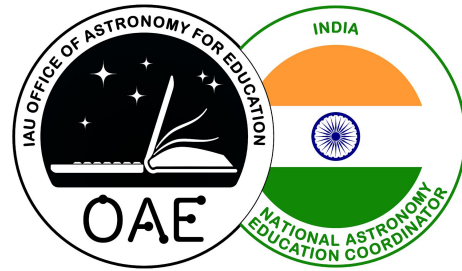


Astronomy Education in India



This overview is part of the project "Astronomy Education Worldwide" of the International Astronomical Union's Office of Astronomy for Education.

More information: <https://astro4edu.org/worldwide>

Structure of education: India has a 'Right to Education' (RTE) law which makes free and quality education a fundamental right of every child between age 6–14 yrs (Grades 1–8). The preprimary education (age 3–6 yrs) is not formally mandatory, but sending kids to kindergarten is a common practice in urban communities. Typically, children study in the same school campus from pre-primary to grade 10 (or grade 12 in some states). However, schools in smaller villages may only run till grade 5 or grade 8 and children have to join another school in some nearby village after that.

All students study the same subjects upto grade 10, including science and mathematics. The students choose a 'stream' of their liking in grade 11–12 (also called jr. college or preuniversity college) and only a part of the student population opts for science subjects. There are public examinations taken by educational boards (India has 43 recognised boards including national, state and private boards) at the end of grade 10, and at the end of grade 12.

Education facilities: The RTE strongly recommends a classroom size of 35 or less in most cases. Grade 11–12 classrooms are considerably larger, with even 100+ students in some educational institutions. Many schools lack the infrastructure and staff strength necessary for active learning methods. The science teachers' lack of confidence in handling laboratory equipment and expensive equipment (such as telescopes or microscopes) is also a significant issue, and these instruments remain inside packed boxes on laboratory shelves. Arranging any additional activities after the school hours is considered impractical by most schools. Especially the late evening activities (e.g sky observation) cannot involve female students.

In general, urban private schools and national government owned schools tend to have good infrastructure (running water, stable electricity, clean sanitation facilities, well maintained and airy building, internet connection, well equipped science laboratory, well stocked library, etc.), whereas schools owned by local government bodies, especially in villages and low-income communities, may not have some or any of these.

Governance and organisation: There are about 1.5 million schools in India that can be divided into three major categories; government-run schools, government-aided schools and fully private schools. Government-run schools are mostly run by local bodies like municipalities or district administration, but there are also about 2000 schools run by the national government. The government-aided schools are managed by private trusts but receive grants from the government to cover all salaries and some small operating costs. Schools in both these categories charge zero or minimal (less than USD 200 per year) fees to the students. The fully private schools set their own fees (USD 600 – 6000 per year). Each of the 43 educational boards can, in principle, set their own curricula. However, in practice, the curriculum set by the Central Board (CBSE) is used as a template by most state boards, at least for science and mathematics.

Teacher Training: Minimum qualification for a primary teacher, who teaches all subjects for a given class, is a diploma in education (D.Ed.). Secondary science teachers must hold a degree in science as well as a follow up degree in education (B.Sc.+B.Ed.). For grades 6–10, there are designated ‘science teachers’, but those teachers must teach all sciences. Informal surveys indicate that only 10–15% of science teachers may be Physics graduates, whereas about half hold degrees in biological sciences. In grade 11–12, the minimum qualifications remain the same, but there are separate teachers for Physics / Chemistry / Biology.

Teachers from government run schools undergo regular in-service training. Similar, but voluntary, training programmes are organised by NGOs for the teachers from private schools.

Astronomy in the curriculum: Astronomy is not a separate subject of study in the school. Astronomical concepts make appearances under environmental studies (primary), geography (middle school) and science (high school). But these are mostly factoids without detailed reasoning. These include information about the solar system, lunar phases, eclipses (qualitative), tides (qualitative), pole star, some simple constellations, milky way galaxy, etc. In grade 11–12, students encounter circular orbits, Kepler’s Laws, satellite communications and optical construction of a telescope.

Astronomy education outside the classroom: India has about 60 planetaria (mostly in big cities) including those under the science museums. Some of these are fairly large and most only run the digital shows supplied by their respective equipment vendor. Bigger cities have clubs of amateur astronomers, which organise sky shows between October – May each year. However, many of these clubs seem to be in their decline as there is waning volunteer support.

General Note: The description above pertains to the existing education system in India. The government has recently announced (in August 2020) comprehensive changes to the school education through a new national policy. However, it may be a couple of years at least till these changes get implemented in schools.

The International Astronomical Union's National Astronomy Education Coordinator (NAEC) Team for India: Aniket Sule (Chair), Suchetana Chatterjee, Kuntal Misra, Somak Raychaudhury, Sarita Vig (Contact Person)

For specific information about astronomy education in India or on this document please contact the Office of Astronomy for Education (oea@astro4edu.org).