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RESEARCH REPORT ON

THE DEVELOPMENT OF CRITERIA OF DIGITAL TVET INSTITUTES

The Programme "Reform of Technical Vocational Education and Training in Viet Nam"
November 2023

General Information

This document was developed with the support of the Vietnam-Germany Cooperation Program "Program Reform of Technical Vocational Education and Training in Viet Nam". The program is authorized by the German Federal Ministry of Economic Cooperation and Development (BMZ), implemented by the German Corporation for International Cooperation GmbH (GIZ) in collaboration with the Directorate of Vocational Education and Training, under the Ministry of Labour, Invalides and Social Affairs. The program aims at an enhanced, better aligning TVET in Viet Nam to the changing world of work, towards a greener and digitized future.

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ABBREVIATIONS

Seq.	Abbreviation	Explanations
1.	AI	Artificial intelligence
2.	BMZ	German Ministry of Economic Development and Cooperation
3.	Cir.	Circular No.
4.	Dec.	Decision No.
5.	DoLISA	Department of Labor, Invalids and Social Affairs
6.	DTI	Digital TVET institutes
7.	DVET	Directorate of Vocational Education and Training
8.	DX	Digital Transformation
9.	IT	Information technology
10.	GIZ	German Corporation for International Cooperation GmbH
11.	MoLISA	Ministry of Labor, Invalids and Social Affairs
12.	TVET	Technical Vocational Education and Training

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SUMMARY

This report summarizes the research and development process of a “draft criteria of digital TVET institutes” (henceforth Draft) carried out by the Programme Reform of Technical Vocational Education and Training in Viet Nam, part of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in collaboration with DVET and senior experts.

The Draft is considered as a result of the whole supporting process of DX activities for TVET partners in Viet Nam by GIZ from 09/2020 to 10/2023, legal documents and digital TVET institute model, and the ecosystem of DX in TVET that includes of six components. The development of the Draft is based on international digital competence frameworks, criteria and standards. The content of criteria and standards of a digital TVET institute are based on expert ideas, results of field trips to six partner institutes, and survey responses of 217 TVET institutes nationwide. The Draft was discussed at the Consultation Workshop and received comments from leaders of DVET, GIZ, representatives of Rector Boards from 11 partner TVET institutes and other TVET institutes. The Draft can be considered as a collective intellectual product for the TVET system in Viet Nam along with recommendations and support from GIZ, DVET, GIZ’s partner TVET institutes and experts.

1.

GENERAL INTRODUCTION

1.1. The Programme "Reform of TVET in Viet Nam"

The Programme "Reform of TVET in Viet Nam" was authorized by the German Federal Ministry for Economic Cooperation and Development (BMZ), implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in collaboration with the Directorate of Vocational Education and Training (DVET), under the Ministry of Labour, Invalides and Social Affairs (MoLISA). The Programme "Reform of TVET in Viet Nam" (the TVET Programme) aims at an enhanced, better aligning TVET in Viet Nam to the changing world of work, towards a greener and digitized future. It serves three outputs:

- **Output 1:** State actors, TVET staff, TVET institutes and the business sector are interconnected thanks to digital technologies.
- **Output 2:** The regulatory framework of TVET is aligned to the requirements of the changing world of work.
- **Output 3:** The concept of High-Quality TVET institutes is successfully implemented in selected TVET institutes.

1.2. DX in TVET in Viet Nam

DX has become an inevitable trend. It has a holistic impact and brings in new business models, products and services to any organization. The Government of Viet Nam has developed a regulatory framework to guide the implementation of DX. Among the legal documents, Decision No. 749/QD-TTg dated 06/03/2020 on the National DX Programme, Decision No. 942/QD-TTg dated 06/15/2021 on the Strategy of Developing Digital Government, and Decision No. 2222/ QD-TTg dated 30/12/2021 on the Programme of DX in TVET approved by the Prime Minister are of crucial importance. In the TVET sector, DX may compel a new way of management, administration as well as learning and teaching. In addition, due to the changing world of work, increased autonomy and competitiveness in education, TVET institutes need to initiate DX to develop a more adaptive, flexible, open, and responsive training system to rapidly cope with external factors.

DX is the central support topic of the TVET Programme, GIZ from September 2020. Three main support areas include: Consulting DX policies and strategies; Enhancing the digital literacy for managers and teachers, and Consulting and supporting the development of digital solutions for TVET partners at both macro and micro levels. The TVET Programme approaches DX support through the six-component ecosystem, including: 1) Training content, 2) Teaching and learning methods, 3) Teachers and learners, 4) Digital infrastructure, platforms and learning resources, 5) Management and administration, and 6) Legal framework. In addition, Data Connection and Cyber Safety - Security are two comprehensive and integrated issues within the components.

1.3. Reasons for the implementation of the activity

During the support process, GIZ realizes that awareness of DX in TVET is enhanced and unified, especially the approach to the DX ecosystem among leaders, managers, teachers at partner institutes. However, they encounter challenges and difficulties in self-assessment of their capacity, implementation methods, development of action plans and performance management. Partner TVET institutes are aware of their goal to become a smart/digital TVET institute, but they need clear guidelines and advice on developing a detailed roadmap to achieve it.

In 2022, the TVET Programme conducted a review on the progress and results of DX activities at 11 partner TVET institutes. In addition, the research team explored different aspects, then developed a concept note of a digital TVET institute model.

In 2023, based on the Official Letter No. 955/TCGDNN-VP issued by DVET on supporting the development of criteria and standards of a digital TVET institute and Decision No. 211/QD-TCGDNN issued by DVET on the establishment of a Taskforce to develop criteria and standards of a digital TVET institute , the TVET Programme collaborated with senior experts to conduct research on criteria, standards, indicators, evidence for the assessment of a digital TVET institute .

1.4. Purposes of the activity

The activity is to research and propose a set of criteria and standards of a digital TVET institute. This set of criteria and standards can be used by institutes as a target for their DX activities and to self-assess their level of digital

maturity independently or in combination with accreditation standards as well as criteria and process for assessment and recognition of high-quality institutes. On the part of the DVET as well as other state management agencies in TVET, this set of criteria and standards can also be used to evaluate the overall DX results of the entire system.

1.5. Implementation methodology

The activity combines various research methods such as desk review, group discussion, consultation meeting, in-depth interview, and online survey questionnaire to collect quantitative and qualitative data and information.

1.5.1. Desk review

Consultants conduct intensive reviews of the system of the regulatory framework and documents on the digital competency framework and digital competency assessment models for educational institutesin national wide and worldwide.

Regarding legal documents, the consultants have studied the national strategic regulatory documents on DX such as the National DX Programme (Decision No. 749/2020/QD-TTg), Digital Government (Decision No. 942/QD-TTg), Digital Economy and Digital Society (Decision No. 411/QD-TTg); regulations on the Vocational Education and Training Development Strategy (Decision No. 2239/QD-TTg) and the Programme of DX in TVET until 2025, with orientation to 2030 (Decision No. 2222/QD-TTg). In addition, the consultant team consulted legal documents of other ministries and industries on criteria and indicators for DX such as: An Index and Criterion set to evaluate the digitalization of undergraduate education institutes(Decision No. 4740/QD-BGDĐT) and Guidelines on building digital learning materials and online courses on the application of the platform for providing Massive Open Online Courses (MOOCs) (Decision No. 3784/QD-BGDĐT) of the Ministry of Education and Training; the DX Assessment index (Decision No. 2027/QD-BNN-CDS) of the Ministry of Agriculture and Rural Development. Besides, the consultant team also consulted legal documents on indicators and criteria set to evaluate the digitalization of undergraduate education institutes(Circular No. 35/2021/TT-BLDTBXH) and Criteria and process for assessment and recognition of high-quality institutes (Circular No. 35/2021/TT-BLDTBXH).

In addition, the team has researched and consulted international documents on the digital competency framework in educational sector, including:

- European Framework for Digitally Competent Educational Organizations (DigCompOrg), 2015.
- European Framework for the Digital Competence of Educators (DigCompEdu), 2017.
- The Digital Competence Framework for Citizens (DigComp 2.2), 2022.
- UNESCO ICT Competency Framework for Teachers (version 3), 2018.
- A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2, 2018
- Framework for DX in higher education of JISC (Anh), 2023.
- Education Management and Information Systems (SIGEDs) in Latin America and the Caribbean: the road to the digital transformation of education management of Inter-American Development Bank, 2021.
- SELFIE - A tool to support learning in the digital age of the European Commission.

1.5.2. Online survey

Qualitative and quantitative data from online survey questionnaires is needed to receive feedback and comments on criteria, standards, indicators and evidence, as well as supplement quantitative and qualitative assessment and analysis. Based on the research objectives, the online questionnaires were designed for: Representatives of Rector Boards and DX focal points of TVET institutes and DoLISAs from 63 cities/provinces.

1.5.3. Field trips (In-depth interviews, Consultation meeting, Group discussions)

The consultants and GIZ staff conducted field trips at six (06) institutes in Hanoi, Bac Ninh, Nha Trang, Ninh Thuan, Ho Chi Minh City and Dong Nai. At the consultation meetings, the research team presented the overview and objectives of the field trips, the concept notes of a smart/digital TVET institute and the draft set of criteria and standards of a digital TVET institute. After the presentation, at the roundtable discussion, the team collected comments of representatives of Rector Boards, leaders of IT faculties, Training departments, Human resource department, Administration department, Student affairs department, Library, focal points in charge of business cooperation, core teachers, IT staff, students and alumni, etc.

Then, the team conducted in-depth interviews with each selected group and consultation meetings with the Rector Boards.

1.6. Activity summary

The activity of developing criteria and standards of a digital TVET institute officially took place in 3.5 months (from July 20, 2023 to November 3, 2023).

From July 20 to August 10, 2023, the consultant team finalized the digital TVET institute model including 06 components and developed preliminary criteria and standards of a digital TVET institute according to the 06 components.

From August 11 to September 9, 2023, the team conducted two (02) field trips at six (06) partner TVET institutes of GIZ in Hanoi, Bac Ninh, Nha Trang, Ninh Thuan, Ho Chi Minh city and Dong Nai.

From September 10 to October 11, 2023, the team designed an online survey and collaborate with the DVET to collect comments from Departments/Institutes of the DVET, DoLISA, institutes and intermediate institutes nationwide. As a result, 217 responses were collected, including 119 institutes, 58 intermediate institutes, 38 DoLISA and 2 departments of DVET.

On October 17-18, 2023, GIZ collaborated with DVET to organize the Workshop on the development results of the Draft, discussion and feedback gathering from leaders of DVET, the Development Taskforce established by DVET to develop a set of criteria and standards of a digital TVET institute, experts, and representatives from GIZ's partner institutes on each criterion and standard of a digital TVET institute based on online survey results.

After the Workshop, the consultants continued receiving comments to finalize the Draft and submit to GIZ the document set including Research report, the Draft of criteria and standards (including the digital TVET institute model and related definition).

The final research findings were distributed to DVET, TVET institutes, GIZ programs, domestic and foreign organizations for reference.

2.

THE LEGAL BASIS, THEORETICAL BASIS, AND INTERNATIONAL EXPERIENCE

2.1. The legal basis in Viet Nam

The draft set of criteria and standards of a digital TVET institute is built based on "Strategy for TVET development for the period 2021-2030, with a vision to 2045" issued under Decision No. 2239/QD-TTg dated December 30, 2021 of the Prime Minister and "The DX programme in TVET for the period 2021-2025, with a vision to 2030" issued under Decision No. 2222/QD-TTg dated December 30, 2021 of the Prime Minister. In addition, in the process of developing this set of criteria and standards of a digital TVET institute, the provisions of the Law on Vocational Education and other related guiding documents were also referred to.

2.2. Theoretical basis

The theoretical basis for building a set of criteria and standards of a digital TVET institute is the DX methodology presented in [21], [22]. The basic argument underlying this methodology is to consider each organization (a TVET institute, in particular) as a Cyber - Physical - Social System, in which digital connections, in addition to traditional connections in the physical environment, allow enhancing the capacity to collect, store, process and distribute data, information and knowledge. To further integrate the digital environment into a physical system successfully and effectively, every component of the physical system including their methods of operation (products, services, operating processes, governance, and management methods) and organizational structure (people, institutes, technology) must be changed appropriately.

Thanks to increased connectivity in the digital environment and outstanding data storage, analysis, and exploitation capabilities, a digital TVET institute will improve the quality and scale of training with existing human and material resources (in other words, becoming smarter). Thus, the concepts of a digital TVET institute, DX institute or smart institute can be considered similar to each other.

It should be emphasized that the process of DX in a TVET institute is not only a process of enhancing IT applications by equipping modern hardware and software, but also a process of using data and connectivity to continuously innovate training content to closely follow the rapidly changes in requirements of job positions, training methods, and institute administration processes.

The extensive use of digital data and digital connections will lead to security and safety risks in the digital environment and require corresponding protection measures. All the above transformations can only become a reality if there are profound transformations of the entire team of teachers, administrators, and students, as well as necessary changes in institutes, regulations, related economic and technical norms and of course if there is appropriate investment in technology infrastructure. All the above transformation contents form a DX ecosystem in TVET and have been expressed in "The DX programme in TVET for the period 2021-2025, with a vision to 2030" under Decision No. 2222/QD-TTg and will be presented in more detail in the following section.

DX in TVET institutes is a continuous process, with no stopping point. However, this transition cannot be carried out without setting milestones for each stage. The set of criteria and standards of a digital TVET institute is developed based on understanding of current technology and the actual capacity of institutes and is also intended to represent the destination for TVET institutes in the process of DX. Thus, this set of criteria and standards should be considered as an open set of criteria and standards and should be regularly reviewed and updated to reflect new technological advances as well as the increasingly maturity levels of institutes.

2.2.1. Digital transformation ecosystem in TVET

There are six components of DX ecosystem in TVET (see Figure 1):

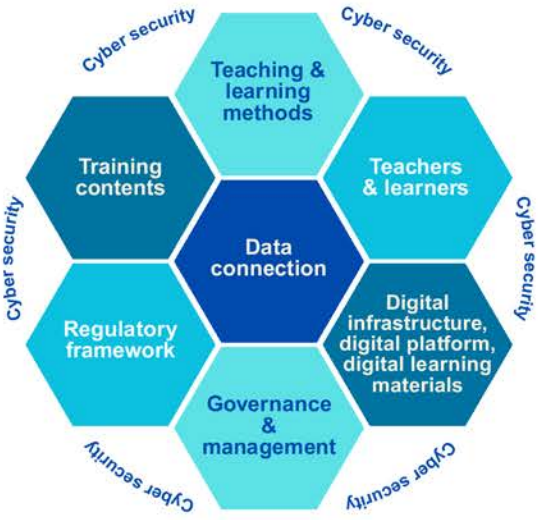

Figure 1. The DX ecosystem in TVET

Training contents of a TVET institute includes a list of training occupations and corresponding training programs. In the context of the ongoing Fourth Industrial Revolution, requirements for job positions are changing rapidly. New occupations are appearing while traditional occupations are disappearing or undergoing profound changes. Digital competency of workers becomes a mandatory requirement for all job positions. In TVET, digital competencies include general digital competencies and specialized digital competencies. Both of these digital competencies need to be urgently added to the training programs. On the other hand, digital competency is a dynamic concept and its connotation changes very quickly with technological advances that change every day. Thus, DX of TVET institutes requires the use of digital technology to enhance information collection and processing capacity to promptly capture changes and update training programs.

Training methods: Digital technology allows the implementation of online training, blended training, flipped classrooms, project-based learning... can be deployed easily and effectively. Advances in AI technology, especially generative AI, allow to greatly improve training quality. On the other hand, innovating training content, especially content that is new to teachers, also requires a drastic change in training methods. Innovating training methods requires transferring all teaching and learning activities (including testing and assessment) to a physical-digital environment; applying digital technology to provide personalized training as well as providing student services in a simple and convenient way; minimizing time to comply with bookkeeping regulations for teachers and administrators.

Administration - management: The DX of institute administration and management essentially means moving from document-based operational management to data-based operational management. In short, the decision-making process will gradually shift to real-time data-based decision making. When all teaching and learning activities are recorded as digital data, analyzing that data with appropriate algorithms will allow more objective, timely and accurate decision-making. DX of institute administration and management requires all resource management processes (human resources, training materials, facilities, finance...) to be redesigned in sync with the application of digital technology.

Human: To transform training content, training methods, and administration and management methods, it is necessary to create positive changes in people (here are teachers, managers, students), legal framework and IT infrastructure. All managers, teachers, staff, and students need to be aware of the inevitability of DX and have the necessary knowledge and skills to be able to teach, learn, and work in a physical-digital environment. Because the core of DX is innovation and connection to share and accumulate data, information and knowledge, the capabilities related to innovation culture and sharing culture will be core elements in the culture of digital TVET institutes.

Legal framework: Current policies and regulations are built to operate in a physical environment. The addition and integration of the digital environment requires the modification and addition of policies and regulations that regulate interactions in the digital environment. Policies are external legal regulations that TVET institutes need to comply with. According to the national DX process, policies are being revised. The responsibility of TVET institutes is to grasp and promptly update new DX related policies (such as personal identification, non-cash payments, digital signatures, e-invoice etc.) of state management agencies. On the other hand, regulations are about the internal regulations and regimes developed and promulgated by the institute. Amending and supplementing internal regulations to suit the new operating model in the physical-digital environment is an important content of DX in TVET institutes. In short, digital TVET institutes need to have a system of regulations that regulate both activities in the physical environment as well as the digital environment. Applying IT without corresponding regulatory adjustments will not be effective and often leads to increased workload of individuals, and this is the main cause of failures in DX.

IT infrastructure: Although the DX methodology emphasizes that DX is not just a technological issue, it can be affirmed that without digital technology, there is no DX. Digital TVET institutes need to be invested in and equipped with strong digital infrastructure, enough to meet DX requirements of other components of the DX ecosystem in TVET. The digital infrastructure here includes IT infrastructure, application platforms and digital learning materials necessary for institute 's operations.

2.2.2. Digital TVET institute model

The basic model for building a set of criteria and standards of a digital TVET institute is shown in Figure 2.

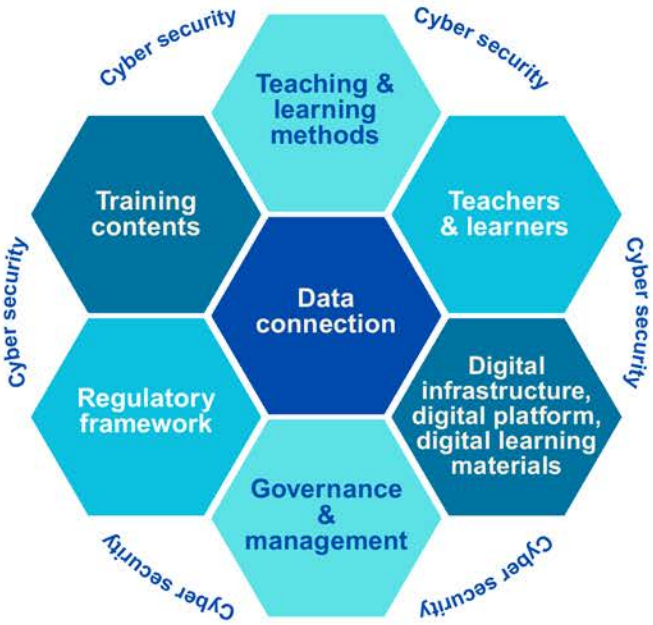

Figure 2: Digital TVET institute model

This model is proposed based on principle 2 in the ST-235 DX methodology [22].

This principle affirms that DX is a process of innovation with data and connectivity. For TVET institutes, this means that digital TVET institutes must have a reliable and effective digital connection system, connecting all relevant entities (staff, teachers, students, parents, businesses, alumni, etc...). The digital connection system complements and enhances traditional connections in the physical environment to improve the institute 's ability to collect, process and distribute data, information, and knowledge. Data capacity and connection capacity enhanced by digital technology are the basis for transforming training content, training methods as well as administration and management methods and are core characteristics of digital TVET institutes.

The basic requirements for a connection system in the digital environment are legitimacy and security. The simple principle to follow while designing connection systems is "Each person has only one account" (Single Sign - On). Through this account, staff, teachers, and students will connect with the institute and have access to all authorized resources according to regulations.

Enhancing connection capacity and data capacity as well as ensuring system security cannot only rely on investment in the technology

infrastructure but must ensure synchronous transformation of human, legal framework and technology factors as described above.

The set of criteria and standards of digital TVET institutes is developed based on the presented digital TVET institute model, in which 06 criteria represent 06 corresponding components of the DX ecosystem in TVET. Elements of data connection and cyber safety - security are expressed through specific standards.

It should be noted that the digital TVET institute model, proposed as a basis for developing a set of criteria and standards, not only refers to equipping technological infrastructure (hardware, software) but also aims to put more emphasis on the use of that technology infrastructure to enhance data capacity, connection capacity and especially the level of data use and connection to change training content, training methods and management methods in a smarter and more effective way.

2.3. International experiences

The consultant team studied and researched documents and international experiences on DX, digital competence in education, including documents on digital competence for educational institutes, digital competence for teachers and students of the European Commission, UNESCO and other research organizations within the education field. Within the framework of this activity, the consultant team studied and consulted three directly related documents, including the European Framework for Digitally Competent Educational Organizations (DigCompOrg), the Framework for DX in higher education of JISC (UK) and Education Management and Information Systems (SIGEDs) in Latin America and the Caribbean. Each framework offers a different model/evaluation, but these are the bases for the consultant team to learn and then propose a structure, model, and content suitable to the actual situation of TVET in Viet Nam to include in the Draft.

2.3.1. European Framework for Digitally Competent Educational Organizations

The European Reference Framework of Digital Competent Educational Organization is an initiative of the European Commission, Directorate General for Education and Culture (DG EAC). Research and design of the Framework was carried out by the Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS) in 2015.

The DigCompOrg framework can be used for educational organizations (i.e., primary, secondary and VET institutes, as well as higher education institutes) to guide a process of self-reflection on their progress towards comprehensive integration and effective deployment of digital learning technologies. Digital learning technologies, in the context of DigCompOrg, constitute a key enabler for educational organizations, which can support their efforts to achieve their particular mission and vision for quality education. Deep, as distinct from superficial, integration of digital technologies requires significant educational innovation and implies a process of planning for change on three basic dimensions: pedagogical, technological and organizational.

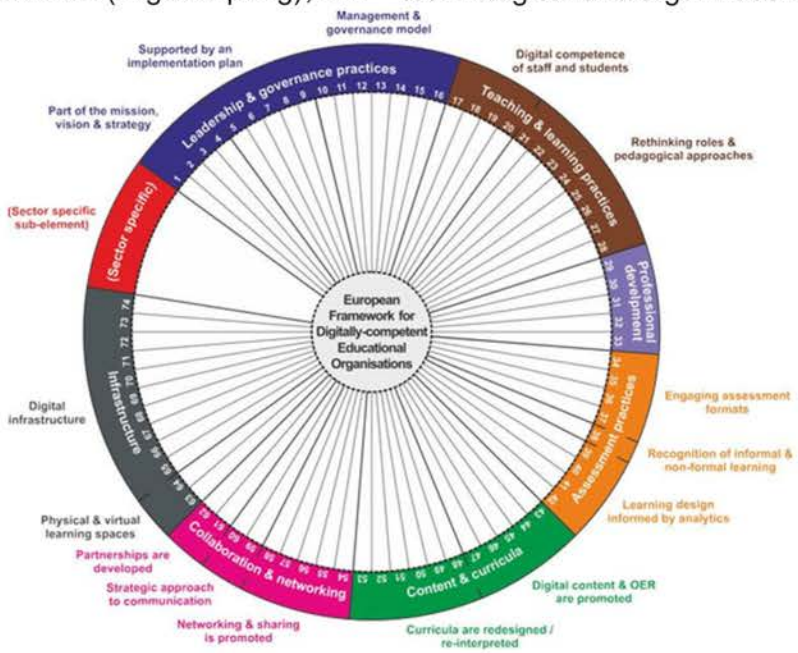

Figure 3: The DigCompOrg

The DigCompOrg framework has **seven key elements** and **15 sub-elements** (see Table 1) and **74 descriptors** (see Appendix 1). Diagrammatically, the elements, sub-elements and descriptors of DigCompOrg are presented as the segments of a circle, with an emphasis on their inter-relatedness and inter-dependence (see Figure 3).

Thematic elements	**Sub-elements**
Leadership & Governance Practices	Integration of Digital-age Learning is part of the overall mission, vision and strategy
	Strategy for digital- age learning is supported by an implementation plan
	A Management and Governance Model is in place
Teaching and Learning Practices	Digital Competence is promoted, benchmarked and assessed
	A rethinking of roles and pedagogical approaches takes place
Professional Development	
Assessment practices	Assessment Formats are engaging and motivating
	Informal and Non- Formal Learning are recognized
	Learning Design is Informed by Analytics
Content and Curricula	Digital Content and OER are widely promoted and used
	Curricula are redesigned or re- interpreted to reflect the pedagogical possibilities afforded by digital technologies
Collaboration and Networking	Networking, sharing & collaboration is promoted
	A strategic approach is taken to communication
	Partnerships are developed
Infrastructure	Physical and Virtual Learning Spaces are designed for digital- age learning
	The digital infrastructure is planned and managed

Table 1: The elements and sub-elements of DigCompOrg

The primary purposes of DigCompOrg are (i) encourage self-reflection and self-assessment within educational organizations as they progressively deepen their engagement with digital learning and pedagogies (ii) enable policy makers (at local, regional, national and international level) to design, implement and appraise programmes, projects and policy interventions for the integration of digital learning technologies in Education and Training systems (iii) facilitate transparency and comparability between related initiatives throughout Europe, and it can also play a role in addressing fragmentation and uneven development across the Member States.
DigCompOrg is designed to focus mainly on the teaching, learning, assessment and related learning support activities undertaken by a given educational organization. It is not intended to address the full range of administrative and management information systems that may be in use within the organization. Besides, DigCompOrg complements rather than supersedes other frameworks and tools already in use for specific purposes: e.g., the DIGCOMP framework that can be used to develop relevant aspects of students' digital competence.

After the DigCompOrg, the European Commission has developed a Self-Assessment tool for Digitally Competent institutes (i.e., primary, secondary and VET institutes) based on DigCompOrg descriptors, called SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies). SELFIE is a free tool designed to help institutes embed digital technologies into teaching, learning and assessment.

SELFIE anonymously gathers the views of students, teachers, and institute leaders on how technology is used in their institute. This is done using short statements and questions and a simple 1-5 answer scale (see an example in Appendix 2). SELFIE asks a series of questions to teachers, institute leaders and students to provide a snapshot of the use of digital technologies for learning at their institute. The tool focuses primarily on learning rather than technology, and takes all dimensions into account including institute strategies, teaching practices, infrastructure, curricula and student experience.

The questions and statements take around 20 minutes to complete. Based on this input, the tool generates a report – a snapshot ('SELFIE') of a institute 's strengths and weaknesses in their use of technology. This report is intended for dialogue and reflection within the institute. The focus is on progress so SELFIE can be used by any institute, not only the ones that are digital 'champions' or highly innovative.

2.3.2. Framework for DX in higher education (JISC)

Framework for DX in higher education was developed, in 2023, by JISC - a not-for-profit organization which is the UK digital, data and technology agency focused on tertiary education, research and innovation.

This DX framework has been developed in consultation with a range of UK professional bodies: Advance HE, Association for Learning Technology (ALT), Association of University Administrators (AUA), Association of University Directors of Estates (AUDE), Quality Assurance Agency for Higher Education (QAA), Society of College, National and University, Libraries (SCONUL), Universities and institutes Information Systems Association (UCISA), Universities UK (UUK) and Vitae. This ensures the framework reflects sector priorities and links to key UK HE models and frameworks already in use.

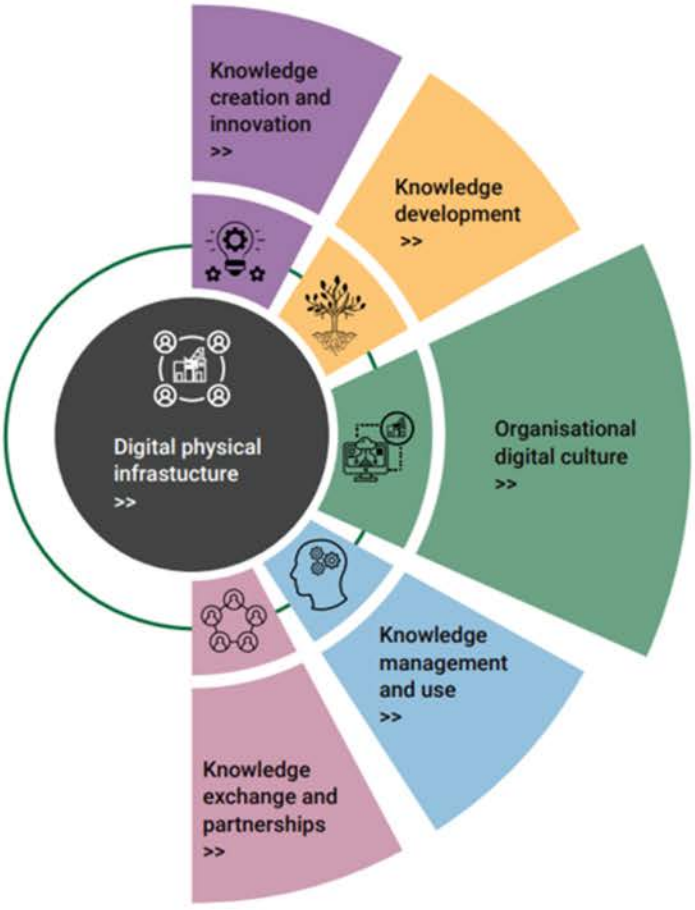

Figure 4: Framework for DX in higher education (JISC)

The framework adopts a knowledge practices approach. There are the six elements and their four key areas of activity (see Figure 4). In addition to the underlying digital and physical infrastructure and the overarching organizational digital culture, the four core knowledge practices focus on the wide range of activities, experiences and practices of an HE organization.

- Knowledge creation and innovation
- Knowledge development
- Knowledge management and use
- Knowledge exchange and partnerships

This takes the emphasis away from technological or business process approaches and puts the focus on what people do or need to do to enhance these practices within the organization. It also aims to help organizations see patterns, links and synergies across traditional boundaries, and encourage ownership and engagement of all stakeholders.

Each section has a list of keywords which highlight these aspects and reflect the kinds of principles and values that organizations often highlight in their corporate strategies. The framework structure highlights the importance of using information and data intelligently, building on existing collective wisdom, and also emphasizes the impact of knowledge creation, innovation and exchange in a global setting through collaborative social and learning networks.

The framework can be used to break down various elements of DX activity into achievable goals and actions. It is presented in varying degrees of detail from broad statements to illustrative examples of more specific activities (see Appendix 3). The framework helps educational organizations assess their digital maturity across all business activities. It can be used within educational organizations to:

- Map activities, strengths, ambitions, and key strategic principles and values.
- Bring together key stakeholders to allocate responsibilities and identify which teams have the expertise to fulfil each of the organizational activities.
- Recognize the range of digital expertise within the organization and plan to use that more effectively.
- Identify any gaps in expertise or in responsibility and plan to fill them.
- Identify digital maturity for different areas of activity: emerging, established, enhanced (in development).
- Support the development and success of digital strategies and to connect strategies together.
- Draw up achievable, measurable action plans.
- Move forward from legacy systems and approaches.
- Contextualize their current position and next steps, recognizing each institute has a unique starting position and maturity levels.

2.3.3. Education Management and Information Systems (SIGEDs)

Education Management and Information Systems (SIGEDs) in Latin America and the Caribbean: the road to the DX of education management is a publication of the Education Division of the Social Sector of the Inter-American Development Bank (IDB).

Education Management and Information Systems (SIGEDs) can be defined as the set of key educational management processes required for the design, registration, generation, exploitation and dissemination of strategic online information in an integral manner in the framework of specific legal, institute al and technological infrastructure. A SIGED should allow complete and efficient management of the relevant processes at all the levels of the education system, incorporating new technologies. Having comprehensive information and management systems is essential to advance in the transformations required to optimize efficiency and equity in the allocation of resources.

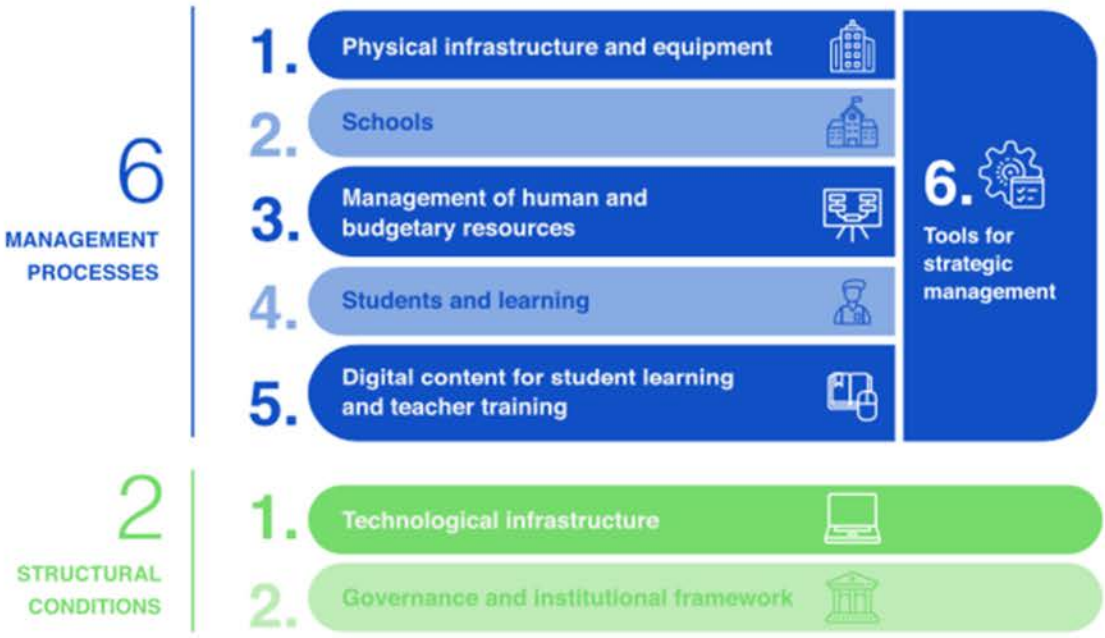

Figure 5: Education Management and Information Systems (SIGEDs)

For the diagnosis of the SIGEDs, an information-gathering instrument which comprises 119 questions was designed, structured around six key education management processes: i) physical infrastructure and equipment; ii) institutes; iii) students and learning; iv) human and budgetary resources; v) digital content for student learning and teacher training; and vi) tools for strategic management, as well as two structural conditions: i) technological infrastructure and ii) governance and institute al framework (see Figure 5).

The development of each process and structural condition is classified in one of four levels (see Figure 6):

(1) Latent: SIGED does not cover the central processes and sub-processes and structural conditions that define it.

(2) Incipient: SIGED partially covers the central processes and sub-processes and the structural conditions that define it but is not geared to efficient management.

(3) Emergent: SIGED partially addresses the central processes and structural conditions that define it, and its orientation is appropriate but is geared to efficient management.

(4) Established: SIGED covers more than 80% of the central processes and structural conditions that define it and is geared to efficient management.

The classification is based on the level of development of the main functionalities of each process and structural condition, captured through closed-ended questions (between nine and 18 questions per process). Each question is associated with a sub-process or specific functionality that an established SIGED should fulfill (see Appendix 4). In addition, each answer includes a brief qualitative description of how the sub-process or functionality operates. The global SIGED score is calculated as the median of the score for each of the six processes and the two structural conditions.

The DX of a SIGED brings with it a series of efficiency gains in the management of an education system that include:

1. The availability of timely, high-quality information for the design of policies and the allocation of resources (human, physical and financial).
2. The time saved through digitization of administrative tasks that were previously carried out manually, with the resulting better use of human resources.
3. Budgetary savings, thanks to more efficient use of resources as a result of the availability of high-quality information and time savings

Figure 6: Levels of development of SIGEDs

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3.

SURVEY RESULTS

3.1. General Information

During the development of the criteria and standards of a digital vocational institute, the consultant team conducted field trips, online surveys and organized a Consultation Workshop.

The field trips were conducted at six GIZ's partner institutes in two phases. The first field trip at two institutes (Bac Ninh College of Industry and Hanoi Construction Technology College No. 1) aimed at gathering opinions for the first draft of criteria and standards of a digital TVET institute (including 8 criteria and 59 standards) compiled by the team based on desk review, international experience and practical implementation of DX in TVET in Viet Nam. Based on the feedback from the two institutes in this first survey, the team edited and produced the second version (including 6 criteria and 31 standards). The second field trip was conducted at four institutes (College of Machinery and Irrigation, College of Technology II, Nha Trang College of Technology and Ninh Thuan Vocational College) to get comments for the second version. After the second field trip, the team edited and completed the third version of criteria and standards of a digital TVET institute (including 6 criteria and 30 standards).

The online survey was deployed to get opinions from the DVET, DoLISA, institutes and intermediate institutes in the TVET system nationwide on the third version of criteria and standards of a digital vocational institute. As the results, 217 responses were collected (see Figure 7) including opinions from 2 departments of DVET, 38 DoLISA, 119 institutes and 58 intermediate institutes in 58 provinces and cities (Tuyen Quang, Thai Nguyen, Ha Nam, Lang Son, Vinh Phuc, Hai Duong, Ha Giang, Hanoi, Lao Cai, Phu Tho, Hai Phong, Thai Binh, Hoa Binh, Yen Bai, Bac Ninh, Lai Chau, Quang Ninh, Dien Bien, Nam Dinh, Ninh Binh, Cao Bang , Bac Giang, Son La, Thanh Hoa, Dak Lak, Lam Dong, Phu Yen, Ha Tinh, Binh Dinh, Quang Binh, Nghe An, Binh Phuoc, Quang Ngai, Quang Tri, Da Nang, Khanh Hoa, Dak Nong, Kon Tum, Thua Thien Hue, Quang Nam, Binh Thuan, Kien Giang, Ba Ria - Vung Tau, Long An, Dong Nai, Tien Giang, An Giang, Dong Thap, Tay Ninh, Ben Tre, Ninh Thuan, Ca Mau, Vinh Long , Kien Giang, Hau Giang, Can Tho, Ho Chi Minh City, Soc Trang). At the end of the online survey, the consultant team compiled comments for the third version of criteria and standards of a digital TVET institute for in-depth discussion in the workshop.

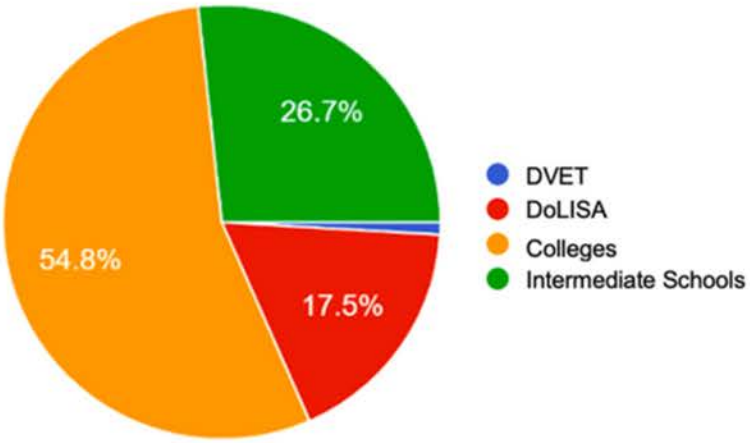

Figure 7: Participants in online survey

The Consultation Workshop was conducted with the participation of leaders of the DVET, members of the Development Taskforce of the criteria and standards of a digital TVET institute according to the decision of DVET, GIZ's officials and experts, and 11 GIZ partner institutes' representatives. At the workshop, participants exchanged general views on the development of a set of criteria and standards of a digital TVET institute and discussed in depth each criterion and standard. GIZ, officials from partner TVET institutes, and consultants received feedback and comments at the Workshop to synthesize the final Draft with six (06) criteria and 25 standards. The results of the Workshop helped the team complete the research report and the final Draft set of criteria and standards of a digital TVET institute to transfer to the Development Taskforce of the criteria and standards of a digital TVET institute of DVET to continue receiving and presiding the implementation on the next phase.

3.2. Key results

3.2.1 The necessity of the set of criteria and standards of digital TVET institutes

Results of field trips, online surveys and Consultant Workshop show that the majority of surveyees believe that the development and promulgation of a set of criteria and standards of a digital TVET institute is necessary. This will be a guide for TVET institutes to conduct activities in the DX process and help institutes determine their goals as well as self-assess their digital capabilities. The results of the online survey show that 195/217 (89.8%) responses agreed that the set of criteria and standards of a digital TVET institute is necessary and very necessary (see Figure 8).

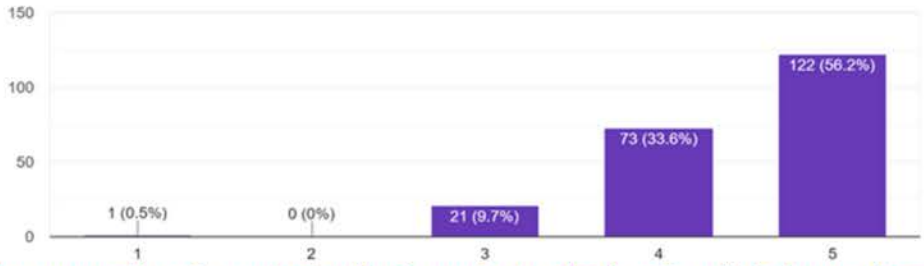

Figure 8: The necessity of a set of criteria and standards of a digital vocational institute

In addition, 168/217 (77.4%) responses said that the set of criteria and standards of a digital TVET institute can help TVET institutes self-assess the results of their DX activities (see Figure 9).

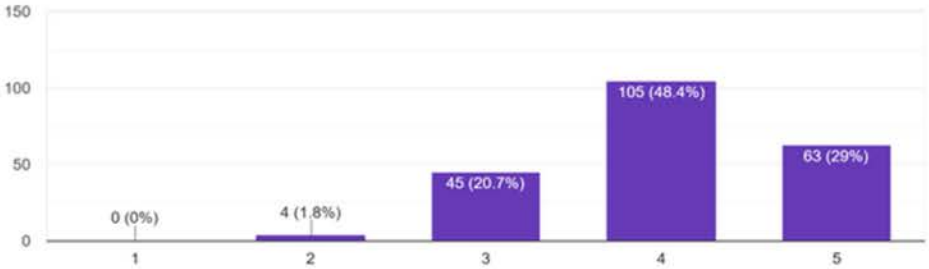

Figure 9: Ability to self-assess the results of TVET institutes' DX activities based on a set of criteria and standards of a digital TVET institute

3.2.2 The appropriateness of Structure

Structure of the set of criteria and standards of a digital TVET institute with six (06) criteria including Training content; Teaching and learning methods; Administration - Management; Teachers, Staff and Learners; Policies and Regulations; Digital infrastructure, platforms and learning materials with 30 standards are considered reasonable (186/217 responses equivalent to 85.7%) (see Figure 10).

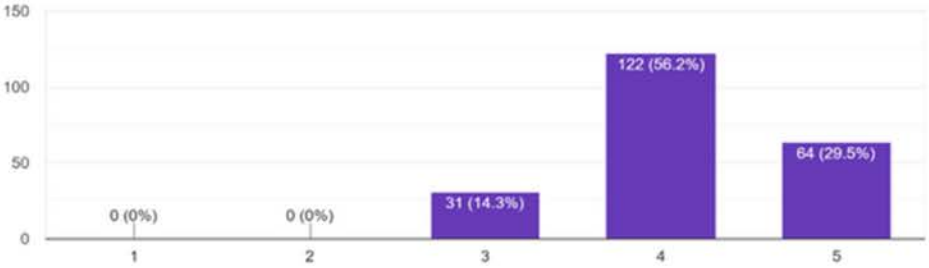

Figure 10: Appropriateness of Structure of the set of criteria and standards of a digital TVET institute

3.2.3 The appropriateness of Content

According to the online survey, 84% of respondents think that each standard in the third version of the set of criteria and standards of a digital TVET institute has appropriate content (see Figure 11). Surveyees also gave many useful comments to help the team complete the set of criteria and standards of a digital TVET institute.

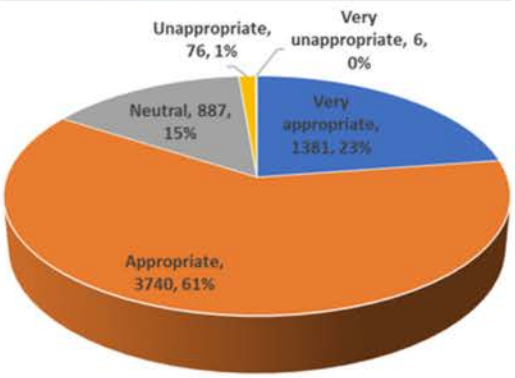

Figure 11: Appropriateness of Content of each standard

4.

DRAFT OF SET OF CRITERIA AND STANDARDS OF A DIGITAL TVET INSTITUTE

4.1. Scope and objects

The scope and subjects of application of this set of criteria and standards are institutes and intermediate institutes in the TVET system of Viet Nam.

4.2. Glossary

Digital TVET institute: These are TVET institutes that have been undergoing DX and have achieved the criteria and standards of digital TVET institutes at a pass or higher level. Digital TVET institute is understood as another name for digital TVET institute.

Smart TVET institute: Basically, smart TVET institutes are also digital TVET institutes and have often made efforts and achieved results in intelligentizing activities. Smart TVET institutes is another name for smart TVET institutes. According to the intelligent nature of DX, digital TVET institutes can also be understood as smart TVET institutes.

Criteria: The criteria of a digital TVET institute correspond to the components in the digital TVET institute model (Figure 2). In other words, the criteria of a digital TVET institute are the basic tasks of a digital TVET institute.

Standards: The main and specific requirements and contents that need to be implemented to achieve the criteria.

Indicators: Important results that can be measured or evaluated (qualitative and quantitative) for each standard.

Demonstration: Visible products, documents, figures to assist in determining the assessment of indicators of each standard.

Standards assessment scale: These are points specified and used to evaluate the level of achievement of standards in a digital TVET institute. The scoring scales of different standards are different, with values ranging from 1 to 5 (1 is the lowest score and 5 is the highest score), depending on the importance of the standards. The evaluation score of a digital TVET institute is the total score of all major and basic standards.

4.3. Objectives

The set of criteria and standards of a digital TVET institute is used first of all for institutes to self-assess their level of DX, then for DVET to monitor and evaluate the DX process of the entire system.

4.4. Structure

The set of criteria and standards of a digital TVET institute is organized in a hierarchical structure with three layers: the base layer; criteria layer; standard layer with indicators, scales and demonstrations (see Figure 12).

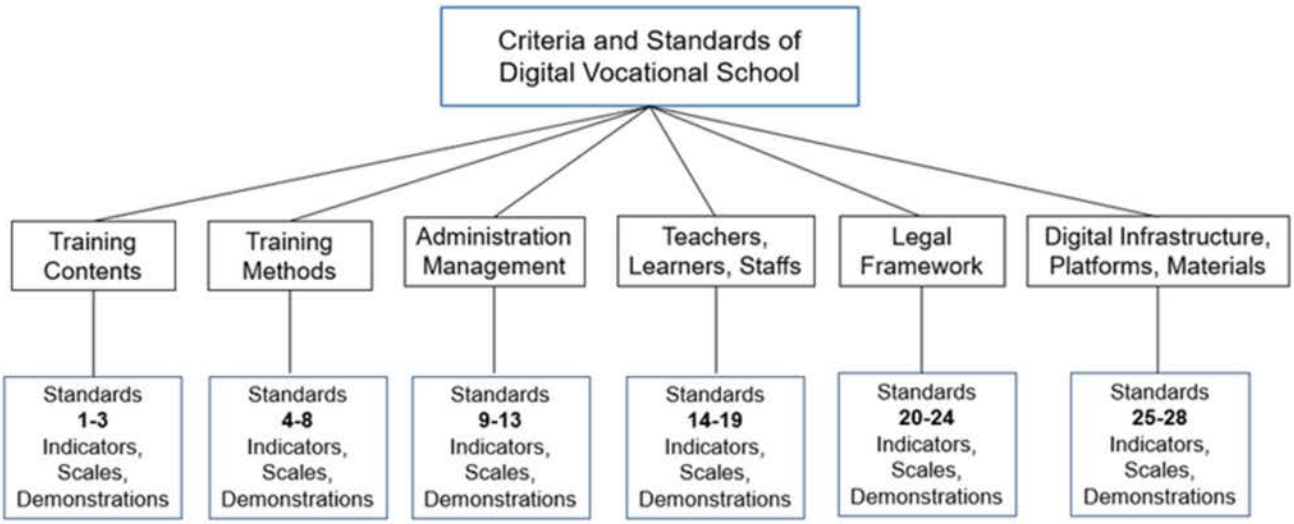

Figure 12: Structure of the set of criteria and standards of a digital TVET institute

4.5. Consistency with vocational education accreditation criteria and high-quality institute criteria

The set of criteria and standards of a digital TVET institute is developed in connection with accreditation standards as well as criteria and process for assessment and recognition of high-quality institutes. The set of criteria and standards of a digital TVET institute can be considered to supplement the criteria for accreditation and high-quality TVET institutes, with the concept that high-quality TVET institutes must be digital TVET institutes. Or the high-quality TVET institutes must achieve the minimum assessment score out of the total score of digital TVET institute standards.

5.

RECOMMENDATIONS

After researching the legal basis, scientific basis, consulting international experience and practice of TVET institutes in Viet Nam through extensive discussions and interviews, the Draft set of criteria and standards of a digital TVET institute has been preliminary completed.

To use this set of criteria and standards effectively, we would like to make the following recommendations:

5.1. For TVET institutes

Firstly, TVET institutes can use the set of criteria and standards of a digital TVET institute as a basis for designing the institutes' DX programmes. It should be noted that when applying this set of criteria and standards to evaluate the current status of DX, there may be many standards and indicators with not high scores, low scores or even no scores. This is completely normal because DX is a process and if an indicator has a low score, it will help institutes identify shortcomings that need to be overcome and point the way forward in future DX efforts.

Secondly, DX process of a TVET institute can only be successful if there is a unified awareness among the entire groups of teachers, officials and employees of the institute. The organization of a collective study of each criterion, standard, index and evidence stated in this set of criteria and standards will be a good way to unify awareness, build and unify action plans to achieve DX goals within the whole institute. Otherwise, collective research is a good basis not only for building DX KPIs for each individual and department in the institute but also for effective implementation administration of DX.

5.2. For DVET

For the DVET, the consultant team has the following recommendations:

Firstly, the promulgation of a unified set of criteria and standards of a digital TVET institute nationwide will have a positive impact on promoting the DX of the TVET sector, contributing to the successful implementation of the "DX program in TVET for the period 2021-2025, with a vision to 2030" issued under Decision No. 2222/QD-TTg by the Prime Minister. We recommend that DVET quickly develop guideline materials, organize appraisal and submit to the Ministry of Labor, Invalids and Social Affairs for early promulgation and implementation.

Secondly, the set of criteria and standards of a digital TVET institute can first be used by TVET institutes to self-assess their level of DX. Then, DVET can also use it to organize and evaluate the levels of DX of institutes, thereby evaluating the overall DX status of the entire sector.

Thirdly, the set of criteria and standards for a digital TVET institute can be used in parallel with the current sets of criteria and standards for VET institutes (VET accreditation criteria, standards issued under Circular No. 15 /2017/TT-BLDTBXH, Criteria and process for assessment and recognition of high-quality institutes issued under Circular No. 35/2021/TT-BLDTBXH). In case of updating the above criteria and standards, the set of criteria and standards of a digital TVET institute can be used to replace the content related to IT applications in related documents. Or the high-quality TVET institutes must achieve the minimum assessment score out of the total score of digital TVET institute standards.

Fourthly, to effectively deploy the set of criteria and standards of a digital TVET institute, it is recommended that the DVET develop and promulgate specific standards related to digital competencies of officials, employees, and teachers as well as technical norms, and other related standards.

Finally, the goal of the set of criteria and standards of a digital TVET institute is to promote DX of formal TVET institutes. However, the goal of DX in TVET is a smart TVET system. In such a TVET system, it is important to carry out continuous DX; to invest in building industry-wide shared platforms; to connect all available resources for TVET; and to share learning materials, data, and other resources. The research team recommends that the DVET continues to promote general DX activities of the entire system.

6.

CONCLUSION

The draft set of criteria and standards of a digital TVET institute developed within this research frame obviously cannot be considered a complete version. However, according to the opinions of all participating parties including the GIZ's consultants, leaders of relevant agencies under DVET and TVET institutes participating in the survey, this version can be used immediately and will have a positive impact on promoting the overall DX process of institutes as well as of the vocational education sector. As a results, we concluded that this version is eligible to be transferred to the DVET to take the next steps for promulgation.

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APPENDIX

APPENDIX 1: DRAFT CRITERIA AND STANDARDS OF DIGITAL TVET institutes

Perspectives on developing the set of criteria and standards for evaluating a digital/smart TVET institute .

- The purpose of developing and promulgating the set of criteria and standards for a digital/smart TVET institute is to determine specific requirements in the destination of TVET institutes in DX progress, helping TVET state management agencies and institutes evaluate current status and achieved results. The set of criteria and standards is used in parallel with DX programmes of TVET institutes and are requirements and metrics in the DX process.
- This set of criteria and standards is a new addition for the criteria and standards for vocational education quality accreditation according to Circular No. 15/2017-BLDTBXH and the criteria and standards for high-quality institutes according to Circular No. Circular No. 35/2021/TT-BLDTBXH.
- Criteria and standards for a digital/smart TVET institute are developed with the purpose of considering DX as a method to achieve the strategic goals of TVET, aiming to innovate training content, training methods, administration and management methods. Criteria and standards related to human factors, institutes and digital infrastructure need to be implemented synchronously to realize changes in working practices. The set of criteria and standards contributes to concretizing the "DX programme in TVET" issued under Decision No. 2222/QD-TTg dated December 31, 2021 of the Prime Minister.
- DX is essentially innovation with the combination of data use and data connection. Therefore, standards for data capacity, connection capacity as well as standards for security and safety in the physical-digital environment will be integrated into all criteria and standards for a digital/smart TVET institute .
- DX is a continuous process, the destinations (specific goals) can change in each stage due to the development of science and technology. Therefore, criteria and standards need to be open.
- A number of criteria and standards aim at using digital technology to innovate TVET institutes ' operations in a smarter, more effective way. If institutes have invested in technology but have not yet put it into daily operations to improve efficiency, this will not be considered. The phrase "Using digital technology to..." is intended to express this idea.
- To implement the assessment and appraisal standards, there must be clear, complete, and verifiable evidence.
- Some standards require guiding documents DVET or the Ministry of Labor, War Invalids and Social Affairs such as digital competency standards of officials and teachers; IT equipment norms....
- Due to the diverse nature, the indicator of standards will be assessed according to several scales: binary (yes, no), level (for example: very good, good, average, weak, not done), percentile (score from 1 to 100), and all refer to the level scale at the end of assessment.
- This set of criteria applies to TVET institutes of all types: public, private and with foreign investment, does not apply to pedagogical institutes or other specific vocational institutes .

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 1: Training content	1. Training programs include content that meets basic digital competency requirements.	• The ratio of training programs to the total number of active programs that are updated with basic digital competency content according to the institute's training cycle. • Scored from 1 (lowest) to 5 (highest).	• Dossiers for issuance of training programs (Decision to establish Board of Directors/Program Compilation Team, Decision to establish Appraisal Council, Decision to issue training programs...) • The content of the training program includes basic digital literacy: Introduction to digital competencies; Using digital equipment, tools and platforms; Working in digital environments; Creating digital content; Application of digital competencies in careers according to the training cycle of the institute.
	2. Training programs include content that meets industry-specific digital competency requirements.	• The ratio of training programs to the total number of active programs that are updated with occupational digital competency content according to the institute's training cycle. • Scored from 1 (lowest) to 5 (highest).	• Dossiers for issuance of training programs (Decision to establish Board of Directors/Program Compilation Team, Decision to establish Appraisal Council, Decision to issue training programs, detailed program...) • Contents of training programs with specialized digital competencies associated with each specific training profession.
	3. Training content is updated through digital connection with businesses and alumni.	• The ratio of training programs to the total number of active programs updated via digital connection • Scored from 1 (lowest) to 5 (highest).	• Survey documents: Business survey process, Learner tracing survey, survey results. • Digital information systems, platforms, and connecting tools are used to exploit information and data to identify labor market needs and job placement requirements to update training content • Minutes of appraisal of the training program with comments from representatives from enterprises... • Updated training programs, module programs

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 2: Training methods	4. Curriculum and training methods enables personalized learning for learners	• The ratio of training programs to total active programs that meet learners' personalized learning requirements • Scored from 1 (lowest) to 5 (highest).	• Training documents: training programs, training plans, training progress, timetable… on digital platforms or technology applications. • Subjects, modules are designed to allow learners to build and manage their learning path.
	5. The institute applies blended learning methods	• The ratio of training programs to total active programs applying combined face-to-face and online training methods • Scored from 1 (lowest) to 5 (highest).	• Training programs, digital learning materials, platforms or learning management systems • Other training methods, for example project-based learning, flipped class, which are suitable to each training content, are also recognized
	6. The institute uses digital teaching and learning materials	• The ratio of training programs to total active programs using digital learning materials in training activities • Scored from 1 (lowest) to 5 (highest).	• Detailed training plans and subject modules • Set of digital learning materials or list of simulating technologies, virtual reality, assisted reality, mixed reality (VR/AR/MR) that is exploited in training.
	7. Teaching and learning assessment activities are implemented by using digital technologies and are integrated throughout the training process…	• Scored from 1 (lowest) to 5 (highest).	• Decision to launch a project (can be signed by the institute) and the dossier of strategy development, action plan, implementation, monitoring and reporting of results in each phase • Digital transformation contents are integrated in the general strategy as well as institute development projects. The leaders of TVET institutes directly and comprehensively direct all aspects of DX activities. There are activities to assess the current state of digital transformation annually and measures to improve.

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 3 Administration - Management	8. The institute has a digital transformation project with vision, goals, implementation plans and effective management systems.	• Scored from 1 (lowest) to 5 (highest).	• Decision to launch a project (can be signed by the institute) and the dossier of strategy development, action plan, implementation, monitoring and reporting of results in each phase • Digital transformation contents are integrated in the general strategy as well as institute development projects. The leaders of TVET institutes directly and comprehensively direct all aspects of DX activities. There are activities to assess the current state of digital transformation annually and measures to improve.
	9. The institute applies synchronized management processes based on data exploitation and connection.	• Training management, learning, facilities, human resources, administrative, and quality assurance activities are operated on digital platforms, data exploitation and connection. • Scored from 0 (lowest) to 5 (highest).	• The workflow of each department, operating on a digital platform • Records of building, updating/adjusting processes • Connections and links among processes on the same platforms
	10. The institute manages learners by using a digital platform.	• The ratio of learners to total number of the institute's learners that are managed by using a digital platform • Scored from 0 (lowest) to 5 (highest)	• Management platforms and systems have enough data • Digitalize learners' profiles, learners have an account connected to the institute's learning management system.
	11. The institute manages teaching and learning activities and training quality by using a digital platform.	• Scored from 1 (lowest) to 5 (highest).	• Management platforms and systems have enough data • Training programs, teaching plans, textbooks, reference materials, outlines, question banks as well as all training documents, books and records are digitalized. • Training and training quality management data reporting demonstrates consistency, interconnectedness, openness and publicity

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 3 Administration - Management	12. Learning resources including print and digital formats are managed on digital platforms or digital library software.	• Scored from 1 (lowest) to 5 (highest).	• A digital library platform or software that has sufficient data and is being used
Criteria 4 Teachers, staff and learners	13. Leaders, officials, teachers and learners are trained to have updated awareness of digital transformation	• The ratio of leaders, officials, teachers, and learners with updated awareness of digital transformation • Scored from 0 (lowest) to 5 (highest).	• Training plan, decision to open classes, training results, list of learners • Reports on conferences, seminars, trainings, workshops, internal training activities...
	14. Teachers have basic digital competencies, occupational digital competencies and digital pedagogical competencies.	• The ratio of learners to total number of the institute's learners that are managed by using a digital platform • Scored from 0 (lowest) to 5 (highest)	• Training plan, decision to open classes, training results, list of learners for capacity development activities • Teaching-learning materials, lesson plans prepared and used by teachers • Lessons of teachers on digital platforms • Digital classroom management records, digital learning records of subject's teachers are responsible for • Apply the capacity to produce digital learning materials and using digital teaching equipment
	15. Officials and employees have digital capabilities appropriate to their job positions.	• The ratio of officials and employees with improved digital capabilities according to job position • Scored from 1 (lowest) to 5 (highest).	• Training plan, decision to open classes, training results, list of learners • Ability to use and analyze data, connect to improve work efficiency.
	16. Learners have basic digital competencies to serve their studies at institute and future work	• Results of the digital competency survey of graduated students • Scored from 1 (lowest) to 5 (highest).	• Training plan, plan for beginning-of-course activities, photos, contents

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 5 institutes and regulations	17. The institute updates and implements new guidelines, policies and regulations on digital transformation of state management agencies.	• The ratio of implementation of documents of new guidelines, policies and regulations on digital transformation of management agencies • Scored from 1 (lowest) to 5 (highest). Yes/No	• General report of the clerical/administrative department on the implementation of the requesting documents by state management agencies • Report on the results of the institute's activities such as digital administrative system, personal identification, citizen digital signature, e-invoice, e-tax, non-cash tuition fee payment and salary payment…
	18. The institute applies internal regulations to encourage and recognize departments and individuals who contribute to digital transformation activities.	• The institute has regulations to encourage digital transformation activities and results • Yes/No	• The contents of digital transformation activities and results are integrated in the institute's incentive regulations and policies • A summary of the institute's digital transformation activities and their results in the year • The list of leaders, staff, teachers (learners?) of the institute is recognized and encouraged for digital transformation results
	19. The institute applies regulations and guiding documents on safety and security in the digital environment for officials, teachers and learners.	• The institute applies regulations and guiding documents on safety and security in the digital environment • Yes/No	• Contents of regulations, policies and guiding documents • Plan to guide and implement cybersecurity and safety for the year • Summary of results of activities of practicing security and safety in digital environment • List of leaders, staff, teachers, and learners to be informed on how to implement regulations, policies, guiding documents about cybersecurity and safety
	20. The institute implements measures to support learners in accessing digital devices and resources for learning.	• The institute has measures to support learners in accessing digital devices and resources for learning • Yes/No	• Plan to implement measures to support learners' access to digital devices and resources for learning • There is a networked self-study area and software for learning • There is a digital library and computer labs • Provide a stable transmission line for learning • Report the results of the year

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 5 institutes and regulations	21. The institute applies internal regulations / guidelines on intellectual property and copyright.	• The institute has regulations/ guidelines on intellectual property and copyright. • Yes/No	• Content of internal intellectual property and copyright regulations/guidelines. • Summary table of activities on the implementation of internal regulations/ guidelines on intellectual property and copyright.
Criteria 6 Infrastructure, platforms, and digital learning materials	22. The institute ensures digital infrastructure to help officials, teachers and learners work, teach and study	• The institute has digital infrastructure that meets the working, teaching and learning conditions of staff, lecturers and learners. • Pass/Fail	• Report of the institute's digital infrastructure meets the scale of exploitation and use of staff, teachers and learners annually • Internet service contract • Documents of procurement, provision of equipment for digital infrastructure such as servers, computer labs, e-learning rooms, digital libraries,... • Reports related to digital infrastructure exploitation results
	23. The institute has a unified data architecture to ensure the internal database system is connected, shared and used among units and departments in the institute.	• The institute has a data architecture design consistent with the institute's organizational structure, functions and tasks • The ratio of tasks (training, scientific research, student services, human resources, finance...) that have data described in a common data architecture and shared internally with each other through the institute's digital platform/ software • Yes/No	• A document describes the overall data architecture of the institute

Criteria	Standards	Indicator	Suggested proof/evidence
Criteria 6 Infrastructure, platforms, and digital learning materials	24. The institute exploits private or shared digital platforms with internal connections and with external organizations	• Platform to connect internal staff, teachers, learners, and external parties (for example: parents, industries, alumni and other vocational education institutes...) • Yes/No	• A report summarizing the results of exploitation of digital platforms and reality checks • The institute exploits or connects data with the database system of DVET, Ministries, branches, localities, managing agencies. • Contract to build digital systems/platforms such as LMS, DMP, digital learning materials management.... (if applicable)
	25. The institute exploits digital or open learning materials for training activities.	• The ratio of active training programs that have digital learning materials • Scored from 1 (lowest) to 5 (highest)	• The report summarizes the results of exploitation and use of digital learning materials for training programs and practical tests on digital platforms • Statistical tables of textbooks, reference books, digital learning materials for training programs

APPENDIX 2: EUROPEAN FRAMEWORK FOR DIGITALLY COMPETENT EDUCATIONAL ORGANISATIONS

Thematic elements	Sub-elements	Descriptors
Leadership & Governance Practices	Integration of Digital-age Learning is part of the overall mission, vision and strategy	1. The potential of digital learning technologies is clearly flagged
		2. The benefits of digital learning technologies are communicated
		3. The strategic plan encompasses digital-age learning
		4. Open education is an aspect of public engagement
	Strategy for digital-age learning is supported by an implementation plan	5. Planning builds on enablers while addressing barriers
		6. Internal stakeholders have a degree of autonomy
		7. Opportunities, incentives and rewards for staff are identified
		8. Digital-age learning is aligned with broader priorities
		9. There are twin goals of modernizing existing educational provision and offering new opportunities
	A Management and Governance Model is in place	10. There is a shared understanding of and commitment to the implementation plan
		11. Management responsibility is clearly assigned
		12. Resources are aligned with budgets and staffing
		13. The outcomes, quality and impact of the implementation plan are reviewed
		14. Specific initiatives or pilots are evaluated
		15. Implementation status is benchmarked
		16. Oversight of policy and direction is evident
Teaching and Learning Practices	Digital Competence is promoted, benchmarked and assessed	17. Staff and students are Digitally Competent
		18. Safety, risks and responsible behavior in online environments are foregrounded
		19. The Digital Competence (DC) of staff and students is benchmarked
		20. DC is included in staff appraisal
	A rethinking of roles and pedagogical approaches takes place	21. Staff are partners in change
		22. New roles are envisaged for staff
		23. New roles are envisaged for students
		24. Pedagogical approaches are expanded
		25. Personalized learning is developed
		26. Creativity is promoted
		27. Collaboration and group work is expected
		28. Social and emotional skills are developed
Professional Development		29. A commitment to Continuous Professional Development (CPD) is evident

		30. CPD is provided for staff at all levels
		31. CPD is aligned with individual and organizational needs
		32. A wide range of CPD approaches is evident
		33. Accredited/certified CPD opportunities are promoted
Assessment practices	Assessment Formats are engaging and motivating	34. The scope of formative assessment is extended
		35. Summative assessment is diversified
		36. Self- and peer-assessment are promoted
		37. Rich, personalized and meaningful feedback is encouraged and expected
	Informal and Non-Formal Learning are recognized	38. Prior, experiential and open learning are recognized and accredited
	Learning Design is Informed by Analytics	39. Learning analytics is given strategic consideration
		40. A code of practice for learning analytics is in place
		41. Learning is supported through learning analytics
		42. Quality management and curriculum/program design are supported through learning analytics
Content and Curricula	Digital Content and OER are widely promoted and used	43. Staff and students are the creators of contents
		44. Content repositories are widely and effectively used
		45. Intellectual property and copyright are respected
		46. Digital tools and contents are licensed as required
		47. Open Educational Resources are promoted and used
	Curricula are redesigned or re-interpreted to reflect the pedagogical possibilities afforded by digital technologies	48. Subject-based learning is reimagined to create more integrated approaches
		49. The time and place of learning is rescheduled
		50. Online provision is a reality
		51. Learning in authentic contexts is promoted
		52. Digital learning provision is evident across curriculum areas
		53. Students' digital competence is developed across the curriculum
Collaboration and Networking	Networking, sharing & collaboration is promoted	54. Networked collaboration for staff to pool expertise and share contents is the norm
		55. Knowledge exchange efforts are recognized
		56. Students engage in effective networking
		57. Participation in knowledge-exchange activities and events is promoted
		58. Internal collaboration and knowledge exchange is expected
	A strategic approach is taken to communication	59. An explicit communication strategy is in place
		60. A dynamic online presence is evident

	Partnerships are developed	61. A commitment to knowledge exchange through partnerships is evident
		62. Staff and students are incentivized to be actively involved in partnerships
Infrastructure	Physical and Virtual Learning Spaces are designed for digital-age learning	63. Physical learning spaces optimize the affordances of digital-age learning
		64. Virtual Learning Spaces are optimized
	The digital infrastructure is planned and managed	65. An Acceptable Usage Policy is in place
		66. Pedagogical and technical expertise direct investments in digital technologies
		67. A range of digital learning technologies supports anytime/anyplace learning
		68. Bring Your Own Device (BYOD) approaches are supported
		69. Risks relating to inequality and digital inclusion are addressed
		70. Technical and user support is evident
		71. Assistive technologies address special needs
		72. Measures to protect privacy, confidentiality and
		73. Effective procurement planning is evident
		74. An operational plan for core ICT backbone and services is in place

APPENDIX 3: AN EXAMPLE OF SELFIE

Area C: Infrastructure and Equipment

This area is about having adequate, reliable and secure infrastructure (such as equipment, software, information resources, internet connection, technical support or physical space). This can enable and facilitate innovative teaching, learning and assessment practices.

Answer options: five-point scale and not applicable (N/A)

Item code	Item title	SCHOOL LEADER	TEACHER	STUDENT	IN-COMPANY TRAINERS
C7	Data protection	In our school, there are **data protection** systems in place	In our school, there are **data protection** systems in place		In our company, there are **data protection** systems in place
C8	Digital devices for learning	In our school, there are school-owned/managed **digital devices for students to use** when they need them	In our school, there are school-owned/managed **digital devices for students to use** when they need them	In our school, there are **computers or tablets for me to use**	In our company, students are allowed to work with the **relevant (digital) equipment** for learning purposes
WBL C9	Digital devices for learning in company			In our company, I can learn **operating the relevant (digital) equipment**	
C17	Database of training opportunities	In our school, students have access to a **database of in-company training opportunities**	In our school, students have access to a **database of in-company training opportunities**	**VET:** In our school, I have access to a **database of traineeships, apprenticeships and other opportunities**	
C10 OP	School owned devices for students	*In our school, there are **school owned and managed portable devices** that students can take home when needed*	*In our school, there are **school owned and managed portable devices** that students can take home when needed*	*In our school there are **portable devices** for me to take home when needed*	*In our company there are **company owned and managed portable devices** that students can take home when needed*
C11 OP	Digital divide: Measures to identify challenges	*In our school we have measures in place to **identify challenges** that arise with Blended Learning, related to students learning needs and socio-economic background*	*In our school we have measures in place to **identify challenges** that arise with Blended Learning, related to students' learning needs and socio-economic background*		*In our company we have measures in place to **identify challenges** that arise with Blended Learning, related to students' learning needs and socio- economic background*

APPENDIX 4: FRAMEWORK FOR DIGITAL TRANSFORMATION IN HIGHER EDUCATION (JISC)

Elements	Sub-elements	Examples of activities that might be done
Organizational digital culture The values, beliefs and practices are affected by the use of digital technology. Empowering digital culture and leadership (strategy, planning and investment), focusing on core strategies, administrative structures and processes, effective governance, stakeholder support, development and engagement. The organization's digital culture also determines its approach to issues such as digital safety and wellbeing,	Digital culture and mindset	Work with stakeholders to produce a glossary that provides an agreed organizational definition of terminology that reflects the principles and values of the organization (e.g. resilience, sustainability, inclusion, graduate attributes, responsible and ethical research and innovation) • Develop codes of practice for different areas of business activity that articulate clear expectations around digital practices and behavior • Encourage staff to identify new digital opportunities to improve their working practices and to feed in suggestions via the appropriate approval routes • Apply ethical frameworks to ensure staff and learners approve the use of automated notifications Review existing job descriptions and person specifications to ensure that digital capabilities relevant to each role are up to date • Provide opportunities for staff and students to self-assess and reflect on their own digital capabilities and develop individual development plans to enhance the areas they identify as important • Ensure that digital leaders have opportunities to self-assess and reflect on their own digital capabilities and enhance these to model digital confidence to others • Give senior leaders the opportunity to attend a digital leadership course

openness, collaboration, and equity, diversity and inclusion, as well as how well it implements and adapts to organizational change.		• Use the Jisc role profiles to consider and baseline digital capabilities of different groups (e.g. digital leaders, professional services, teachers, students, library staff, learning technologists, researchers)
	Organizational identity	Carry out an organization wide audit of manual and digital relationship management systems to develop a coherent and integrated single source customer relationship management (CRM) system Promote and encourage a sense of belonging for all stakeholders and provide a mix of on-site and digital opportunities for them to demonstrate presence and engagement • Encourage students to establish and build professional/career related digital identities throughout their course
	Organizational wellbeing	Engage and involve stakeholders to develop shared guidelines and approaches for the use of digital communications to negotiate, argue respectfully, and deal with and respect difference • Develop accessibility and inclusion policies, practices, support and guidelines to ensure that all stakeholders have equitable experiences of work and learning • Make sure accessibility, inclusion and wellbeing challenges and problems are addressed as a high priority • Provide staff with digital tools, apps or services to manage their wellbeing (eg time management, workload prioritization, screen time), and encourage their use • Investigate the ethical use of digital nudges (automated notifications) to monitor wellbeing of staff and/or students

		• Offer remote/hybrid working for appropriate roles to improve recruitment and retention of skilled staff. Encourage engagement, reconfigure tasks and events to fit a digital format, and address mental health and equity issues • Upgrade or reconfigure workspaces to support a flexible, hybrid work culture (e.g. upgraded classrooms, conference rooms, shared workspaces)
	Organizational change	Ensure senior leaders are clear about their roles as digital leaders and confident to model good digital practice and innovative approaches to others • Carry out a review of roles and remits of existing senior management groups/ committees, considering development plans, to clarify group responsibilities and to identify any gaps in coverage • Provide time and space for staff to benefit from digital transformations and ensure recognition and sharing of good practice
Knowledge creation and innovation Analyzing emerging trends and developments across all areas of the organization's business to inform policy and development. Enhancing knowledge creation and innovation through research, and collaborative activities. Considering the wider impact	Digital vision and horizon scanning	Develop a series of visioning workshops for senior leaders • Encourage leaders and governors to be aware of digital transformations in industry, research and development, education, and business sectors and consider how to incorporate appropriate new practices and approaches into the organization (e.g. curriculum development, knowledge practices) • Create a futures-thinking or foresight framework for the organization which supports policy decision making
	Research	Enable interdisciplinary approaches to research through digitally connected communities • Provide access to appropriate scale and type of research infrastructure • Identify routes to access appropriate technologies (e.g. high-performance computing)

on local, regional, national or international communities.		within or outside the organization to support high complexity/high-capacity research • Provide adequate and well-managed research data storage • Provide secure access to open research data management infrastructure and policies to support clear research data lifecycle provision to include preservation and disposal • Ensure that effective content management systems are developed and used and maintained to support storage, retrieval and access to research and enterprise outputs, including internal and external digital repositories • Identify routes to managing physical research assets and equipment digitally to support a sustainable research estate • Identify routes for researchers to access research software and data engineering services where appropriate • Offer research software engineering services to researchers to develop and improve code for specific research projects • Reduce bureaucracy and administrative burdens on researchers by streamlining and simplifying research management process • Ensure availability and management of effective and interoperable research management processes, systems and technology
	Innovation	Enable recognition, recruitment, development and retention of creative digital practitioners in professional roles • Encourage and support staff to take calculated risks and experiment with technologies • Develop a ring-fenced innovation budget to support initial development of ideas

		• Provide opportunities for students to be involved as partners in research-informed digital innovation • Create new events, awards, initiatives and funding streams to support digital creativity • Support centers of excellence in digital fields and ensure their expertise is leveraged inside the organization • Enable a culture of enterprise and facilitate initiatives that contribute to the wider community; build entrepreneurship skills in students
	Wider impact	Ensure staff and students have the appropriate technologies, support, and training to produce digital content for different audiences • Maintain efficient marketing and communications to ensure that organizational outputs and key messages are effectively managed, stored, branded, and disseminated
Knowledge development Supporting knowledge development within the organization to ensure all stakeholders can learn, work and thrive in a digital environment. Rethinking and enhancing digital learning, teaching and assessment	**Curriculum development**	Work to transform and develop courses across the organization according to changing strategic visions, employer needs, and/or frameworks such as active blended learning, personalized learning, hybrid learning, and transdisciplinary learning • Reconsider and redesign traditional assessment and feedback to realize the affordances of digital approaches, ensuring staff and students have the required digital capabilities • Explore economic models for offering blended learning at scale • Identify and implement new international programs of study

		• Consider new global markets for courses exhibiting increasing demand considering increased digital learning capacity and staff capability • Explore how digital and physical spaces are being/could be used to provide enhanced opportunities for student flexibility and engagement
	Digital learning	Use a balance of in-person and digital methods to provide timely and appropriate feedback throughout a course to allow students to self-regulate their learning • Encourage and support learners to self-assess, identify, and articulate their digital and study preferences, and needs through a mixture of in-person and digital diagnostic methods • Offer learners regular opportunities to assess their digital learning capabilities and identify what support they need to build on these • Provide learners with appropriate digital tools and encouragement/support to reflect on their learning (e.g. e-portfolios, personal blogs) • Provide opportunities for curriculum teams to assess and reflect on the levels of digital capability and identify areas for professional development opportunities for student flexibility and engagement
	Digital teaching	• Establish a set of metrics and analytics that can be used to measure the success of digital learning beyond the simplistic data such as attendance and retention • Invest in self-access resources to support the development of digital capabilities among staff • Explore or research the use of AI to provide a personalized learning experience which identifies and responds to the needs and preferences of learners • Provide opportunities for teaching staff to share digital practices and expertise formally and informally

		• Ensure recognition and reward for teaching staff who develop their digital capabilities (e.g. appraisal, grading, time allocation, career opportunities, specialist roles, link to teaching excellence) • Redesign the management and delivery of assessment and feedback mechanisms • Leverage technologies to scale delivery of high-quality services to students located anywhere in the world • Adapt quality improvement processes to support the adoption of digital approaches to learning, teaching and assessment • Work with stakeholders to identify barriers to the adoption of technologies related to blended/hybrid learning and find ways to deal with this equitably (e.g. cameras on/ off for remote students, environmental impact of digital interactions) • Identify alternative means to support knowledge practice for people who are unable to access in-person spaces or equipment (e.g. games, simulations) • Work with other HEIs as consortia to advocate for increased availability and affordability of e-books with publishers
	Learner experience	• Embrace the notion of presence (for staff and students) which can be demonstrated synchronously or asynchronously as an alternative to contact hours • Include the digital wellbeing of students in wider student wellbeing initiatives and services • Take an active interest in the digital experience of learners through research, surveys and/or consultations • Use technology to provide personalized, adaptive learning and assessment

		• Identify all sources of data across the organization to support a better understanding of the learner experience and to use this to improve learner outcomes (e.g. use of library resources, engagement with the VLE etc.)
	Business intelligence (BI)	• Gather market intelligence to benchmark institutional position (e.g. research performance) • Ensure leaders and governors are aware of digital transformations in industry, education and business sectors and support new practices and approaches into the organization as appropriate (e.g. curriculum development, knowledge practices) • Consider how information is used in the institution and highlight this (e.g. local Labor market intelligence to identify career opportunities for students, student admissions trends to consider future size and shape) • Gain consensus on priorities for reporting - what information is essential for decision making and who should provide it • Provide access to appropriate user-defined data dashboards for people in different roles across the organization • Create a roadmap for the implementation of business intelligence services, considering interim measures where needed • Prioritize the collection of data needed to achieve goals (e.g. attendance monitoring in place for learner analytics)
	Decision making	• Understand business processes in different contexts across the organization and how digital enables and constrains these (e.g. education, research, support) • Give governors and senior leaders access to information and data to support decision making and planning

Knowledge exchange and partnerships Enhancing knowledge exchange to communicate and disseminate key organizational messages and encourage collaboration and community participation of all partners/stakeholders.	**Communication**	• Work with stakeholders to create digital communication guidelines that are inclusive (e.g. codes of conduct, email etiquette, managing online behavior) • Establish a culture of zero tolerance to online harassment and bullying • Work with stakeholders to consider how different digital formats and messages achieve different purposes and how far digital media and networks influence social behavior • Develop guidelines for online synchronous and asynchronous communication approaches to ensure a consistent and fair experience is had by all stakeholders
	Collaboration	• Ensure that systems and procedures for safe and secure data sharing support collaborative activities across the organization • Work with stakeholders to create rules and guidelines for effective and inclusive digital collaboration within and outside the organization • Consider how to work with TNE partners to share systems and technologies and identify potential challenges and risks
	Community participation	• Contribute towards local and regional industry and business to drive innovation and economic growth • Link with cultural and social initiatives in the local community or region to enrich the experience of staff and students and encourage social and environmental change
	Relationship management	• Enable and encourage students to develop and build relationships with potential local, regional, national and international employers • Develop and maintain strong and lasting relationships with alumni

Digital and physical infrastructure Providing robust and secure infrastructure through relevant expertise and vision, including appropriate investment in networks, systems, hardware, software and digitally equipped physical spaces, and ensuring effective management and standards compliance.	**Robust digital infrastructure**	• Establish horizon scanning activities that enable all stakeholder groups to participate and contribute • Encourage the development of shared local and institutional evaluation plans, methods and procedures • Carry out regular review audits to map data flows, workflows and processes across different functions to inform digital strategy going forward • Ensure digital planning is coordinated with other relevant plans and strategies (e.g. estates, learning, teaching and assessment, student experience, research, information and communication, international, IT, corporate plan) • Develop a cross-organizational steering group to take forward digital strategies and plans • Implement strategic digital visions as appropriate through digital leadership and effective governance (e.g. cloud-first, mobile-first, digital-first, people-first, sustainability) • Balance investment and effort to both refreshes, consolidate and/or integrate existing/legacy systems and services and develop new ones as appropriate • Plan for changing investment and procurement in the switch from majority capital expenditure to majority revenue expenditure (e.g. move to cloud services) • Plan for a balanced investment between fixed computing and resources/facilities for personal device use (e.g. under a bring-your-own or leasing policy) • Coordinate software purchasing, licensing, and access across diverse parts of the organization to maximize efficiency and availability • Engage with partners to identify opportunities for external investment in digital equipment or resources

		• Ensure digital infrastructure planning and decisions take account of the diverse needs of staff and students, particularly those at risk of exclusion through issues such as poverty, disability, mental health, physical location, language, or any other access difficulties. • Ensure that digital infrastructure decisions and activities do not create barriers to participation, working or learning • Ensure digital infrastructure planning and decisions are considered against organizational targets for environmental sustainability (e.g. energy use, carbon footprint, net zero) • Ensure that virtual environments reflect and are representative of diversity in the real world • Provide opportunities for all stakeholders to proactively engage in the design of the digital environment • Balance investment and effort to both refreshes, consolidate and/or integrate existing/legacy systems and services and develop new ones as appropriate • Plan for changing investment and procurement in the switch from majority capital expenditure to majority revenue expenditure (e.g. move to cloud services) • Plan for a balanced investment between fixed computing and resources/facilities for personal device use (e.g. under a bring-your-own or leasing policy) • Coordinate software purchasing, licensing, and access across diverse parts of the organization to maximize efficiency and availability • Engage with partners to identify opportunities for external investment in digital equipment or resources

	Digital connectivity	• Provide and maintain secure systems, services and content (e.g. cyber security protections and protocols) • Establish an incremental plan, targets, and roadmap to implement and/or integrate new systems, platforms, or applications to ensure minimum disruption to established business activities • Develop and support systems and services to enable effective and ethical collection and use of high-quality, secure data (e.g. business intelligence architecture, data centers, data dashboards, high performance computing (HPC), data visualization) and procedures
	Digital support	• Establish organizational guidelines for the impact of digital connectivity on the environment; suggest ways to mitigate this through changing practice (e.g. carbon footprint of email sending and storage) • Carry out ongoing monitoring of network usage, performance, and capacity, and highlight aspects that present current or future challenges (e.g. e-sports, e-science) • Ensure websites, digital services, and apps provided through the organization are accessible across multiple platforms/devices and comply with accessibility standards and regulations • Ensure no one is disadvantaged due to accessing services and systems that are outdated and less secure • Consider the challenges of global interconnectivity, technical impacts and potential restrictions

		• Establish appropriate plans and policies that specifically focus on data privacy and ethics, and cyber security issues that are unique to work-from-home environments • Expand, upgrade, and adopt digital security measures such as multi-factor authentication, password tools, threat detection, monitoring, ransomware protection software, and endpoint and Wi-Fi security • Work to achieve ISO 270001 certification to manage information security • Work with and access specialist services to support incident response, forensics and the recovery of organizational digital estates to mitigate the impact of attacks • Access appropriate services to support cyber security activities (e.g. Cyber Essentials), and participate in events and activities to support threat intelligence sharing • Manage roll-out and training for new digital systems and major updates • Establish a shared understanding of the differences between IT support and supporting a range of different digital practices (e.g. digital learning, digital research, data analytics)
	Estates management	• Carry out a full audit of teaching rooms, their 'purpose' or configurability, and the equipment in them, including rooms with specialist facilities • Streamline systems across the organization to facilitate room and equipment booking and measure room use to ensure physical spaces support current practice • Utilize data from intelligent environments to identify traffic and use of campus spaces to support ongoing improvement and development • Provide virtual tours for people who cannot access physical spaces

		• Provide a variety of bookable hybrid and virtual spaces • Include the effective pedagogical use of learning spaces and equipment in the plan for developing digital capability of teaching staff and provide training materials and support for staff and students using the spaces • Consider furniture, room layout, technology use and pedagogical approaches in different learning spaces to ensure flexible options are available. Consider limitations that may impact on teaching and learning in a blended/hybrid context • Assess the level of technical support required to adequately maintain (and keep current) the large number of technology-equipped rooms. Ensure that a sufficient and appropriate mix of technical, administrative and teaching support is available

APPENDIX 5: AN EXAMPLE OF SIGED

LEVEL	LATENT	INCIPIENT	EMERGENT	ESTABLISHED
1.1 How many and which systems/modules exist within this process? How do they operate?				
1.2 Do you apply the unique school building identification model?				
	There is no unique identifier for each element	Not all elements have a unique identifier	A unique identifier for each element exists, but there are duplications or other data quality issues	A unique identifier for each element exists and there are no duplications
1.3 Do you keep a unique record of buildings in digital format for use in the day-to-day management of schools?				
	There is no unique record	There is a partial unique record, or several records, scattered in digital format	A complete unique record in digital format exists but it is not used for the day-to-day management of schools	A complete and updated unique record in digital format exists and it is used in the day-to-day management of schools
1.4 Do you record the georeferenced data of school buildings?				
	There is no georeferenced information on school buildings	There is a partial digital record of the georeferenced data of the buildings, although it is outdated	A complete digital record of the georeferenced data of buildings exists, although it is outdated	There is a complete and updated digital record of the georeferenced data of the buildings