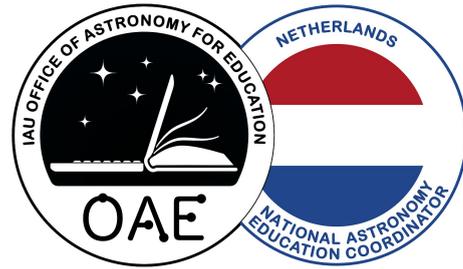


Astronomy Education in Netherlands



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: Children begin school on their 4th birthday. The first two years at school are predominantly structured play activities designed to prepare children for a more formal classroom learning environment. Astronomy and space are popular themes for this age group. Primary education begins at age 6-7 and lasts for 6 years (until age 12). The first two years are focussed on literacy and numeracy with humanities and sciences introduced in the third year in most schools.

The Dutch secondary school system is complex with multiple streams. Entry is based on testing in the latter years of primary school. VWO and HAVO schools last for 6 and 5 years respectively and prepare students for University (academic/applied sciences). VMBO lasts 4 years and prepares students for vocational further education colleges. The system is reasonably flexible – students can change levels either during the school career or by progressing to the next level after successfully completing a level. The majority of schools in the Netherlands are open to all students and are free of charge to attend although most schools ask for a parental contribution for 'extras', ranging from a small contribution for an annual school excursion (common in primary schools) to larger contributions for more extensive extra-curricular activities (common in secondary schools). There are a small number of private (fee-paying) schools. These are typically International schools which follow the curricula of other countries. With the exception of the International schools, the school language is Dutch but dual-language (English) secondary schools are becoming increasingly popular. The Netherlands also has a number of schools operating special language classes for newcomers to speed-up the process of learning the Dutch language.

Education facilities: Dutch schools have typical class sizes of 25-30 pupils. With the exception of e.g. Montessori schools, classes are organised into homogeneous groups with little mixing between age groups. At primary school part-time working is common and most classes have two class teachers. It is becoming more common at primary school level to hire - in specialist subject teachers (e.g. gym, arts). In secondary schools, all subjects are taught by subject specialists. All schools have good facilities and access to educational materials. Students see technology in the classroom from day one. Virtually all classrooms have a digital whiteboard and many students are using individual devices (tablets and/or laptops) from at least halfway through primary school if not earlier. Dutch school children live at home and typically walk or cycle to school. Many children of primary school age go to organised afterschool childcare a few days per week. School buildings are well maintained but it is not uncommon for students to spend part of their education in temporary classrooms due to maintenance problems or lack of space.

Governance and organisation: Schools are not managed by central or regional government but are managed by non-profit organisations which typically follow a specific ethos, religion or (educational) ideology (e.g. Montessori, Dalton). It is common for schools within these organisations to profile

themselves in a particular area of expertise beyond these standard profiles. At primary level, common profiles are programmes for gifted children, English lessons from age 4 and the use of the latest technology (robots, programming, 3D printers). At secondary school profiles range from International & bi-lingual education, sport, expression (art/music/drama) and science/technology.

There is no set curriculum in The Netherlands. Standardised 'learning goals' are set on a national level by the government at three key stages (end of primary, mid- and end of secondary) with varying levels of detail. These are currently under review and an update is expected soon. Whilst the government also gives suggested learning paths, the majority of schools choose to purchase comprehensive teaching methods (including fully developed lessons, teacher instructions, student workbooks and testing materials) for each subject from the many educational publishers. All students sit a variety of national exams throughout their school career.

Teacher Training: Primary school teachers typically follow a 4-year bachelor degree in education at a University of Applied Sciences. There are two main routes into secondary teaching (1st and 2nd grade). Second grade teachers follow a similar trajectory to primary school teachers with more subject-specific content in the training course and may teach up to the mid-level in secondary schools. First grade secondary teachers first complete a bachelor degree in their chosen subject area at an academic University and then obtain a Master's degree in education.

All three of these routes include significant in-the-class experience. In order to address the shortage of teachers in The Netherlands, the last few years has seen an increase in the popularity of the 'on-the-job' teacher training route, mostly at primary level. This route comprises working 2-3 days per week in the classroom and following a compacted teacher training course.

Astronomy in the curriculum: There are no specialised school courses in astronomy. At primary level, there are several learning goals related to astronomy within the 'nature and technology' and geography subject area covering the solar system and predominantly the sun-Earth-moon system (day & night, seasons, moon phases).

At secondary school astronomy falls under the physics programme with some Earth-related topics falling under physical geography. For the majority of students, the specific astronomy focus is on the solar system and movements of the celestial bodies. Links to astronomy are also made in more general physics topics such as forces (gravity) and the electromagnetic spectrum (including lenses). Astrophysics is reserved for the final two years of the 5-year HAVO and 6-year VWO programmes and the astrophysics content is included in the national exams. Physics is not a core subject beyond the first half of secondary school.

In addition to scientific subject knowledge, research and design skills, inquiry based learning and scientific thinking and reasoning are key skills which are being worked into the science curricula.

Astronomy education outside the classroom: The Netherlands hosts a number of organisations actively working on astronomy and space science projects for use in formal education settings.

The Netherlands Research School for Astronomy (NOVA), a collaboration between all Dutch Universities active in Astronomy, hosts the Dutch IAU-NAEC and IAU-NOC. NOVA runs a network of three mobile planetaria which visit around 200 schools (reaching ~30,000 students and ~1000 teachers) per year. NOVA has provided the astrophysics content in the latest edition of widely used secondary school physics textbooks and provides teacher training in astrophysics to secondary school science teachers. Astronomy news and public outreach activities are disseminated via the website www.astronomie.nl.

The UNawe (www.unawe.org) and EU-Space Awareness (www.space-awareness.org/) projects are hosted by a NOVA University (Leiden). Leiden University also hosts the European Regional Office of the IAU-OAD.

The Education Office of the European Space Agency (ESA) is located in the Netherlands and, alongside European-wide projects, ESA also co-funds the Dutch European Space Education

Resource Office (ESERO-NL) in collaboration with the Netherlands Space Office (NSO). ESERO-NL is run by the science centre NEMO in Amsterdam. ESERO-NL produces classroom resources and runs teacher training events.

There are several science centres and science museums including a dedicated space exhibition centre, a number of public and amateur observatories and six public planetaria; all running their own informal education programmes including observation nights and Astronomy clubs. In addition, the universities and research centres active in astronomy and space science run various local events throughout the year. There is a dedicated astronomy club for children and young people (8-21 yrs) which runs activities including regular camps (<https://www.sterrenkunde.nl/jwg/>). There is a national astronomy prize competition for teenagers annually. The amateur organization is KNVWS (Royal Dutch Society of Meteorology and Astronomy, <https://www.knvws.nl/>).

All of the organisations work together to promote astronomy and space science on a regular or ad-hoc basis.

The International Astronomical Union's National Astronomy Education Coordinator (NAEC)

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