

LOG>IN

Recommendations for the design of training in logistics



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The Project “LOG-IN”



was aimed to significantly strengthen the acquisition of job-related digital skills in training in the logistics sector in order to prepare young specialists for the requirements of a digital working and living environment. The job-related skills for digital logistics go well beyond the previous training content and include both transversal ICT and technology applications for digital logistics. Since digitization is also changing the role of teachers (they are changing from knowledge brokers to facilitators in self-directed learning), the project also aimed at developing the capacity of teachers to use interactive teaching and learning methods, digital learning media and tools.

The project brought together seven partners from four EU countries - Germany, Croatia, the Netherlands and Poland. The main result of "LOG-IN" are transferrable solutions for the integration of digitization in vocational education and training with digital learning models to be used in specialist classes (learning 4.0) and the integration of new technologies for digital logistics as training content (work 4.0). A matrix of professional skills represents both specific skills (such as WMS administration, digital goods coding) and transversal ICT skills (such as handling digital devices) as they are currently and will be relevant to the handling of logistics processes. This enables a tailor-made tailoring of competencies to the needs of logistics.

Irrespective of the structure of the education system and the different education profiles (especially VET and higher education) in each of the participating countries, all partners agree that the digitization of education is a very important and necessary means to achieve the overriding educational goal, which is the development and well-being of the student and teacher.

It includes e.g. development of information and communication technologies (ICT), modernization of infrastructure or enrichment of content and resources. Successful schools are those that first define their educational goal, and then use technology wherever it is needed and justified.

Logistics talents are often quickly given responsibility, for example as export manager for sea freight, key account manager for air freight, supply chain manager or process manager for fashion warehousing. The list could be continued endlessly. In addition to the classic jobs of dispatcher, professional driver and specialist warehouse clerk, the Logistics sector is also increasingly looking for IT specialists.

Digitization - a Global Trend

The rapid digitization of the working world and the introduction of new technologies are fundamentally changing operational work processes and thus also the skill requirements for skilled workers. A common definition of the term digitization or digitalization is provided by Gartner as “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business”¹.

Digitization more or less permeates all areas of our lives – in the sense of Big Data. This means that digitization goes beyond purely technological or business solutions and becomes a central social challenge and design task (as illustrated in the article “„Verschränkung von physischer und digitaler Welt“ by Matthias Schmidt²)



Annually, the European Commission publishes the Digital Economy and Society Index (DESI). This index tracks Member States' progress in the five key areas of connectivity, digital skills, internet use by individuals, digital integration by businesses and digital public. According to the index, in 2022 the Netherlands will take the 3rd place with an index value of 67.37 after Finland (89.6) and Denmark (69.3). In contrast, the index value of Germany is only 52.88 (13th place), that of Croatia 47.55 (the 20th place) and that of Poland 40.55 (23rd place). The average EU value is 52.28³. There is still a lot to do for political actors and education policy actors to advance the digitization of the countries.

¹ Gartner Glossary (2021): Digitalization, <https://www.gartner.com/>

² M. Schmidt (Hrsg.), Kompendium Digitale Transformation - Perspektiven auf einen gesellschaftlichen Umbruch“, UVG-Verlag, Berlin 2022, p. 3-14 (https://charta-digitale-vernennung.de/app/uploads/2022/04/Kompendium_Digitale_Transformation_Schmidt.pdf)

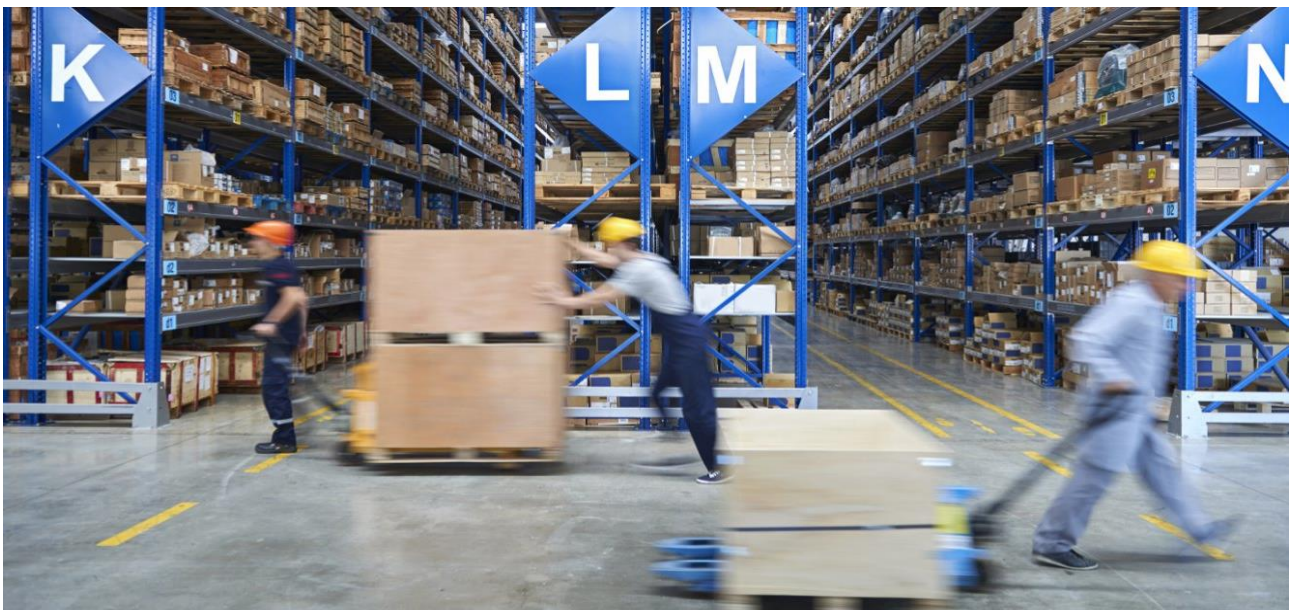
³ Platform of Statista GmbH (<https://de.statista.com/statistik/daten/studie/1016565/umfrage/digitalisierungsgrad-der-eu-laender-nach-dem-desi-index>)

Logistics - A Situation Analysis of the Industry

The logistics sector as an interface industry is faced particularly great challenges. Digital communication and online trade are booming, cross-technology business models are catching on. In addition, logistics is a multifaceted growth market that offers a wide range of fields of work and career prospects - also in an international environment - for academically or in the dual system trained young people in the commercial or industrial sector.

The sector is strongly influenced by the online retail boom. Cross-technology business models are gaining ground. Logistics is becoming more technology-heavy, with fundamental changes in work processes along the whole chain. Business and technology trends such as cloud logistics, fresh chain, batch size one, connected life, IoT or low-cost sensing are forcing upheavals in warehouse management and in the transport chains and are presenting logistics as an interface industry with new challenges - in the sense of "green logistics" and "digital logistics". It is about communication, supply chain monitoring, transport routes and much more. In this context, well-functioning European cooperation is also becoming increasingly important for the industry.

All these factors are changing the requirements to competences and qualifications for logistics professionals and thus also the requirements to education and training in logistics professions. As Matthias Schollmeyer, Managing Director of the Association „Verband Verkehr und Logistik Berlin und Brandenburg e.V.“ says, digitization and automation dramatically change the industry. While operational activities are losing importance, new are emerging – such as complex monitoring tasks. This has a significant impact on education and training in all warehouse professions.



The technological innovations and digital content must be integrated in the logistics VET – this will not only ensure that the required skills and competences will be on place but also improve the professional image of

the sector and strengthen the future viability, quality and attractiveness of logistics VET in Europe. This is the only way to cover the increasing demand for well-qualified logistics workers in the future.

Changes in logistics are not only progressing digitization. Advances in the industry have also contributed to the emergence of new professions. Mondialization, the economic crisis and technological innovations have changed the face of modern logistics.

In the past, logistics processes were part of others. Today, logistics has become "a key link in the activities of companies and an essential part of their strategy", emphasizes Michael Page of the French Logistics Association (Aslog). The proof is the fact that many companies from various industries currently have a logistics director. Logistics Coordinator The transformations that the logistics industry has undergone have caused the scope of duties of people employed in some positions to change dramatically.

<p>Germany</p>	<p>Logistics is the third largest industry in Germany. It links the value-added stages of industry and trade, manages global supply chains and supplies the population with all the goods they need every day. At the same time, the trend towards outsourcing is not diminishing - the range of services in logistics is therefore being continuously expanded to include distribution and procurement tasks.</p> <p>Logistics talent is wanted, e.g. as export manager for sea freight, key account manager for air freight, supply chain manager or process manager for warehousing fashion. In addition to the classic jobs of dispatcher, professional driver and specialist warehouse clerk, our industry is also increasingly looking for IT specialists.</p> <p>According to the association "Bundesverband Spedition und Logistik" the success of the forwarding company of the future will lie in the linking of the analogue and digital worlds. The digital skills of employees must therefore be continuously expanded.</p>
<p>Croatia</p>	<p>Labour shortages continue to cause major problems. According to a 2020 survey by the Croatian Employment Office (Hrvatski zavod za zaposljavanje; HZZ), 48.2 percent of the companies surveyed (2014: 29.1 percent) suffered from this problem. The shortage of skilled workers is due, among other things, to the decline in population and to emigration. Croatia's poor ranking in the World Economic Forum's ranking of the country's competitiveness indicates a great need for reform of the labour market. Croatia's school and university graduates are often overqualified in relation to market needs or have not obtained their degrees in the subjects they are looking for. Entering the logistics branch opens up new perspectives.</p>
<p>The Netherlands</p>	<p>The Netherlands is one of the top logistics markets in Europe. However, despite a stock of logistics space of almost 38 million m² and an average vacancy rate of 3%, the supply of high-quality logistics space is scarce, especially in logistics hotspots. The Netherlands is characterized by a strong transport and logistics sector.</p> <p>Thanks to their central location in Western Europe and their excellent infrastructure, they have the most efficient hub for overseas trade in Europe. However, the industry is faced with an increasing shortage of staff According to plans by the Dutch government, the Netherlands should also take a leading position in the management of logistics</p>

	chains from a digital point of view (programme digital ready ⁴).
Poland	<p>According to the "Talent Shortage" report prepared by ManpowerGroup, a particular problem in Poland is filling such positions as: warehouseman, forklift operator, sidecar operator and high warehouse operator.</p> <p>The market also lacks engineers, team managers, as well as forwarders, stock, quality, export and warehouse management specialists. – Logistics is one of the industries that, regardless of the pandemic, and sometimes even because of it, records the most dynamic growth and becomes increasingly important. In addition, the spectrum of duties of the so-called logisticians is very wide, ranging from inventory planning, through warehouse work coordination, forklift operation, to transport planning and implementation. What's stopping you from recruiting logisticians?</p> <p>According to the ManpowerGroup study, the biggest obstacles in recruiting employees from the logistics industry are considered to be: too high financial expectations of potential employees (61 percent of employers indicate this) and a shortage of candidates on the market (58 percent). Insufficient experience (44%), lack of required hard skills (33%) and unwillingness to change jobs during a pandemic (22%) can also be a problem.</p>

Almost all professional activities are now affected by the digital transformation. This defines the urgent need for modernization of vocational training and thus of vocational schools, since they act at the interface between the employment and education systems. Vocational schools on the one hand and companies on the other are faced with major challenges. Skilled workers should already acquire digital knowledge as well as process and system understanding during their (dual) training.

Thanks to thematic research and work with stakeholders in the logistics industry, from vocational and university education, but also from politics and administration (associated partners, experts, participants in the multiplier events), the "LOG-IN" project team gained a number of insights into training in logistics professions and also for dealing with digitization in vocational education and training, as illustrated in the next chapters.

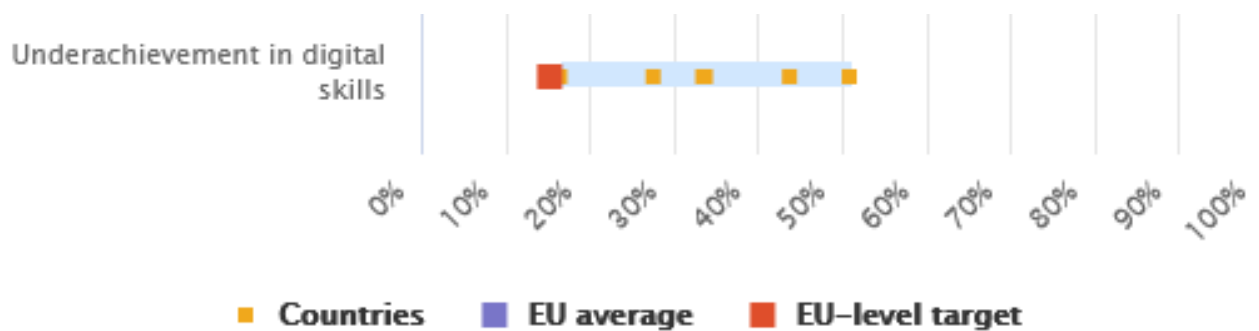
⁴ "Portbase Rotterdam: Plans for making logistics sector 'digital ready' (07/07/2022), <https://www.portbase.com/en/plans-logistics-sector-digital-ready/>

Digitization in VET and Logistic Professions

Logistics is a multifaceted growth market that offers diverse fields of work and career prospects - also in an international environment - for academically or in the dual system trained young people in the commercial or industrial sector.

The need for specialists is constantly increasing, even in times of crisis. Due to the Corona pandemic, the importance of logistics professions has increased significantly. At the same time, the negative consequences of demographic change become more and more noticeable. As in many other sectors, there is a gap between supply and demand.

According to the Education and Training Monitor of the European Commission⁵ and a survey made by Statica.de in 2022⁶, there is still a high demand for digitization in the VET sector. However, the situation differs from country to country. The 2022 Education and Training Monitor's comparative report⁷ comprises a broad, cross-EU analysis of education and training systems to go alongside 27 more in-depth country reports. It tracks progress towards achieving the EU-level targets agreed as part of the strategic framework for European cooperation in the field. Digital skills are among the seven EU-level targets set in the report, as illustrated below.



Source: Eurostat (EU Labour Force Survey 2021 and UOE 2020), OECD (PISA 2018) and IEA (ICILS 2018).

⁵ <https://op.europa.eu/webpub/eac/education-and-training-monitor-2022/en/index.html>

⁶ <https://de.statista.com/statistik/daten/studie/1016565/umfrage/digitalisierungsgrad-der-eu-laender-nach-dem-desi-index/>

⁷ <https://op.europa.eu/webpub/eac/education-and-training-monitor-2022/en/comparative-report/executive-summary.html>

THE NETHERLANDS

The Netherlands as a country and as a society are highly digitalized. Being a small country in a big world, there has always been an urge and emphasis on getting and staying connected. With a population size of 17,5 million, there are 17,01 million mobile connections. 99,2% of the Dutch adult population owns a cell phone. The homes in the Netherlands are highly connected as well. Over 7,5 of the 8 million households have a broadband internet connection.

The general conditions for digital learning are very good in the Netherlands. The schools are mostly well equipped, tablets and laptops are also available in the elementary schools. Studies show, however, that the use of digital media in the classroom is very widespread and continues to increase, but that teachers mostly use it based on their own experiences in the classroom and are less concerned with the question of which digital tools are best suited for acquiring skills.

POLAND

Contrary to this, in Poland acceleration of digitization caused by the pandemic has revealed a deep mismatch between the Polish labour market and the needs of employers. Company managers complain about the lack of workers, because the candidates available on the market do not have the appropriate qualifications. Polish education does not sufficiently equip graduates with the skills needed on the labour market (Trenkwalder Polska). Companies stress that this requires changes in the system of education and vocational training.

There is a definite oversupply of university graduates of all kinds, while vocational education has been completely neglected, retrained, and therefore has lost some of its attractiveness for companies. As a result, the Polish market is now suffering from a lack of qualified technical staff with appropriate education.

CROATIA

Digitization in education is governed by the "Strategic framework for digital maturation of schools" (2030). The strategic framework is based on the 2014 National Strategy for Education, Science and Technology and expands it in the part of digital transformation of the school educational system in the Republic of Croatia by year 2030. It responds to the need for sustainable planning of the informatization of the school system in the Republic of Croatia. The goal is to carry out the process of strategic direction and prioritization of activities and projects in the field of digital transformation of the school system by 2030.

The Strategic Framework is implemented by the Ministry of Science and Education of the Republic of Croatia, in cooperation with the main beneficiary of the project, the Croatian Academic and Research Network - CARNET⁸. The duration of the Framework covers the period up to year 2030. All strategic areas and most policies cover the whole period, but the goals are divided into three periods within which goals and indicators of achievement are defined: short-term (until 2022), medium-term (until 2026) and long-term (2030).

However, the strategy is not yet sufficiently implemented at school level. Recent observations discover that students are lacking both computer technology infrastructure and up-to-date ICT education according to current logistics practice. In result, we see low-quality employees in logistics practice, low operational

⁸ <https://www.carnet.hr/projekt/e-skole-razvoj-sustava-digitalno-zrelih-skola-ii-faza/>

quality of logistics industry, and low informational technology implemented in the logistics industry in Croatia.

These are the top three challenges for logistics VET in Europe:

1. The schools have below-average digital equipment in an EU comparison, especially at primary level (e.g. in Germany 26 percentage points below the EU average).
2. In a European comparison, teachers in Croatia, Poland and Germany are far behind in terms of digital skills and the use of IT in the classroom.
3. The proportion of schools that promote digital skills is low in an EU comparison, the digital skills of pupils are below-average.

The focus of effective digitalisation in VET is on the implementation of the following five ambitions:

- teachers, school leaders and administrators innovate by learning together and with others
- students and teachers are digitally literate
- digital learning resources work for the user
- infrastructure is safe, reliable and future-proof
- ethics of digitization in education has structural attention

Lessons Learnt & Recommendations

For Decision Makers

Based on the lessons learned, the partnership jointly developed recommendations for action on digitization in vocational training for decision-makers from business, vocational training and the regulatory level (educational politicians, administration).

Creation and consistent implementation of existing digitization strategies are in demand

Young people are overloaded with knowledge. The problem today is not the access to knowledge, but the access to digital knowledge. According to the school survey conducted by the European Commission in 2019⁹ in partnership with IPSOS and Deloitte and the Eurydice report on digital education, less than 1 in 5 European students attend schools that have access to high-speed internet (over 100 mbps). In the EU at ISCED 1 access 11% of students have access to high-speed internet, and at ISCED 2 and 3, 17% and 18% respectively.

The proportion of students attending schools with wireless LAN access varies greatly across Europe, ranging from 46% (ISCED 1) to 52% (ISCED 2) and 67% (ISCED 3). Only 8% of students attending schools located in rural areas or small towns have access to high-speed internet.

Eliminating these grievances will require active action by policy decision-makers in each country, including installation of funding programmes and consolidation of digitization strategies for the schools.

As good practice, the “National strategic framework for digital maturation of schools” of the Republic of Croatia is to be mentioned. This Strategy attached great importance to the introduction of information and communication technologies in education. In addition to investing in the development of e-infrastructure and access to broadband Internet and the purchase of necessary ICT equipment, it has developed many other measures for the development and expansion of e-learning and other modern teaching methods using ICT, and the availability of 50% educational content in digital form by 2020. in accordance with the adopted standards.

The strategy defines four strategic areas: (1) digital maturity of environment, (2) digital maturity and confidence of teachers, (3) supporting learning and teaching using ICT and (4) data-based leadership and decision making.

⁹ For details, see the Eurydice Report: “Digital Education at School in Europe” 2019 (<https://eurydice.eacea.ec.europa.eu/publications/digital-education-school-europe>) and the European Commission’s 2nd Survey of Schools: ICT in Education (https://ec.europa.eu/information_society/newsroom/image/document/2019-10/ictineducation_objective_2_report_final_4688F777-CDED-C240-613EE517B793385C_57736.pdf)

Monitoring of the Strategic Framework includes:

1. Monitoring school and teacher practice in schools, and collecting relevant feedback from the field on the needs of users in the system;
2. Monitoring of emerging technologies and new discoveries related to their application in education;
3. Redefining goals and indicators according to needs.

The schools are still not sufficiently equipped with digital devices.

Teachers consider the insufficient number of tablets, laptops and notebooks to be the most important obstacle to the use of digital technologies in schools. In the EU, there are on average 18 students per computer (desktop, laptop, notebook or tablet) at ISCED level 1, 7 at ISCED level 2 and 8 at ISCED level. The percentage of students in the EU who use the internet at least once a week varies from 68% (ISCED 2) to 73% (ISCED 3).

This corresponds to the findings of the Bertelsmann study “Monitor Digitale Bildung: Berufliche Ausbildung im digitalen Zeitalter”¹⁰ made already in 2016. VET teachers said that the costs of procuring, operating, and maintaining digital teaching and learning materials as well as equipment and infrastructures are a major challenge and unsolved problem for vocational schools and training companies. Obviously, the situation did not significantly improve in the last years, widening the gap between the technological innovations in the industry and the digital content in the VET curricula.

Use of ICT for teaching in VET

Still, too few teachers use information and communication technologies for teaching. Moreover, the In the EU, the percentage of students taught by teachers who use technology ICT for at least 25% of their lessons varies from 71% (ISCED 1) to 58% (ISCED 2) and 65% (ISCED 2). COVID has provided an enormous boost to digitization of teaching materials and to the development of skills among teachers to use this as well. What is missing is a paradigm shift in the mind.

Here, training for teachers is essential. They are the main drivers of ICT integration into the teaching process. In order to provide an opportunity for the exchange of good practices and self-reflection of teachers, a continuous development of the community of practitioners shall be supported and teachers shall be encouraged to network and share good practices through various communication channels.

However, greater flexibility is required in planning the content and a great deal of openness when naming problems and gaps in skills if you want to reform the existing structures within the vocational schools. Apparently, this is not the case at all levels. The goal that has now been aspired to at national level - "digital vocational training" sometimes encounters resistance at the local level from the less affine training or administrative staff. Apparently, being open to new things is not something that can be given as a guideline from above.

¹⁰ Monitor Digitale Bildung: Berufliche Ausbildung im digitalen Zeitalter. Bertelsmann Stiftung, 2016 (<https://www.bertelsmann-stiftung.de/de/unsere-projekte/teilhabe-in-einer-digitalisierten-welt/monitor/ausbildung>)

An important goal is therefore to convey teachers, which applications support their didactic goals in order to be able to use digital media even more professionally and purposefully and thus increase their positive effects.

The new Teacher Training Ordinance “Lehrkräftefortbildungsverordnung” (FBLVO) in Germany should be mentioned as a good practice. The FBLVO came into force on August 1st, 2022. In particular, it states the obligation to provide in-service training in certain areas and a minimum amount of in-service training of ten hours per school year, whereas in-school in-service training measures of up to five hours can be considered. For the school year 2022/2023, the overarching in-service training focus is on "Competences for living in the digital world". Inherent focal points of further training are media competences, competences for political maturity, competences for inclusive and social learning in all-day schooling as well as mathematical and linguistic competences, with due consideration of individual learning needs and heterogeneous learner groups.

The lack of investment in further education and training of employees hampers progress in digitization

Another reason for the serious competence gap results from the nature of investments that have so far taken place in larger cities. What is important here is the willingness of companies to settle in different regions and to invest in further education and training of their employees. The Dutch government's programme, which aims to make all companies in the logistics industry "digital ready", serves as a good practice. The Digital Infrastructure Logistics programme includes several work packages. The foundation being pushed by the Port of Rotterdam Authority is the development of a basic data infrastructure for the Dutch logistics sector. The aim is to set up a chain of co-operations and instruments that enable problem-free communication for the entire logistics area and guarantee the secure exchange of data.

Developing a public education infrastructure for learning

People in professional practice are expected to adapt quickly to new technological developments. This increases the demand for permanent development and schools. The educational infrastructure of VET is a good basis for shaping lifelong development. These broad developments place demands on the digitization of education and educational organizations. Digitization is a necessary condition to achieve the above goals. At this point the VET-schools need support from the regulatory level and policy decision-makers, e.g.

- National and regional ministries, such as the Ministry of Education and Science, the Ministry of Economic Affairs, the Ministry of Climate (especially for compliance with climate protection tasks for logistics transport)
- Education councils
- Chambers and Guilds
- Teacher Training Institutes.

For Teachers

Making interactive teaching and learning effective

Teaching using digital media create an incentive, but this incentive must be redeemed to be attractive for the learners. The teacher has to offer added value for the learners, e.g., for exam preparation or for exchanging ideas with other trainees. Otherwise, there is a risk of demotivating the learners.

But, interesting interactive teaching is not witchcraft. Good preparation is important. The following tips may be helpful:

- Online courses should not be too long. And not too many in one day.
- For a smooth course, formulate clear rules for participants in advance - e.g., mute the microphone, ask questions only in the chat.
- Adjusting the schedule is necessary - time for feedback or homework, for example, should be taken into account.
- Sufficient time should be allocated in each course for discussion and exchange among participants. Participants can work in groups, ask quizzes, use the chat function, etc. This promotes positive energy.
- Each unit should be concluded with a test - Google forms or Socrative, among others, are suitable for this.

There are numerous programmes on the market, for beginners e.g. MS Teams is well suitable. The program has extensive help functions. There is also a large video database (link to Youtube). This can also be used to work on projects. Furthermore, the smartphone is a helpful tool to support interactive teaching.

Teacher competences

Regular teacher trainings are very important. Traditionally, most VET teachers obtain their qualifications in digital learning mainly through self-study. Although there are relevant training and continuing education programmes, only about half of the teachers make use of them. School principals also rate self-study as a suitable qualification measure for teachers¹¹. However, this quickly reaches its limits when it comes to technological innovations. For being really effective, such training is best to be organised per team by task and education department, moderated by an expert of the industry and offering room for exchange. Above that, international cooperation and school networks may improve both the availability of learning offers for the teachers and their motivation to get engaged with the new technologies.

¹¹ See Monitor Digitale Bildung: Berufliche Ausbildung im digitalen Zeitalter. Bertelsmann Stiftung, 2016 (<https://www.bertelsmann-stiftung.de/de/unsere-projekte/teilhabe-in-einer-digitalisierten-welt/monitor/ausbildung>)

For VET-Institutions

Digital Maturity of Schools

For any VET institution, a framework, agenda or action plan is a pre-requisite for a consistent and effective digitalization process. Ideally, it is based on a digitalisation strategy of the regulatory level defining key indicators and providing guidance in terms of approach, tools and funding. An example is given by the Croatian Academic and Research Network CARNET, in particular with their programme “e-Schools”, covering the development of a pilot for a system to make schools digitally mature¹².

The overall objective of the e-schools programme is to contribute to the capacity building of the primary-school and secondary-school educational system in order to allow students to be prepared for the labour market, further education and lifelong learning. Key elements are the adaptation and improvement of both the school operation processes and teaching processes.

In digitally mature schools, the appropriate use of information and communications technologies (ICT) contributes to the following:

- an efficient and transparent management of the school;
- the development of digitally competent teachers prepared for the application of innovations in their own pedagogical practices and;
- the development of digitally competent students, who are prepared for a continuation of their schooling and competitive on the labour market.

A purposeful use of the benefits of available information and communication technologies in the school – including data-based leadership and decision making will largely contribute to a continuous improvement process of VET practice – enhancing the quality of teaching and learning and the attractiveness of the education for school leavers.

In this respect, an important element is to set up and promote good cooperation within education, VET education and other parties such as academia or business representatives.

Digital Literacy and learning resources

Students are expected to develop topical knowledge and skills. Digital literacy is one of the basics that a student needs nowadays to participate in modern society and succeed in a future career. Education, teachers and schools aim to prepare students for the digital future.

Education is aimed at developing the talents of young people. For many young people this is a journey of discovery. Making choices at a young age is difficult. This requires good guidance and transfer from pre-vocational secondary education. But also for greater flexibility in the training itself. It is also in the interest of young students that the transition to further education or professional practice goes smoothly.

¹² <https://pilot.e-skole.hr/en/>

Teachers, who use more digital learning resources, tests and applications in their lessons, offer more opportunities for different teaching materials. This promotes a tailor-made education for the students. Due to the workload, the growing challenge of finding enough qualified staff to fill the education vacancies, and the urgent and ongoing need to provide quality distance learning.

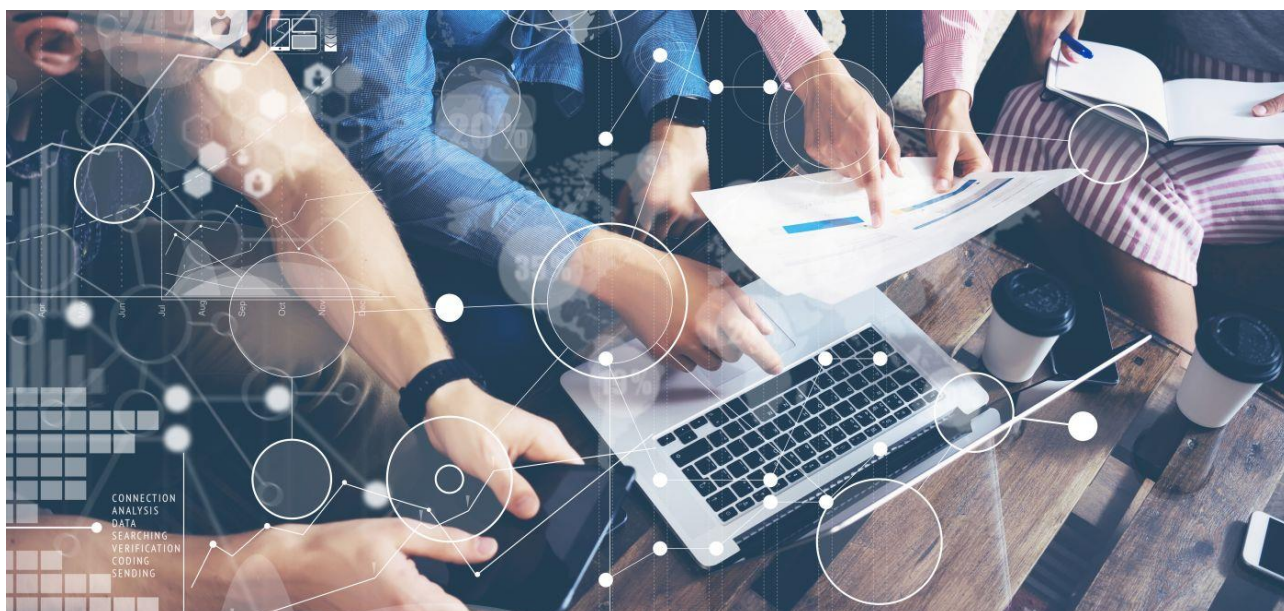
Identification of training needs and qualification of teaching staff.

The challenge for the VET schools is to develop a suitable environment and school culture that motivate teachers to enrich their digital skills, to improve the use of digital learning in the classroom and to encourage them to further develop and exchange knowledge and experiences with colleagues.

If innovations for digitization are to be applied in the training of logistics specialists, this is not possible without profound qualification of the teaching and training staff. Such a qualification must cover both technical content and didactic implementation. From a technical point of view, it can be assumed that most teachers did not learn this in their own training because the technologies did not yet exist.

However, informally acquired knowledge, skills and competencies do exist. Younger teachers often already have relevant ICT competencies in some areas, but often have problems in the didactically adequate implementation for the respective learning level.

However, experience with learning management systems (LMS) is rare. Therefore, a comprehensive survey of the current competencies of teaching staff in ICT and didactics in e-learning/blended learning and the identification of specific training needs are required (see also recommendations regarding teaching skills above).



Another finding from the Bertelsmann study was the unused potential of digital media for the benefit of disadvantaged trainees. Digital learning applications offer many opportunities for targeted support of apprentices with learning difficulties, people with disabilities, or people whose native language is not German.

The provision of appropriate tools holds significant potential for improving instruction and makes training more attractive specifically for these target groups. In the wake of an increasing shortage of skilled workers, this is an urgent task. However, this has not been realized to any significant extent to date. One main reason is the lack of inclusion competence in dealing with digital media. For this, vocational schools need support from academia - another argument for increased cooperation between vocational education, higher education and research. Here, the recommendation addresses the installation of cooperation contacts with universities and/or research institutions in the sector, ideally supported through national or EU funding instruments.

Outlook

The belief is that well-considered digitization in education – particularly in the VET sector - can optimize contact times, use of space in schools and opportunities to provide young people with tailor-made, personalized education of the highest quality. Technological developments constantly require adaptation of the educational content. All professions have to do with digitization. In addition, new professions or new content are appearing faster and faster. Some of the existing professions will disappear within a few years.

ANNEX 1: Good Practice of STC

Embedding technological innovation in vocational education

To keep teachers' knowledge of the professional practice and the technological developments in it up to date, we follow different paths. Below is a brief summary of some of the efforts:

(International) internships for teachers	International internships for teachers are made possible with the help of Erasmus+ grants. These internships offer an opportunity to tap into rapid technological developments in the logistics industry.
Industry committees	<p>Industry committees (e.g. BTC in NL) that always have a say in the education program, play an important role in the connection between educational programs and the continuously developing professional practice.</p> <p>In addition to making the (changing) wishes and requirements of employers known to employees of the future, they also provide the school with insight into current developments and innovations in the sector.</p>
Sharehouse	STC has a rich track record in the field of (subsidised) projects that are carried out in broad consortia. In this way, the attention for innovation is linked to objectives that are relevant for education, research and business. Robotization, digitization, cobotization, etc. With a scientific research institute and a physical research location in the school, where students play an active role in carrying out the research, we have literally brought innovation in-house. Various projects are underway in which efforts are being made in collaboration with the business community to arrive at newer, more innovative, more practical and more experience-oriented education. STC's motto is "I hear and I forget, I see and I remember, I do and I understand" (Confucius). With its multi-year strategy, STC focuses on effective vocational education that prepares students as well as possible for their future work practice. 21CC as a partner of the sharehouse project immediately ensures a lot of attention for innovative teaching material that is directly linked to research results and the logistic VET education that STC offers.
Aviation Services	The training courses for aviation services (cargo specialist, aviation operations specialist, supply chain planner and logistics supervisor (all VET level 4) offer more and specific choices, which are tailored to the needs of aviation logistics. Supply chain manager and logistics supervisor have a shared base year, to enable students to make a more targeted choice and to switch profiles when this better matches their talent and ambition or the job opportunities in the market.
Droning	...for students and teachers. Since STC offers the elective part 'droning' as part of logistics training (warehousing), it has been decided to also offer teachers the opportunity to take this educational program.

ANNEX 2: Bibliography & Recommended Reading

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OSZ Logistik, Touristik und Steuern (LOTIS)
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University in Zagreb (FPZ)

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Editors

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