

## **Curriculum technological and industrial production**

This is a translation from Norwegian Bokmål of the official Norwegian subject curriculum text.

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## About the subject

### Relevance and central values

Vg1 technological and industrial production focuses on practical work using a variety of materials, tools, techniques and machines to produce goods and services. The programme subjects involve communication and collaboration with workshops and other learning arenas, and compliance with applicable regulations governing health, safety and environment when performing such work. Furthermore, the programme subjects safeguard the natural environment through emphasis on sustainability and technological developments. The programme subjects shall help develop independent and adaptable skilled workers with a basic knowledge of chemistry, materials, electricity, mechanics, programming, robotisation, automation and transport in line with the needs of society and the workplace.

All subjects are designed to help give pupils a strong foundation for learning. Vg1 technological and industrial production shall contribute to pupils gaining knowledge of various forms of participation and involvement in decision-making processes. The programme subjects shall also help develop the social and academic competence of the pupils through cooperation, the joy of innovation and critical thinking in an equal and inclusive community. Vg1 technological and industrial production shall contribute to knowledge of how social partners cooperate to develop a better workplace.

### Core elements

#### Technology

The core element technology involves technological facilities, drawings, tools and programming. Further, it involves using digital applications for monitoring, troubleshooting, optimisation and repair of machines and equipment, and the adoption of new solutions and technology.

#### Production and documentation

The core element production and documentation involves the design and production of goods and services, in addition to operation and maintenance. Further, the core element involves using documentation and quality as an integral part of the work processes prior to, during and after the production of goods and services.

## Collaboration

The core element collaboration involves the communication of technical explanations and reasoning, in addition to choices and solutions at various levels. Further, the core element involves communication and collaboration with people from different backgrounds and cultures at school, in the workplace and society at large.

## Health, safety and environment

The core element health, safety and the environment involves carrying out assignments in line with applicable regulations during the production of goods and services. The core element involves the ability to observe the relationship between quality and safety, resource management, reputation and the impact of the trade on the natural environment. Further, it involves the ability to observe risks linked to physical and mental challenges the pupils may encounter in a working environment.

## Interdisciplinary topics

### Health and life skills

Vg1 technological and industrial production addresses the interdisciplinary topic of health and life skills to give pupils competence to promote good mental and physical health, and enable them to make responsible decisions at home, at school or in the workplace. The interdisciplinary topic also addresses success and adversity, the setting of personal boundaries, respect for the boundaries of others, and demonstrating a willingness to cooperate.

### Sustainability

In vg1 technological and industrial production, the interdisciplinary topic of sustainable development addresses the ability to give the pupils technological competence and knowledge of the connection between technology and the social, financial and environmental aspects of sustainable development. The interdisciplinary topic also addresses the ability to make responsible decisions, and to act in an ethical and environmentally friendly manner. Further, the pupils shall gain knowledge of how the actions and decisions of each person impact sustainable development.

## Basic skills

### Oral skills

Oral skills in vg1 technological and industrial production involve the ability to communicate with the appropriate technical terms and comprehension of

modes of expression, argumentation of personal opinions and discussion of problems.

## Writing

Writing in vg1 technological and industrial production involves being able to prepare plans, structure and process texts, and to take notes. It also involves using different forms of expression such as images, figures and symbols.

## Reading

Reading in vg1 technological and industrial production involves being able to retrieve, reflect on, interpret, understand and use relevant technical resources. It also involves reading and understanding instructions for use, work and safety instructions, work drawings and other occupationally relevant descriptions with signs and symbols.

## Numeracy

Numeracy in vg1 technological and industrial production involves being able to read, set and correct equipment and machinery, in addition to calculating and using technical tables relevant to the subject. It also involves knowledge of relevant financial management units and terms related to the choice of material, equipment, consumption and time consumed.

## Digital skills

Digital skills in vg1 technological and industrial production involves being able to use digital resources to communicate, plan, produce and document work assignments. Further, it involves the ability to use digital skills when troubleshooting and using machines, tools and equipment. Digital skills also include digital judgement and ethical reflection.

# Competence aims and assessment

## Competence aims and assessment production and services

### Competence aims after production and services

The pupil is expected to be able to

- use materials, techniques and equipment in compliance with applicable regulations governing health, safety and environment

- use ergonomically correct techniques and reflect on the connection between public health, efficiency and socioeconomics
- explain and use suitable hand tools, measuring tools and machinery to process materials related to production and interpret the measurement results according to the work drawings
- plan, complete and document one practical assignment related to production and maintenance of machinery and equipment in compliance with applicable standards and procedures
- disassemble and assemble machinery components in relevant assignments
- describe tasks related to production and services based on drawings and procedures
- describe the specific properties of various materials and explain how they may affect the natural environment
- explain how chemical compounds and properties impact use, reuse and safe storage of raw materials and other materials
- execute and explain thermal, chemical and mechanical joining methods
- use safety datasheets and other types of chemical documentation and perform risk analyses on chemicals used in the workplace
- interpret information using digital aids and relevant tables to complete tasks related to production and services
- describe the workflow of a practical assignment from the idea to end product
- describe the meaning of sustainable development of products and services

## Formative assessment

The formative assessment should help promote learning and the development of competence. The pupils demonstrate and develop competence in production and services when they use knowledge, skills and critical thinking to solve assignments in the programme subjects.

The teacher facilitates pupil participation and encourages the desire to learn through a variety of assignments. The teacher can give assignments that cover multiple or all the programme subjects. The teacher shall have conversations with the pupil regarding their development within production and services. The pupils shall have the opportunity to express what they believe they can accomplish and reflect on their own academic development. The teacher provides guidance on further learning and adapts the education to enable the pupils to use the guidance provided to develop their competence in the programme subject.

## Assessment of coursework

The grades awarded for coursework reflect the overall competence of the pupil in production and services at the end of the education in the programme subject. The teacher plans and facilitates the pupils in demonstrating their competence in various ways. Using the competence aims as a starting point, the teacher shall assess how the pupil demonstrates understanding, reflection and critical thinking, and how the pupil masters challenges and solves assignments in various contexts. The teacher awards grades in production and services based on the competence the pupil has demonstrated through planning, completing, assessing and documenting their own academic work.

## Competence aims and assessment construction and management techniques

### Competence aims after construction and management techniques

The pupil is expected to be able to

- explain and apply health, safety and environment regulations, as well as requirements for electric, hydraulic and pneumatic installations
- develop and describe diagrams with basic components that are used in electric, hydraulic and pneumatic installations
- perform and use basic calculations of relevant sizes in relation to electric, hydraulic and pneumatic installations
- use appropriate simulation programs for documentation, design and testing of management systems related to electric, hydraulic, pneumatic and chemical processes
- connect, test and troubleshoot automatic and manual management systems based on electronic, hydraulic and pneumatic installations and machinery, and take measurements relevant to the subject areas
- interpret and explain the connection between taking measurements and calculated sizes related to electrics, hydraulics and pneumatics
- use 2D and 3D Computer Aided Design (CAD) programs and Computer Aided Manufacturing (CAM) programs for basic drawings and documentation
- perform basic programming on management systems for robotisation, automation and CNC

### Formative assessment

The formative assessment should help promote learning and the development of competence. The pupils demonstrate and develop competence in construction and management techniques when they use knowledge, skills and critical thinking to solve assignments in the programme subject.

The teacher facilitates pupil participation and encourages the desire to learn through a variety of assignments. The teacher can give assignments that cover multiple or all the programme subjects. The teacher shall have conversations with the pupil regarding their development within construction and management techniques. The pupils shall have the opportunity to express what they believe they can accomplish and reflect on their own academic development. The teacher provides guidance on further learning and adapts the education to enable the pupils to use the guidance provided to develop their competence in the programme subject.

## Assessment of coursework

The grades awarded for coursework reflect the overall competence of the pupil in construction and management techniques at the end of the education in the programme subject. The teacher plans and facilitates the pupils in demonstrating their competence in various ways. Using the competence aims as a starting point, the teacher shall assess how the pupil demonstrates understanding, reflection and critical thinking, and how the pupil masters challenges and solves assignments in various contexts. The teacher awards grades in construction and management techniques based on the competence the pupil has demonstrated through planning, completing, assessing and documenting their own academic work.

## **Competence aims and assessment productivity and quality control**

### Competence aims after technology awareness

The pupil is expected to be able to

- carry out and document work in compliance with applicable regulations governing health, safety and environment
- describe risk assessments and safe job analyses, and have knowledge of necessary reporting requirements relevant to assignments
- use and describe how appropriate hand tools and diagnostic equipment are used during the service, improvement and repair of machines and equipment, and interpret measurement results
- use methods and techniques for the surface treatment of various materials
- use and explain how relevant materials are processed
- calculate the cost of assignments and prepare proposed streamlining measures
- describe and reflect on logistics from purchasing a product up to recycling
- communicate and convey messages adapted to various target groups

- explain and assess how social partners cooperate to develop a better workplace

## Formative assessment

The formative assessment should help promote learning and the development of competence. The pupils demonstrate and develop competence in productivity and quality control when they use knowledge, skills and critical thinking to solve assignments in the programme subject.

The teacher facilitates pupil participation and encourages the desire to learn through a variety of assignments. The teacher can give assignments that cover multiple or all the programme subjects. The teacher shall have conversations with the pupil regarding their development within productivity and quality control. The pupils shall have the opportunity to express what they believe they can accomplish and reflect on their own academic development. The teacher provides guidance on further learning and adapts the education to enable the pupils to use the guidance provided to develop their competence in the programme subject.

## Assessment of coursework

The grades awarded for coursework reflect the overall competence of the pupil in productivity and quality control at the end of the education in the programme subject. The teacher plans and facilitates the pupils in demonstrating their competence in various ways. Using the competence aims as a starting point, the teacher shall assess how the pupil demonstrates understanding, reflection and critical thinking, and how the pupil masters challenges and solves assignments in various contexts. The teacher awards grades in production and storytelling based on the competence the pupil has demonstrated through planning, completing, assessing and documenting their own academic work.

## Type of assessment

### Assessment of coursework

Production and services: The pupils shall have one grade awarded for coursework.

Construction and management techniques: The pupils shall have one grade awarded for coursework.

Productivity and quality control: The pupils shall have one grade awarded for coursework.

## **Examination for pupils**

Production and services: The pupils shall not sit for an examination.

Construction and management techniques: The pupils shall not sit for an examination.

Productivity and quality control: The pupils shall not sit for an examination.

## **Examination for external candidates**

Production and services: External candidates shall sit for a written examination in the programme subject. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will have a preparatory part.

Construction and management techniques: External candidates shall sit for a written examination in the programme subject. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will have a preparatory part.

Productivity and quality control: External candidates shall sit for a written examination in the programme subject. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will have a preparatory part.

Production and services, construction and management techniques, and productivity and quality control: External candidates shall take an interdisciplinary practical examination in these programme subjects. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will include a preparatory part.