- Programme orientation (ISCEDO) indicates whether the programme's curricular content was general, pre-vocational or vocational.

Science-related career expectations

In PISA 2015, students were asked to answer a question (ST114) about "what kind of job [they] expect to have when [they] are about 30 years old". Answers to this open-ended question were coded to four-digit ISCO codes (ILO, 2007), in variable OCOD3. This variable was used to derive the index of science-related career expectations.

Science-related career expectations are defined as those career expectations whose realisation requires further engagement with the study of science beyond compulsory education, typically in formal tertiary education settings. The classification of careers into science-related and non-science-related is based on the four-digit ISCO-08 classification of occupations.

Only professionals (major ISCO group 2) and technicians/associate professionals (major ISCO group 3) were considered to fit the definition of science-related career expectations. In a broad sense, several managerial occupations (major ISCO group 1) are clearly science-related: these include research and development managers, hospital managers, construction managers, and other occupations classified under production and specialised services managers (submajor group 13). However, it was considered that when science-related experience and training is an important requirement of a managerial occupation, these are not entry-level jobs and 15-year-old students with science-related career expectations would not expect to be in such a position by age 30.

Several skilled agriculture, forestry and fishery workers (major ISCO group 6) could also be considered to work in science-related occupations. The United States O*NET OnLine (2016) classification of science, technology, engineering and mathematics (STEM) occupations indeed include these occupations. These, however, do not typically require formal science-related training or study after compulsory education. On these grounds, only major occupation groups that require ISCO skill levels 3 and 4 were included among science-related occupational expectations.

Among professionals and technicians/associate professionals, the boundary between science-related and non-science related occupations is sometimes blurred, and different classifications draw different lines.

The classification used in this report includes four groups of jobs: [1]

1. ***Science and engineering professionals:*** All science and engineering professionals (submajor group 21), except product and garment designers (2163), graphic and multimedia designers (2166).
2. ***Health professionals:*** All health professionals in submajor group 22 (e.g. doctors, nurses, veterinarians), with the exception of traditional and complementary medicine professionals (minor group 223).
3. ***ICT professionals:*** All information and communications technology professionals (submajor group 25).
4. ***Science technicians and associate professionals,*** including:
   - physical and engineering science technicians (minor group 311)
   - life science technicians and related associate professionals (minor group 314)
   - air traffic safety electronic technicians (3155)
   - medical and pharmaceutical technicians (minor group 321), except medical and dental prosthetic technicians (3214)
   - telecommunications engineering technicians (3522).

How this classification compares to existing classifications

When three existing classifications of 15-year-olds' science career expectations, all based on the International Standard Classification of Occupations (ISCO), 1988 edition (ISCO-88), are compared to the present classification, based on ISCO-08, a few differences emerge. Some are due to the updated version of occupational codings (as discussed in the next section); the remaining differences are summarised in Table A1.1.

Developing a comparable classification for ISCO-88

The same open-ended question was also included in the PISA 2006 questionnaire (ID in 2006: ST30), but students' answers were coded in the PISA 2006 database according to ISCO-88. It is not possible to ensure a strictly comparable classification. To report changes over time, the correspondence described in Table A1.2 was used to derive a similar classification based on PISA 2006 data.

Table A1.1 ■ **Differences in the definition of science-related career expectations**

	This classification	OECD (2007)	Sikora and Pokropek (2012)	Kjærnsli and Lie (2011)
Science-related managerial jobs	out	in	in	out
Psychologists	out	in	in	out
Sociologists and social work professionals	out	in	out	out
Photographers and image and sound recording equipment operators, broadcasting and telecommunications equipment operators	out	in	in	out
Statistical, mathematical and related associate professionals	out	out	in	out
Aircraft controllers (e.g. pilots, air traffic controllers)	out	in	in	out
Ship controllers (Ships' desk officers, etc.)	out	out	in	out
Medical assistants, dental assistants, veterinary assistants, nursing and midwifery associate professionals	out	in	in	out
Computer assistants, computer equipment operators and industrial robot controllers	out	out	out	in
Air traffic safety electronic technicians	in	in	in	out
Pharmaceutical technicians and assistants	in	in	in	out
Dieticians and nutritionists	in	in	in	out

Table A1.2 ■ **ISCO-08 to ISCO-88 correspondence table for science-related career expectations**

Group	ISCO-08	ISCO-88
Science and engineering professionals	21xx (except 2163 and 2166)	21xx (except 213x), 221x
Health professionals	22xx (except 223x)	22xx (except 221x), 3223, 3226
ICT professionals	25xx	213x
Science technicians and associate professionals	311x, 314x, 3155, 321x (except 3214), 3522	311x, 3133, 3145, 3151, 321x, 3228

The main differences between ISCO-88 and ISCO-08, for the purpose of deriving the index of science-related career expectations, are the following:

- Medical equipment operators (ISCO-88: 3133) correspond to medical imaging and therapeutic equipment technicians in ISCO-08; air traffic safety technicians (ISCO-88: 3145) correspond to air traffic safety electronics technicians in ISCO-08; building and fire inspectors (ISCO-88: 3151) mostly correspond to civil engineering technicians in ISCO-08.
- Dieticians and nutritionists (ISC0-88: 3223) are classified among professionals in ISCO-08. For consistency, this ISCO-88 occupation was classified among health professionals.
- Physiotherapists and related associate professionals (ISCO-88: 3226) form two distinct categories in ISCO-08, with physiotherapists classified among professionals. Given that students who expect to work as physiotherapists far outnumber those who expect to work as related associate professionals, this ISCO-88 occupation was classified among health professionals.
- Several health-related occupations classified as "modern health associate professionals" in ISCO-88 are included among health professionals in ISCO-08 (e.g. speech therapist, ophthalmic opticians). While health professionals are, in general, included among science-related careers, health associate professionals are not included among science-related careers. In applying the classification to ISCO-88, the entire code was excluded from science-related careers.
- Telecommunications engineering technicians (ISCO-08: 3522) do not form a separate occupation in ISCO-88, where they can be found among electronics and telecommunications engineering technicians (ISCO-88: 3114).
- Information and communications technology professionals form a distinct submajor group (25) in ISCO-08 but are classified among physical, mathematical and engineering science professionals in ISCO-88.