Analysis of digital education in the VET system of the Republic of Moldova
Disclaimer

This report was prepared for the Ministry of Education and Research of Republic of Moldova by Veronica Midari (external expert) with the support of Fabio Nascimbeni, Human Capital Development at the ETF.
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Preface

The information for this report was collected during the survey applied for entire VET system from Republic of Moldova in autumn 2023 and from the interviews carried out with the most important stakeholders from the education system. The structure of the survey and interviews followed the ETF Digital Education Reform Framework.

The survey was delivered via Google Forms. Out of 90 VET institutions, 63 participated in the survey. The data were validated during the workshop organized on 28th of November 2023 with 10 VET institutions that were selected out from Centres of Excellence, Colleges and Profesional School. Two representatives from 10 VET institutions were invited for validation of the survey results. The information below represents a result of VET system survey and the validation process.

The interviews were organised in semi-structured following the European Training Fund Digital Policy Framework and the main questions addressed to decision makers. More than 10 interviews were carried out with representatives of Ministry of Education and Research and representatives of agencies that implement reform in education.
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1. Digital education within VET institutions: results analysis, existing policies and recommendations

This section presents the findings of the research within the nine policy areas of the ETF Digital Education Reform Framework. For every area, the results of the survey are presented together with some indication of the existing policies in the country, followed by some recommendations.

1.1 Digital infrastructure

In terms of connectivity, The internet coverage of VET institutions is quite high: two thirds of VET Institutions are covering 80% of their infrastructure with internet connection, almost one third of institutions are covering 50% of infrastructure with internet and less than 10% covers less than 25% of institution infrastructure.

![Infrastructura digitala In Instituția noastra internetul acoperă](image)

In other words, in all VET institutions on average two thirds of study blocks and workshops are covered with internet connection. Centres of Excellence are in a better condition (71,4% on average), followed by Professional Schools (68,5% on average) and Colleges with a coverage of 63,2%. The situation with internet coverage of VET institutions is quite good, because all VET institutions are connected to optic fibre and the only aspect the school management should take care of is development of internal cable networks or installation of routers.

**VET institutions feedback:** the connectivity depends on the package of Internet services that is bought by the institutions. Usually, one institution is buying 3-5 packages. Institutions should secure at least 3000 MDL per month to pay Internet services. In order to keep the Internet traffic, the access to Wi-Fi schools’ administration have a establish a specific regime that limit the access of students to Internet. This happens during the breaks, and this does not affect that education process. VET institutions are also contracting maintenance services to keep the Internet connection in good condition. This implies an additional cost that the institutions should take care of. In almost 50% of schools, teachers apply for technical problems solving to a person called technical support staff, in 22% of cases, they apply to teacher of Informatics, only in 15% of cased teachers apply to another digital competent teacher. VET schools are equipped with technical support staff. In almost half of VET institutions teachers apply to that person for solving technical issues.

**VET institutions feedback:** VET institutions have in their organisational chart the position of technical assistant (laborant tehnic). This person is responsible only for hardware and networks. Everything that is about software is not in his responsibility. When issues are emerging about the software, then
teachers with digital experience or teacher of informatics are asked to solve the difficulty. In the future it is foreseen to include in organisational chart the position of software system administrator (administrator de sisteme software). It is important to have within each institution the Internal Regulations on digitalisation: instructions, procedures, steps. CEITI has develop for their own institution this Regulation and is willing to share with other institutions.

Digital repositories developed by VET institutions do not exist, 39,7% of VET institutions state that they developed partially their own online repository. Most often these are institutions that are using Moodle or the website of the institution for posting learning materials for students. There is not a common repository for VET learning materials that all VET institutions would be able to access. Individual institutions are using their own repositories (39,7%) where there is access only for institution teachers and students. However, this is not common for the entire VET system.

VET institutions feedback: in almost 70% institutions there are no repositories. The existing repositories belong to individual institutions, and they are secured. But no sharing of information between VET institutions network is happening. There is one precedent in the VET system, when CEITI shared the exam items with those institutions that provide IT qualification, opening new Moodle accounts for students from other institutions. But this was one off activity.

What it comes to digital equipment, around 50-60% of computers within VET institutions are outdated. There is a big problem to procure new computers, because there is no budget line for that purpose. All new computers were bought with the support of donors and technical assistance projects and from modest savings from the institutions’ budget. The disposal of outdated equipment is a problem because there are no places where old equipment could be stored. Thus, VET institutions end up having a lot of equipment that is outdated. Software used in the schools are not licensed. On one hand, this is a good solution, because it does not cost money, on the other hand, installing the licensed application means reinstalling the antivirus each year. However, for some professionals specialised software is needed. Unfortunately, institutions do not have resources to pay for them, unless some projects are supporting them with this issue.
Policies related to endowment of schools with equipment

Minimum standards for equipping vocational education institutions with digital resources was approved by Ministerial Order 1043/2015\textsuperscript{1}. The minimum standards include separate features for 3 types of classes: Class for IT course units; Multimedia Chair of the Ordinary Class Teacher, Multimedia Office of the Management Board of the Educational Institution. The focus is on classes of Informatics that should ensure that each student has a computer. Other classes are not foreseen with computers, apart from one that is used by the teacher. A smartboard and printer are required for all the study classes. A new UNICEF project plans to update in 2024 the standards for endowment of classrooms with digital equipment. The Ministry of Education and Research is monitoring the number of computers per school via the Education Management Information System (EMIS), and the same information is collected by the National Bureau of Statistics. Close monitoring on how outdated the computers are in schools is not performed.

Recommendations

- An inventory of digital equipment of VET institutions should be carried out
- The new standards for endowment of classrooms with digital equipment, as planned in UNICEF Global Partnership for Education Project, should be used
- A list of specific professional applications should be compiled and solutions for registering these applications should be organized in partnership with businesses from specific sectors of industry and Sector Skills Committee.

1.2 Digital competences of educators

Digital competences of teachers within VET institution are developed via informal mutual support between teachers – 68.3%. 17.5% of respondents mentioned that digital competences in their institutions are not developed at all. Only in 14.5% cases the VET institutions there is a program/schedule known by all teachers that could be accessed for development of digital competences for teaching process.

Competentele digitale ale CD în institutia noastra se realizează instruirea CD privind formarea competentelor digitale pentru procesul de predare-invatare

63 responses

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Chart showing the distribution of digital competence development methods.}
\end{figure}

VET institutions feedback: Indeed, the biggest support in development of digital competences teachers get via collegial mutual support within the school.

\textsuperscript{1} https://MoERc.gov.md/sites/default/files/ordin_1043_din_29.10.15.pdf
VET teachers need support in development of capacities for elaboration of digital learning materials (68.8%) and for learning digital assessment tools (66.7%). Also, teachers mentioned that they need support in management of digital learning information (64.7%) and capacity for keeping it on the cloud (60.8%). Less support teachers need in using platforms for running lessons online (27.5%) and digital communication via computer or telephone (19.6%), since these skills were developed during pandemics.

![The share of needs for strengthening digital competences of educators in VET, 2023](image)

**VET institutions feedback**: teachers confirmed that the most important skill that is missing in the system is competence related to digital assessment and cloud storage capacity. For some teachers, the development of digital learning materials continues to be a difficulty requiring a lot of time.

**Policy related to digital competences of educations**

There is a long history of development of teachers’ digital skills via continuous education courses that teachers should take to get certified according to Regulation for the attestation of teaching staff in general, vocational, and technical education and within psycho-pedagogical assistance structures (once in 5 years’ time). IT training courses are provided by many training providers across the country. However, the courses are not provided by level of competence. Specific certification on digital competence is not issued.


In September 2023 Moldova Education system adopted the EU tool DigCompEdu\(^3\). DigCompEdu is directed towards educators at all levels of education, from early childhood to higher and adult education, including general and vocational education and training, special needs education, and non-formal learning contexts. This updates the digital competence standards for teachers and puts them in line with EU policies.

**Recommendations**

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\(^3\) [https://mecc.gov.md/sites/default/files/ordin_competente_digcompedu_compressed_1.pdf](https://mecc.gov.md/sites/default/files/ordin_competente_digcompedu_compressed_1.pdf)
Development of digital competences of education should be developed via continuous education. Regarding continuous training courses, the main training providers for the VET system could be CEITI – Centre of Excellence in Informatics and Information Technology. They can cooperate in this sense with other digital training providers, like Class of the Future, Universities, CTICE, National Institute for Education and Leadership.

The training could follow the developments that are planned to be done within UNICEF Global Partnership for Education Project and namely: development of assessment tools for identifying the level of digital competence of teachers (A1-2, B1-2, C1-2), development of curricula for specific training of teachers per levels of competence (A1-2, B1-2, C1-2), awarding digital competence certification for teachers, and making these curricula mandatory for all continuous training providers.

1.3 Digital capacity of schools

The school capacity to assess teachers’ progress in using digital methods of teaching is low. In almost half of the cases there are some tools in the institutions for assessment teachers’ digital competences. In 42.9% institutions recognized that there are no methods/practices for assessment of teachers’ digital skills.

Without specific mechanism of assessment of teachers’ capacity of using ICT tools in teaching process, it is hard to measure in general the effect of training and progress of digitalization in the schools. A little bit less than half of VET institutions recognized that there are no methods/practices for assessment of teachers’ digital skills.

**VET institutions feedback:** the most efficient way of measuring the digital competences of teachers is a unified questionnaire that could be applied across the VET system. The way of motivating teachers to develop digital competences is the assessment of progress. This procedure happens once per semester when the management is measuring the performance of personnel. Teachers with the best performance get a 10% salary increase. However, teachers consider that this tool is not a motivation leverage since teachers’ salary is low and the increase is not significant.

Almost in half of the schools (46.2%) the **assessment of digital progress** is done based on free discussions, without using any indicators and based on non-formal approach (12.8%). In 33.3% of the institutions are using once a year a questionnaire to analyse the situation. Only in 7.7% of institutions there is a monitoring system with indicators that is used for following the progress.
VET institutions feedback: A unified questionnaire applied across the system could be a good solution for measuring the digital processes of institutions. SELFIE tool could be a good solution.

Policies on supporting digital capacity of schools

Government Decision No. 601 of 12-08-2020, updated in 2023, regards the approval of the concept of the Management Information System in Education, specifying the way input of data should be done by the schools’ representatives. Schools provide input to EMIS 3 times a year. This task is performed by Education Management Information System (EMIS) schools’ administrators. EMIS is a tool that the Ministry of Education and Research is developing since 2015 as an important mean to handle the statistical data in education system. EMIS contains separate modules for different levels of education: pre-school, general and VET. It stores various data on every element of the educational process, making it possible to analyze the educational system from different aspects and incorporate such data into evidence-based policy- and decision-making. With the obligation to use Electronic Register and Electronic Agenda, the schools will adopt the culture of using electronic devices constantly. This is another important aspect after introducing the Electronic Admission into VET system that make teachers obliged mastering digital skills.

Recommendations

- Provision of training courses in digital pedagogy and digital management for school administration and teachers at the availability is very important during the transition from traditional way of administration and teaching. Demonstration of success stories in this sense is a good strategy.
- Cooperation among schools that are affiliated to a specific Centre of Excellence and strengthening the network based on sharing the experience and having common training courses is a strategy that would support a double objective, of digitalization and of networking.
- The constant use of Electronic Register and Electronic Agenda should be encouraged by the school’s administration. Training sessions for development of skills for using this application should be organized at the VET system level.

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https://www.legis.md/cautare/getResults?doc_id=135904&lang=ro#
1.4 Digital pedagogies and curriculum and Digital education resources

Digital education resources of high quality and accessible, possibly through open licenses, are a key component of digital education: their use as well as the capacity of educators to produce and curate them should be fostered. In the case of Moldova, between 70-80% of teachers of general education disciplines are using digital materials during lessons.

Teachers of professional education are using digital materials in proportion 60-80%. The share of teachers of professional education developing digital learning materials is 40-55%. A critical percentage of teachers of professional education are using and developing digital learning materials (60-80%).

Instructors of professional education are using digital materials in proportion of 25-55%. The share of instructors of professional education developing digital learning materials are 18-45%. Although the share of instructors of professional education that are using and developing digital learning materials is compatible lower, still their proportion is quite impressive. In many cases, especially in hands-on subjects, instructors do not need to use digital tools for developing professional skills with students.

As a general conclusion the share of teachers of general education and those of professional education is almost the same regarding the use of digital learning materials and gets up to two thirds of teacher personnel, more than 60%. The share of instructors is twice as low as teachers in using digital learning materials. However, this is perfectly justifiable in conditions that some qualification during the professional skills development do not need to use digital means.

VET institutions feedback: digital education resources should be foreseen in complex: for (1) teaching, (2) learning and (3) evaluation process. The access of students after school hours to digital resources presented during the lessons by the teacher is crucial. If only during the lessons students are seeing...
these materials, that is not enough. The best way of using digital approach for evaluation is to use digital test for formative evaluation. From this aspect, another important issue is emerging, related to the quality of digital materials and their **systematization**. So far, there are no mechanisms for quality assurance of developed digital materials. Currently the MER approved the standards for learning materials in VET, with a set of criteria. So far, these criteria have not been applied. In general, in VET system there are no **Open Education Resources** available for teachers and students. Moldova is at the beginning of the process of unification of digital education resources, starting with the unification of curricula per qualification and unification of qualification exams. Digital education resources are developed by individual teachers and are not Open Education Resources.

**Policies on supporting digital capacity of schools**

In terms of policy related to provide curricula based on digital tools, it should be mentioned that all curricula under the **Methodological suggestions**, include the possibility and usefulness of using digital tools, digital training materials and online open sources for making the educational process more accessible. This is valid for general education disciplines, as well as for qualification disciplines. VET institutions are subjected to accreditation by qualification program and one of the **accreditation standards** is specifically addressed to use of ICT in education process: Accreditation standard 3. Student-centered learning, teaching and assessment (17.0 pts.) Institutions ensure that professional training programs are offered in such a way that they encourage students to have an active role in the learning processes, and student assessment reflects this.

The MER has the experience of posting educational PDF format materials on the website of CTICE. Now the MER is in the process of deciding on which platform the VET teaching materials will be posted. According to legal framework the responsibility to develop curricula, qualification exam items and training materials is with the Centres of Excellence. However, considering the fact that Centers of Excellence do not have staff specially dedicated to development of this information, this responsibility is not performed very well, exceptions are situations when projects are supporting the costs and offering assistance to professional both from business and VET institutions.

**Recommendations**

- Centers of Vocational Excellence should be supported to develop curricula, qualification exam and training materials for all the qualifications from their sector of industry they are affiliated to.
- The organizational chart of Centers of Vocational Excellences should be revised and specific positions for specific tasks that these entities are carrying out for the entire system should be included and budgeted.
- Complementary fund from the Ministry of Education and Research could be used for the development of digital training materials, accompanied by training sessions for all teachers from the system to be acquainted with the newly developed materials.
- A digital resources repository for the VET system should be developed. Is important to offer access to all the teachers and to students in different regimes. The responsibility for the repository could stay with MER or with CTICE. At the same time the responsibility to Centers of Excellence to deal with their own sector on development of curricula, exam items and training materials in digital format for the entire system remains the same.
- The MER should secure finance resources for those qualifications that need to be register of specific platforms that are in line with professional development.

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5 The reference documents are the following: SM ISO 29990:2016 Formal and non-formal education services. Basic requirements for education providers, Minimum standards for equipping institutions with ICT equipment in technical vocational education institutions (Order of the Ministry of Education no. 1043 from 29.10.2015), Regulations/instructions/guidelines regarding the use of ICT tools in organizing and conducting the teaching-learning-evaluation process and the list of electronic course units, placed on the platform, used by students in the professional training program (with the indication of the electronic address of the platform used).
1.5 Digital learning environments

Google Classroom is the preferred platform in VET system, used by more than half of VET institutions: 52.4% are using Classroom, 25.4% are using different platforms, 15.9% are using digital platforms very seldom, on the need. A very small share is using Moodle.

Policy supporting development of learning environments

There is no policy in this regard. Some VET institutions started using Moodle, but this was the decision of individual institutions, no requirements at national level in this sense. Teachers of general disciplines are using Google Classroom most often.

Recommendations

In the VET system, it is considered that Moodle is the most secure platform since it is administrated by the school, and could serve as a platform that keeps all the training materials, tests, communication with students. However, some of these institutions should administrate the platform. That is a big responsibility and for Centers of Excellence that do not have their organizational chart positions for these specific responsibilities. In this context, MER with Centers of Excellence should decide what platform should be taken as learning environment common for VET system.

1.6 Digital assessment

Digital assessment has the potential to support authentic, self-directed and peer learning and to multiply interactions with peers and professionals: by fostering formative and summative digital assessment practices, policies can have a strong impact.

Teacher of general disciplines are using: 38.1% Google Forms, 30.2% Classroom, 17.5% question in digital format. Teacher of professional disciplines are using: 33.3% Classroom, 30.2% Google Forms, 14.3% questions in digital format, 11.1% Moodle. 9.5% are not using digital assessment.
Half of the instructors are not using digital assessment, 23.1% are using questions in digital format very seldom, 15.4% are using Google Forms. In conclusion, around 30% of teachers are using Google forms and Classroom for digital assessment of students’ performance. Instructors are using digital assessment much less. However, the process of digital assessment is present in the system.

**VET institutions feedback**: indeed, the digital assessment is not widely used in VET system. The most used tool is Classroom and Google Forms. The best way of using digital evaluation is to use digital test for formative evaluation. This indeed helps memorising terms, definitions, understanding some aspects, phenomena, rules. The experience has shown that exams and final texts in digital format are not efficient and do not reflect the real knowledge of students. The digital assessment is most needed for qualification disciplines. For discipline of general education in colleges are used the projects development (teze).

**Policy supporting digital assessment of students’ competences**

The previous standards did not specify digital assessment as a separate competence. The newly approved regulation (DigCompEdu framework) provides the requirement of using digital assessment. The provision is stipulated in chapter 4 of the document. The implementation mechanisms and monitoring indicators are going to be developed by UNICEF Global Partnership in Education Project.

**Recommendations**

- Digital assessment should be introduced gradually, along the development of digital competencies of teachers. The recommendation is to use digital assessment mostly for formative assessment.

- Peer tests should be applied where students could assess themselves. This helps developing and acquiring knowledge in a playful way. For each qualification could be developed a pool of questions to be used as a final test after random selection.

- Final test also could be developed as an assignment that would be submitted in digital format. However, this decision should be taken in cooperation with specific professionals, because in some cases digital tests are not the best choice. For this purpose innovative teaching could be implemented, like project-based learning or problem-based learning.
1.7 Digital competences of learners

The level of digital competence of learners was assessed based on the results on discipline of Informatics. This discipline is optional in VET system. However, quite a high percentage of students got good digital competence in all types of VET institutions. This leads to the conclusion that for some students this discipline is rather easy, while for others (also a high percentage of students) this discipline is hard, and they get low performance.

The survey reveals that the percentage of students that a missing a computer / laptop / tablet is between 40 and 55 %. In conclusion, to deliver education based on digital pedagogy in conditions where almost half of the students do not have a digital device is not effective. Considering that the school is also not providing a device for each student during class hours, the objective of delivering digital pedagogy becomes difficult. This aspect is exacerbated with the fact that around 20-30% of students have low digital competences.

VET institutions feedback: for evaluation of digital competences of learners, clear criteria are needed. In the opinion of VET teachers, the best way of assessing the digital competences would be the Certification ECDL or CISCO. Teachers’ estimation is that students with low digital competences are around 50% and with high digital competences are around 20%. Indeed, the percentage of students that do not have a digital device is around 50-60%. So, the share of students that are missing the device is very high. At the same time all the students have mobile phones. So, communication and very simple education tasks could be done on these applications, but the entire education process is not possible to be organized in digital format.

Policies related to digital competences of learners

According to the standards promoted in 2015 at primary, gymnasium and lyceum levels, students have to be able to: Use of computer systems; Processing of text type documents; Creating and editing images; Elaboration, development, and dissemination of electronic presentations; Data processing with the help of tabular calculation tools; Use of the Internet; Communication in virtual environments; Development and implementation of algorithms; Organization and processing of information with the help of database management systems; Compliance with the norms of ethics and informational security. These competences mainly are developed in the Informatics discipline that is provided from the II to XII grade.

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**Recommendations**

- It is recommended to continue the implementation of curricula on Digital Competences in primary grades and Informatics at gymnasium and lyceum level, as well as in VET system as a mandatory discipline.
- The policy of “bring your own device” could be considered for some qualifications. This is especially valid for IT qualifications, Energetics and Electronics.
- The provision of devices for students that do not own a computer/laptop should be solved with endowment of computer lab in the institutions that are working long hours and allow students to make the home tasks.

1.8 **Digital credentials**

Digital credentials are a rather new area for digital education reform, which keeps receiving increased attention from the policy level due to the potential impact of micro- and digital credentials on increased employability and innovations in reskilling processes.

Recently (24.1.-2023) the MER approved via Ministry Order nr. 1326, a methodology that allows students from lyceum level/VET institutions to get highest grade without passing the exam in case of obtaining international certification of specific competencies in Informatics. This is supposed to be realistic if the student master quite well the Informatics curricula for the grade X-XII and is able for coding and programming.

**VET institutions feedback:** The best way of assessing the digital competences and to get digital credentials would be the Certification ECDL or CISCO.

**Policies related to digital credentials**

The certifications that are included in the document Ministry Order no. 1326 of international recognition for the certification of skills specific to the IT field, upon the promotion of which a grade of 10 can be granted ex officio, focus of the following:

<table>
<thead>
<tr>
<th>Programming Languages</th>
<th>Computer structure, networks</th>
<th>Database</th>
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<tbody>
<tr>
<td>- Java</td>
<td>- Networking</td>
<td>- Database</td>
</tr>
<tr>
<td>- Java Script</td>
<td>- Network security</td>
<td>- Database Analytics</td>
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<td>- Python</td>
<td>- Device configuration and management</td>
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<td>- HTML</td>
<td>- CISCO CCNA</td>
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<td>- CPA - C++</td>
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**Recommendations**

The MER approach, promoted recently in general education, should be supported in VET system. For this purpose, an information campaign should be carried out. More information could be collected from the companies that provide the certification and dissemination of information should be organized. This is especially valid for students that study IT qualifications.

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2. Summary of findings

As a general conclusion, it should be mentioned that the developments in General Education related to digitalisation of education process lead the way within the VET system. Most legal provisions related to digital pedagogy are developed for General Education and by default are expected to be replicated in VET system. At the same time the expectation that the teachers of general discipline would be more familiar with digital teaching tools were not confirmed: teachers of professional education are also using digital tools for teaching, this especially true for institutions that provide education for qualification connected to engineering, electronics and energetics, ICT.

<table>
<thead>
<tr>
<th>Area</th>
<th>Specific conclusions</th>
<th>Conclusion</th>
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<tbody>
<tr>
<td>Digital infrastructure</td>
<td>The connectivity of VET institutions is quite high. In the almost in 50% of schools' teachers apply for IT maintenance to a person called technical support staff. There is not a common repository for VET learning materials that all VET institutions would be able to access. Digital equipment is the most serious problem within the IPT system.</td>
<td>While connectivity is quite spread, costing is an issue, as well as digital equipment within VET schools.</td>
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<tr>
<td>Digital competences of teachers</td>
<td>Digital competences of teachers within VET institutions are mainly developed via informal mutual support between teachers. Teachers needs are still high and are focused on: elaboration of digital learning materials (68.8%), learning digital assessment tools (66.7%), management of digital learning information (64.7%), capacity for keeping it on the cloud (60.8%). Teachers need less support in using platforms for running lessons online (27.5%) and digital communication via computer or telephone (19.6%), since these skills were developed during pandemics.</td>
<td>Teachers do cooperate within the school for development of digital skills via mutual support, but they still need quite a substantial support in being confident and using digital tools more often.</td>
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<tr>
<td>Digital school capacity</td>
<td>Almost in half of the schools (46.2%) the assessment of digital progress is done based on free discussions: non-formal approach is used in 12.8%, while in 33.3% of the institutions are using once a year a questionnaire to analyze the situation. Only in 7.7% of institutions there is a monitoring system with indicators that is used for following the progress. Some mechanisms for teachers' identification of digital level of competences should be developed or taken from those institutions that already have something in place.</td>
<td>An internal mechanism for assessing the digital progresses of schools does not exist. SELFIE could be proposed for this purpose.</td>
</tr>
<tr>
<td>Digital pedagogy and curricula and Digital learning resources</td>
<td>Teachers of general education disciplines: 70-80% of them are using digital materials during the lessons, around 40-55% of them are developing digital learning materials. Teachers of professional education: are using digital materials in proportion to 60-80%, around 40-55% of them are developing digital learning materials. Instructors of professional education are using digital materials in proportion to 25-55%. 20-45% of them are developing digital learning materials. The frequency of using digital training materials depends on the subject: around 30-40% of both categories of teachers are using digital materials from time to time.</td>
<td>At least half (50%) of teachers of general disciplines and professional education are using digital learning materials. This is a good indicator for future development of digital culture of institutions.</td>
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<tr>
<td>Digital learning environments</td>
<td>Google Classroom is the most preferred platform in VET system, used by more than half of VET institutions.</td>
<td>VET system is in the phase of exploring digital platforms.</td>
</tr>
<tr>
<td>Digital assessment</td>
<td>For digital assessment of students competences teacher of general disciplines are using: 38,1% Google Forms, 30,2% Classroom, 17,5% are using questions in digital format. Teacher of professional disciplines are using: 33,3% Classroom, 30,2% Google Forms, 14,3% are using questions in digital format, 11,1% Moodle, 9,5% are not using digital assessment. Half of the instructors are not using digital assessment: 23,1% are using questions in digital format very seldom, 15,4% are using Google Forms.</td>
<td>These such as Google Forms and Classroom tools are good for formative assessment, while they are not recommended by VET educators for final tests.</td>
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<tr>
<td>Digital competence of learners</td>
<td>Digital competences of learners were assessed according to the academic results on the discipline of Informatics. The initial information, from different project reports, was that around 20% of students do not have electronic devices for educational purposes. The percentage of students that a missing a computer / laptop / tablet is between 40 and 55 %.</td>
<td>Polarisation exists between students with high digital performance and low digital performance.</td>
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<tr>
<td>Digital credentials</td>
<td>The authors of curricula for Informatics are stating that requirements of ECDL are included in this discipline. However, VET teachers do not fully support this idea. At the same time, MER at the end of 2023 approved a decision which stipulates the possibility to get certified by international validation centers on different computers skills, including coding and programming. This ensures that the highest grade is awarded by the MER while presenting the certificate with validation of competences.</td>
<td>In VET teachers’ opinion, the best way of assessing the digital competences and to get digital credentials would be the Certification ECDL or CISCO.</td>
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</table>
3. Digital education within VET institutions: analysis of critical factors

This section presents an analysis of the state of play of digital education in Moldova along the critical factors of the ETF Digital Education Reform Framework, as a way to dig into key transversal dimensions of digital education.

3.1 Data for policy-making.

Digital education policies should be based on sound evidence, and they should foster the collection and analysis of data according to international best practices; at the same time, policy-makers should be wary of how the data produced by digital education practices are collected, stored, and used.

In the Republic of Moldova the information about the situation in VET system is collected:

- via National Bureau of Statistics according to a predefined template and is presented once a year,
- Via EMIS (sime.md) where information from institutions at least 3 times a year should be updated. This is stipulated in the Government Decision No. 601 of 12-08-2020 regarding the approval of the Management Information System Concept in education.\(^8\)

In 2021 SELFIE in VET system was piloted across the system and information was gathered and analyzed at institutional level and on national level.

Once in 4 years' time all VET institutions submit to the Ministry of education their Strategic Development Plans that focus on the most important issues, including digitalisation.

An important source of information is also analysis of PISA results. The year 2022, when the last PISA test was taken, is revealing important data related to digitalization of education.

Having all this information and evidence collected at national level, the Ministry of Education and Research can make evidence-based policies, based on quantitative and qualitative information.

3.2 Digital inclusion

Tackling digital and educational inequality should be the key driver of any digital education reforms, encompassing the provision of basic digital skills and specific measures to ensure that digitalisation increases inclusion and accessibility of education and training, and not the opposite.

The Republic of Moldova adopted the GD No. 523 of 11-07-2011 regarding the approval of the Program for the development of inclusive education for the years 2011-2020. In the current year, the Government will approve a new Program for the development of inclusive education in the Republic of Moldova (for the years 2023-2027). The legal framework is addressing the aspects of inclusive education. VET system is specifically adapted to embrace marginalized layers of population via:

- offering education free of charge, without specific preconditions, offering accommodation for a price that covers only 15 percent of the real cost, offering 2 meals a day free of charge, offering textbooks and other learning materials.

Based on the results of survey, digital marginalization emerged in VET system due to the lack of digital devices for students coming from vulnerable backgrounds. Some actions to alleviate this phenomenon happened during the pandemics, but the current data are showing that around half of students do not have digital devices. They also do not have good digital competence.

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\(^8\) [https://www.legis.md/cautare/getResults?doc_id=122778&lang=ro](https://www.legis.md/cautare/getResults?doc_id=122778&lang=ro)
3.3 Stakeholders’ engagement

Policy design, implementation, monitoring, and evaluation should be an inclusive process that meaningfully involves stakeholders, including teachers, through various channels and in different phases of the policy process. The contribution of technology commercial providers should be carefully managed by the policy-maker. In the Moldovan VET system, the following stakeholders are actively involved in digitalisation process: World Bank, EU Delegation, UNICEF, Pestalozzi, and entities like Class of the Future within Pedagogical State University, Tekwill within Technical University of Moldova, USAID with Future Technologies Project. All of them are supporting the digital education sector and its workforce and promote through the education system the idea of development of digital and programming skills, as well as capacities for getting international certifications. ATIC (association of ICT companies) is a leading association and the voice of the Moldovan ICT industry that promotes the development of the ICT sector in Republic of Moldova through viable partnerships between companies, similar organizations, government, state institutions and international organizations. This organization, via technical assistance projects, is supporting the VET system in the development of qualified workforce. At the same time, should be mentioned that ICT companies are not very actively involved in the process of digital education.

In 2010 the Moldovan Government engaged in the e-Transformation process to streamline the governance through intensive use of information technology. For this purpose, in August 2010 the State Chancellery established the public entity e-Governance Agency - a team of professionals with an innovative and systemic approach towards the modernization of public services to bring the Government closer to the Moldovan citizens. Its mission is to achieve good and efficient governance, responsive to the citizens’ needs, achieved through smart investments in information technology and its extensive use9. The role of the Agency within VET should be explored and eventually strengthened.

3.4 Financing

Available financial resources should be carefully planned, with attention given to sources’ differentiation and sustainability. Innovative funding mechanisms, also with the participation of commercial actors, should be explored, ensuring that all parties involved, such as learners’ families, are considered.

While financing is a critical enabler for the digitalization of the VET system, it is important to recognize that mere financial resources are not sufficient, and a holistic approach is necessary. This involves strategic planning, differentiation of funding sources, sustainability considerations, exploration of innovative financing mechanisms, and the inclusive participation of all stakeholders, including learners’ families. By adopting such a comprehensive strategy, the digitalization efforts can be more resilient, impactful, and responsive to the evolving needs of the education system. At the same time, the UNICEF Global Partnership Project in cooperation with EU Delegation in Moldova, as well as the World Bank General Education and Higher Education Projects are focused on digital pedagogy. The projects plans foresee the revision of standards, training of teachers, endowment of classrooms, revision of initial training of teachers, revision of students’ curricula. VET system is not directly part of these projects, apart from 6 VET institutions with pedagogical profile, but the developments will influence the whole education system.

3.5 Quality assurance.

An adequate mechanism for digital education quality assurance should be established, integrating new dimensions into the existing system to generate swift feedback rounds and immediate programme adaptation, to guarantee equity and innovation in a technology-neutral way. VET institutions are subjected to accreditation by qualification program and one of the accreditation standards is specifically addressing to use of ICT in education process. Accreditation standard 3. point 3.1.3.

9 https://www.egov.md/en/about-ega
requires: The use of ICT tools in the teaching-learning-evaluation process. The reference documents to which reference is made are the following: SM ISO 29990:2016 stipulating the basic requirements for education providers like Minimum standards for equipping institutions with ICT equipment in technical vocational education institutions (Order of the Ministry of Education no. 1043 from 29.10.2015), Regulations/instructions/guidelines regarding the use of ICT tools in organizing and conducting the teaching-learning-evaluation process and the list of electronic course units, placed on the platform, used by students in the professional training program (with the indication of the electronic address of the platform used). Although the accreditation standards require ICT use in the education process, the minimal use of digital education is accepted. Another mechanism for quality assurance is the Methodological key aspects in the development of the manual for technical professional education developed by MER in 2023. This document is under Transparency procedure, being planned to be approved in the nearest future. It presents a list of quality criteria for digital textbooks for VET system. In general, the quality assurance mechanisms are not very well developed concerning digital training materials and use of ICT in education. More efforts are needed to ensure good quality in this sense.

3.6 Environmental sustainability.

The environmental impact related to the introduction of digital practices in education should be kept in mind, to allow future-looking digital education reforms to fit environmentally sustainable standards and to foster the emergence of green and digital skillsets among learners. The education system does not have a scheme for outdated digital equipment disposal. In this sense, the MER should propose a mechanism for this purpose. The VET schools’ managers are complaining about having around 50% of outdated digital devices that are very slow and are not able to accept new applications, but at the same time they are on the inventory list of goods.

3.7 Teachers and learners’ wellbeing.

As shown by the COVID-19 experience, introducing digital education can have a negative impact on the mental and physical wellbeing of teachers and learners. These risks should be taken into account by digital education initiatives, instilling virtuous circles of wellbeing support and development.

In the case of Moldova, the main risks are the following:

- Data Breaches: The collection and storage of personal information in digital education platforms may be vulnerable to hacking and data breaches, posing risks to the privacy and security of students and educators.
- Ethical Use of Data: Ensuring that data collected is used ethically and in compliance with privacy regulations is crucial for maintaining trust and wellbeing.
- Screen Time Issues: Excessive screen time can lead to digital fatigue, eye strain, and other health concerns, negatively impacting the overall wellbeing of learners.
- Mental Health Impact: The isolation associated with prolonged digital learning may contribute to mental health issues, such as anxiety and depression.
- Limited Teacher Training: Inadequate training for educators in the use of digital tools and teaching methodologies can hinder the effectiveness of digital education initiatives.
- Resistance to Change: Resistance among teachers to embrace digital methods can impede the successful implementation of initiatives.
- Technical Issues: Technical glitches, internet outages, or platform failures can disrupt the learning process and contribute to frustration.
3.8 Foresight

Digital education is rapidly developing, in terms of emerging technologies (such as AI or ‘metaverse’ technologies) and innovative teaching approaches, such as competence-based learning and formative assessment. To be able to anticipate these developments and to take informed decisions among the many existing digital solutions, including commercial applications, policy-makers in charge of digital education must invest time in being exposed to the current debates on digital education, by attending conferences and joining policy networks in the field, such as the DELTA Group by the European Commission10.

4. Summary of recommendations for digital education in VET system

The summary of recommendations was compiled on the information collected via the survey and via the interviews, as well as via consultation of national legal documents and reports available about digitalisation of education system. As a general conclusion that also determines the recommendation is that the leader in digital pedagogy is General Education from the point of view of formulation of legal and normative acts.

<table>
<thead>
<tr>
<th>Policy area</th>
<th>Recommendations and specific actions to be taken</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Digital infrastructure</td>
<td><strong>Updating the standards for equipping</strong> the classrooms with digital devices with establishment of technical specification for equipment.</td>
<td>The digital infrastructure subject should be solved at national level with direct involvement of Ministry of Education and Research.</td>
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<td></td>
<td>Decision on “bring your own device” policy should be taken. This should be the decision of individual institutions. For example, the Center of Excellence in ICT is already implementing this policy for IT qualifications.</td>
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<td></td>
<td>Make the <strong>inventory of digital equipment</strong> that exists in all VET institutions. Quantify the equipment that is outdated and does not correspond to the requirements.</td>
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<td>Organize a <strong>scheme for outdated equipment disposal</strong> via Ministry of Education and Research. This action should be accompanied by the development of a storage place for all outdated equipment and accountant documents delivery.</td>
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<td></td>
<td>Make an enquiry for <strong>identification of students that do not have the digital equipment</strong> and need support within the institution.</td>
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<td>The VET institutions should <strong>develop a computer lab</strong> with enough computers for students that do not have the possibility to acquire their own computer/laptop. This place should be open until late evening allowing students to do assignments, tasks, and the development of digital skills.</td>
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<td></td>
<td>Develop a <strong>scheme of endowment of VET institutions with digital equipment</strong> at national level. This scheme should prioritize those qualifications that need this equipment as a priority for the development of professional skills. Donors and investment projects should be involved in this exercise.</td>
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<td></td>
<td>Include in the normative act the provision on the <strong>percentage of institution budget that would be allocated for procurement of digital equipment</strong>. Currently the institutions’ budget is not addressing this issue.</td>
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Mobilize schools to develop good internal network and installation of routers for good coverage with Wi-Fi. Schools can apply to internet providers to facilitate this action and even to endow 1-2 places (hall, library, office) with necessary equipment.

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<tr>
<th>Digital competences of teachers</th>
<th>Updating the standards for digital competences of educators</th>
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<td></td>
<td>Develop of assessment tools for identifying the level of digital competence of teachers (A1-2, B1-2, C1-2)</td>
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<td>Develop the curricula for specific training of teachers per levels of competence (A1-2, B1-2, C1-2)</td>
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<td>Awarding digital competence certification for teachers</td>
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<td>Making these curricula common and mandatory for all continuous training providers.</td>
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<td></td>
<td>Revising the conditions for supporting good educators’ performance that is taking place once per semester within each VET institution. The procedure should foresee more incentivizing mechanisms.</td>
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<td></td>
<td>Revising the conditions of teachers’ certification/attestation that takes place once in 4 years’ time with inclusion of Digital Competence Certification for teachers.</td>
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<tr>
<th>Digital school capacity</th>
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<tr>
<td>Development and provision of training courses on administration of EMIS modules. Making sure that each VET institutions has at least 3 persons that could act as administrators.</td>
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<tr>
<td>Development and provision of training courses on digital management: tools, applications, ways of making management more efficient</td>
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<tr>
<td>Dissemination of success stories of good and efficient time management</td>
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<tr>
<td>Development and provision of training courses for teachers on using Electronic Register and Students Electronic Agenda</td>
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<tr>
<td>Institutionalization of SELFIE as a self-assessment tool for analysis of digitalization level of institution</td>
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<tr>
<td>Creation of a strong network of affiliated institutions to a specific Centre of Excellence and strengthening the network based on sharing experience and having common training courses, dissemination of information sessions.</td>
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| Modifying and adjusting the quality standards for the external assessment (accreditation) of VET institutions by including criteria related to technical equipment, the use of ICT in the teaching-learning-

Mainly these tasks are committed by UNICEF Global Partnership for Education Project. It is envisaged that these will be done in 3 years’ time.

The prerequisites for implementation of these activities are already in place, the legal framework is in force. It depends a lot on the capacity of Centres of Excellence to mobilise the network of institutions and on VET institutions focus on digitalisation.
The evaluation process, the use of ICT in educational management, the rate of students who hold the diploma of ECDL, CISCO or other international certifications.

Operate the amendment to the Regulation on the certification / attestation of educators from pre-school, primary, special, complementary, VET education (MER Order 454/20120) by conditioning the obtaining of the managerial degree only after holding the ECDL certificate.

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<tr>
<th>Digital pedagogy and curricula and Digital learning resources</th>
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<tr>
<td>Support the <strong>Centers of Excellence to develop curricula, qualification exam items and training materials</strong> for all the qualifications from their sector of industry they are affiliated to by securing finance resources in MER budget. This could be done in cooperation with donors that support the VET system.</td>
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<tr>
<td>Organize the mechanism for <strong>cooperation of VET teachers for development of digital training materials</strong>. These developments should be used for getting teachers degrees, as a measure to incentivize teachers for this complex activity.</td>
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<tr>
<td><strong>Revising the organigram of Centers of Excellences</strong> including specific positions for specific tasks that these entities are carrying out. The revised organigram should be accompanied with the additional budget lines, specifically for Centers of Excellence.</td>
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<tr>
<td>The <strong>complementary fund</strong> that the Ministry of Education and Research has should be used for development of training materials in digital format.</td>
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<td>Running training sessions for all teachers from the system for learning newly developed materials.</td>
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<tr>
<td><strong>Develop a repository for the VET system</strong>. It is important to offer access to all the teachers and to students in different regimes to a common VET repository. Centers of Excellence should have a high level of access to this platform to post the developed materials, update the information, coming with news from the sector.</td>
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<td>Ensure the <strong>continuous education of VET teachers</strong> in provision of digital education.</td>
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<th>Digital learning environments</th>
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<tr>
<td>All VET teachers should learn the way <strong>Classroom and Moodle</strong> work and build on this knowledge that proved to be the most developed in the system.</td>
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<tr>
<td>At least half (50%) of teachers of general disciplines and professional education are using digital learning materials. This is a good indicator for future development of digital culture of institutions.</td>
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<tr>
<td>In general, in VET system there are no <strong>Digital Education Resources</strong> available for teachers and students. Republic of Moldova is at the beginning of the process of unification of Digital education resources.</td>
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<tr>
<td>The most preferred digital learning platform is Classroom and more secure, Moodle.</td>
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## Digital assessment

Digital assessment should be developed mainly for formative assessment and peer assessment, specifically having the purpose of learning the terms, the definitions, memorizing new information. In this sense, apart from digital competences, the competence for development of assessment items should be important.

Digital assessment tools mostly used in the system are Glassroom, Google Forms. Future developments should build on existing competences.

## Digital competence of learners

The share of students with high digital performance and low digital performance creates the impression that there are two poles, meaning that digital marginalisation is present in VET system. The fact that in the country from the primary education level curricula provides hours of digital competence and later on gymnasium and lyceum levels there are hours of Informatics with quite complex curricula, is a good sign for the potential good development of digital competences with students. The **discipline of Informatics should be mandatory for VET system at both level: 3 and 4**.

The percentage of students that do not have a digital device (50%) is quite high and this also contributes to digital marginalisation. For meeting this need, it was proposed under the compartment of digital infrastructure, VET institutions to have **computer labs endowed with needed digital devices** and Internet connection available late hours in the evening, allowing students to work on their assignments.

Supporting the development of digital culture amongst youth also could be done within the institution via different scheme developed in partnership with IT companies, internet providers, technical assistance projects.

## Digital credentials

MER at the end of 2023 approved a decision which stipulates the possibility to get certified by international validation centers on different computers skills. Students should be encouraged to get these **international certifications**, especially those that embrace IT qualifications.

The best way of assessing the digital competences and to get digital credentials would be the Certification ECDL or CISCO.