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BỘ LAO ĐỘNG - THƯƠNG BINH VÀ XÃ HỘI
TỔNG CỤC GIÁO DỤC NGHỀ NGHIỆP
DIRECTORATE OF VOCATIONAL EDUCATION AND TRAINING

ACTIVITY REPORT

ON THE FACT-FINDING ON DX AT 11 PARTNER TVET INSTITUTES

- Written by: Prof. Ho Tu Bao and Dr. Nguyen Nhat Quang – GIZ's Consultants

- Activity period: from 5 to 19 March 2021
- Activity locations: Hanoi, Bac Giang, Ha Tinh, Hue, Nha Trang, Ninh Thuan, Ho Chi Minh City, Dong Nai, Long An, and An Giang
- Host organization: Programme "Reform of TVET in Vietnam"
- Collaborating organizations: Directorate of Vocational Education and Training (DVET) and 11 partner TVET institutes of GIZ

May 2021

MỤC LỤC

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ABBREVIATIONS

Seq.	Abbreviation	Explanations
1.	AI	Artificial intelligence
2.	BMZ	German Ministry of Economic Development and Co-operation
3.	DX	DX
4.	IT	Information technology
5.	TVET	Technical Vocational Education and Training
6.	GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
7.	IoT	Internet of things
8.	LISA	Labour, Invalids and Social Affairs
9.	SWOT	Strength, Weakness, Opportunity, Threat
10.	IC	Information and communication
11.	PC	People's Committee

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SUMMARY

The report presents results of the fact-finding on the status of information technology (IT) applications and digital transformation (DX) directions at 11 TVET institutes supported by GIZ. It has uncovered the status-quo of strengths, weaknesses and difficulties associated with DX at the TVET institutes. In particular, the report reveals the discussion on key findings related to six components of the DX ecosystem in TVET and as well as nine recommendations. The six components include: 1) Content education and training, 2) Teaching and learning methods, 3) Teachers and students, 4) Digital infrastructure, platforms, and courseware, 5) Digital administration and management, and 6) Regulatory framework. Although the fact-finding activity was conducted at 11 TVET institutes, its key findings and recommendations can be useful to not only GIZ, DVET and 11 supported TVET institutes, but also other TVET institutions regarding real insights and development of relevant programmes of DX.

To complete the activity, the consultant team has received great support from leaders, teachers, staff and students from different organizations, including GIZ, DVET, provincial authorities, TVET institutes. We would like to express our sincere thanks to individuals and organizations for your contributions and participation.

1. GENERAL INTRODUCTION

1.1. About the Programme “Reform of TVET in Viet Nam”

The Programme “Reform of TVET in Viet Nam” joint Vietnamese-German technical cooperation programme “Reform of Technical Vocational Education and Training in Viet Nam” (TVET Programme) is financed by the German Ministry of Economic Cooperation and Development (BMZ) with counterpart funds from the Vietnamese Government. The implementing agencies are the GIZ and the Directorate of Vocational Education and Training (DVET) under the Ministry of Labour, Invalides and Social Affairs (MoLISA). The TVET Programme aims at better aligning TVET in Viet Nam to the changing world of work. It serves to three outputs:

– State actors, TVET staff, TVET institutes and the business sector are interconnected,

– The regulatory framework of TVET is aligned to the requirements of the changing world of work,

– The concept of High-Quality TVET institutes is successfully implemented in selected TVET institutes.

1.2. Fact-finding context

1.2.1. Overview of TVET in Vietnam

Vietnam currently has 56 million people of working age, while the training capacity of the TVET system can only meet a modest part (2.2 million learners/ year). The need to increase the scale of skilling, re-skilling and up-skilling training for employees is huge. According to the draft “Development Strategy of TVET during 2021-2030 and direction to 2045”, DVET targets to scale up the training capacity of 12,900,000 learners by 2025. However, the current TVET system of nearly 2000 vocational training institutions still encounters a great deal of challenges and difficulties pertaining to infrastructure and teachers. Meanwhile, the Government and MoLISA urge to merge TVET institutions to reduce the number, while ensuring the quality and efficiency of vocational training.

Due to the impacts from the changing world of work, the 4th industrial revolution, the increased autonomy and competitiveness in education and training, and the COVID-19 pandemic, it is required to further enhance a flexible, open, adaptive and responsive TVET system in order to meet the requirements from the industry, and ensure its sustainable development.

The COVID 19 pandemic compels TVET organizations to transform all management and academic activities from physical settings to the digital environment, including teaching and learning methods. However, many vocational institutions have not been able to, or ready to deal with this external change. A certain number of institutions even have to stop teaching and learning activities simply due to the inability to conduct online training.

All in all, the above analysis shows the needs, opportunities and potentials that DX will bring into vocational education in Vietnam. DX can help TVET institutions to scale up their training capacity based on digital platform solutions. DX potentially contributes to the improvements of openness, flexibility, adaptability and responsiveness for the TVET system, as well as bringings all management, teaching and learning activities to the digital environment.

1.2.2. Digital transformation in Vietnam

DX is currently an inevitable trend, triggering comprehensive changes to all organizations and individuals, changing the working and living methods in a new environment. DX can make impacts on business models, training models, products and services, helping organizations and businesses exploit a great deal of opportunities in the digital environment.

The Vietnamese Government attaches great importance to DX. The draft Socio-economic Development Strategy for 2021-2030 states: “Strong innovation ... focusing on research and application of core technologies and digital technologies”. This is one of the important steps for the digital economy to form and develop and a new remark of the XIII Party Congress Document in Vietnam. In 2020, the Vietnamese Government issued the Decision No. 749 / QD-TTg dated June 3, 2020 approving the “Programme for National Digital Transformation by 2025 with Orientations towards 2030”. On May 28, 2020, the Prime Minister issued the Directive No. 24 / CT-TTg on “promoting skilled workforce development to contribute to the improvement of productivity and national competitiveness in a new situation". These are considered two of the important documents expressing the Government's concern and direction on DX.

In the TVET sector, DX is also being focused. DX is considered as an overarching solution in the draft “Development Strategy of TVET during 2021-2030 with direction to 2045”. The DVET is urgently developing its “Programme of DX for Vocational Education during 2021-2030”, planned to submit it to the Government for approval and promulgation in 2021.

1.3. Rationale of the fact-finding

To date, there has no in-depth and comprehensive research on the topic of DX in the TVET sector of Vietnam. In addition, the Programme “Reform of TVET in Vietnam” started a new project phase 2020-2024 since September 2020, and DX is a new focused area. The fact-finding activity is thus needed to be implemented. Based on intensive analysis, discussion and especially recommendations, the activity supports:

- The Programme “Reform of TVET in Vietnam” to develop activity plans on strategic advice, capacity development and on-site technical support for promoting DX in TVET,

- DVET for formulating policies and developing the Programme of DX for TVET during 2021-2030,

- 11 partner TVET Institutes for raising awareness and exploring relevant development directions of DX for their organizations.

1.4. Fact-finding objective

For all things to be achieved, we propose an overall objective of the fact finding activity which aims to “gain insights into the status of DX in the TVET sector of Vietnam”.

Specific objectives are further clarified as below:

– Uncovering impacts, challenges, and critical success factors associated with six mutually related components of the DX ecosystem in TVET,

– Providing research-based evidence for developing policy advice, capacity development and strategic plan for the TVET sector of Vietnam,

– Developing a set of concrete recommendations for the implementation of DX in the TVET sector of Vietnam,

– Giving suggestions to DVET and TVET institutes for further studies on other aspects of DX, or scale-up of the research scope to the regional level (ASEAN).

To this end, the research aims to answer the main question “What is the status of DX at TVET institutes?” In particular, the following questions are further addressed:

– How has DX impacted on the TVET sector?

– What determines a successful DX for the supported TVET partners?

– What main challenges pertain to DX at supported TVET partners?

– What are the main needs of the TVET stakeholders to overcome these challenges?

1.5. Methodology

The methodology includes document review, group discussion, campus visit and interview.

1.5.1. Document review

For the purpose of collecting basic data and information before coming to work at each Institute, the consultant team requested DVET, the Programme “Reform of TVET in Vietnam”, and 11 surveyed institutes to provide necessary documents for fact-finding purposes. The partner Institutes are further required to submit general reports, specifically for:

– Overview of Institutes (features, functions, tasks, outstanding performance results on direction, training, student affairs, infrastructure, external affairs, enrollment results, training occupations, statistics of the number of students and staff...)

– The institute's overall development strategy (vision, mission, core values, strategic goals, action plans ...)

– The current status and the DX strategy (the institute's intention/direction, SWOT analysis of DX, the status and intended objectives associated with six components in the DX ecosystem).

In addition, the consultant team researched additional information through websites and documents requiring additional supplements such as the current status of the IT applications.

The DVET and the Programme “Reform of TVET in Vietnam” are required to provide general information and supported activity plans relating to DX in TVET.

These documents are required to be thoroughly studied together with comments and questions prior to each fact-finding visit.

1.5.2. Group discussion

The participants were required to attend the discussion, including: representatives of rector boards, heads of IT department, training departments, faculties, administrative and personnel departments, student affair departments, person in charge of libraries, person in charge of cooperation with enterprises, key teachers and among others. The discussion was followed a common schedule as follow:

– The leadership representative of the institute presented general information, status of IT applications at the institute, the vision and expectation

of DX, especially from what they learned after the training in November 2020 organized by GIZ, including their SWOT analysis of the institute relating to DX.

– The consultant team presented an overall picture of the 4th Industrial Revolution and its impacts, and the DX ecosystem in TVET, including 6 components: training content; teaching and learning methods; digital infrastructure, platforms and learning resources; digital teachers and students; digital administration and management; and regulatory frameworks.

– The consultants moderated the discussion by asking participants of the institute to share their comments/opinions.

– The consultants asked further questions for better understanding of the status quo, especially awareness of the institution members regarding the six components of DX in TVET.

Open discussions were conducted for all members aiming at a common understanding and initial ideas of DX for the institute.

1.5.3. On-site visit

The consultant team spent an hour visiting the institute campuses and did quick interviews with relevant staff in charge of the sites such as workshops, training rooms, libraries est.

1.5.4. Interviews

Interviewed participants were selected randomly. The main points of the interview questions are as follows:

– Awareness of DX and understanding of six components of the DX ecosystem in TVET. Based on their responses, the consultant team can further clarify and give appropriate advice.

– To achieve the objective, interview questions were designed relevantly to groups of surveyed participants. The design of interview questions took into consideration the selection of contents and wording in a meaningful order and format within the context of a limited time.

– Interviewees were divided into 5 groups: 1) leaders of departments /centers, 2) heads of departments, 3) representative teachers for training occupations, 4) students of different training occupations, representatives of years, 5) institute leaders.

1.6. Activity summary

The fact-finding survey activities officially took place within 15 days (from 5 March to 19 March, 2021). After the first fact finding trip took place at Bac Ninh

College of Industry, the fact-finding delegation was divided into 2 working groups to conduct parallel activities at partner TVET institutes in the central and southern provinces of Vietnam. In addition to the purpose of investigating the situation, each fact-finding trip is an opportunity to raise awareness and understanding of DX for targeted groups including:

a) Leaders of principal departments and organizations,
b) Leaders, staff, lecturers, students at partner TVET Institutes,
c) Leadership representatives of other TVET institutions in the provinces/city.

After the fact-finding trip, the consultant team focuses on developing the activity report and proposing recommendations to GIZ, DVET and partner TVET institutes. Key findings of the activity can be shared with other GIZ's programmes, TVET institutions, and other local and international organizations for reference.

2. BACKGROUND INFORMATION OF 11 PARTNER TVET INSTITUTES

In this section, information has been distilled and synthesized from general reports submitted by 11 partner TVET institutes. It serves the purpose of generating a general overview and statistical presentations of human resources, students, training occupations, and so on.

2.1. Some features of 11 partner TVET institutes

Among 11 partner TVET Institutes, 55% are under the management of Provincial People's Committee, 18% are under the Ministry of Construction and the remaining 27% are under other ministries. This can be taken into account when consulting on strategic development, policy advice, and how to mobilize resources for implementing DX (details can be found in the Appendix 1).

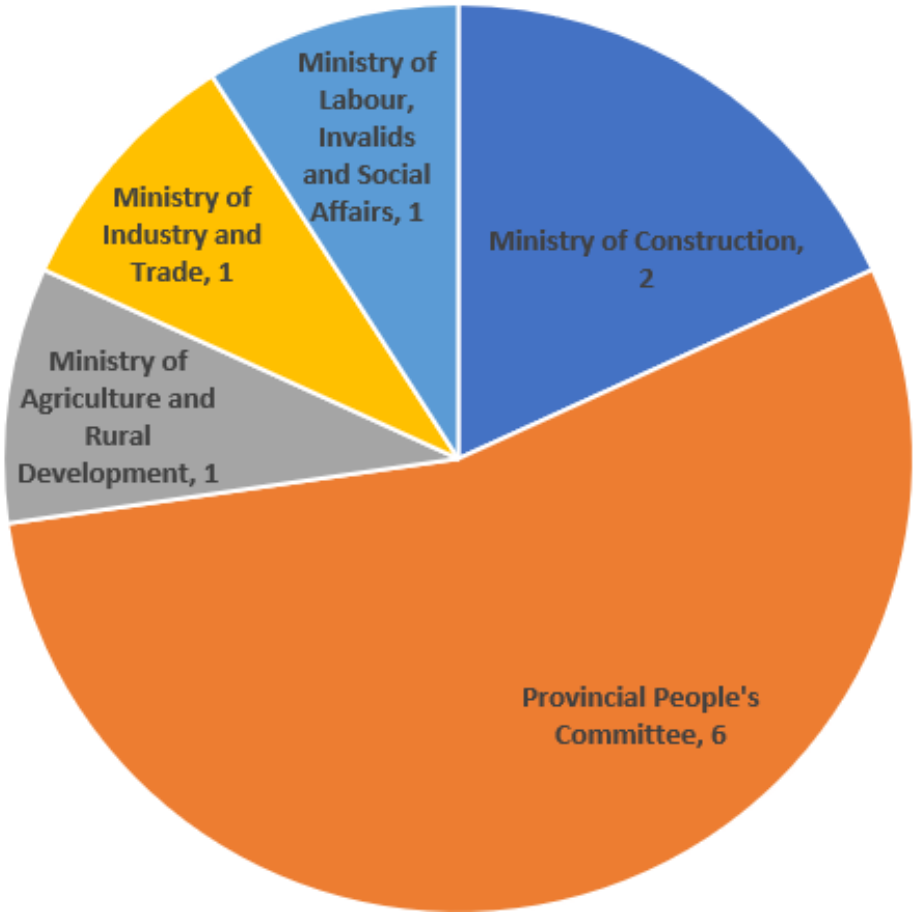

Figure 1: Diagram of parent organizations of TVET institutes

The Figure 2 shows different numbers of permanent management staff, administrative staff and teachers by institute.

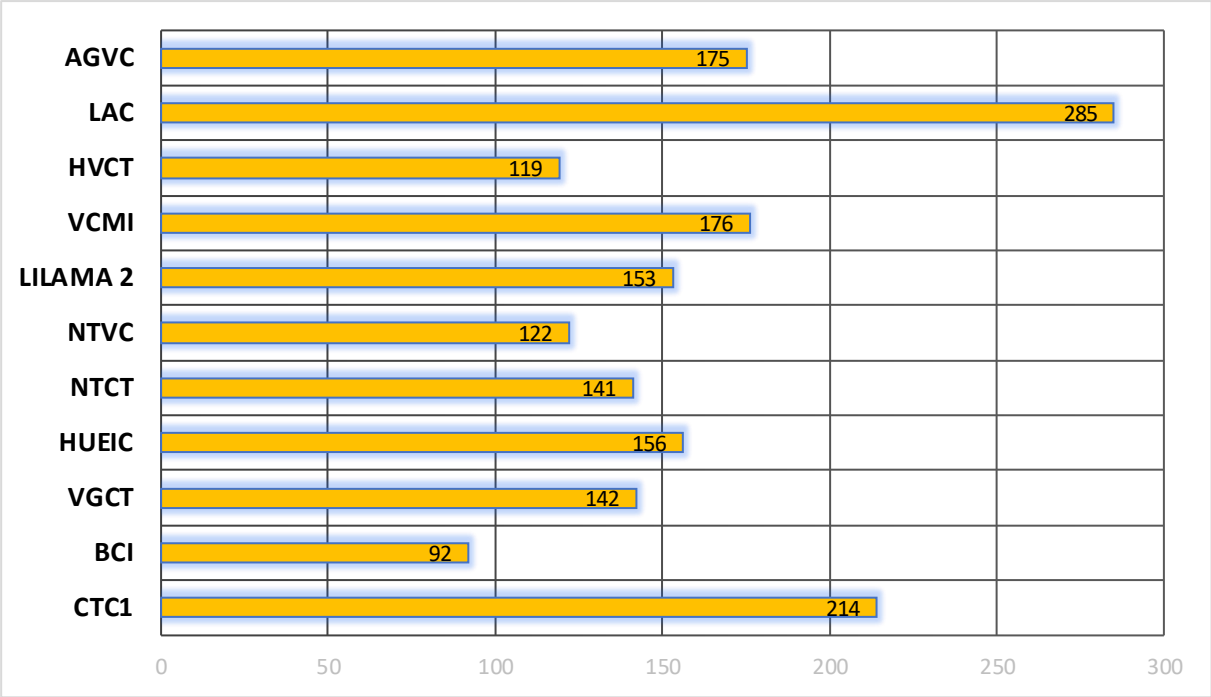

Figure 2: Statistics on the number of staff and teachers of 11 TVET institutes.

Currently, 11 partner institutes have a total number of 50,198 students, at college training level (13,106 students, accounting for 26%), intermediate training level (18,628 students, accounting for 37%), primary training level (16,703 students, accounting for 33%), and other training (1,761 students, accounting for 4%).

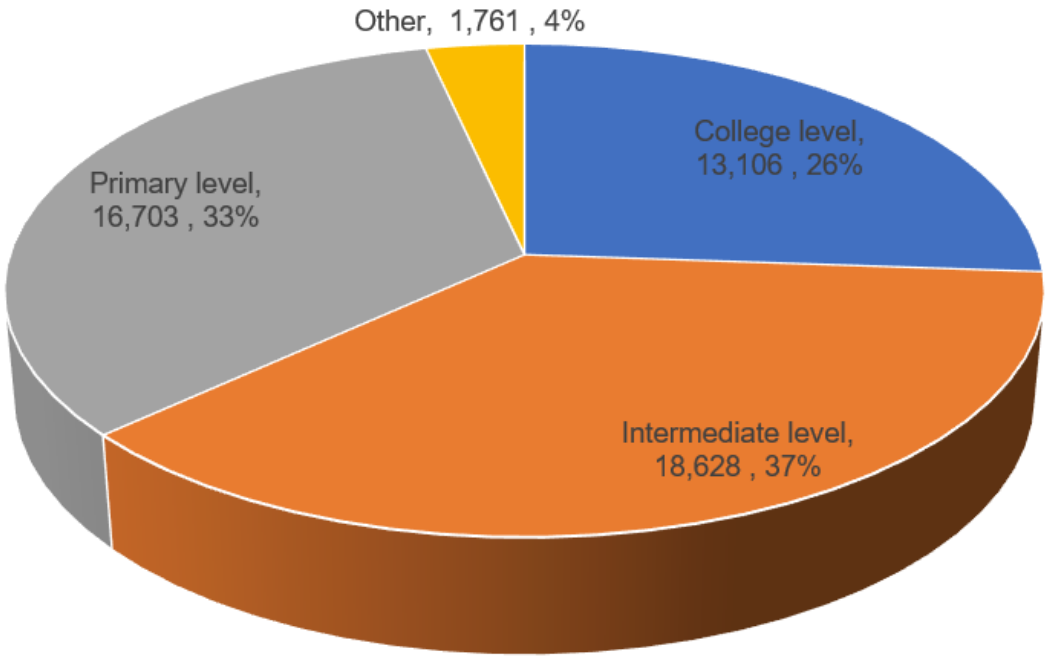

Figure 3: Statistics on the number of students by training levels

The Figure 4 compares the number of students by training levels and by TVET institute.

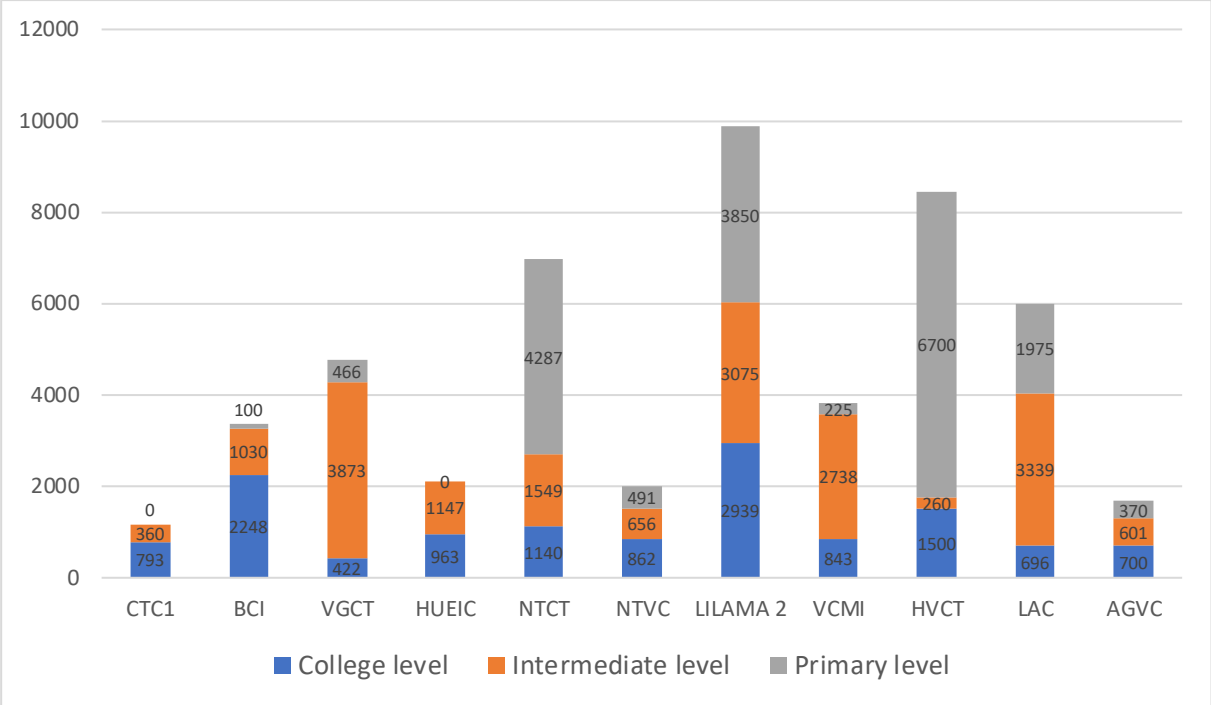

Figure 4: Statistics on the number of students by TVET institute and by training level

2.2. Training occupations

Currently, 11 partner TVET institutes are providing 191 training occupations and 335 occupational training courses at three training levels. Among 335 occupational training courses, 212 are at the college level, 187 at the intermediate level and 171 at primary level. Details are shown in Figure 5 below.

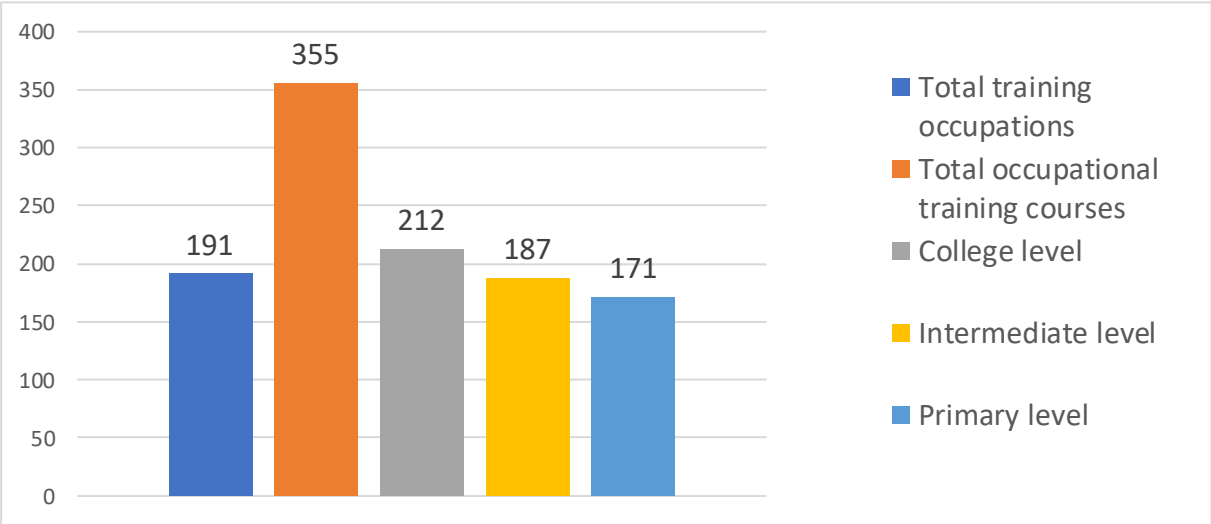

Figure 5: Statistics on the number of training occupations and training courses

From the Figure 6 below, it can be seen that, out of a total of 191 occupations, there are 13 most popular training occupations of three training

levels. Especially, the top 06 training occupations includes Business accounting (offered by 11 institutes), Welding technology (10), Industrial Electrics (10), Metal Cutting (9), Automobile Technology (9) and Industrial Electronics (9).

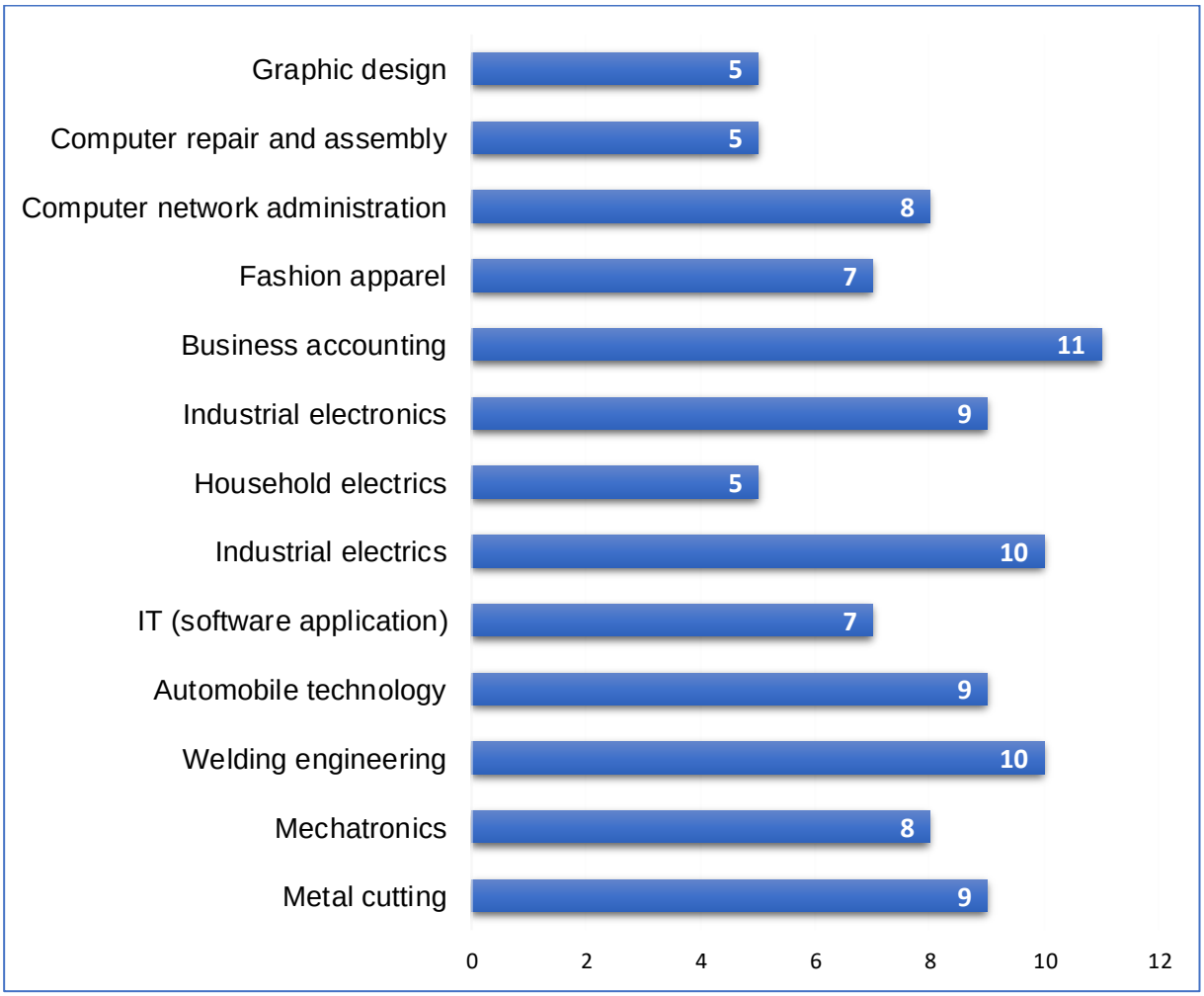

Figure 6: Statistics on 13 popular training occupations offered by 11 TVET institutes

When comparing 13 popular training occupations by training level, it is considerable to add 02 more training occupations: "Mechatronics" and "Computer Network Administration" which are also widely trained by TVET colleges at the college training level and the intermediate training level.

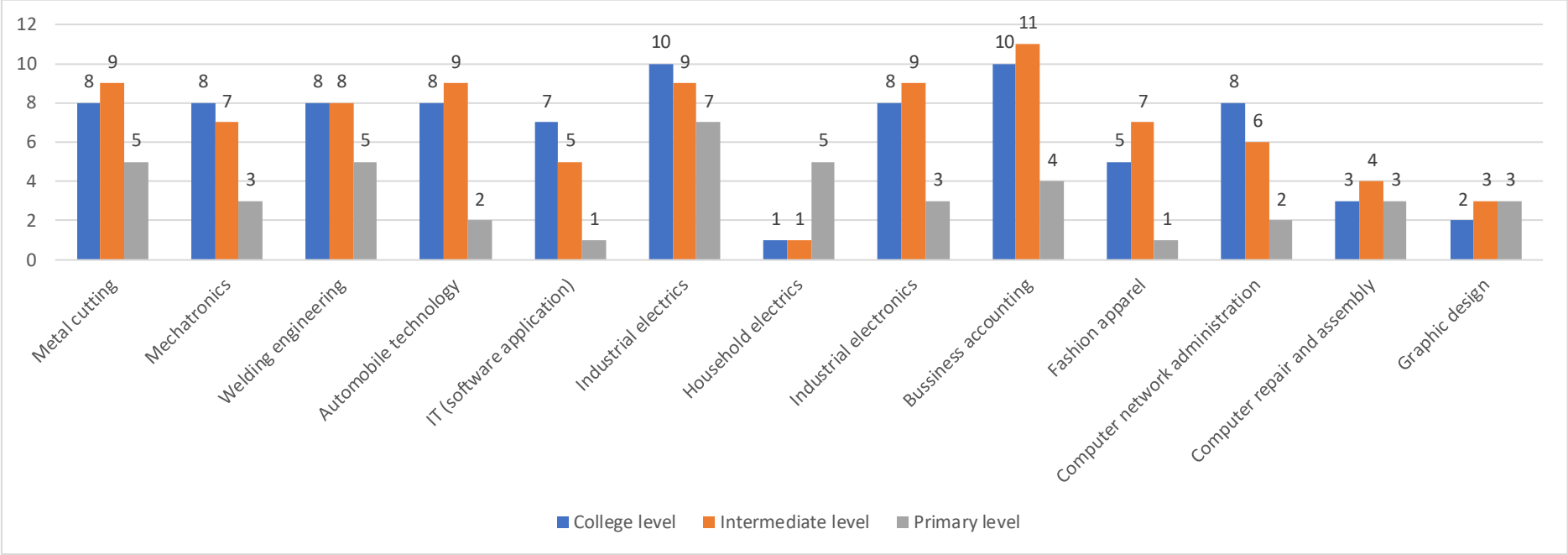

Figure 7: Comparative statistics on 13 popular occupations by training level

The analysis of popular training occupations can provide helpful hints to initiate breakthrough ideas of DX in TVET. More specifically, with these popular training occupations, 11 institutes can work together to develop shared teaching materials, to implement pilot innovations in training content (e.g., to apply digital technologies to modularize lectures), to create professional networking groups for teachers for sharing experiences and enhancing professional updates.

Below are statistical illustrations on the number of training occupations by training level offered by institutes.

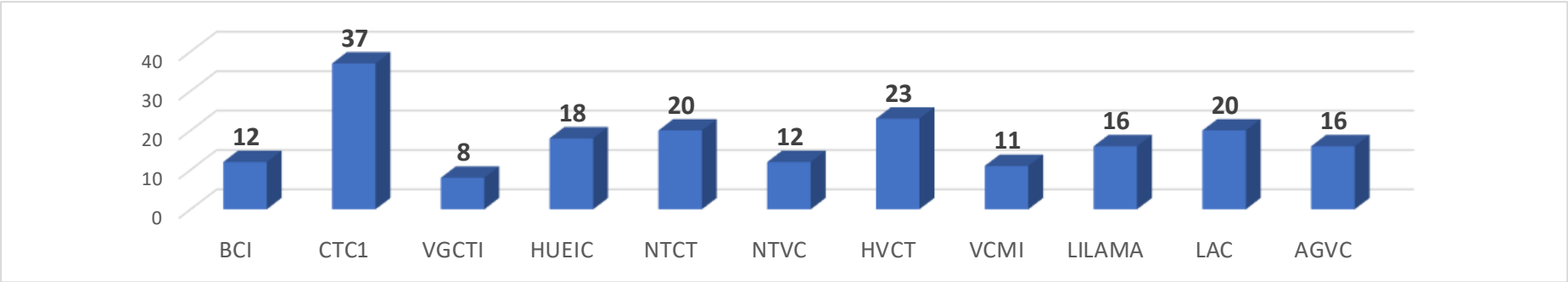

Figure 8: Statistics on the number of training occupations at the college level by TVET institute

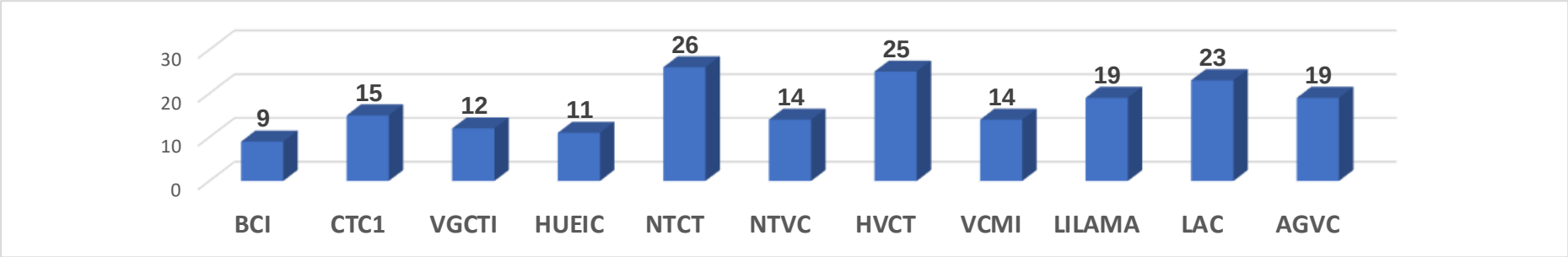

Figure 9: Statistics on the number of training occupations at the intermediate level by TVET institute

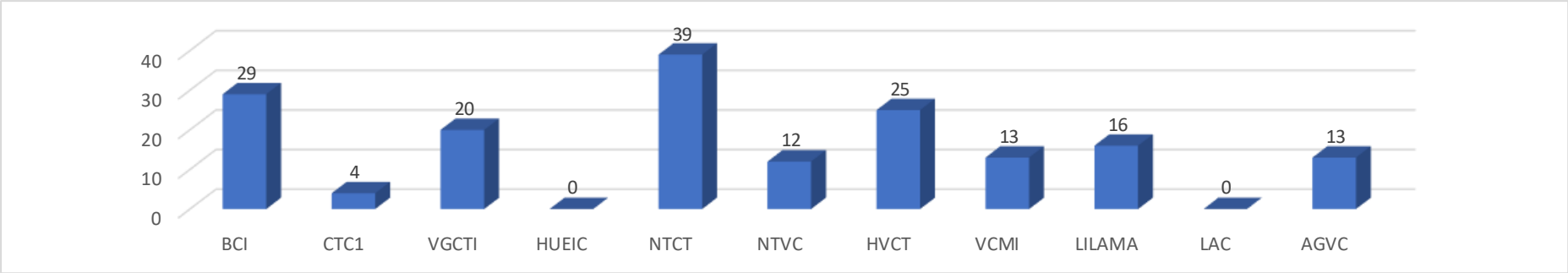

Figure 10: Statistics on the number of training occupations at the primary level by TVET institute

2.3. SWOT analysis

The SWOT analysis provides a summary of common strengths (S), weaknesses (W), opportunities (O) and threats (T) which have been extracted from the general reports submitted by 11 TVET institutes. The most common issues are repeatedly mentioned, and marked by corresponding number of asterisks (*), and arranged by the order from most popular to least popular. The table below can be considered as an initial evaluation reflecting the perception of the DX situation by partner TVET institutes. We can draw on possible solutions based on the principles of SWOT matrix analysis. In particular, a TVET institute can capitalize on its strengths to seize opportunities, or overcome weaknesses to lessen challenges/risks.

(Positive factors)	(Internal factors of the organization)		(Negative factors)
	STRENGTHS	**WEAKNESSES**	
	– Young and dynamic staff and lecturers who own professional qualifications and abilities to quickly absorb new technologies*******	– Insufficient infrastructure, platforms, IT equipment, facilities (classrooms, library, workshops, experiments ******	
	– Strong management support, determination, and direct guidance of leaders******	– Lack of knowledge of DX at all organizational levels, hesitant about change ***	
	– Some institutes have good IT infrastructure, ERP systems *****	– Shortage of digital learning resources (e-books, e-libraries, test banks, e-lectures, e-learning software, applied simulation software) ****	
	– Rich experience and capacity in vocational training***	– Experience in online training ***	
	– Diverse training occupations**	– Lack of investment resources ***	
	– Good partnership with the industry**	– Limited and uneven IT skills***	
		– Internet security issues**	

		– Training quality is still limited** – English competence**, – Training programmes, contents, and methods are not updated timely, catched up with scientific advances** – Admission is insufficient* – Institutes are not able to optimize supporting resources from the industry for training activities, – Lack of an enabling regulatory framework, – Databases are still fragmented, not integrated.	
	OPPORTUNITIES – Enable diverse training forms based on digital platforms, and adaptability, flexibility, openness, to fast respond to external changes and impacts ***** – Innovate the management, administration, and teaching methods for institutes *** – Support from provincial departments, ministries, the Government, international organizations (GIZ) ******	**THREATS** – The labor market requires increasingly high-quality human resources (competence, qualifications, skills) **** – Resources (human, finance, data…) for DX**, – Improve digital literacy for staff and teachers when shifting teaching and learning activities to the digital environment** – Raise awareness and hesitation about change among staff, lecturers and learners, including managers** – Develop appropriate plans and strategies*	

	– Contribute, share, exploit educational resources and databases **** – High demand for vocational training human resources** – Establish business cooperation networks, – Social awareness of the role and image TVET has changed positively, – Extensive international integration brings in more opportunities, – Improve the quality of training,	– Regulatory frameworks for DX – Competitive pressure of student enrollment quota/admission, ** – Low salary rate that can not keep competent teachers, – Lack of digital tools to support student's learning* – Enterprises are not ready to DX – Infrastructure and platforms required for DX – Data security, the danger of being left behind	
	(External factors of the organization)		

3. DISCUSSION ON KEY FINDINGS

This section presents our opinions and assessments of the current state of 11 TVET institutes on DX. These opinions and assessments aim to point out the gaps between current status and intended objectives related to the six components of the DX ecosystem in TVET, as shown in the Figure 11 below (See the Appendix 3 for more information about the DX ecosystem).

1) Training content,
2) Teaching and learning methods,
3) Digital teachers and students,
4) Digital infrastructure, platforms, and learning resources,
5) Digital administration and management,
6) Regulatory frameworks.

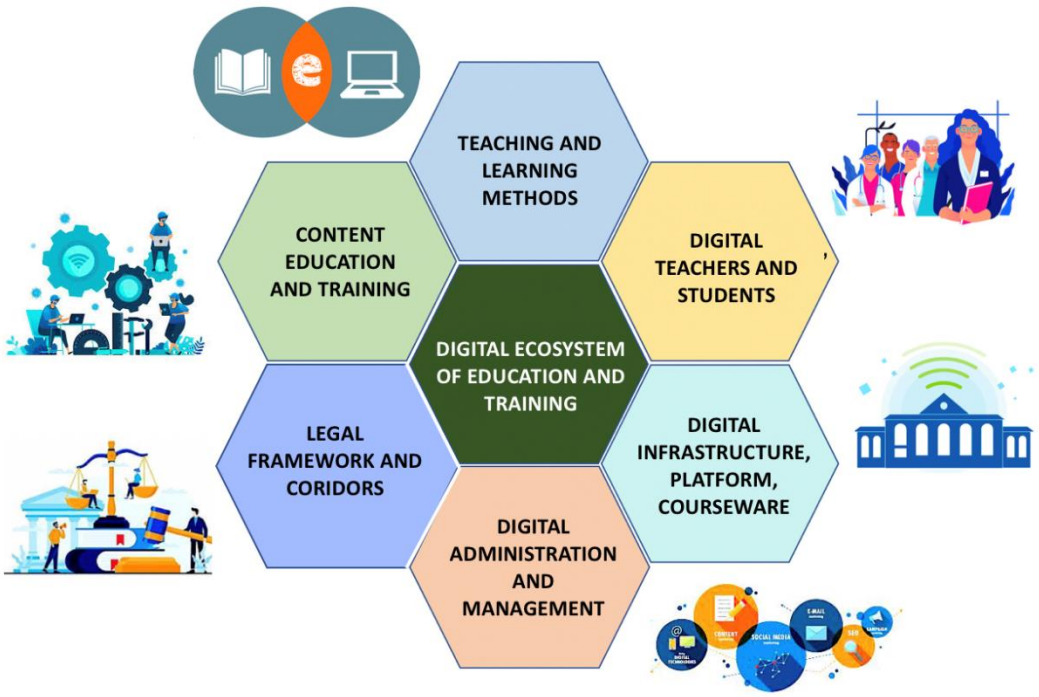

Figure 11: Six components of the DX ecosystem (Ho Tu Bao, 2021)

The formation of opinions and assessments is based on direct discussions, interviews and observations along with analysis of activity documentations at 11 partner TVET institutes. These evaluations will be the basis for formulating recommendations and suggestions for TVET institutes to develop their action plans on DX as well as for GIZ to develop supporting plans.

3.1. Training contents

3.1.1. TVET institutions have realized the importance to review, change and improve their current training contents. However, most of these institutions have not put this category on a mission, a goal, and not yet have a “strategic vision” about changes in the digital environment and its impacts on training contents.

3.1.2. The current training content is still conventional and not updated, and there is no support system to forecast the training needs. TVET institutions are all aware that training activities must be tailored to the needs of the industry. However, there is no clear plan to foresee and anticipate future training needs (new occupations appear, changes in the knowledge and skills of traditional occupations). Even, the demand for human resources of traditional occupations is determined by personal assumptions. The annual admission plan has not been closely linked to the socio-economic development strategy and local mobilization of investments. Part of the reason (objective and subjective) is that there is no sector database system to support TVET institutes for identifying training contents and needs based on general data analysis.

3.1.3. Training programmes are not open and flexible enough, and this shortcoming leads to limitations in updating training content effectively and in a timely manner. For example, without the modularity of lectures, it will be difficult to flexibly break down, replace, assemble, update new content, or remove content that is no longer relevant.

3.1.4. The proportion of students in the digital economy, including IT, is still very low due to many reasons. Institutions all face a challenge of recruiting IT students while there is substantial demand for IT-related occupations in the labour market. In particular, the Vietnamese Government aims to build a digital economy which is expected to contribute to the achievement of at least 20% of GDP (According to the Decision No. 749 by the Government). Human resources for the digital economy cannot solely rely on higher education. But it is essential to have a skilled laborforce of workers, technicians with appropriate skills, and this is the responsibility of the TVET system.

3.1.5. In fact, most of the surveyed institutes have not yet established partnership with large IT enterprises and professional IT associations. Due to the shortage of connection with the digital industry both at the TVET institute and DVET levels, the structure of vocational training fields, name of training occupations, training programs, training scale and quality of the teaching staff have not well met requirements of the industry as well as the requirements of DX to the economy.

3.1.6. The proportion of knowledge and skills related to digital technology (IoT, AI, big data analysis...) in traditional training fields is still not high. Digital skills are simply referred to Informatics which is a compulsory subject in all training fields. Subjects in economics (e.g. accounting) need knowledge, skills in business analysis and data analysis, but this has not been reflected in training programmes. Engineering sectors such as automobile mechanics, refrigeration, electricity - electronics, and mechatronics have not been updated with knowledge of IoT and AI. Although some fields such as mechanical engineering, electrics and electronics have been allocated a certain amount of time for teaching for knowledge and skills in CNC and PLC programming. But in general, TVET institutes do not show a clear plan to integrate digital literacy into foundation subjects and specialized subjects. The training content has not yet ensured that all learners are equally equipped with digital literacy, especially for cross cutting training fields. TVET institutes do not have a systematic approach to digital literacy, which must be considered as one of the graduate attributes for all students.

3.1.7. Today, the job of workers is very much related to the use of specialized software which is trained at college, intermediate and primary levels. In the future, skills to master specialized software will become even more important. However, the investment in specialized training software for teaching has not been paid enough attention, most of the software is obsolete (very old versions, without licence) compared to industrial standards.

3.1.8. To implement DX in training content, it is first necessary to promote the proactiveness of TVET institutes, while many issues need to be solved at the sector level (specifically DVET and MoLISA Department of Employment).

In summary, the DX of training content at TVET institutes need to focus on enhancing digital literacy for graduates by restructuring and renewing the training content of training occupations, improving the proportion of digital literacy training for traditional occupations by integrating digital literacy into all related subjects. The institute-industry partnership is not comprehensive and there is no database system at the sector level to support the forecasting and identifying training needs. This triggers difficulties to TVET institutes in adjusting and updating their training content to properly and fully prepare students to meet the requirements of the industry upon their graduation.

3.2. Teaching and learning methods

3.2.1. The teaching and learning methods at institutes basically remain conventional. That is, teachers present, students listen and take notes. Although the use of presentation equipment and software to deliver lectures has become

polupar, teaching contents and pedagogies have not yet been innovated much. A typical feature of vocational training is that teaching and learning activities are conducted in the workshops. In theoretical teaching, teachers write or draw directly on the board or using slides. However, the use of other digital learning materials (such as videoclip, software…) is rarely seen. Skill development activities in the workshops are fundamental to all TVET institutes.

3.2.2. One of the fundamental advantages of training in the digital environment is the individualization of learning, but this initiative has not been shown in training practice.

3.2.3. During the social distancing due to Covid 19, many teachers have used the internet to give lectures and assign exercises remotely. However, the method of communication is still similar to giving lectures directly in the class and there is no significant change in pedagogies relevant to the new conditions. The majority of teachers are not yet familiar with e-pedagogies, or simply flipped class format. Due to the lack of appropriate pedagogical changes, institutes self-evaluate that the quality of online training during Covid19 lockdown is not high as expected. Online training is only an ad-hoc solution rather than an advanced approach and a long-term direction.

3.2.4. Teachers' limited capacity to master new technologies (digital tools, digital platforms) does affects the effectiveness of online teaching activities and e-pedagogies. Many teachers responded that online teaching during Covid is not effective, and they encounter "difficulties in managing student's learning activities and interacting with students during the teaching and learning process". In fact, part of the reason is because many teachers still bring traditional contents and offline methods to conduct online teaching. They have the ability to only use simple features/functions of free learning platforms such as Zoom, Google Classroom, etc.

3.3. Digital teachers and students

3.3.1. On the students' side, due to the characteristics of the young age and dynamic, they are quite proactive and able to quickly absorb new technologies. Most students know how to actively search on the internet (Youtube, professional forums...) to search for necessary learning materials and resources. Especially, some students with high learning motivation exploit online knowledge sources for their self-studying purposes effectively. However, students' self-learning in the digital environment is still spontaneous and depending on the level of dynamism and motivation of each student.

3.3.2. Another related issue is that at the beginning of the course, students are oriented with teaching and learning methods, but the digital learning methods have not been included. Students have not been equipped with soft skills such as behavior culture in an online social environment.

3.3.3. A common problem for all institutes is that the teachers have not been trained for e-pedagogies as well as the necessary techniques and skills to participate in the production process of digital learning materials. Many lecturers have not actively participated in developing and posting their lectures online because they are afraid that the content of their lectures have shortcomings, low quality, or inaccuracy

3.3.4. The scale of digital literacy training including e-pedagogies for staff and teachers is very large. To ensure a rapid implementation and cost effectiveness, it is possible to employ e-learning forms (using digital technologies to support DX for institutes).

3.4. Infrastructure, platforms, and digital learning materials

3.4.1. In general, the current hardware and software infrastructure of TVET institutes do not meet the requirements of modern training practices. In the future, when DX is strongly reinforced, a large part of teaching and learning activities will be shifted to the digital environment, the current infrastructure is thus unable to meet the new requirements. During the social distancing period due to the Covid 19 pandemic, most institutes' networks including servers and transmission lines were overloaded. The network system and equipment of the institutes are invested in small batches, lacking an overall design.

3.4.2. Computers and software equipment are conducted through sponsorship activities and small purchases, not synchronized. The number of computers on paper is larger than the real number in operation due to inappropriate regulations on asset depreciation as well as the repairing and upgrading costs. Computer configurations sometimes do not meet technical requirements for running specialized software and simulation software, which are derived from centralized procurement policies of local authorities (the majority are office computers procured by a low-price bidding regulation as a main selection criteria). This sometimes leads to under optimization of even expensive and modern software.

3.4.3. Students face a shortage of digital divides. They have smartphones, but not enough PCs/laptops for learning, and internet infrastructure is not ensured.

3.4.4. The digital learning materials of the institutes are all in their infancy and pilot stage. Some institutes have been equipped with studios with configuration sufficient for producing learning materials, but lack of human resources to exploit. Institutes simply perceive that recording teaching activities is the main method of producing digital learning and learning resources. Besides, one TVET institute sent a group of key teachers overseas to participate in an intensive and specialized training course in e-learning and skills/techniques to produce e-teaching materials, then shared their knowledge and hand-on experience with other teachers when returning home country. Some other institutes have a few talented teachers who are active in self-learning and mastering studio tools well. In general, institutes still give priority to using studio equipment for admission communication activities.

3.4.5. Human resources for DX are the entire staff, teachers and students in the institute. Most institutes are not properly aware of this issue. Right from the initial stage of developing an DX action plan, it is necessary to mobilize the active participation of everyone. It needs to be ensured that everyone considers DX as a common work which needs their own roles and clear understanding of what should be carried out. Only a few institutes have formed DX taskforces. The level of commitment and readiness to DX varies by institute.

3.4.6. Regarding human resources to develop and operate the IT system, all institutes rely on teaching faculties of IT. The quality and quantity of this human resource are not even. They are concurrently in charge of both technical support and teaching roles. Some institutes have relatively strong IT faculties, thus teachers can group students to develop some basic management software. Meanwhile, other institutes really need to develop the capacity of the IT faculties. According to our assessment, IT departments are incapable of administering a large and complex IT system, especially open-source-based systems.

3.4.7. In the process of DX, if institutes want to expand their training scale in digital industries and effectively deploy digital platforms, it is necessary to strongly invest in human resources at IT faculties as well as closely collaborate with external technology enterprises.

In general, for the success of DX, institutes need to rebuild their digital infrastructure, starting from designing a system architecture along with an appropriate vision, then restructuring the system according to the new design.

3.5. Digital administration and management

4.5.1. All 11 surveyed institutes are aware of IT applications in management and have invested a lot in these systems. In fact, the level of effectiveness and returns on investment are substantially varied from organization to organization.

3.5.2. The general situation is that institutes are equipped with management systems for each specific business processes, lack of data connection among systems, thus effectiveness of applications is not high. Different software supplied by different vendors and they cannot be integrated with each other. This leads to duplicated work, time consuming and resources for inputting same data repeatedly (the best scenario for reducing data input time is to export data to excel files, then import data again). On the other hand, this problem triggers data conflicting and more importantly, deep data analysis techniques can not be utilized to gain insights into the training and operation of the institute.

3.5.3. Administration software systems of the institutes are not connected to external systems (e.g, DVET, Department of Employment...) except for some e-office software for the management of inter-organizational official documents, and local management of public and civil servants through the e-government systems.

3.5.4. Some institutes express their concerns and worries about internet security when transforming all activities to the digital environment. However, this issue has not received adequate attention from most institutes.

3.5.5. In DX, the design and development of a digital platform for the administration and management of the institute is extremely important. The platform must enable real-time data collection and analysis to support decision making process, continuous improvements of training quality, resource optimization for the institute. A general awareness of this issue among institutes is still inadequate.

3.5.6. The institutes are basically at the beginning phase of analyzing the status and brainstorming initial ideas, not yet developing an action plan or programme of DX. They propose a need for advisory support.

3.6. Regulatory frameworks for DX

During discussions with leaders at surveyed institutes, many issues were raised. But a general comment is that regulatory frameworks for DX should go one step ahead, or Sandbox mechanism should be taken into consideration. In particular, some other prominent issues are:

3.6.1. TVET institutes have not yet developed a comprehensive and long-term DX programme and they propose a need for advisory support from DVET, and other parent organization and international partners.

3.6.2. It is essential to develop a benchmarking framework to assess/evaluate the effectiveness of DX implementation in TVET.

3.6.3. The regulation on the number of students in one class which is prescribed on the basis of face-to-face teaching in offline classrooms. However, this fixed regulation has become irrelevant when switching to online class. This shortcoming limits the possibility to scale up the number of students in an online class.

3.6.4. Lack of regulations on the recognition and certification of completed online learning formats.

3.6.5. Lack of regulations on modularization and mutual recognition of certificates and credits.

3.6.6. Inspection activities are still based on paper documents while the institute has converted the management documents into electronic format.

3.6.7. Another major problem is that there are currently no regulations to motivate teachers to develop and share teaching materials, which is a key issue in the overall DX of the entire vocational education sector.

4. RECOMMENDATIONS

The overall assessment of investigated institutes is that they are at the initial stage of IT applications to TVET, much behind the situation in developed countries such as Germany, Korea and other countries. Although awareness of an urgent need of DX among the institutes has increased significantly, the majority of them do not have a fundamental understanding of the DX and how to implement it. Based on fact-finding results,, the consultant team proposes the following recommendations:

4.1. Continue to raise awareness among TVET institutes and management staff at all levels regarding the needs and methods of implementing DX. Agree to use the six component ecosystem model as the destination of DX in institutes and as the main communication tool in the whole TVET sector.

4.2. TVET Institutes need to urgently develop their own DX programme with the strong support of DVET and GIZ. The DX programme should fully address the contents of DX according to the six component model. Institutes need to form a dedicated core team on DX (DX taskforce) chaired by the top leader of the institute to develop and implement the programme.

4.3. To save costs, it is necessary to study and develop common and shared platforms, pilot for 11 institutes first to draw on lessons learnt, then expand the platform to the whole TVET system. The development of a common database system should be prioritized to support decision-making management and training need assessment based on data. There is a need to quickly build a sharing culture for sharing teaching and learning materials and other knowledge resources. Consideration should be given to piloting the development of an educational resource platform for popular training occupations among 11 institutes.

4.4. It is necessary to identify the breakthrough solutions to build the DX ecosystem for the institute during this initial phase. For instance, the following activities can be conducted quickly and created a wide impact:

a) Innovating training content and developing learning materials for popular training occupations (see the Section 2.2 “Training occupations”);

b) Building a comprehensive database from institutes to DVET according to standards, serving as a digital infrastructure for innovation in management;

c) Changing the way of teaching and learning with new methods in the digital environment.

4.5. DVET urgently conducts reviews and amendments of the regulatory frameworks to facilitate DX for TVET institutes following the “enabling development” principle. The reviews of the regulatory framework should be associated with the six components of the DX ecosystem in TVET right from this stage, thereby summarizing the assessment and recommendations to engage legal frameworks with the needs and requirements from the on-site implementation level.

4.6. Apart from giving guidance and direction, DVET seriously considers an appropriate allocation of resources and funds to support TVET institutions for implementing DX programmes.

4.7. For GIZ, it is appropriate to provide technical and partial financial support to institutes to establish e-learning/studio rooms during this stage, helping institutes to initially develop digital learning resources. In addition, it is essential to organize capacity development activities for core teachers/multipliers to improve their knowledge and skills in using digital tools, digital platforms, and e-pedagogies.

4.8. It is necessary to develop a benchmarking framework to evaluate the effectiveness of DX activities for institutes, thereby recognizing and motivating staff and teachers to actively contribute to a positive change process.

4.9. To ensure an equal equipment of digital literacy for learners in all training occupations, it is advisable to develop a digital literacy training module, then integrating it into the training programmes and recognizing digital literacy as one of the graduate attributes. GIZ or international organizations can collaborate with DVET to develop this training module, pilot it in one institute, then replicate it in the TVET system (lessons learnt from the Greening Training Module at VCMI).

5. CONCLUSION

The fact finding to 11 partner TVET institutes supported by GIZ shows that leaders perceived digital transformation as an urgent task and they determine to implement it. This is an important basis to positively think about a successful progress of digital transformation. However, related key stakeholders need to do a lot of work in order to overcome difficulties relating to awareness, resources and financial mechanisms to ensure the success of digital transformation in TVET.

The consultant team hopes that assessments and recommendations in the report are useful to related organizations, and will be effectively employed to strongly promote digital transformation, so that the TVET sector can meet the expectations from the society.

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APPENDIX

Appendix 1: List of TVET institutes

	Institute's name	Authority in charge
1	Construction Technical College No. 1	Ministry of Construction
2	Bac Ninh College of Industry	Provincial People's Committee
3	Vietnamese-German Technical College of Ha Tinh	Provincial People's Committee
4	Hue Industrial College	Ministry of Industry and Trade
5	Nha Trang College of Technology	Provincial People's Committee
6	Ninh Thuan Vocational College	Provincial People's Committee
7	LILAMA2 International Technology College	Ministry of Construction
8	College of Machinery and Irrigation	Ministry of Agriculture and Rural Development
9	College of Technology II	Ministry of Labour, Invalids and Social Affairs
10	Long An College	Provincial People's Committee
11	An Giang Vocational College	Provincial People's Committee

Appendix 2: Fact-finding activity plan

Activity	Time	Participants	Province/ City
GROUP 1			
Working with Bac Ninh College of Industry	5/3/2021	1. Dr. Pham Vu Quoc Binh 2. Mr. Kim Hong Hung 3. Prof. Ho Tu Bao 4. Dr. Nguyen Nhat Quang 5. Dr. Juergen Hartwig 6. Ms. Pham Viet Ha 7. Ms. Pham Ngoc Anh 8. Mr. Pham Xuan Hoan	Bac Ninh
Working with Construction Technical College No. 1	19/3/2021 (Mon)	1. Prof. Ho Tu Bao 2. Dr. Nguyen Nhat Quang 3. Mr. Pham Xuan Hoan	Hanoi
GROUP 2			
Travel from Hanoi - Ha Tinh	9/3/2021	1. Prof. Ho Tu Bao, 2. Ms. Pham Viet Ha, 3. Mr. Kim Hong Hung	Ha Tinh
Working with Vietnam-German Technical College of Ha Tinh	10/3/2021		
Travel from Ha Tinh to Hue	11/3/2021		Hue
Working with Hue Industrial College	12/3/2021		
- Travel from Hue to Da Nang Airport by project car (morning) - Travel from Dang Nang to Nha Trang by airplane (afternoon)	13/3/2021		Nha Trang
- Internal group meeting and documentation (8h00-12h00) - Briefing with Programme Director and Deputy General Director of DVET (14h00-16h00)	14/3/2021	1. Dr. Pham Vu Quoc Binh, 2. Mr. Kim Hong Hung, 2. Dr. Juergen Hartwig, 3. Prof. Ho Tu Bao, 4. Ms. Pham Viet Ha	
- Working with Nha Trang College of Technology - Travel Nha Trang to Ninh Thuan	15/3/2021		Ninh Thuận
Working with Ninh Thuan Vocational College	16/3/2021		
Travel from Ninh Thuan to Cam Ranh Airport by car Travel from Cam Ranh Airport to Hanoi by airplane	17/3/2021		Hanoi

GROUP 3			
Travel from Hanoi to HCM City	9/3/2021	1. Dr. Nguyen Nhat Quang, 2. Mr. Pham Xuan Hoan 3. Dr. Nguyen Thi Luyen	HCM City
- Working with College of Technology II (HVCT) in HCMC, - Travel HVCT to Dong Nai	10/3/2021	1. Dr. Nguyen Nhat Quang, 2. Mr. Bach Hung Truong 3. Mr. Pham Xuan Hoan 4. Dr. Christian Hoffmann 5. Ms. Nguyen Thi Ngoc Huong 6. Dr. Nguyen Thi Luyen	Dong Nai
Working with College of Machinery and Irrigation in Dong Nai	11/3/2021		
Working with LILAMA2 International Technology College Travel from Dong Nai to HCM City (via TSN Airport. Dr. Quang goes back Hanoi)	12/3/2021		
Stay in HCM City	13/3/2021		
Travel from Dong Nai to Long An (via TSN Aiport to pick up Dr. Quang)	14/3/2021	1. Dr. Nguyen Nhat Quang, 2. Mr. Pham Xuan Hoan 3. Dr. Christian Hoffmann 4. Ms. Nguyen Thi Ngoc Huong 5. Dr. Nguyen Thi Luyen	Long An
Working with Long An College	15/3/2021		
Travel from Long An to An Giang	16/3/2021		An Giang
Working with An Giang Vocational College	17/3/2021		
Travel from An Giang to HCMC, HCMC to Hanoi	18/3/2021		Hanoi

Appendix 3: Presentation on DX for TVET by consultants

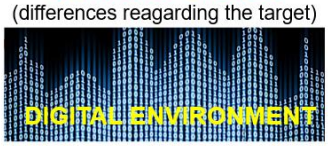
DIGITAL TRANSFORMATION OF EDUCATION AND TRAINING

Ho Tu Bao
VIASM
VIETNAM INSTITUTE FOR ADVANCED STUDY IN MATHEMATICS

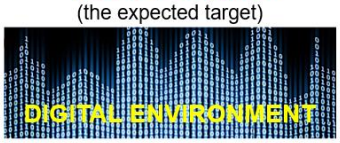
What is digital transformation?

Digital transformation is transforming the activities of the government, the economy and society into a digital environment. (*)

CURRENT STATUS
(differences reagarding the target)



TARGET STATUS
(the expected target)



(*) https://vietnamnet.vn/vn/cong-nghe/media/bo-truong-nguyen-manh-hung-chuyen-doi-so-la-cuoc-cach-mang-toan-dan-663208.html#inner-article

© Bao Ho. Digital transformation of education and training

Digital transformation = Physical world-Cyber space

Life, society, economy..

DATA
+
CONNECTION

digital twin

DIGITAL ENVIRONMENT

"The digital environment is the environment with digitized entities (data) each other connected over the internet"

DIGITAL OPPORTUNITIES

Three levels of digital transformation

Transformation
Holistic and comprehensive restructure of the organization and operation

Smart products, digital services, digital business models, AI, RPA, business, analytics, cloud computing, IoT, blockchain.
Data is central.

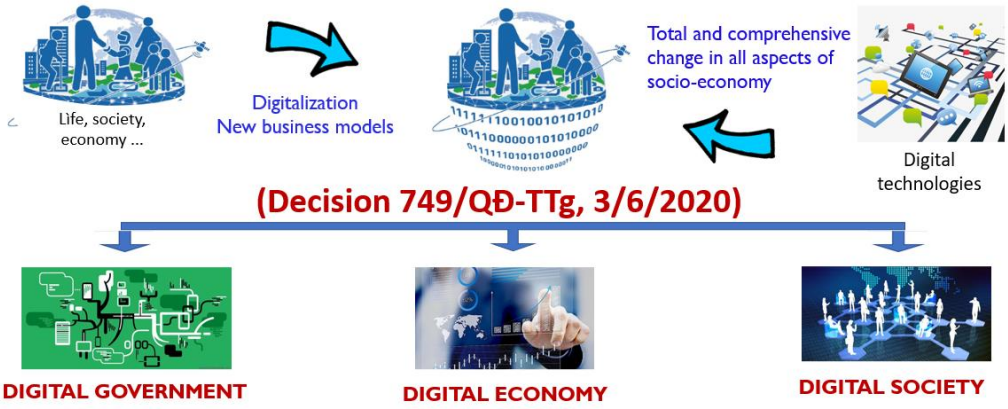
Digitalization
Creation of new business models

Management software, ERP, and automation software. LAN or Intranet.
Process is central.

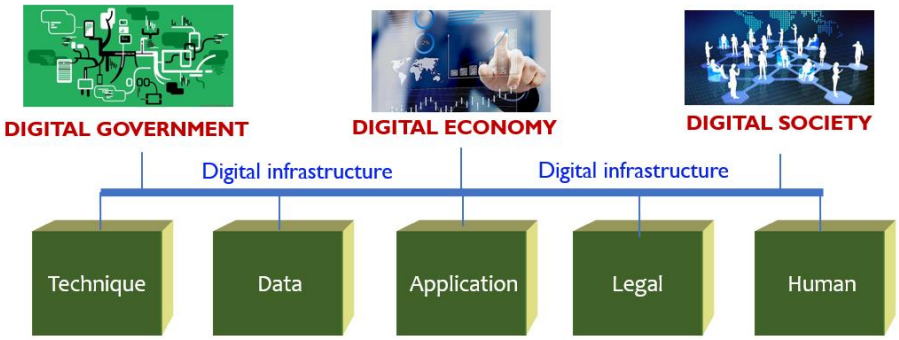
Digitization
Generation of the digital (data) form of entities

Personal software, document editor, spreadsheets, plans, estimates, accounting, email ... personal computers, network files exchange.
Personal productivity is central.

National program of digital transformation



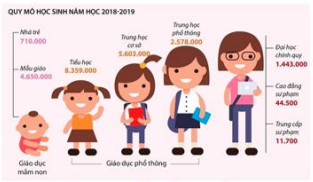
Digital infrastructure of digital transformation



Four areas of DX in education and training

Vocational education and training

Further education and re-training



General education

Higher education

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The future of learning roadmap

	Traditional Learning experience	*New Learning experience*
Key constituent	Faculty	Student
Learner approach	Passive Theory comes before applications	Active, self-directed, collaborative and enjoyable Based on problems, projects, cases and context
Teacher approach	Lecturer	Coach
Pace of learning	Set by national or school curricula and course syllabus	Adaptable to student (or groups of students) capacity and areas of interest
Basic unit of content	Course	Module/ competence
Progress tracking	Standardized through tests and essays that at set dates assess memorization of knowledge	Ongoing, iterative, individualized and focused on tracking the acquisition of competences, collaborative culture and critical thinking
Location of learning	Classroom	Anywhere
Role of ICT	Automating one-way delivering of content	Enabling blended learning environments

https://www.slideshare.net/massimilianoclaps9/education-digital-transformation-a-view-of-the-future-of-learning

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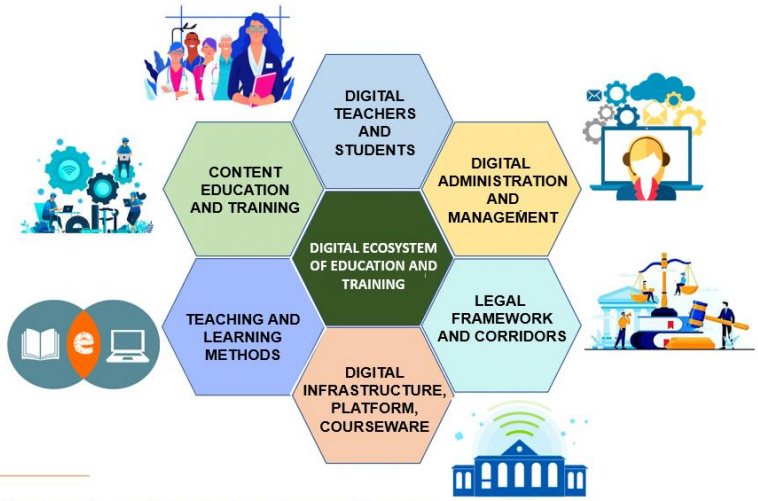
Digital ecosystem of education and training



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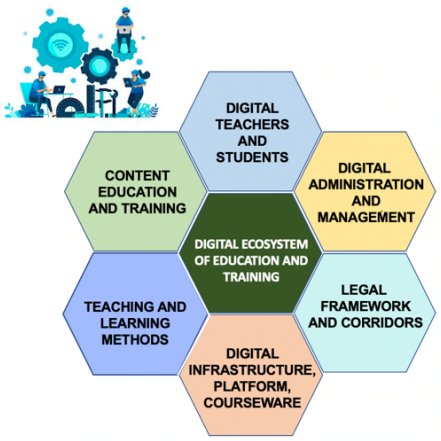
Digital ecosystem of education and training

Transformation of the education and training contents

- Redefine content with the knowledge and skills that learners need to know and have in **the time they live**.
- **Remove** the old content we don't need and **add** the new one we will need.
- Associate content with **labor market**.
- Define the required **skills** of labor occupations.
- structure the content into **modules**.



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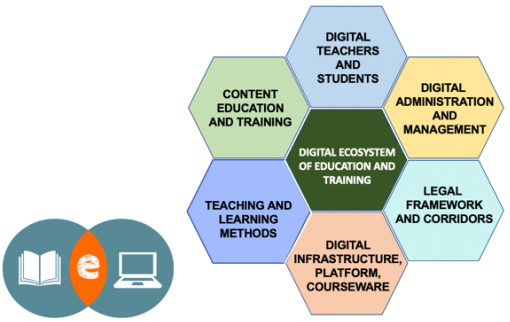
Digital ecosystem of education and training

Transformation of the education and training methods

- **Blended learning** harmonizes face-to-face teaching and learning with the use of digital technologies and courseware, including online education.
- **Adaptive learning** analyzes student data and instantly adjusts learning and evaluation materials.
- Learning **personalization**.
- Use **data analytics** and **AI** to support teaching and learning.



Computer-based learning

E-learning

MOOC

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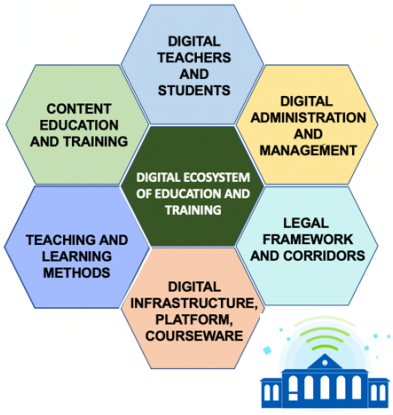
Digital ecosystem of education and training

Digital infrastructure, Platform, Courseware



- **Technical** infrastructure: networks and computers.
- **Data** infrastructure for teaching and learning, teachers and students, the training process ...
- **Application** infrastructure with digital platforms, multiple services, information control and sharing.
- **Courseware** associated with training programs and content, and shared.

courseware = course + software

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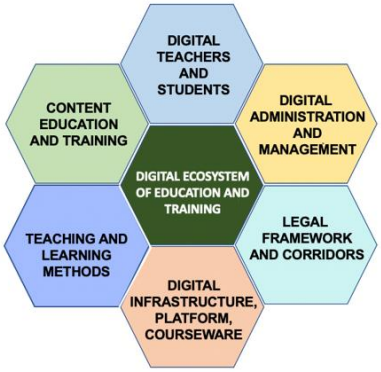
Digital ecosystem of education and training

Digital teachers and students

- **Students** play a central role, learn actively, self-orient, increase self-study ability, learn anytime, anywhere. Learning involves problem, skill, modularity, and contextualization and participation in creation and knowledge process.
- **Teachers** teach in a new way, and mainly plays the role of the "coach"



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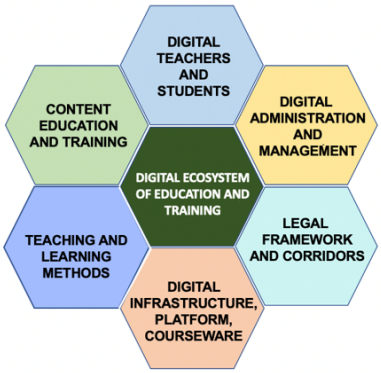
Digital ecosystem of education and training

Digital administration and management



- Campus is digitized, connected, shared and interactive. Planning, organization, and leadership use resources for **administration** of teaching and learning, administer, forecast and make decisions based on data and digital technologies.
- On a digital basis, effectively use digital technologies for **management** of operations, and achieve education and training goals.

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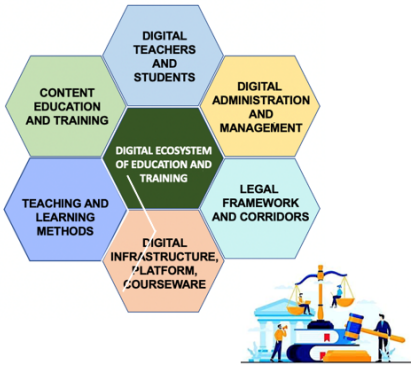
Digital ecosystem of education and training

Legal framework and corridors



Create **legal framework** and **corridors** for:

- Changing content, teaching and learning methods in digital environment.
- Teaching and learning, testing, online evaluation, quality accreditation, results recognition.
- Regulations on copyrights, intellectual property, personal information security, sharing and exploitation of digital databases and archives.
- etc.

Message

- Digital transformation of education and training is a **comprehensive and holistic change** of teaching and learning activities in digital environment.
- **Awareness** is the decisive step in the digital transformation process. **Digital transformation** must be done by the "owner".
- Digital transformation is **changing the way** of teaching and learning with digital technologies, not just the use of these technologies.
- What are the **opportunities** and **challenges** of digital transformation in **your** educational and training institution?

Appendix 4: List of 191 training occupations offered by 11 TVET Institutes

(Notes: C = College training level, I = Intermediate training level, P = Primary training level)

Seq.	Training occupations in English	BCI	CTC1	VGTC	HUEIC	NTCT	NTVC	HVCT	VCMI	LILAMA	LAC	AGVC	Total	C	I	P
1	Administrative accounting						1					1	2	1	2	
2	Agriculture machine operation and repair			1									1			1
3	Air-condition and fridge repair and maintenance					1							1			1
4	Apartment management		1										1	1		
5	Applied informatics				1							1	2	1	2	
6	Applied IT in construction		1										1	1		
7	Aquaculture in salt water, brack-ish water						1						1	1	1	
8	Arc electric welding	1				1						1	3			3
9	Architecture		1										1	1		
10	Architecture painting		1										1	1		
11	Asian-Western bread making techniques					1							1			1
12	Autocad									1			1			1
13	Automatic equipment repair	1											1			1
14	Automation and control engineer-ing				1							1	2	2		
15	Automation technology									1			1	1		
16	Automobile electric repair and maintenance					1							1			1
17	Automobile engineering	1		1	1	1	1	1		1	1	1	9	8	9	2
18	Automobile maintenance and re-pair	1		1									2		1	2

19	Automobile refrigeration repair and maintenance			**1**								**1**			**1**
20	Background construction machine operation								**1**			**1**			**1**
21	Bartender technique					**1**						**1**			**1**
22	Beauty care			**1**	**1**							**2**		**2**	**1**
23	Bilingual technical drawing processing		**1**									**1**	**1**		
24	Biotechnology					**1**						**1**	**1**	**1**	
25	Blasting machine repair										**1**	**1**			**1**
26	Bonsai shaping, styling and care	**1**										**1**			**1**
27	Building management		**1**									**1**		**1**	
28	Bulldozer operation								**1**			**1**			**1**
29	Business accounting	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**11**	**10**	**11**	**4**
30	Business administration				**1**			**1**				**2**	**2**	**1**	**1**
31	Business administration (small and medium)			**1**		**1**				**1**		**3**	**2**	**1**	**1**
32	Cable hook									**1**		**1**			**1**
33	Car driving training					**1**	**1**		**1**	**1**		**4**			**4**
34	Cattle farming and disease prevention	**1**										**1**			**1**
35	Chemical engineering (chemical engineering - cosmetics)				**1**							**1**		**1**	
36	Clean vegetable planting	**1**										**1**			**1**
37	CNC cutting	**1**				**1**						**2**			**2**
38	Commercial bank		**1**									**1**	**1**		
39	Computer accounting										**1**	**1**		**1**	
40	Computer accounting practice									**1**		**1**			**1**
41	Computer network administration	**1**		**1**		**1**	**1**	**1**	**1**		**1**	**1**	**8**	**8**	**6**	**2**

42	Computer network and communication				**1**					**1**			**2**	**1**		**1**
43	Computer programming										**1**	**1**	**2**	**2**	**1**	
44	Computer repair and assembly			**1**		**1**	**1**			**1**		**1**	**5**	**3**	**4**	**3**
45	Computer-based drawing and design									**1**			**1**	**1**	**1**	
46	Concrete		**1**										**1**		**1**	
47	Construction business administration		**1**										**1**	**1**		
48	Construction economics		**1**										**1**	**1**		
49	Construction engineering				**1**	**1**							**2**	**2**		
50	Construction entity evaluation		**1**										**1**	**1**		
51	Construction entity repair and maintenance		**1**										**1**	**1**		
52	Construction geodetic engineering		**1**										**1**	**1**		
53	Construction material and component		**1**										**1**	**1**		
54	Construction material production engineering		**1**										**1**	**1**		
55	Construction materials engineering		**1**										**1**	**1**		
56	Construction project management		**1**										**1**	**1**		
57	Construction waterproofing technology		**1**										**1**	**1**		
58	Constructional accounting		**1**										**1**	**1**	**1**	
59	Constructional engineering					**1**	**1**	**1**				**1**	**4**	**3**	**4**	**3**
60	Cooking techniques	**1**				**1**		**1**					**3**	**2**	**3**	**3**
61	Corporate finance		**1**										**1**	**1**		
62	Crane operation								**1**	**1**			**2**		**1**	**2**

63	Credit finance							**1**					**1**	**1**	**1**	**1**
64	Data processing								**1**				**1**	**1**	**1**	
65	Design and assemble advertising light circuits					**1**							**1**			**1**
66	Design and construction of land-scapes and gardens		**1**										**1**	**1**		
67	Design and construction of urban roads		**1**										**1**	**1**		
68	Diesel engine repair and mainte-nance					**1**							**1**			**1**
69	Digging machine operation								**1**				**1**			**1**
70	Drainage engineering		**1**		**1**								**2**	**2**	**1**	
71	E-commerce	**1**	**1**	**1**									**3**	**1**	**1**	**1**
72	Electric and electronic engineering				**1**								**1**	**1**		
73	Electric automobile engineering	**1**		**1**									**2**			**2**
74	Electricity and water for construc-tion works		**1**										**1**	**1**		
75	Electromechanical equipment maintenance									**1**			**1**	**1**	**1**	
76	Electronic and building energy en-gineering								**1**				**1**	**1**	**1**	
77	Electronic fuel injection system re-pair and maintenance					**1**							**1**			**1**
78	Engine automobile engineering	**1**											**1**			**1**
79	English for specific purposes									**1**			**1**			**1**
80	Environmental engineering tech-nology				**1**	**1**							**2**	**1**		**1**
81	Environmental technology							**1**					**1**	**1**	**1**	**1**
82	Event management				**1**								**1**		**1**	

83	Excavator operation								**1**				**1**			**1**
84	Fan, electric engine and voltage regulation repairing			**1**									**1**			**1**
85	Fashion apparel				**1**	**1**	**1**	**1**	**1**		**1**	**1**	**7**	**5**	**7**	**1**
86	Fashion design					**1**		**1**			**1**		**3**	**3**	**3**	**1**
87	Flower arrangement art					**1**							**1**			**1**
88	Flower planting and care	**1**											**1**			**1**
89	Food and beverage					**1**	**1**					**1**	**3**		**2**	**2**
90	Food processing					**1**							**1**	**1**	**1**	**1**
91	Food technology				**1**								**1**	**1**	**1**	
92	Forklift operation									**1**			**1**			**1**
93	Formwork - scaffolding		**1**										**1**		**1**	**1**
94	Front office					**1**							**1**			**1**
95	Fruit pare and prune					**1**							**1**			**1**
96	Fuel engine repair and maintenance					**1**							**1**			**1**
97	General accounting		**1**										**1**	**1**		
98	General business administration		**1**										**1**	**1**		
99	General mechanized loading and unloading								**1**				**1**		**1**	
100	Graphic design		**1**	**1**		**1**		**1**				**1**	**5**	**2**	**3**	**3**
101	Heating engineering technology				**1**								**1**	**1**		
102	Hotel management		**1**			**1**	**1**					**1**	**4**	**3**	**3**	
103	Household electrics	**1**		**1**		**1**	**1**					**1**	**5**	**1**	**1**	**5**
104	Household electronics					**1**							**1**		**1**	
105	Household sewing											**1**	**1**			**1**
106	Housekeeping					**1**							**1**			**1**
107	Industrial and household construction		**1**									**1**	**2**	**1**	**1**	**1**

108	Industrial automation	**1**											**1**	**1**		
109	Industrial control and electric installation engineering	**1**						**1**		**1**	**1**		**4**	**4**	**3**	**2**
110	Industrial electrics	**1**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**10**	**10**	**9**	**7**
111	Industrial electronics	**1**		**1**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**9**	**8**	**9**	**3**
112	Industrial robot									**1**			**1**	**1**		
113	Industrial sewing	**1**				**1**	**1**		**1**				**4**			**4**
114	Industrial wastewater treatment					**1**		**1**					**2**	**2**	**2**	**1**
115	Interior building construction		**1**										**1**	**1**		
116	Interior building design		**1**										**1**	**1**		
117	Interior electric installation					**1**							**1**			**1**
118	IT (software application)	**1**	**1**	**1**	**1**	**1**		**1**			**1**		**7**	**7**	**5**	**1**
119	Kitchen operation					**1**							**1**			**1**
120	Labour protection							**1**					**1**	**1**	**1**	**1**
121	Labour safety									**1**			**1**			**1**
122	Labour, wages and social insurance accounting		**1**			**1**					**1**		**3**	**2**	**1**	**1**
123	Lifting machine operation								**1**				**1**			**1**
124	Machined vehicle repair						**1**						**1**			**1**
125	Management and exploitation of irrigation works	**1**											**1**			**1**
126	Manufacturing engineering	**1**									**1**		**2**	**2**		
127	Marine environment protection					**1**							**1**	**1**	**1**	
128	Marketing online				**1**								**1**	**1**		
129	Masonry		**1**										**1**		**1**	**1**
130	Material engineering				**1**								**1**	**1**		
131	Mechanical engineering technology				**1**								**1**	**1**	**1**	
132	Mechanical equipment assembly									**1**	**1**	**1**	**3**	**3**	**3**	**1**

133	Mechanical equipment fabrication			**1**					**1**	**1**			**3**	**3**	**3**	
134	Mechanical equipment system maintenance									**1**			**1**	**1**	**1**	
135	Mechatronic engineering technology				**1**								**1**	**1**		
136	Mechatronic engineering, heating and air conditioning						**1**		**1**		**1**		**3**	**3**	**3**	
137	Mechatronics	**1**				**1**	**1**	**1**	**1**	**1**	**1**	**1**	**8**	**8**	**7**	**3**
138	Metal cutting	**1**		**1**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**9**	**8**	**9**	**5**
139	MICE Tourist management											**1**	**1**	**1**	**1**	
140	Mobile phone repair			**1**									**1**			**1**
141	Motor machine repair			**1**									**1**			**1**
142	Motorbike repair											**1**	**1**			**1**
143	Multi-machine turnery	**1**											**1**			**1**
144	New construction material engineering		**1**										**1**	**1**		
145	Nguội sửa chữa máy công cụ	**1**											**1**			**1**
146	Nursing							**1**					**1**	**1**		
147	Office informatics	**1**	**1**			**1**				**1**			**4**	**1**	**3**	**2**
148	Optical and television transmission technology									**1**			**1**	**1**	**1**	
149	Pharmacy							**1**					**1**	**1**	**1**	**1**
150	Plant protection			**1**									**1**			**1**
151	Planting techniques			**1**									**1**			**1**
152	PLC programming (basic, advance)									**1**			**1**			**1**
153	Poultry farming and disease prevention	**1**											**1**			**1**
154	Professional accounting practice									**1**			**1**			**1**

155	Pumping machine operation and repair	**1**											**1**		**1**	**1**
156	Refrigeration					**1**	**1**	**1**				**1**	**4**	**1**	**1**	**4**
157	Refrigeration and air-condition/air control engineering			**1**		**1**						**1**	**3**	**3**	**3**	
158	Refrigeration equipment installation	**1**											**1**			**1**
159	Refrigeration equipment repair										**1**		**1**	**1**	**1**	
160	Reinforcement - Welding		**1**										**1**		**1**	**1**
161	Restaurant management		**1**			**1**		**1**				**1**	**4**	**4**	**1**	**1**
162	Road bridge construction											**1**	**1**		**1**	
163	Roller operation								**1**				**1**			**1**
164	Rural construction site management		**1**										**1**	**1**		
165	Rural infrastructure construction		**1**										**1**	**1**		
166	Sales management		**1**								**1**		**2**	**2**	**1**	
167	Sales operation		**1**	**1**									**2**		**1**	**1**
168	Sales operation and marketing in hotel					**1**							**1**			**1**
169	Security and safety management in hotel					**1**							**1**			**1**
170	Security guard					**1**		**1**					**2**		**1**	**2**
171	Semi-automatic welding TIG, MAG	**1**											**1**			**1**
172	Sewing equipment repair										**1**		**1**		**1**	
173	Social works			**1**		**1**		**1**			**1**		**4**	**3**	**3**	**3**
174	Solid work									**1**			**1**			**1**
175	Storage management								**1**				**1**	**1**	**1**	
176	Substructure automobile engineering	**1**							**1**				**2**	**1**	**1**	**2**

177	Supermarket management and sales										**1**		**1**		**1**	
178	Tax declaration accounting practice					**1**							**1**			**1**
179	Tax declaration practice									**1**			**1**			**1**
180	Technological pipe installation engineering									**1**			**1**	**1**	**1**	
181	Telecommunication station installation engineering									**1**			**1**	**1**	**1**	
182	Tour guide				**1**	**1**							**2**	**2**	**1**	
183	Turnery					**1**	**1**						**2**			**2**
184	Urban infrastructure engineering		**1**										**1**	**1**		
185	Veterinary	**1**									**1**		**2**	**1**	**1**	**1**
186	Wastewater drainage and treatment		**1**										**1**	**1**		
187	Water and electric installation					**1**							**1**			**1**
188	Water supply and drainage		**1**										**1**		**1**	**1**
189	Water works and interior engineering		**1**										**1**		**1**	
190	Welding (Inox and oxy axetylen welding)	**1**				**1**							**2**			**2**
191	Welding engineering	**1**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**10**	**8**	**8**	**5**
Total		**37**	**49**	**27**	**24**	**58**	**22**	**26**	**24**	**34**	**24**	**3**	**355**	**212**	**187**	**171**