

## **OAE Review Topics**

Office of Astronomy for Education, 8 July 2020

### **How to evaluate resources and activities**

From the point of view of the IAU, proper use of evaluation tools and methods is a key part of the professionalization of astronomy education. From this OAE Review, readers are meant to learn practical ways of evaluating typical teaching resources and educational activities. After reading the Review, they should be able to perform effective ongoing evaluations of their own activities in astronomy education – in fact, part of the work on the Review will be to find out which forms of evaluation are suitable for such ongoing evaluation (which is, after all, a trade-off between spending time on teaching and time on evaluation). Evaluation of workshops (as a specific format) is included, as well.

### **Standards for teacher training**

This OAE review is meant to define guidelines and standards for high-quality and effective teacher training in astronomy education – standards that, eventually, we want to meet with all teacher training workshops organized in the context of the OAE, and beyond. The challenge is to find a workable compromise between the flexibility necessary to encompass the many different varieties of workshop, and the uniformity characteristic of standards. In the end, we will likely end up with a combination of guidelines, additional desiderata, and a variety of best-practice examples illustrating the implementation of the standards in different contexts.

### **Diversity, equity and inclusion in education (Panel found; currently in starting phase)**

This will be one of our more important reviews – collecting recommendations on how to make astronomy education more inclusive and diverse, in an equitable way. After reading the Review, educators should be aware of best practices to ensure that their teaching activities are equitable for a diverse audience, and inclusive.

### **Online formats for astronomy education**

In a number of countries, this has become more important as Covid-19 imposes restrictions on in-person teaching: online formats, which use asynchronous or synchronous formats for students and teachers to interact. After reading this Review, educators should be able to find a suitable way for using online teaching formats for their own needs, including awareness of pitfalls and best practices.

### **Remote observing**

Remote observing via the Internet – with a telescope in one place, hopefully in a good observing spot, and control of that telescope in another – is a good way of introducing students to authentic data. Depending on the setup with the added thrill of having been actively involved in taking a particular picture. This Review is meant to qualify readers for using existing services such as LCOGT, as well as containing information helpful for readers who mean to create a remote observing setup of their own.

### **Astronomy education with authentic data**

We live in an age where more authentic astronomical data – images, spectra, catalog data and more complex data formats – is available more widely than ever before. This Review is meant to enable readers to take their own first steps in using such data for astronomy education. This includes both general information, including useful software and pointers to existing in-depth resources, as well as specific use cases: data that can be used for learning about a selection of fundamental astronomical concepts.

## **Naked-eye astronomy**

An important part of astronomy education starts with the basics: naked-eye observations of the heavens, and of celestial objects. This Review presents useful resources, explains the basics and a best practices of naked-eye observations with students.

## **Amateur astronomers in education**

Amateur astronomers can play key roles in astronomy education. This Review explores the possible roles, presents numerous best-practice examples from different countries with very different settings, and provides helpful tips for amateurs to engage in education, as well as for educators to engage with amateur astronomers.

## **Daytime astronomy**

School teaching is a daytime activity, so daytime astronomy – from observing the Sun to observing planets that are visible in the daytime – can play an important role in providing students with practical observational experience. The Review provides basic knowledge, examples for specific observational techniques, best-practice examples for including daytime astronomy in an educational setting, as well as pointers to additional resources.

## **Cosmology**

Cosmology is one of the areas of astronomy that is most attractive to students. But it is also an area rich in possible misconceptions. The Review provides an overview of secondary-school level treatments of cosmology and the early universe, about misconceptions and how to counter them, about examples of including cosmology in secondary-school curricula as well as pointers to resources.

## **Earth as a Planet**

Astronomy education has an important role to play when it comes to teaching about Earth as a planet – knowledge that has crucial ramifications in current discussions about environmental challenges such as climate change. This OAE Review includes resources on habitability, the conditions for life in the universe, and specifically about planetary atmospheres and climate change, making the connection with the challenges we currently face

## **Modern teaching methods**

An overview of modern teaching methods – notably those involving active learning – for astronomy educators. Includes brief introductions and best-practice examples from astronomy for each technique.

## **Astronomy education in science centres and planetariums**

Science centres and planetariums are attractive learning environments for astronomy education both formal and informal. This Review summarizes research into astronomy education in those settings, lists best-practice examples and provides pointers to additional resources.

## **Student competitions in astronomy education**

Competitions such as astronomy olympiads or science fairs provide opportunities for motivating students for learning about specific areas in astronomy, fostering and supporting such learning, and bringing students who are interested in astronomy in contact with each other. This Review will provide best-practice examples, helpful guidance and resources for organizing different kinds of astronomy-related competitions.

**Astronomy across disciplines**

Provides examples for connecting astronomy with other disciplines in educational contexts: From literature and the arts, biology, chemistry, history to philosophy, including general topics such as critical thinking skills, the scientific method, hypothesis testing and the analysis of evidence. The Review is likely to be modular in structure.

**Indigenous astronomy in astronomy education**

Describes guidelines and best practices for including indigenous astronomy in astronomy education, including specific examples from different cultures.