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GOOD VOCATIONAL TRAINING PRACTICE IN NORWAY

Good vocational training practice in Norway

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Introduction

This text focuses on vocational education programmes in Norwegian upper secondary schools, describing framework factors, structure, educational pathways, and outcomes. To gain a comprehensive understanding of vocational education, it is also necessary to discuss the overall

education system in Norway and how it is administered by the authorities. This includes the system from both a historical and future perspective, as well as financial aspects.

The text also details how vocational education programmes in technology are conducted at two Norwegian schools involved in the project, and how these schools collaborate with companies on the apprentice scheme. The two schools involved are Bodin Upper Secondary School and Surnadal Upper Secondary School.

Following the 10-year compulsory primary and lower secondary school, students may progress to upper secondary education and training. All students are entitled to, but not obliged to attend upper secondary school. In upper secondary, students choose between two main pathways: Programme for General Studies or Vocational Education Programmes. The former prepares students for higher education at colleges/universities, while the latter qualifies them directly for the labour market.

Vocational Education in Historical Perspective

In the current school year (2023-2024), there are 329 public and 102 private, a total of 431, upper secondary schools in Norway, spread across 11 counties. The total number of students is approximately 185,000, of which 69,000 are enrolled in vocational education programmes. These vocational students are spread across 10 different education programmes.

The upper secondary education and training as we know it today was shaped starting in 1974 with the Upper Secondary Education Act. Before this, general studies and vocational education were separated into two different types of schools: gymnasiums, concluding with the examen artium, and vocational schools. With this act, the two types of schools were merged into one educational institution: the upper secondary school.

Reform 94 was implemented in 1994. The curriculum underwent several structural changes in the various courses in the upper secondary school, within both general studies and vocational education programmes. Among other changes, some programmes were merged, and others were discontinued, resulting in a reduction in the number of level 1 courses. Overall, greater emphasis was placed on general subjects, such as Norwegian, English, and Mathematics, because it was believed that these were subjects everyone needed regardless of the profession they would later enter. However, the most significant change with Reform 94 was arguably the legal right for all students to upper secondary education and training.

In 2006, with the new national curriculum Kunnskapsløftet (transl. Knowledge Promotion Reform), primary and lower secondary school, and upper secondary education and training were for the first time unified under the same curriculum. All subjects received new curricula, and competence goals were defined, clarifying what students should achieve at different grades. In addition, even more emphasis was placed on general competence, which was defined through basic skills that applied across all subjects and grades.

Kunnskapsløftet was further developed through processes leading to a new curriculum implemented in 2020. Through this process the number of competence goals in various subjects was reduced, primarily to facilitate in-depth learning. Three interdisciplinary topics were also introduced, intended

to train students to see subjects more in conjunction, namely: Health and Life skills, Democracy and Citizenship, and Sustainable Development.

School Structure in Norway

In Norway, all children are entitled and obligated to attend 10 years of primary and lower secondary school. Pupils begin in the first grade in the year they turn six, initially attending seven years of primary school, followed by the final three years in lower secondary school. The vast majority of Norwegian primary and lower secondary schools are public and municipally operated, although private schools also exist.

Vocational students, with few exceptions, spend the first two years in school-based training, followed by two years of in-service training. After this, they take a final trade exam. With a passed exam, students receive a trade certificate, qualifying them for the labour market.

Upon completing primary and lower secondary school, all students retain the right, though no longer the obligation, to pursue further education. Students apply for admission to upper secondary school, where they list three preferred education programmes in order of priority. Admission is determined through a points system based on grades from lower secondary school. County authorities, which own and operate the public upper secondary schools, have their own admission rules. The general rule is that students can apply to any school and education programme within their county of residence, guaranteeing admission to one of their three preferred programmes.

There are ten different vocational education programmes: Building and Construction; Electrical Engineering and Computer Technology; Hairdressing, Floral, Interior and Retail Design; Technological and Industrial Production; Healthcare, Childhood and Youth Development; Crafts, Design and Product Development; Restaurant and Food Processing; Information Technology and Media Production; Sales, Service and Tourism; and Agriculture, Fishing and Forestry. Each upper secondary school offers a selection of these programmes, and through a four-year educational path, the programmes increasingly specialize towards specific occupations.

During the school-based training period, i.e. the first two years, students take both common core subjects, like Norwegian and Mathematics, which are shared across education programmes, and programme subjects that increasingly direct their education towards respective professions.

After obtaining a trade certificate, one can pursue further education at vocational colleges, which are also regulated by Norwegian law. A vocational college awards academic credits similar to university education but is more practice-oriented, offering deeper and more specialized expertise within one's profession. Approximately half of the vocational colleges are public, mostly owned and operated at the county level, similar to upper secondary schools. Many vocational colleges offer online and part-time studies, enabling students to combine education with full-time employment.

Within automation and robotics, there is only one applicable trade certificate: Automation Technician. To pursue this certification, one must choose one of two vocational education programmes: Electrical Engineering and Computer Technology, or Technology and Industrial Production. The former focuses on electrical subjects, while the latter on mechanical subjects.

Both Bodin Upper Secondary School and Surnadal Upper Secondary School offer these two education programmes, thus providing the opportunity to earn a trade certificate as an automation technician at these institutions. Both schools feature crossover subjects between the two programmes, meaning there are certain programme subjects throughout the educational pathway that are common to both programmes.

Vocational Training Establishments

Companies depend on skilled labour, and the demands for education within the business sector are continuously increasing. Formal competence among workers leads to a competitive business, which has resulted in increasingly close cooperation with educational institutions.

As various organizations were established around the year 1900, a tripartite cooperation emerged in Norway, involving trade unions, employers' organizations, and the government. This collaboration focuses on areas such as pay, tax policy, and social security benefits. In 1981, the Act on Vocational Training in Enterprises was implemented, and from 1998, its text was incorporated into the Education Act. This act regulates the design of apprentices' in-service training, including trade exams, as well as other duties and rights of the parties in the tripartite cooperation. This cooperation has significantly contributed to Norway's current situation, where everyone has excellent opportunities to acquire vocational education.

Since the 1960s, private apprenticeship training offices have been established throughout the country, with over 300 existing today. An apprenticeship training office acts as a coordinator between companies and upper secondary schools, assisting in the recruitment of apprentices and ensuring that training is conducted according to curriculums and other guidelines. The office is legally responsible during the apprenticeship and documents the process. The offices are owned by companies, while the government provides financial support through the county authority.

Upper secondary school students themselves apply for apprenticeships with companies, with assistance from their school and the apprenticeship training office. A company must be formally approved by the county authority to take on apprentices. The main criteria for being approved as a training establishment are that the company must be able to offer work tasks relevant to the curriculum, and dedicate a professional supervisor responsible for the apprentice throughout the training period. It is ultimately up to the company to decide who receives an apprenticeship, and each employment is formalized through a contract. Approved training establishments are not obliged to hire apprentices, but various guarantee schemes exist in some county authorities, including in Bodø and Surnadal, where Bodin Upper Secondary School and Surnadal Upper Secondary School are located, respectively.

There are also opportunities for unskilled adult workers to achieve vocational education. Some training establishments offer a Full In-service Training programme, where the worker can complete their entire vocational education while holding a full-time job. The worker must then pass the necessary exams in both programme subjects and common core subjects before finally taking the trade exam. Such an offer requires close cooperation between the company and the school, and the apprenticeship training offices can also assist. An example of such a programme is an initiative started by Hydro and Newton

Sundal. Hydro and other companies collaborate with Surnadal Upper Secondary School and Sundal Upper Secondary School on the experience-based trade certification, where the companies pay for teachers from the two schools to teach the candidates partly at school and partly in the companies. In this specific programme, candidates can achieve a trade certificate in either Chemical Processing or Automation.

Evaluation and Assessment

There are ten main subjects in Norwegian schools: Mathematics; Norwegian; English; Social Science; Natural Science; Physical Education; Music; Food and Health; Arts and Crafts; and Knowledge of Christianity, Religion, Philosophies of Life and Ethics. Additionally, language subjects, in-depth studies, and optional subjects are offered.

Pupils are not assigned grades in primary school. However, their level of achievement is continuously monitored, and they typically undertake a number of locally determined tests in various subjects. The implementation of this varies by municipality, school, and even teacher, but all students receive bi-annual evaluations, documenting both academic and social achievements on a three-tiered scale: low - medium - high.

From lower secondary school onwards, students receive grades for each subject, using the same grading system as in upper secondary school, where they are assessed on a scale of 1-6, with 6 being the highest. Students are awarded an overall achievement grade in each subject.

In addition to overall achievement grades, lower secondary students undertake two concluding exams, one written and one oral. The written exam covers one or more of the three subjects: Norwegian (both first- and second-choice form), English, and Mathematics. The subjects for the exam, and the students who will take them, are selected randomly. The oral exam can cover Mathematics, Norwegian, English, Social Science, Natural Science, and Knowledge of Christianity, Religion, Philosophies of Life and Ethics, as well as language subjects and in-depth studies.

All students who complete primary and lower secondary school are entitled to admission to upper secondary school in one of their chosen education programmes. Overall achievement grades and exam results are summed and then divided by 10, creating a score that determines admission priority to upper secondary school. However, before this points-based admission, students with priority rights, such as those with disabilities, primary sign language, or entitled to extended time, are given precedence. For a student to have priority rights, an individual decision based on the Education Act regarding the right to special education must be in place.

In both primary and secondary education, all written exams are centrally administered. In upper secondary school, this applies to both common core subjects and programme subjects. Oral and practical exams are administered locally.

Trade exams and their evaluation criteria are designed by a board appointed by the county authority, consisting of active, qualified professionals. A trade exam typically spans days or weeks, where candidates demonstrate their competence through planning, execution, evaluation, and documentation of a significant practical task. This usually takes place at companies or their clients,

though sometimes at school. The exam is graded on a three-tiered scale: fail - pass - pass with distinction. Upon passing, candidates earn the trade certificate and the title of skilled worker.

Vocational Teacher Education

For vocational teacher education, Norway offers various pathways. One is through a bachelor's degree at the university, combining pedagogical training with specialized courses related to a vocational area. This ensures that future teachers are well-prepared for the unique challenges of vocational education. Emphasis on practical, hands-on learning experiences bridges the gap between theory and practice.

Another pathway is available for those with a trade certificate and a general university admissions certification (or equivalent real competence), plus two years of work experience. Several colleges and universities offer this three-year vocational teacher education programme through online and on-site sessions. Between sessions, students work on mandatory tasks, individually and in groups, guided by a subject teacher. The study includes 70 days of school practice, which may occur at one's workplace, and 60 days of work practice, enhancing both depth and breadth of expertise in specialization subjects. This education grants teaching qualifications in selected programme subjects.

A third pathway is through the undergraduate teacher training programme, requiring a completed three-year vocational university or college education and at least two years of relevant full-time work experience after graduation, alternatively a trade certificate plus general university admissions certification. This education is typically part-time over two years, recognizing the value of practical experience, allowing individuals with academic or industry experience to enter teaching through tailored programmes. This approach offers flexibility and the opportunity to acquire necessary pedagogical skills, leveraging industry expertise to enrich the teaching environment.

Funding and Resources

Public schooling in Norway is free of charge, funded by public administration through governmental block grants. These grants are determined with the aim that each municipality should provide its citizens with equitable service offerings, seeking to uphold demographic and district policy objectives. The allocation of services within municipalities and county authorities is prioritized by themselves and is financed through discretionary funds. However, the subsidy scheme imposes certain framework factors, and a small portion of the funds is earmarked specifically for schools. Currently, primary and lower secondary education accounts for about 30 percent of municipal net operating expenses, while upper secondary education and training represents approximately 60 percent of the county authority's net operating expenses. These figures are national averages, and significant variations exist across

counties and municipalities. Only about 5 and 2 percent of the expenses for primary and lower secondary, and upper secondary education, respectively, are financed through earmarked funds.

98 percent of primary and lower secondary school students, and 95 percent of upper secondary school students, attend public schools. State-approved private schools receive approximately 85 percent funding based on operating expenses per student, with calculations made separately for primary, lower secondary, and upper secondary education levels.

Authorized training establishments receive subsidies per apprentice through block funding, either directly from the county authority or via an apprenticeship training office if the company is a member of such an organization. For independent companies, the entire subsidy goes to the company, but it must then manage individual follow-up of the apprentice throughout the apprenticeship, as well as handle administrative tasks like HR and accounting. Conversely, when an apprenticeship training office intermediates between the county authority and the company, the office may opt to spend part of the subsidy on other services, such as training for the company's employees.

For training establishments, the company pays the apprentice's salary. Over two years of in-service training, an apprentice typically earns the same as a skilled worker does in one year. The salary is distributed progressively over the two years, as an apprentice becomes increasingly productive with greater experience and competence.

Future Trends and Challenges

Although upper secondary education and training in Norway functions relatively well, challenges remain. One in five students does not complete upper secondary school, and to reduce this number, a revised Education Act will be introduced in the autumn of 2024. This grants everyone not only the right to start but also to complete upper secondary education and training. Among other provisions, students will be allowed to finish their started education regardless of duration (currently limited to three years), choose a new education programme an unlimited number of times (currently only once), and have the right to acquire multiple trade certificates regardless of how many they already possess (currently only one).

To achieve a higher completion rate in upper secondary education and training, the Norwegian Parliament in 2021 introduced Fullføringsreformen (transl. the Completion Reform). This reform aims to better adapt education to companies and the diverse society of students, as well as to offer even more flexible educational pathways. With a ten-year timeline, the reform aims to initiate actions such as modular structured education for adults, long-term assignments as an alternative or supplement to exams, a council for preparatory work, and new initiatives to combat school absence.

The experiences from study visits

Using good practices developed by other people can lead to building better professional relationships. You can establish contacts, exchange experiences and support each other in pursuing common goals. Following good practices and learning from others in the field of education allows for continuous development of the proposed teaching content and forms of conducting classes. It is possible to acquire new skills, techniques and knowledge that contribute to the development and improvement of both teaching staff and learners. Therefore, in September 2022, research staff from the Lodz University of Technology and teachers from the Technical School of Automation and Robotics in Lodz took advantage of the opportunity to come to Norway to Trondheim. The second study visit took place in February 2024. It was attended by students of the Technical Secondary School of Automation and Robotics who participated in educational activities carried out as part of the project, as well as the school's teaching staff.

During the first five-day study visit, the participants were presented with the education system and the way classes are conducted at universities and vocational secondary schools. Norwegians, rooted in a culture different from ours, approach life completely differently than Poles. When we had the opportunity to walk around the beautiful city of Trondheim in our free time (Photo 1), the first thing that caught our eye was cleanliness. Throughout the city, no abandoned garbage or cigarette butts were found anywhere on the street or in any of its corners. Most cars driving around the city have purely electric drives. At first glance, it is clear that residents care about the environment and ecology. The streets are colorful and neat, you can see a lot of smiling people. There are still many old, renovated Scandinavian houses made of wood in the center. The first impression right after arriving in Norway was very positive. We couldn't wait to meet university representatives and high school teachers to observe their work style and exchange professional experiences.



Photo. 1. The old town built on logs. Private foto

The first meeting took place with academic teachers at the technical university NTNU (Norwegian University of Science and Technology). The curriculum here is not as rigid as in Poland. It is modified every year depending on what is happening on the labor market. Depending on the needs of large companies that are looking for good and educated employees in a given profession, the education program is adjusted so that employers can find properly qualified staff among university graduates. One of the presented examples included the following situation: a company reports to a university and presents its need for employees and basic competency requirements for given positions. On this basis, university employees prepare or, in fact, modify the curriculum in accordance with these needs, adapting subjects and fields of study. After completing such a course, the student is guaranteed a job in a given company. However, in Poland, most university graduates do not work in their dream profession or struggle with finding a job.

Another example would be the organization of the program in the field of study we visited - electronics and computer engineering. The presented automation systems and the possibilities of their use allowed students to explore exciting and important topics, such as intelligent systems, mechatronics and robotics, regulation technology and control systems. The Norwegian educational system focuses on the integration of theory and practice, which enables students to practically apply the acquired knowledge and skills, which contributes to a better understanding of the teaching material. As an example, students could design projects of inspection robots for pipelines (Photo. 2 a) or small mobile robots (Photo. 2 b).

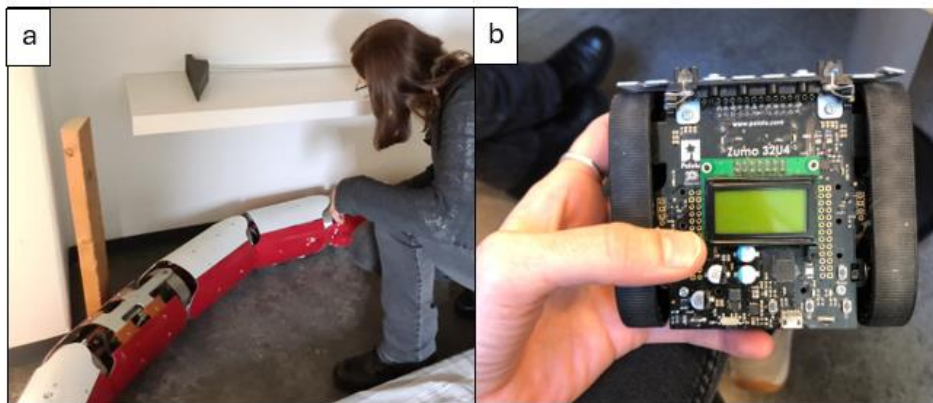


Photo.2 a) Pipeline inspection robot ; b) mobile robot

Work on the project is based not only on theoretical calculations, but also on making models and testing them. An important element of this education system is the availability of materials, drive elements, but also specialists enabling the production of both mechanical and electronic components. This availability is provided by companies operating at the University that provide this type of services to students. When ordering the production of e.g. electronic components, students take an active part in these tasks and are not passive observers of the presented processes.

For comparison, at the Lodz University of Technology only a few diploma theses are prepared with the participation of entrepreneurs - this is the exception rather than the rule. Only the last two years have resulted in the creation of a professional 3D printing studio available to students, where they can partially create functional models of their projects. In the case of automation and robotics, the design itself is not enough, the key is to design and implement the control system and select appropriate controller settings. In this respect, our students are provided only with theoretical knowledge. What surprised us most about the organization of education at a secondary vocational school was the curriculum. The Norwegian approach to education is more practical than theoretical. If the student has chosen a vocational school (equivalent to our vocational school), where the first level lasts 3 years, after this period he or she can decide whether to continue education and choose a practical or theoretical path. The theoretical path prepares the student for university entrance exams. During the semester, school studies are interspersed with internships in a given company, i.e. three days at school and two days at the workplace. Even if a student chooses purely practical education and in the last year decides that he would like to go to university, the path is not closed. Then he completes the subjects included in his field of study, such as mathematics or physics. We liked the fact that young people choose their career path themselves, and it is not, as in most cases in Poland, the decisions of their parents. Therefore, it often turns out at school that these are not children's dreams - this is not what they would like to do in life, which is why they become depressed or change schools during the education cycle.

When it comes to internships for students, in Norway it is mostly handled by specialized companies that look for employers with a similar profile to the students' education. Internships for students are fully paid, just like for an already employed employee. In Poland, the search for companies where students can do internships is often done by designated teachers who sometimes do not have the clout to provide students with their dream and paid internships. It seems a good solution for internships in Poland to be interspersed with classes at school. This would make students much more interested in classes and there would be much more variety in vocational education.

During the second study visit, the week spent in Sunndalsøra was quite a challenge for the students of the technical school, but they managed to combine a large number of substantive classes with a bit of relaxation. On the first day of their stay, the trip participants met with project partners from Norway and went to the Aura power plant Statkraft. Wandering through deep tunnels carved in the mountain massif under Lake Aursjøen, they learned about the technological processes of generating electricity from renewable sources. Then they went to the Hydro aluminum smelter, where they learned about different aluminum production methods in the largest and most modern aluminum factory in Europe. The next day of our stay in Norway was a visit to the Surnadal Vocational School in Surnadal. During the visit, our students presented information about TAiR and Łódź to their peers from Norway, visited the school and took part in educational activities together with their Norwegian colleagues. The next point of the visit to Surnadal was the Pipelife Norge AS pipe factory, where students

analyzed the technological processes of producing plastic products. On the next day, the students of our technical school combined duties with entertainment in Newtonroom Sunndal, where they enjoyed, among others: from the mathematics and physics labs, and also had practical classes in robotics. Before returning to the country, we visited the plastics processing company Plasto AS in Åndalsnes, but we also had time to travel by cable car to the Rampestreken viewpoint, from which we can admire the mountain landscape and Norway's showcase, the beautiful fjords. Tired, but happy and full of motivation to continue learning, they returned to Łódź. This adventure certainly helped them discover new tourist and educational paths, and the article about TAiR that appeared in the local newspaper will be a great souvenir for them.

How are classes conducted in schools in Norway? Well, there are no bells there. Students must show up for classes scheduled at a specific time. Young people prepare for most professional activities themselves. How is this possible? Well, the global pandemic has developed a multimedia reality in schools in every country. Some countries, such as Norway, have decided to continue to equip classes with multimedia elements. This means that if a student has to complete a task at a certain station, he or she is given a specific amount of time (not 45 minutes or 2 x 45 minutes as in Poland), but for example three months or even a year. It depends on the complexity and difficulty of the task. There are QR codes stuck on the stations (Photo 3), which students read using their phones and at home they view the entire instructions, showing what and how they will need to be done step by step. Who prepares such instructions? Teacher? Well, no. Older students prepare all this. Why doesn't the teacher do this? The Norwegians have a simple explanation: the world is developing very quickly, not everyone keeps up with technological innovations or new multimedia programs and new forms of communication, just like young people, exchanging information with each other. Peers reach out to their colleagues more easily and effectively and gain the ability to teach others. At the same time, they have a lot of fun and are able to keep the required distance. In Poland, teachers devote a lot of time at work, and often their private time, to prepare such multimedia materials, and in most cases they do not reach students. Why? Because the forms of knowledge transfer are changing and we cannot always keep up with them, which causes frustration and burnout among teachers. It turns out that no matter how much time teachers devote to their materials, students will not always be interested in them.



Photo. 3. QR codes stuck on the station where the student will perform the exercises.

How are the vocational training rooms equipped? At a very advanced level. You might think that Norway is a rich country and has enough money to equip its studios... It actually works differently than in Poland. Companies that cooperate with a given school try to equip the rooms with equipment from a given factory. During the modernization of the line (once every five years or so), the old equipment is dismantled and transported to the school. As part of the classes, students equip rooms with this equipment and repair damaged elements. This is how the robotics and automation laboratory was created at school, where teachers had no involvement in it. The students themselves adapted the equipment they received to the needs of the studio (Photo 4.).



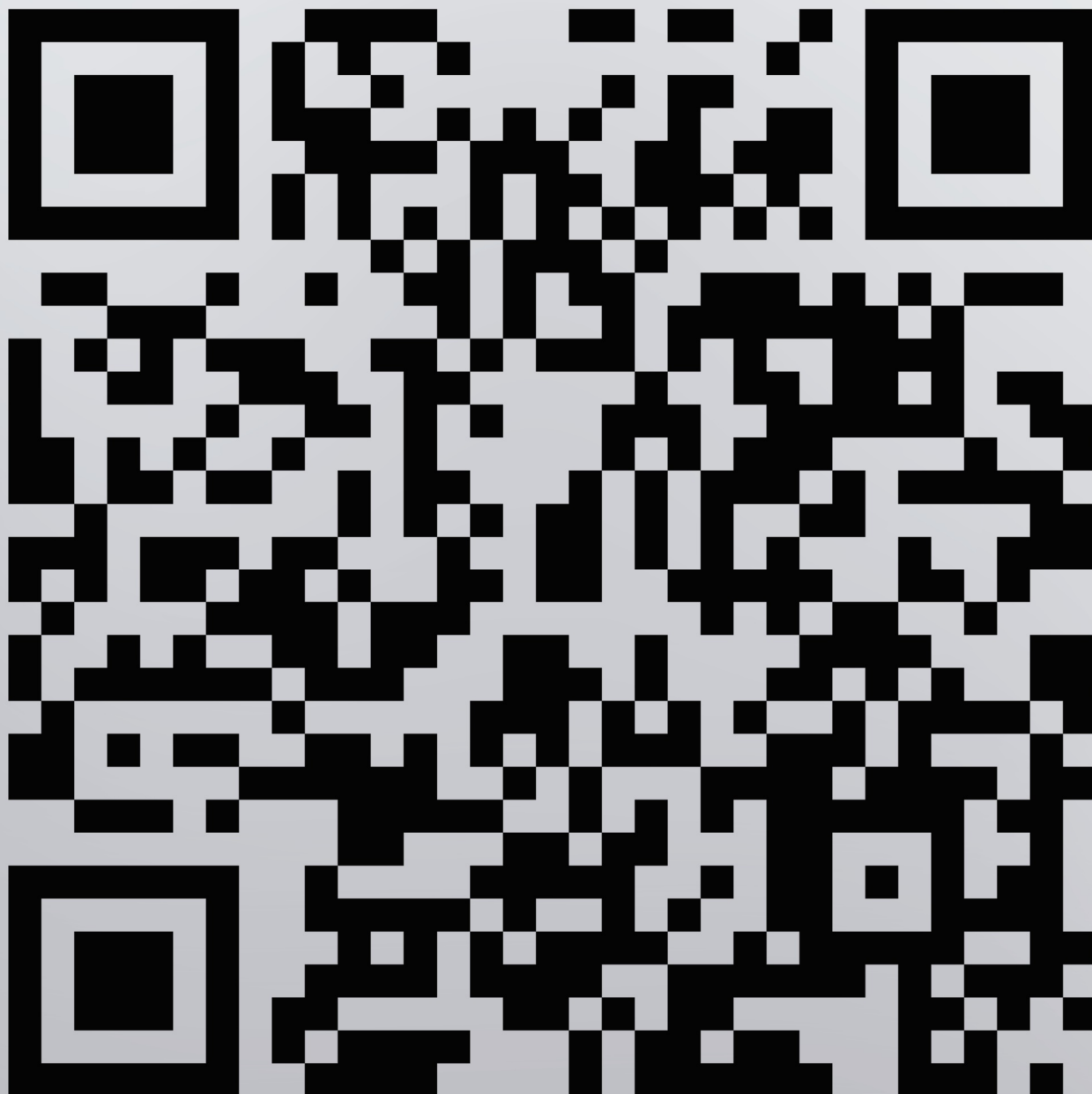
Photo. 4. Equipment for automation and robotics workshops. Photos taken during classes.

During their classes, students had access to workshops, e.g. 3D printing, electronics and a workshop with lathes and milling machines. During lessons, students work alone in their rooms, and the teacher does not stay in a given room all the time. How many people are in the class? Often no more than ten people in one group. So are there any damages and health and safety accidents there? Almost not at all, because Norwegians have been taught since childhood that regulations and the law are sacred, so they work in accordance with the regulations. The teacher is a mentor, not a person who has to supervise and lead the children "by the hand". If a student has a specific time to complete a task, it does not matter whether he completes it seven or fourteen days before the deadline - he simply has to finish the task. . In our education system, the biggest problem is that we increasingly have to "pull" students to do a given task, ask them to do something on their own, etc. This is often when we encounter such a reaction that students do not want to do it. Lack of motivation is the problem of our education system.

Nowadays, there is a very big problem with the independence of young, almost adult people. They are not very good at searching for knowledge, studying it or a given issue, but they constantly expect that they will receive everything "on a platter". What are the working hours of teachers in Norway? They stay in the school building from Monday to Friday from 8:00 a.m. to 4:00 p.m. Are they happy with their school work? Oh yes, by the way, schools have close cooperation with the university and sometimes academic staff participate in school activities. Thanks to this, the knowledge transferred is at a high level. There is no such thing as a salary to be worked. Thanks to this, the employee does not have to move from school to school and can work more efficiently. The question arises whether it is possible to improve Polish vocational education? Certainly yes, and it does not require large financial outlays, just changes in the law so that companies that often throw a lot of equipment into the trash can donate it to schools without restrictions and have greater cooperation with them. Teachers sometimes need to be given more freedom to act in education, and not be limited to the core curriculum, the framework of which is rigid and prepared several years ago. Education workers of the younger generation should also try to restore respect for the teaching profession to schools. The teacher should have systemically supported opportunities to be able to effectively build the authority of a mentor and be a role model in the approach to learning and work.

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