

# GIZ e-Training Guide for TVET and Energy Programmes

Supporting decision-making to select cost-effective digital educational technologies

Based on the example of training wind energy technicians in Vietnam.

## Content

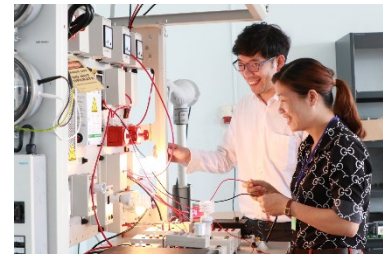
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## Abbreviations

AR	Augmented reality (overlying virtual objects onto the real world)
CMP	College management platform (to handle enrolment and other processes)
DET	Digital Educational Technologies
MoLISA	Vietnamese Ministry of Labour, Invalids and Social Affairs
NTVC	Ninh Thuan Vocational College in Phan Rang, Vietnam
OVR	Open vocational training resource-system (planned)
VR	Virtual reality (virtual environment which is separate from the real world)
WEST	Wind Energy Service Technician

## Purpose and structure of this document

Digital educational technologies (DET) have become an important part of modern training. There are many examples of successful use of DET, great expectations, but also concerns<sup>1</sup>. For project teams it is challenging to decide, if DET can be used cost-effectively to achieve their goals in their specific context – and if yes, which technology suits best their purposes. Hundreds of platforms, tools, apps, and devices are offered on the market.



There are many websites offering a comprehensive overview of hundreds of DET and insight into possible selection criteria (e.g. [capterra](#), [techradar](#), <https://techdetector.de/> [edutopia](#), etc.). However, they usually only offer generic criteria and processes, which do not focus particularly on needs related to the integration of specific DET in specific contexts.

This guide supports the selection of DET with a special focus on requirements of training in the context of energy programmes in disadvantaged areas. We hope that this will help projects also in other fields of application to implement a targeted and comprehensive selection process.

For each step of the selection process key questions are formulated that help to apply the described selection process to the context of the reader. The **e-Training toolkit** provides useful tools to guide project teams in answering these questions.

To illustrate the steps in the guide, the **case** of the decision-making process of a TVET project in Vietnam is described. It has a lot of characteristics of many (not all) training-projects all over the world and may serve as an example how the steps in the guide can be implemented.

### Case: Training service technicians in Vietnam

To address the lack of wind energy service technicians (WEST) in Vietnam, GIZ supports TVET institutions to provide high-quality and fast-paced trainings, based on international standards and focused on industry demand.

The stakeholders have developed a WEST training programme consisting of two semester modules with 320 h each. A one-week basic safety training on international standard of 40 hours is an important part of these modules, training first aid, working at height, manual handling, and fire awareness.

The training will be offered to (1) college graduates of the 2.5 years training programme “Mechatronics Technician”, (2) further training for university graduates, and (3) professional qualified workers who have related experience.

The Ninh Thuan Vocational College (NTVC) has been piloting this new curriculum and has developed elementary training programmes and short-term courses in solar and wind technologies for several target groups.

The curriculum is implemented by NTVC on campus in classrooms, laboratories, and training workshops. On-site training in cooperation with wind turbine operators is planned. Training in class consists of presentation of theory (about a third of the time, usually using PowerPoint presentations) and practical assignments (about two thirds of the time, using pen & paper, but also desktop computers with engineering software).

<sup>1</sup> See for example the Concept Note for the 2023 Global Education Monitoring Report on technology and education. 2022, UNESCO, Paris.

# 1 Analyse needs, strategic goals, and context

In a first step the situation needs to be analysed carefully. This requires a combination of a bottom-up approach with a top-down approach. On the one hand analysing the learning/teaching praxis, needs, challenges, ambitions and dreams of teachers and students, talking to them in their workshops or classrooms, observing them and conducting surveys involving the entire target group. On the other hand identifying strategic goals and policy guidelines of relevant decision-makers, for example national ministries and agencies.

This work can be conducted by two types of actors: Experienced field workers, who know the stakeholders and their context very well. And a project leader who has a good overview of relevant strategies and policies of national authorities and international cooperation actors. They will address three areas of questions:

## 1.1 Prioritise needs and goals

- a) What are the most pressing challenges and needs? What are their causes? (e.g. in the labour market, in the TVET system, for young people and companies, for students and teachers)
- b) Which strategies and policies of decision-makers need to be materialized? How do they relate to the identified challenges and needs?

(See *Toolkit: ICT4TVET decision matrix*)

During the above-mentioned conversations, observations and through surveys different **DET** are usually mentioned by the involved actors as possible solutions. They need to be documented systematically by the field worker to prepare the discussion with stakeholders of the planned intervention. The following questions help to structure these inputs.

## 1.2 Identify possible approaches

- a) Which DET are already used, piloted, or planned?
- b) Who is or is planned to be involved in the use, maintenance, training, and support?

(See *Toolkit: ICT4TVET landscape*)

### Needs & Challenges

The further implementation of the developed curriculum is reaching its limits in two areas: 1. The Dissemination of the developed concepts to some 30 vocational colleges spread all over the country is very costly, quality losses in transfer are likely. 2. The support of practice transfer is limited because of the very high cost and logistical challenges of bringing practice equipment such as a nacelle with frequent technology updates to Vietnam.

### Strategic goals

The Vietnamese government is aware of its responsibility for sustainable development and committed itself to achieving greenhouse gas neutrality by 2050 at the COP 26 UN Climate Change Conference in November 2021. To reach this ambitious goal, the Ministry of Labour, Invalids and Social Affairs MoLISA and relevant line ministries are delegated to create training opportunities and qualify skilled workers in climate-relevant and green professions to fulfil the demand.



The GIZ-team is considering using augmented/ virtual reality solutions to lower the cost related to practice equipment. In this context the project lead decides to analyse more thoroughly which DET might help overcome the above challenges in a cost-effective way, and how the AR/VR could be embedded in the existing ICT-system and ICT-management.

### 1.3 Analyse potential and restrictions to implement DET in your context

Once it is clear which strategic relevant challenges and needs should be addressed using DET, the context needs to be analysed carefully. The identified possible approaches can guide the start of this analysis by asking which resources in the existing context contribute to their cost-effective implementation – and which restrictions inhibit the implementation. However, a discussion with experienced experts on alternative and complementary approaches is vital.

An experienced field worker, often the designated leader of the DET implementation, will collect answers to the following questions involving all stakeholders, such as college directors, technical support, responsible for teacher training, administrative support, business contacts, staff of related government agencies, power-users of DET-pilots, innovative teachers, and students.

- a) **People:** Which skills and motivation do teachers, students and other related stakeholders have to use the envisaged DET effectively? Which skills need to be trained?
- b) **Organisation:** To which extent can the existing organisation develop and deploy the envisaged DET?
- c) **Technology:** In which technological environment will the DET be integrated?

(See Toolkit: ICT4TVET decision matrix)

An analysis of the context of NTVC, their students, and related companies leads to rich insights. Some examples:

- **People:** Teachers are experienced with presenting learning content and giving students assignments. Most of them master PowerPoint, some with multi-media elements. The use of software to support calculations, simulations, AR/VR, or monitoring is challenging. All of the teachers and 80% of the students are IT-savvy, using apps such as Facebook, Zalo (similar to WhatsApp) or TikTok on their mobile phones regularly for communication for personal use or business use.
- **Organisation:** Students learn mainly on campus in classrooms, laboratories, and workshops. 25-40% of practical training is located at external companies. The promotion of interactive learning is rather challenging with class sizes of about 35 students in classrooms and 18 students in practical training. TVET colleges are widely distributed in Vietnam which impedes the common use of expensive physical training infrastructure. Trainers of 11 colleges are being trained in digital skills, data management, e-content management, Moodle usage and design thinking.
- **Technology:** ICT infrastructure of NTVC is quite good with good internet access, projectors in classrooms, 20 tablets to borrow (compared to about xx students who do not own a mobile device). About 80% of the students can use their mobile phone for educational purposes. A pilot Moodle platform and good infrastructure for e-content production are in place, but only used by one teacher so far.



### 1.4 Use Case

The results of the previous steps can be illustrated in a use case, describing the goal of the DET intervention, the relevant actors (students, teachers, support staff etc.), their intentions and a series of interactions (flow) leading to specific events (provision of DET, learning etc.), handling exceptions (technical and organisational difficulties) to reach the goal. Preconditions describe the situation in the beginning, “triggers” that initiate the flow of events which leads to post-conditions after the goal has been reached.

The use case completes the context analysis focusing on the needs of the core stakeholders of vocational training on the one hand and on the strategic focus of decision-makers on the other. It analyses the key aspects of the envisaged use of DET carefully – a key prerequisite for any cost-effective use of technology.

## 2 Identify feasible approaches

In this next step the pedagogical design of the approach is being developed from the background of a thorough context analysis. To design a cost-effective solution among the possible solutions identified in the last chapter (see 1, steps 2 & 3), it is necessary to combine two aspects: First, focusing on supporting learning and teaching, starting with a reflection of the learning goals, a discussion on how to achieve these goals best realizing which learning-/teaching-activities and then discussing which of the possible approaches supports learning- and teaching activities best. And secondly thoroughly examining, if it is feasible to implement this solution with the existing potential and restrictions identified in this context.

This is a creative process, which requires the participation of all of the stakeholders who will contribute to the solution in the future (and who have already participated in the context analysis). They will elaborate a solution guided by the following **questions**:

1. Which digital educational technologies (DET) help best to support which kind of learning/teaching activities effectively to achieve the learning goals?
2. Do we have sufficient potential (in HR, organisation, and technology) to implement this DET?
3. Which restrictions will we have to overcome or accept?
4. How can we realize the implementation of the identified solutions?

(See *Toolkit: ICT4TVET Landscape & decision matrix*)



The team drafts an approach to combine three DET solutions:

Advancement of a high-quality configuration and use of the piloted **Moodle-platform** to further improve the quality of Blended Learning in the classroom for up to 30 institutions. Teachers will need to be trained and supported to combine different e-content (including AR/VR by-products), quizzes, assignments, and assessments to support learning stations in the classroom, self-directed learning and connecting practice with class.

Introduction of a **virtual reality** solution to bridge the gap between the classroom and placements, and to prepare students for practical learning in companies. Teachers need to be trained and supported to create meaningful assignments for both using AR/VR goggles as well as using 3D-illustrations.

Piloting the use of **smartphones**, creating, and sharing multimedia training material and supporting **practical learning and reflection**, communication between instructors, students, and business partners. Students need to be trained in basics of self-regulated learning, reflecting on their goals, findings, and deliverables. Teachers need to be supported in using their devices to create meaningful assignments, drawing on photos and short video-clips from practice. They need coaching skills supporting students in their reflection process.

The elaboration of feasible approaches to achieve the strategic goals and in particular the learning goals narrows down the field of possible DET. It forms a rich basis to develop requirements for the following DET selection.

### 3 DET-selection

Selection criteria will be developed based on both the analysis and the feasible approach. They will be applied to evaluate the DET discussed in the process, starting with the feasible approach identified in chapter 2. If cost is too high, other possible approaches identified in chapter 1 or alternative solutions may be evaluated.

The designated project leader and the designated technical support will lead this selection process. Depending on the complexity of the decision and the scope of the project, external experts, teacher trainers, power-users, teachers, and administrative staff might be involved in the selection process. They will address the following questions to create a comprehensive basis for the planning of the DET project in its specific context.

#### 3.1 Which preparation will be needed to implement an effective solution?

1. Need for e-content development, customization of systems, change management and quality assurance, as well as measures to ensure inclusion, privacy, and sustainability.
2. Need for training, coaching and support of teachers, staff, directors, businesses, and students to engage in effective teaching and learning.

#### 3.2 Does the DET meet general quality criteria?

1. Usability for students and teachers (accessibility, user friendliness of interface, responsive design; depending on the solution: clear, engaging, and motivating content and feedback, adaptability, meaningful activity- and progress tracking, data privacy and security, intuitive and effective support of communication and collaboration)
2. Technical specifications (depending on the solution: features to support interactivity and assessment, flexibility of roles and permissions, content organisation, back-up and recovery, scalability, interoperability etc.)
3. Applicability of DET and its features in the context.
4. Quality of the technical support (e.g. accessibility and responsiveness support of effective use of all features, customization, updates, and maintenance of application)
5. Positive product reviews, reliability and quality of the provider or community of open-source software

#### 3.3 Is the planned implementation cost-effective?

1. Which cost do we expect for licences, hosting, maintenance, and software support?
2. Which cost do we expect for the implementation measures described above?
3. Which of these costs are to be paid by whom?
4. How does the expected cost relate to the expected added value of our intervention?
5. Is this cost justified compared to alternative measures?

The team develops requirements to guide DET selection in addition to general quality criteria (for details, see chapter 3.5, DET list):

**Preparation:** An effective DET use will require creating and organising high-quality e-content, quizzes, and assignments on Moodle, creating meaningful AR/VR assignments, and preparing clear regulations on smartphone use in learning situations.

**Training and Support:** Teachers and students need to be training in the use of Moodle (e.g. content creation, course management, analysis of student data, coaching), of the VR/AR solution (e.g. creation of assignments, classroom management), and of mobile apps (e.g. online coaching, self-regulated learning) to engage in effective teaching and learning.

**Cost:** Based on existing experience the roughly estimate the cost for the implementation of the needed measures to fulfil the requirements.

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