE took over operations of astroEDU and the Big Ideas, each former Commission C1 Working Groups, while assuring that the C1 members involved in building these projects remained involved at the editorial board/advisory board level. We will start talks with the present and incoming Division C and Commission C1 leadership about additional ways of

collaborating, and have started collecting ideas about the shape such collaboration could take within the OAE team. Ideas so far include

- a partnership with Commission C1 regarding our virtual Shaw-IAU workshop and their in-person astroEDU conference;
- a mentoring program where selected C1 members provide advice and support for specific NAEC teams in particularly in countries where there are no strong astronomy and astronomy education communities, and
- involvement of the astronomy education research community within C1 in our ongoing efforts to conduct such research with the NAEC network, starting with the ongoing establishment of an ethics committee for OAE/IAU-led research of this kind.

Regarding the Legacy Working Group, from our perspective, the important part is to see which roles specific to the legacy projects can play for the education-related parts of the IAU mission, and to forge specific partnerships with the aim of joint contributions to that mission.

Collaborate with regional IAU meetings and symposia organisers and the local NAECs (National Astronomy Education Coordinators) to provide teacher workshops in parallel with or adjacent to these scientific meetings. IAU symposia proposals require an education/outreach component.

This is an important expansion of our involvement with teacher training events, and we see the advantages of synergies with the larger IAU meetings in particular. We have begun talks with the IAU, specifically with the IAU representatives on our Steering Committee, about the best way of implementing this. From our perspective, it is important for these training events to be anchored more concretely in the rules the IAU sets for organisers of such events, and that the commitment of the organisers include adequate funding for such events. The events themselves, as you recommend, should have strong involvement from the local education community, including the NAECs. We will develop, jointly with the IAU, a framework to establish teacher training workshops complementing specific IAU events, which should address the needs in terms of money and organisational support, as well as the involvement of OAE, Centers and Nodes, and the local NAECs.

Develop a strategic plan.

We have begun the development of a strategic plan setting out the goals we aim to reach by the end of this year as well as the means by which we aim to achieve these goals. Our longer-term strategic planning is currently focused on the ways to continue OAE operations in different “modes,” depending on the future developments of our foundation funding (as already sketched in the financial/implementation plan we submitted to the external review committee).

Develop a robust marketing and communication plan to raise the profile of the Office within the IAU community and worldwide.

That is a challenging, but important recommendation, and we will begin the process of developing such a plan. For the OAE mission, we regard the most important part of raising our profile to happen at the level of the various countries' educational communities, which in turn depends on the ways the NAECs have managed to build their national networks. As you know, we already have several pathways for communicating with different parts of the IAU community, but it does of course make sense to consolidate that communication within a coherent marketing and communication plan.

Establish an advisory board (distinct from the Steering Committee) whose members include professional educators as well as astronomers.

This was the most controversial of the top-level recommendations, not only within the OAE itself but also in our discussions of your recommendations with our Steering Committee. We agree with our Steering Committee that it makes sense to take steps to involve more professional educators and individual astronomers in our operations in an advisory capacity, but we want to do so at the level of specific projects (such as TTP or projects for creating specific resources). Also in agreement with our Steering Committee, we do not want to introduce an additional top-level structure in the shape of an advisory board.

2 Responses to working-level recommendations

2.1 OAE organisation and management

We recommend that the OAE allocate responsibilities equitably within the Office; the FTE fraction of both the Director and Deputy Director be increased by at least a factor of 2.

We note that, in the context of the external review report, these recommendations appear to be motivated mostly by the current workload of the OAE Organisational Assistant, and the second one presumably also by staff reporting difficulty to get decisions from the director. We see both problems and take them seriously. In particular, we are aware of the need to distribute the organisational work onto more shoulders. Here, we want to increase the involvement of Centers and Nodes, with FTE contributions to an "organisational support team". The idea behind this is for the OAE Organisational Assistant to be at the head of that team, able to delegate tasks and able to distribute the necessary work onto more shoulders. While the recommended increase in both Director and Deputy Director time is not possible under the present circumstances, we are exploring the communication challenges that presumably have led to the recommendation. We have found that at least some of them have stemmed from the lack of a central source of information about OAE operational practices, and are working on documenting these practices in the form of "bylaws," which we hope will alleviate part of the problem. As per the direct communication during the external review committee visit, we are also exploring ways of using new infrastructure (e.g. Slack as an option as recommended by

Susana Deustua during the in-person meeting as part of this External Review) to improve access to the Director and Deputy Director.

Given that OAE staff are distributed, the Committee recommends that remote staff meet face-to-face at least once a year in Heidelberg.

While the cadence might end up somewhat longer (e.g. once every two years), we are planning to implement that recommendation.

2.2. Budget

The Steering Committee [should] discuss with the MPIA the detailed financial balance sheet for 2000-2023 and the projection for 2024, to facilitate the establishment of a new Agreement for 2025-2029.

OAE leadership and Steering Committee have had that discussion at the recent Steering Committee meeting, and we are going into the negotiations between IAU and the MPIA with the results.

2.3 National Astronomy Education Coordinator Teams (NAEC Teams)

We appreciate the review committee's strong stance on the importance of our NAEC network, which we share. We are in the process of ramping up community management, training and qualification/personal development opportunities (with the Wikipedia workshops as a start), with the goal of forging the NAECs into an ever tighter community.

The Committee recommends the results [of the "astronomy around the world" research] be widely publicised, these could be useful for the NAECs when they liaise with education authorities in their countries – ministries of education, curriculum experts etc.

Beyond their availability on the OAE website, the "astronomy around the world" information as well as the results from a more detailed follow-up survey are/will be the subject of several research articles by OAE Associated Researcher Saeed Salimpour. Supporting the NAECs as they liaise with their country's education authorities remains an important task, and we aim to take this up in particular in the course of future online Shaw-IAU Workshops on Astronomy for Education, as well as during the 1:1 NAEC dialogues.

The Committee recommends [that the OAE] have more freedom to recruit or replace NAECs who are not active or not performing satisfactorily.

The specific rules for this are not part of the MPIA-IAU Memorandum of Understanding, but have traditionally been set at the level of the OAE Steering Committee. Not least because of your recommendation, this topic was one of the agenda points at the last Steering Committee meeting, and we believe to have found a solution that should work: OAE now retains full control of NAEC appointment and recall; for appointments, the NCA/National Member in question will be contacted beforehand and will be given three weeks to object, if they have an objection.

We particularly acknowledge your appreciation of our hiring-and-collaboration practices. We agree that, had we handled this differently, we would not have been able to assemble the multifaceted and talented team that makes up the current OAE.

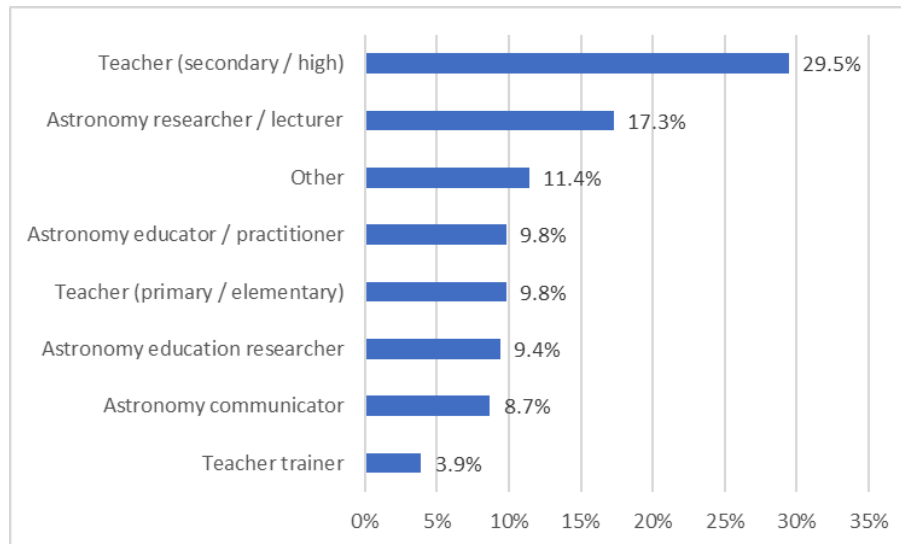
2.4 Shaw-IAU Workshops on Astronomy for Education

That the materials and resources produced from the [online] workshops need to be curated, evaluated and publicised.

For us, the materials and resources from the online workshop are a starting point for creating more systematic resources, notably OAE Reviews. As such, we do not plan on curating, evaluating and publicising the workshop materials (videos and written summaries) as such; instead, they will remain to be published “as is,” while in the mid-term we create more systematic OAE Reviews, in part based on those materials. We are still looking for the best ways of doing this in practice. A targeted collaboration, as the one we have currently with Sophie Bartlett/Cardiff University that will result in the OAE Review on Evaluation Methods, is the best way we have currently found, but requires considerable funding.

That the new Evaluation Framework and Toolkit be used to evaluate the most recent [online] Shaw Workshop held in late November – early December and all future workshops. Feedback as to how many classroom teachers take part as compared with astronomy education professionals would be valuable in assessing the potential reach and impact of the workshops.

The new evaluation framework and toolkit has been used to evaluate the 2023 ‘online Shaw-IAU Workshop, and we expect to publish those results that directly pertain to the 2023 workshop by March 2024. The survey also has a general part that is part of an astronomy education project undertaken by Sophie Bartlett, and will be published separately at a later date. Regarding your specific question, we can report that, based on 256 responses obtained in the Shaw-IAU Workshop survey, school teachers were indeed the largest sub-group among participants, at 39.3% (29.5% secondary school teachers, 9.8% primary school teachers). We reproduce the relevant figure here:



Assuming that those responses are representative, we are gratified that our online workshops indeed have a good mix, which will hopefully lead to fruitful interactions between teachers, astronomy researchers, other astronomy education practitioners and astronomy communicators.

That the IAU explore the option of having a common platform and license for online meetings that could be used by each of the Offices, IAU symposia and meetings.

That is an important building block for ensuring the future of what are now the online Shaw-IAU workshops. Preliminary results from the 2023 evaluation indicate that most of our participants are strongly in favour of continuing such online workshops, and given the need and interest, we intend to do so in the long term. We have taken the matter of an online event platform provided centrally by the IAU up in the Steering Committee, mentioned the issue prominently in the letter from MPIA to the IAU General Secretary about starting negotiations about the hosting of the OAE for the next five years, and intend to bring the issue up in the upcoming regular meeting between the OAE and the IAU Officers on 20 February. Whatever solution is chosen should be compatible with our current workshop format, which in turn is based on our practical experience with the needs of our participants – e.g. the ability to stream pre-recorded videos, the provision of subtitles or even live closed captioning, and the ability for one-on-one networking during the meeting.

The Committee recommends that NAECs be encouraged to organise similar events [to the African regional Shaw-IAU workshop] in their regions.

We are in the process of using the available funds from the Shaw Prize foundation to organise five additional regional workshops that bring together IAU-related stakeholders, and in particular a region's NAECs, together. The specific distribution of the funds still needs to be cleared with the Shaw Prize Foundation, as our concept deviates from the initial plan of one online and one regional workshop each for the three years 2023, 2024 and 2025. We appreciate the statement in the general

conclusions that “an enhancement of the funding is requested for that purpose” and would indeed greatly welcome such funding.

2.5 Teacher Training Program (TTP)

We greatly appreciate the positive feedback on the TTP, in particular the 2022 incarnation that was part of the committee’s remit.

The Committee strongly recommends that the TTP should be continued and expanded with more funding.

After consulting with the Steering Committee, we have approached the IAU with the request to increase funding for the TTP as part of starting the negotiations of the next five-year period. We will also make funding contributions an issue as we negotiate the continuance of the OAE Centers and Nodes for the next five years, including their contributions to the central OAE Mission as a whole. Last year, OAE Center Italy (focus on primary school teacher training) and OAE Center India (training events on the Indian subcontinent) contributed to TTP funding, and we hope to be able to extend this commitment to other Centers.

More generally, we are in the process of adapting the rules for TTP eligibility (in particular regarding the connections with the NAEC network). On the organisational side, we note that there are still some practical challenges in transferring funds directly from the IAU to TTP stakeholders that we need to resolve. We are looking into ways of evaluating the TTP more systematically, starting with the need to define the criteria we consider particularly important for assessing TTP success.

2.6 Astronomy Glossary and Astrophotography Contest

The Committee recommends that the value of the glossary should be explicit such that an internet search clearly indicates what makes the OAE glossary different from the others.

As the committee noted, a key function of the glossary is to serve as “backbone” for the collection of fundamental astronomy resources we are in the process of building (by curation as well as creation). As we restructure our website to better highlight these resources, this function of the glossary will become more directly visible. In the end, the aim is for educators to be able to quickly find fundamental resources for any astronomy topic relevant for school teaching – which, after all, is what our glossary was built around, based on feedback from primary and secondary school teachers. Incidentally, even now the glossary section is the most-visited portion of our website. A number of our glossary terms are even now top hits for their respective Google Searches – even this side of taking out Google Ads, we are confident that we can optimise findability further.

The Committee recommends that the OAE should establish priorities on the work remaining to complete the glossary.

We assume this mainly refers to the English-language glossary as the anchor point for later translations, as the translations will be a longer-term project, and will be largely decoupled from OAE resources. We are happy to report that, even earlier than the envisioned in our initial plan that is reproduced in the evaluation report, we managed to fully complete the English-language glossary by the end of 2023. The resources assigned to that task are now fully available for other OAE endeavours. For the translations, OAE involvement is mostly in providing the infrastructure, in the shape of the translation-and-review backend of our platform.

The Committee recommends that before “launch” of the glossary, a thorough editorial team review of all entries be carried out, the glossary be user tested, (e.g search terms on the glossary web page need to be made clearer) and NAECs involved in this process.

We have given the task of a last editorial run for the English-language glossary to an external editor (who is a science writer) to ensure better uniformity. Improving the glossary web pages will be part of a general overhaul of the usability of our web pages (see below), and will involve both the NAECs and additional stakeholders.

The Committee recommends ending the astrophotography contests.

Our assessment is that the astrophotography contests have indeed fulfilled their intended role, in “filling the gaps” of openly available images useful for education. Thus, the astrophotography contest program is now terminated following the release of results from its third edition.

2.7 Centers and Nodes

The Committee recommends that the Centers and Nodes meet quarterly with the OAE, to better integrate them into the OAE.

The better integration of the Centers and Nodes is one of our key priorities, and our practices are still evolving. Our current practice exceeds the recommendation: We meet quarterly one-on-one with each Center and Node separately, and there is also a joint quarterly meeting for all Centers and Nodes together with the OAE. In our efforts to integrate Centers and Nodes increasingly into our processes, we are currently exploring to form “working groups”, notably for the Shaw-IAU Workshop and for NAEC community management, in which Center and Node staff work along OAE staff towards common specific goals. We plan to specify this kind of Centers-Nodes involvement, as well as the participation in the organisational support team, in the new Centers/Nodes MoUs to be completed for the next five-year period of operations of the OAE.

The Committee recommends that events sponsored by Nodes and Centers be listed on their webpages, with links, as well as on the OAE website.

This is indeed a deficit that we had noticed ourselves this past year. In response, we are now encouraging Centers and Nodes to routinely submit news items for display on the OAE website – any resources they have created, any event they have

organised should be featured there in the form of a news item. To this end, we have created new back-end functionality that allows Centers and Nodes to upload text and images for news items directly, which are then displayed or queued after an OK from the OAE. For the OAE itself, we will also try to make sure that incremental successes are reported in our website's news items. Overall, the news items on our website should then give a reasonably complete overview of the activities of the OAE, Centers and Nodes included.

The Committee recommends that Centers/Nodes should be encouraged to participate in the NAECs quarterly meetings and advertised on the OAE and Center/Node websites as done by the Italian Center.

Inviting the Centers and Nodes to the NAECs quarterly meetings is a good idea. In fact, we want to go further in getting the Centers and Nodes involved in NAEC community building – hence the proposal to create a working group dedicated to NAEC community building, with members from both OAE and selected Centers/Nodes. We will look for ways to better represent the Centers/Nodes on both the OAE websites and the Centers/Nodes websites.

In the conclusion, there is also the more general statement that “***the involvement of the Centers and Nodes ha[s] to be strengthened***”, with the OAE Centers Italy and India singled out as active. It is true that Center/Node involvement in the central OAE mission varies widely, and that we need to find systematic ways of ensuring a higher-level involvement across the board. For this, we believe the negotiations we will now begin about the next 5-year-period are crucial, and we will ensure that the corresponding MoUs specify concrete Center/Node contributions, e.g. in the context of the aforementioned working groups, than the current version.

2.8 OAE Website

The Committee recommends that the OAE website should be tested by teachers, NAECs, for ease of useability.

Now that the “fundamental resources” part of our website has reached a certain critical mass, we plan to revisit our overall website structure to ensure that website visitors find what they are looking for. As a first step, we will construct suitable personae representing typical website visitors, and try to look through our existing website with their eyes. The second step will be user testing, as the Committee recommends. In particular, we are fully aware that the front page of our homepage is in dire need of optimization for user-friendliness – ideally, that is where users should find links to the most frequently looked-for resources.

The Committee recommends that analytics on website use (from where, how long, and what is searched) should be tracked and reported on a regular basis.

We started tracking OAE website usage in August 2023, with monthly reports presented at the OAE team meetings. We'll be happy to include a summary of website statistics in future reporting. Some basic information from the latest (January

2024) analysis: In January, the Glossary was the most-visited part of our website, with 6000 unique (as far as we can ascertain) users. The Shaw-IAU Workshops, Centers and Nodes page, NAEC page, Big Ideas and collection of information on astronomy education world-wide are also in the top ten visited regions of our site. Overall, 15k unique users clicked on our pages 50k times that month.

2.7 Collaboration and liaison with other entities

The Committee recommends that the OAE strengthen communication and collaborate with Division C, in particular with the Working Groups Astronomy Education Research & Methods and IAU Legacy Initiatives in Education, Outreach and Development.

As this was a top-level recommendation, we have already replied on p. 1.

The Committee recommends that the OAE partner with the other Offices to have a strong presence during the regional meetings and the General Assembly.

Both for this and the following recommendation, we feel that we should make a more general remark. While we value communication and networking within the IAU, and while we are fully aware that mobilising support by IAU members and other scientists is important for our work, the fact remains that, for us, the most important target group are the many educators working at various locations who are using or could be using astronomy in their teaching. The main challenge the OAE faces is to reach as many of those educators as we can, notably by helping the NAECs build their respective national or regional networks, and by in turn supporting the NAECs e.g. through community-building measures. Whenever we read a recommendation like the one to have a “strong presence” at IAU events, we feel that we will really need to weigh the costs on the one hand and the *benefits to our specific mission* on the other. We will be happy to support IAU leadership in their task to communicate to its members and other scientists what the IAU is and what its structures (including the Offices) are. We are currently planning for a strong presence at the GA 2024, and will contact the OAE Centers and Nodes to explore which regional meetings could be supported routinely by an appropriate Center or Node. But we think it important to stress that, while we do show such presence, our main focus when it comes to networking needs to be and will remain elsewhere, namely with our main target group of teachers and educators.

The Committee recommends that the OAE take advantage of IAU events such as the regional meetings (APRIM, MEARIM, and LARIM) and other meetings to interact with potential users and to discuss their objectives. OAE should search, with the IAU and the Steering Committee (SC), how to create conditions to have Workshops such as TTP in parallel or after IAU Symposia. This would benefit the OAE by strengthening its visibility in education.

As already stated on p. 2 (since this was another top-level recommendation), we see the opportunity of supporting teacher training events that should become a standard

feature of larger IAU events. We will discuss with IAU leadership how to best implement this, and in particular how to get event organisers to include teacher training events in their planning, including appropriate resources. That said, we feel the need to apply the same caveats to this recommendation as we did to the previous ones. Most of our “potential users” will never be present at such events, so interacting with them (as we should!) requires different planning altogether. Similarly, almost all of the “visibility in education” we are working towards will be unrelated to IAU events. A more specific point: the TTP program is geared towards finding particularly innovative workshop concepts and exploring techniques and methods that work under very different conditions – many of the funded TTP projects are in settings far from the education-friendly environment of larger cities, such as the ones the main IAU events are held in. A potential link with an IAU event should not be a TTP selection criterion, and we do not see substantial benefits in linking TTP with IAU events. We do feel, though, that IAU event organisers should take the education-and-outreach aspect of their events seriously enough to provide TTP-level funding (EUR 2000 or more) for the teacher training workshops associated with their events.

2.8 Development of infrastructure

The Committee recommends that NAECs should be encouraged to explore and list the resources available in their countries especially in the context of non-IAU countries and to use [the OAE] Evaluation Toolkits when organising a Teacher Training Workshop.

Questions about locally available resources, and also about situations where there is a need for such resources but the resources themselves are not currently available, were part of our 1:1 NAEC dialogues (OAE team members talking directly to a specific country’s NAEC team). Given its importance for the OAE mission, we will pay particular attention to this aspect in the (currently ongoing) overall analysis of the NAEC dialogues, and are planning to follow up on this particular aspect more concretely with the NAECs. As for listing resources, there is the additional challenge of making existing resources available long-term – as a counterexample, resource lists simply consisting of links tend to fall into disrepair, with links becoming dead, sometimes after only a few years. We will explore ways of meeting these challenges, e.g. by uploading “snapshots” of such resources on Zenodo. We will strongly recommend using the Evaluation Toolkit for the upcoming round of TTP applications, and will provide workshops to support the successful TTP applicants in that endeavour. This will be one aspect of a concerted effort to use the Evaluation Toolkit much more generally in evaluating OAE activities.