



IO 2 Handbook for Coaches of Digital Learning in SMEs

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next to the quoted sources based on information provided by associated partners SoWiBeFo e.V., SPS e.V. and University of Regensburg

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1. Introduction

The objective of this handbook is to inform future coaches and continuing support agents for workplace or work-based learning as well as VET trainers in training centers about the state of the art techniques of working with digital media and the current methodologies in work-based learning (such as learning and working assignments, visual process descriptions, animations, explainer videos, video-based instructions, etc.) as best practices from partner countries.

The handbook lays out a systematic process of coaching the target groups of VET trainers and small SME trainers to become agents to introduce digital media in SME as well as VET training systems.

The handbook starts with a discussion of the relevance of work-based learning (WBL), including how the use of digital media (DM) should contribute to WBL (in contrast to using digital media in traditional formal learning in settings like universities, schools, or formal further professional training.)

The most important methodologies of work-based learning will be discussed in the following chapter.

The introduction of DM in WBL requires a thorough process of organizational development (OD) within SMEs. While only on rare occasions will it be possible in the scope of this project to fully implement such a process, understanding the general logic of such a process is essential for coaches and trainers alike. Only on this basis will they be able to pilot small initial initiatives and then sustain a more systematic effort in the months and years to come on their own. For this reason, this handbook focuses on the description of such an OD process, describing how “roadmapping” is part of the introduction of digital media and how using a “digital learning canvas” can support this process. The third part introduces some of the most important tools for digital learning. These are videos, in particular self-produced videos or audio material, such as podcasts, and visual material like photos. It is planned that the handbook will be expanded to include additional introductions, such as on learning management systems. A learning platform will be developed, which will present additional material in a more flexible and adaptive manner. The interaction between coaches, trainers, in-company learning groups, and the final beneficiaries in the companies is also explained in detail in this handbook. Finally, chapter 4.3. discusses how the methodology can be adapted to the particular needs of learners with weaker educational language competencies.

2. Coaching Small SMEs for Work-Based Learning

This chapter gives the rationale for the value of work-based learning (WBL).

2.1 The Business Case for Work-Based Learning

Businesses that take responsibility for the dependable provision of high-quality goods and services to their customers, for a stable provision of jobs, and for being good neighbours in their communities must become “learning organizations.”

The learning of individuals in the company but also of teams and the organization as a whole is the main factor in keeping companies productive, adaptable, and innovative. Several factors need to be considered here. We will mention only three of them at this point:

- The market is determined by customer demands. Industrial customers look for flexibility and responsiveness of their suppliers, and customers of service companies look for cost-effective yet flexible and adaptable service provisions.
- The effective design of the production process, therefore, becomes the focal theme for SMEs. For work organization, this means that flexible and smooth team-working and working in projects has become more and more important.
- Changing technologies: While as late as in the 1980s, production and its productivity was determined by the scale of production, the mass of capital used and a comparatively stable technological basis, the microelectronics revolution from the late 80s and beyond (electronics, Internet, robotics) made high productivity technology also available for small units.

The best-known examples are the new opportunities of the networked economy, in which the internet makes many factors of production available worldwide and in particular, data is stored and shared in a worldwide cloud.

Therefore, not the sheer mass of capital now decides on productivity, but rather intelligence in finding innovative combinations and applications for technology that is in principle available for everyone. As a consequence, the speed of innovation of combining technologies and work processes becomes one of the keys to productivity. Workplaces tend to change continually and will be reorganized a couple of times during one worker's lifetime. The recent development of “Industry 4.0,” a production solely controlled by materials, tools, and pre-products as well as the whole logistics of the production process interconnected by RFID chips which “speak to each other,” is the most recent example of such disruption. In the field of services companies, even individual employees find themselves evaluated by globally connected customers, who report each bad user experience through their social media followership, which raises the demands for service provision to new levels.

Globalization brings new players to the field of competition. While until recently industrial production and high-quality services were performed by a relatively closed club of nations, the rise of China and other nations led to competition from evermore technologically competent emerging industrial societies where for some time the cost of labour was much lower than in the old industrial countries. This puts companies in the “old” societies under pressure to increase the speed of innovation and productivity ever more rapidly. Staying the same in this environment means falling behind.

Therefore, the requirements for an adequate learning system in SMEs are that they are flexible, fast, very close to the actual work situation but at the same time high quality, systematic and cost-effective. Digital learning technology from low tech has advanced in capturing audio and video and creating more easily shareable electronic text to high-tech simulations and virtual siblings of workers and machinery in the virtual space, creating vast new opportunities for producing such learning systems.

2.2. Changing Theories and Approaches for Learning

Half of what is known today was not known 10 years ago. The amount of knowledge in the world has doubled in the past 10 years and is doubling every 18 months according to the American Society of Training and Documentation (ASTD). To combat the shrinking half-life of knowledge, organizations have been forced to develop new methods of deploying instruction.

Some significant trends in learning:

- Many learners will move into a variety of different, possibly unrelated fields throughout their lifetime.
- Informal learning is a significant aspect of our learning experience. Formal education no longer comprises the majority of our learning.
- Learning is a continual process, lasting for a lifetime. Learning and work-related activities are no longer separate. In many situations, they are the same.
- Technology is altering (rewiring) our brains. The tools we use define and shape our thinking.
- The organization and the individual are both learning organisms.
- Many of the processes previously handled by learning theories (especially in cognitive information processing) can now be off-loaded to, or supported by, technology.
- Know-how and know-what are being supplemented with know-where (the understanding of where to find the knowledge needed)." (Siemens, G. 2008)

2.3. Methodologies of Workplace Learning

This paragraph gives some background information on some of the most important general methodologies of workplace learning.¹ Understanding the rationale of these methodologies is a prerequisite of including digital media into the learning setup for different groups.

This information intends to support the coach in his or her dialogue with the partners from the companies. The selection of the learning methods must be closely linked to the learning objectives and with the learning content (see the section on road mapping). The learning objectives include not only the technical issues but also the so-called key competencies or soft skills related to changing attitudes as well as the personnel development of the learners.

Traditional methods ² of instruction at the workplace include:

- Learning by doing
- Four-steps method
- Analytic instruction

Action-oriented in-company learning examples are:

- Learning projects
- “Leittext” method (guidance scripts methodology)
- Learning field approach
- Learning islands

Decentralized and group-oriented vocational training methodologies are:

- Quality circles
- “Learnshop”
- Investigation and presentation
- Job rotation

Individual vocational training integrated at the workplace include

- Acquaintance to work
- Training at the workplace
- Self-qualification at the workplace with self-learning media

¹ An abundance of detailed information on how to plan and implement WBL can be found e.g. at <https://www.wbl-toolkit.eu/index.php?id=3>

² Information on the basic mechanisms of initial vocational training in Germany can be found in various languages at <https://www.bibb.de/govet/en/54880.php>

- E-learning with internet resources

Traditional Methods

These are mostly used in initial vocational training, especially in the SMEs.

a) Learning by Doing

In its simplest form, the employee is just confronted with a new task and challenged to figure out how to do it and learn from mistakes. More often the learner is placed near another professional. In this “model” one worker shows what he or she does with some explanations, as considered necessary by the senior. The learner mimics the model worker as closely as possible.

b) Four-Steps Method

This is a more systematic and elaborated version of a). It comprises four formal steps:

- Preparation: motivating the learner and introducing the topic
- Demonstration: demonstrating the correct execution of the task
- Imitation: execution of the task by the learner
- Practice: practicing to the adequate level of competency with diminishing supervision

c) Analytic Instruction

This method is again a further development of the methods mentioned. The task is analysed in detail and thoroughly explained, often supported by written material or other media.

Action Learning in the Company

The aim of action-oriented ways of learning in a company context is to promote the autonomy and the self-activity of the learner. These methods were developed to respond to new vocational training needs, as more complex work processes increased the need for employees to identify learning needs and then learn the necessary competencies on their own.

In Germany, these needs have been synthesized in the framework concept of “**holistic professional proficiency**”,³ which means that the aim of the training of the worker in his or her **apprenticeship** is to empower the learner to:

- **Inform:** acquire information about the tasks and knowledge and resources to master the task
- **Plan:** the learner must develop a (written) working plan

³ <https://aevo-lernkartei.de/modell-der-vollstaendigen-handlung>

- **Decide:** decision on the work process to implement, often in dialogue with an instructor or master worker
- **Implement:** implementation of the work-plan by the learner/trainee
- **Control:** self-control process supported by guiding questions as an instrument
- **Evaluate:** dialogue with an instructor on results method and lessons learned

In order to develop this competence, the training methodologies have to reflect this desired outcome, i.e., challenge the learner to develop professional self-responsibility.⁴ Methodologies to develop these competencies include:

- a) Project Method
- b) Guiding Scripts Method
- c) Learn and Working Assignments Method
- d) Learning Islands

Action Learning Methods and Digital Learning

In the project method, digital media can be used to inform, plan, document, and evaluate the project in a holistic way:

- For informing about the task, the learners will have to show media competency in retrieving the right information, either within the company or from other sources (internet!) and select relevant and quality information from the abundance of the information offerings.
- The learners will use digital planning tools to plan the project.
- Probably they will support their communication by digital media, e.g., form a messenger group and use tools like SLACK⁵ to communicate, plan, and store information.
- Using video conferencing makes the learning group independent from having to be at the same place.
- Having the plan and design of the task to be executed helps to present the plan to additional colleagues or experts for feedback.
- Having to put the plan in the written or visual form helps to focus the group's thoughts.

⁴ The discussion on "action learning" in the US context points at the fact that such competences are not only being developed in the individual, but are from the very start situated in a group context of work. Already from the beginning, therefore, workplace learning must be conceptualised as an interplay of personnel and organisational development. https://www.google.com/url?q=https://www.researchgate.net/figure/Model-of-action-learning_fig1_247506535&sa=D&source=editors&ust=1623406151524000&usg=AOvVaw3M6oCZ--snFiYLmGlrXNeO

⁵ <https://slack.com> [DigiVET: tools for digital learning media \(padlet.com\)](https://www.researchgate.net/publication/331111111)

- Documenting each step, e.g., on video, helps to present the work process and show its outcomes to not only those present but to a wider audience.

In many benchmark cases, producing instructional videos of exemplary work processes is also used as a project assignment.

Decentralised and Group-Oriented Vocational Training

While in the methods described in the last section, the focus and the occasion of learning was individual instruction (even if sometimes in a collaborative environment as learning project teams), in this section, methods will be described which will yield big learning results, but whose aim is primarily problem solving, process innovation and improvement and/or the collective learning in the group.

a) Quality Circles

b) Learnshop

d) Job Rotation or Hospitation (Job Shadowing)

Decentralized and Group-Oriented Vocational Training and Digital Media

The use of digital media to support these methods could comprise of:

Quality circles can be supported by all kinds of digital media that also support group communication, such as Slack, Trello, and BaseCamp ⁶.

While before the digital age flipcharts and boards were the main media in quality circle work, most of these have now been replaced by digital media. There are electronic whiteboards, which make it easier to store and retrieve the visualization of the group discussion. Sessions can be broadcasted live, additional experts can be included and audio or video recordings of the sessions can be stored and shared. This is often useful to also point out the main points of maintaining and improving the quality of the work process to those not present or who use such recordings as teaching material.

a) Learnshops

b) Job Rotation or Work Shadowing

⁶ trello.com; basecamp.com, slack.com

Self- Learning at the Workplace

This general term refers to all activities of an individual employee to learn his or her tasks and duties and to expand skills and knowledge.

Individual Vocational Training Integrated at the Workplace

E-Learning allows for the representation of complex issues with the help of multimedia (audio, video, animation). The most widely used form of E-learning nowadays is based on content-based management learning systems (CMS) and learning management systems (LMS). The most widely used system is the open-source "Moodle" system,⁷ which allows for the easy management and interactive common development of learning content.

2.4 Integrating Working and Learning: Informal Learning at the Workplace - Individual Learning Environments

While many of the above-mentioned methodologies are widely used in SMEs, experts like Jay Cross⁸ and John Seely Brown claim that 80% of the learning in companies is informal.

ISOB (Institute for Socio-Scientific Consultancy) over the last 20 years has developed and accompanied several innovative projects on the introduction of work-integrated learning in the metal and electronics industry as well as the service sector of Bavaria (Germany)." These experiences have also been validated in some European Innovation projects. These projects involved more than 80 companies and employees of all ages and qualification levels but mainly focussed on employees with low educational attainment⁹.

Thanks to the new technologies, occupational learning can be done anytime and anywhere. However, each digital media has specific requirements, purposes, and boundaries. First, digital media changes the way of communication. The "place-time matrix" of Johansen (1991) categorizes the communication in synchronous (same place or time) and asynchronous

⁷ <https://moodle.org/?lang=en>

⁸ <http://theelearningcoach.com/elearning2-0/informal-learning-an-interview-with-jay-cross/>

John Seely Brown: <https://www.youtube.com/watch?v=1BkE-1n2ieo>

⁹ For a list of projects and literature that are the background of the statements made see <http://www.isob-regensburg.net>. Among the most relevant projects for this chapter were: Germany (3 year projects each involving 6-12 companies, funded by the German ministry of education Innovative ways of cooperation between SMEs and training institutions (1989-1996), „Implementing the integration of learning and working in the enterprise, applying CBT (1992-1995), Integrating older workers in modern working environments" (1992-1996), „Preparing young people for group-work" (1995-1999), „Quality assurance in vocational training" (1995-1998). „Self-evaluation of work-integrated learning" (1999-2001), "Flexible and individualised pathways of learning in personnel development" (2003-2007), "Systematic Competence Development in Initial Training" (ongoing), "Qualification of Training Staff in the field of Mechatronics" (2002-2006). International projects (Art. 6 ESF, Leonardo da Vinci): "Corporate Social Responsibility" (2000-2003), "Learn and Work" (2000-2003), "HOTSME-Self-Learning in SME Hotels" (2006-2007). "CompServ-Competency Development in Service SME" (2006-2007), "EUFACINET-European Facilitators Network" (2007-2010), "ReSyFac – Reference System for Facilitators of Learning (2007-2010), INNOinSENS (2012-2014), DEMOCLUST (2013-2016), CoDiCLUST (2018-2021).

(different place or time). **Synchronous communication** means having a real-time exchange. **Asynchronous communication** means exchanging information independent of time and place¹⁰.

		time	
		synchronous	asynchronous
place	synchronous	face-to-face meeting, seminar, workshop	notice board
	asynchronous	video conference, instant chat	email, online forums, collaborative documents, videos, podcasts

IV.: Place-Time Matrix (Johansen 1991)

Videos are more impersonal than face-to-face contact which influences the learner’s role and motivation. The “media multiplexity theory” of Haythornthwaite (2002) also points out that the relational factor is a significant contributor in selecting a particular digital media.¹¹ Hence, critical information should still be discussed and shared in confidence. Apart from this, learners need to intensively and autonomously deal with digital media in their daily work routine. Consequently,

- 1) digital media needs to be produced learner-centered to fit needs and expectations and to integrate feedback and self-regulation
- 2) digital media needs to be integrated into the working environment, such as daily routines and work processes, which presumes the analysis of the (informal) learning and work environment
- 3) digital media needs to fit the SMEs’ learning culture and becomes part of the personal contact, like team meetings (sharing experiences) and seminars (deepening and applying knowledge)
- 4) digital media needs to user-friendly and must run smoothly which requires suitable hardware and attractive look and feel

¹⁰ Johansen, R. (1991): Teams for tomorrow. In Proceedings of the 24th Annual Hawaii International Conference on System Science, Seiten 520–534. Johansen, R., “Groupware: Computer support for business teams,” New York: The Free Press, 1988.

¹¹ Haythornthwaite, C. (2002). Strong, weak, and latent ties and the impact of new media. The Information Society, 18, 385–401. [Link](#)

Another important aspect is the complexity of the information. It is important to adjust the learning content for the intended purpose. The “media richness theory” of Daft & Lengel (1986) and further developed with Trevino (1987) differentiate the nature of information sent over available communication channels. **Rich media** allows immediate feedback, conveys multiple and simultaneous cues (e.g., facial expression, tone of voice), has a personal focus, and enables the use of natural language, which is better suited to conveying concepts, complex information, and more abstract thoughts. **Lean media** has a lower interaction rate, fewer visual or auditory cues, and is better suited for when precision is needed.

	form of communication	non-interactive example	interactive example
lean media	image	photos, pictures	./.
	text	documents, email	instant messaging
	audio	podcast, recordings	phone
	video	video clips	video conference
	face-to-face	./.	monologue, dialogue
rich media			

III: Characteristics of media regarding richness of information processed (Daft & Lengel 1984)¹²

In a nutshell, the effective use of a communication channel needs to match the richness of digital media and the **complexity** of the act of communication.¹³

¹²Daft, R.; L. & Lengel, R.H. (1984): “Information Richness: A New Approach to Managerial Behavior and Organizational Design,” in: Research in Organizational Behavior, L. L. Cummings & B. M. Staw (eds.) JAI Press, Homewood L pp. 191-233.

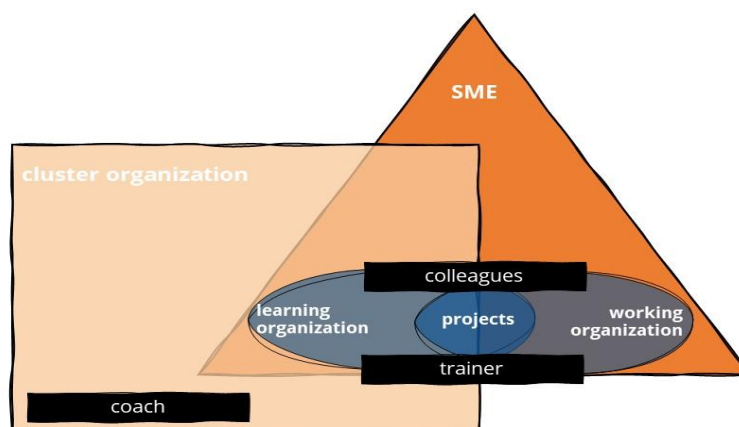
¹³ Daft, R. L., Lengel, R. H. (1986): *Organizational Information Requirements, Media Richness and Structural Design*. In: *Management Science*, 32. Jg., Nr. 5, 1986, S. 554–571. [Link](#). Daft, R. L., Lengel, R. H., Trevino, L. K. (1987): *Message Equivocality, Media Selection, and Manager Performance: Implications for Information Systems*. In: *Management Information System Quarterly*, 11. Jg., Nr. 3, 1987, S. 354–366.

3. General Model of Introducing Digital Learning to the Company Learning System

The aim must be ¹⁴

- to analyze learning needs
- to identify adequate opportunities to learn
- to define learning arrangements and learning pathways to meet these learning needs.

With this integration of learning into the work process, new ways of dealing with the qualification process become relevant. The relevant actors in the future of learning will not be teachers in the classroom but rather employees who empower themselves to build their competencies through a more reflexive work process, supported by facilitators of learning, as the coaches and trainers that will be shaped in the DigiVET project.



III: External support of internal learning and working organisation. Example of cluster of sensors industry in Bavaria

¹⁴ The chapters to follow give some background information on a general methodology of workplace learning as developed in the German Ministry of Science and Education pilot project “FILIP” in cooperation with ISOB GmbH and f-bb, the research department of a major German training provider. It has been tested with six SMEs from different sectors and is now widely used in consulting SMEs in Bavaria on training issues. The model has been developed further in the scope of the project “Coaches for Digital Learning in the High Tech Industry (CoDiCLUST)” sponsored by the German Ministry of Education and Research, in cooperation with the Bavarian Cluster of the Sensors Industry, the University of Regensburg, and SoWiBeFo e.V., which are all associated partners of the DigiVET project.

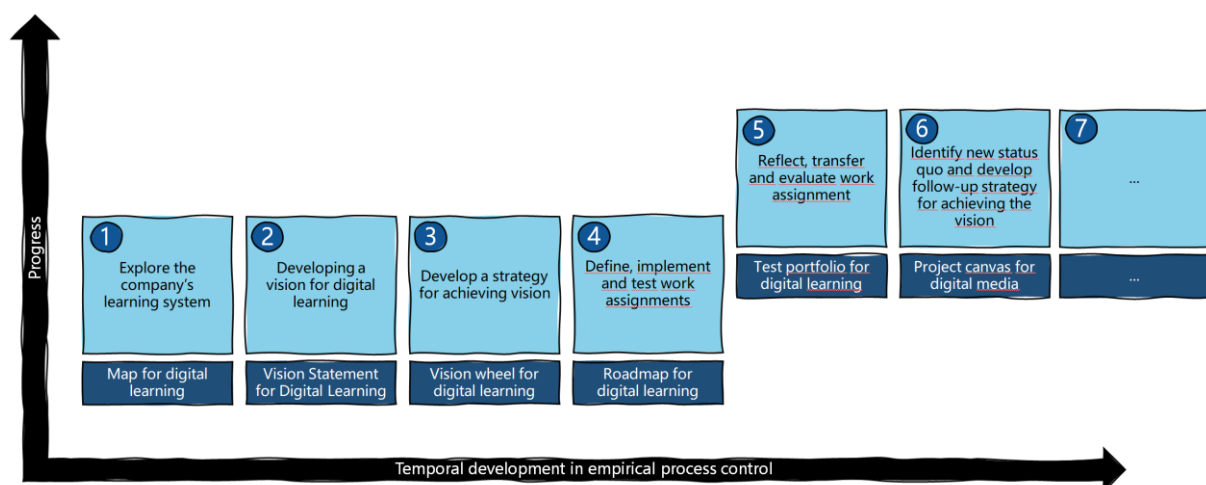
This is the mission of the **coaches for digital learning**. They are experts in the process of introducing digital learning in SMEs and also will have a good overview of the relevant technologies.

Within the company, the trainers for digital learning are the main resource for the key actors of the overall learning system in implementing well-matching digital tools and concepts.

Middle managers, supported by the trainers, are in the focus. They must lead the process and address questions like:

- (1) Identification and assessment of learning needs: **Who** must learn **what**?
With a perspective on digital learning, this includes new qualification demands from digital production technologies, new target groups who are at risk of being included in the new developments, etc. So, identifying the target groups and defining their learning needs is the point here.
- (2) Organizing learning: **Where, when, and how** can it be learned? **From whom** can be learned?
SMEs are not a school, but a place full of learning opportunities. This is proven by the SME being successful on the market. Obviously, the expertise to make it successful is there. Why not nurture and share it? Also concerning the “from whom,” digital media provide new opportunities as they can connect to learning partners more independently from time and space, so 1:1 instruction at the workplace or classroom teaching are not the only formats anymore.
- (3) Evaluating learning: What was the **result** of the learning? What was the benefit? Also, this can be determined more easily by means of digital communication, and the improvements in learning analytics make it easier to see what is being actually used by the learners (e.g., within LMS), about what is communicated, and what portfolio of content the learners have accumulated.

Based on the experiences of the project CoDiCLUST, we will discuss this process, according to six subprocesses, as shown in this chart:



III.: Stages of implementing digital learning in SMEs

The project DigVET, in its initial study of required competences for in-company learning with digital media, has implemented an iterative research on the most needed competencies. The research included a literature review in all partner countries, study of good-practice cases, focus groups of experts and a survey of more than 120 trainers and coaches. This research narrowed down a wide list of competences that has been initially identified to an operable short list of competencies. These were identified according to which of the competences was assessed as most relevant but least developed within companies.

Overall, based on the DigiVET research methodology, which narrowed down in three steps the range of potential competencies relevant for digital learning in SME, the following short list of competencies resulted:¹⁵

Selected competences ranked by difference between importance and development of competences
Planning and Production of Digital Media OVERALL
<ul style="list-style-type: none"> ● Theories and formats of multimedia learning
<ul style="list-style-type: none"> ● The ability to design and produce instructional videos of an appropriate quality
<ul style="list-style-type: none"> ● General multimedia design - The rules of designing these (DOs and DON'Ts)
<ul style="list-style-type: none"> ● The ability to design and produce virtual/augmented reality systems of an appropriate quality
<ul style="list-style-type: none"> ● The ability to set up and facilitate digital learning management systems (LMS like Moodle, etc.)
Learning in a Company Context OVERALL
<ul style="list-style-type: none"> ● The ability to evaluate the outcomes of digital learning
<ul style="list-style-type: none"> ● The ability to facilitate digital learning in the workplace
<ul style="list-style-type: none"> ● The ability to develop learning pathways
<ul style="list-style-type: none"> ● The ability to develop digital learning that takes account of the preferences of different groups (e.g, adults vs youth)
General Media Competence and Digital Communication OVERALL
<ul style="list-style-type: none"> ● Ability to search, collect, process and critically evaluate data, information and concepts
Being Aware and Able to Apply Relevant Legislation OVERALL

¹⁵ see DigiVET: IO 1 A 7 – Competency Matrix and Policy Recommendations Report; p.48ff

- The ability to implement learning systems that meet the requirements of data protection and data security regulations

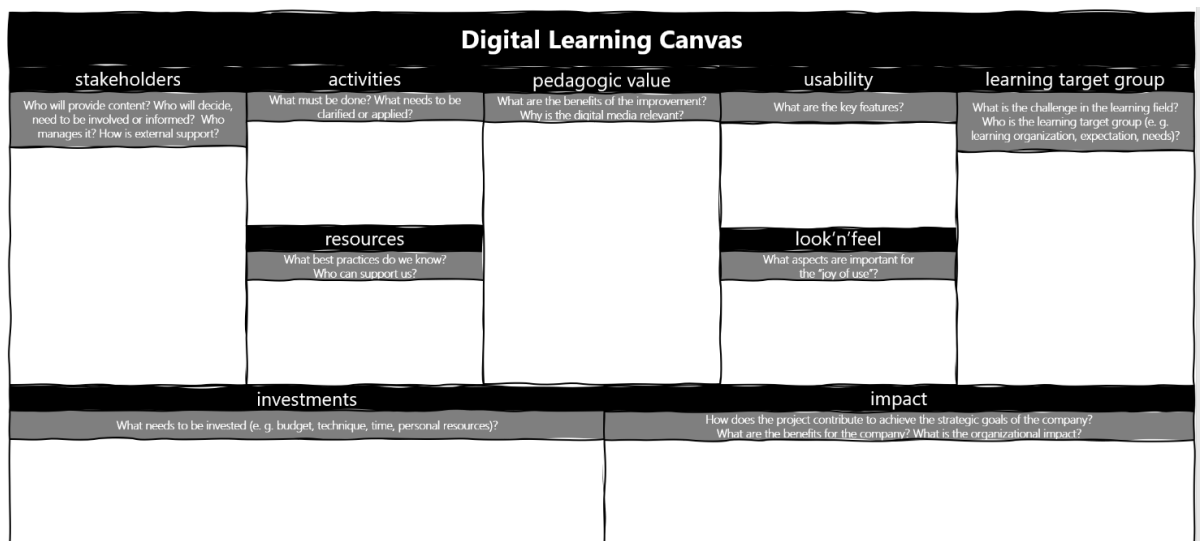
Transversal competences for designing and implementing workplace learning in SMEs OVERALL

- Being able to provide learning experiences that are appropriate for people from different cultures

3.1. Roadmapping

The project has used the general idea of:

- (1) **Digital learning canvas** developed from the initial idea of Osterwalter’s and Pigneur’s “business model canvas” (“canvas visualizes complex business issues simply and collaboratively”) ¹⁶ aims to provide an overview of all relevant aspects of introducing digital media in the learning system of the SMEs on one page.

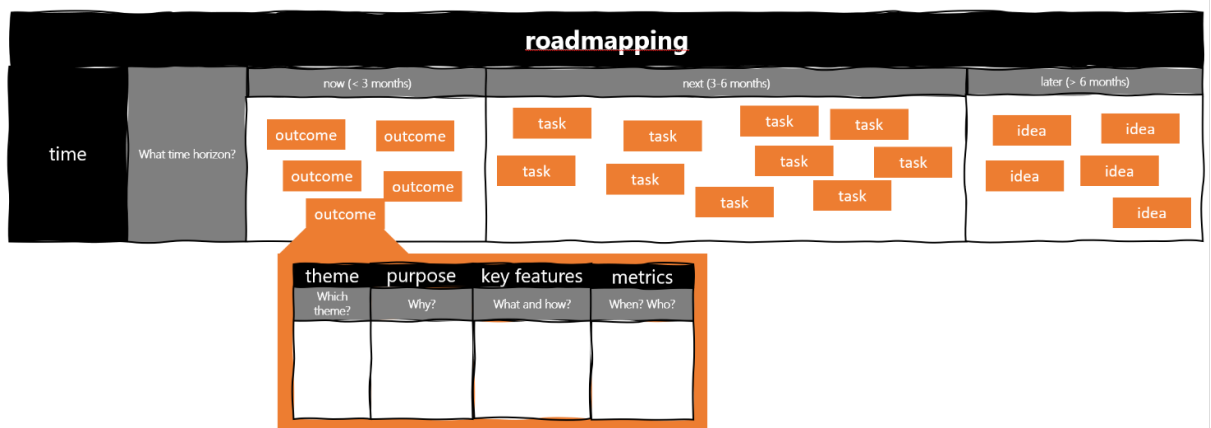


- (2) The short cut is the digital media canvas. It focuses on a specific media production process and is part of the storyboarding of the explainer video production.

¹⁶ <https://www.strategyzer.com/canvas>

Digital Media Canvas							
background	target group	purpose	content	deliverables	responsibilities	activities	benefits
what?	who?	wherefore?	what?	how?	whom?	when and where?	why?
What do I want to show and why?	Who is the learning target group? What are their needs?	What is the purpose of the video?	What is the learning content and objectives? And what do we want to achieve?	What aspects for the usability and look'n'feel are relevant? What are the key features?	Who will provide content? Who can help? Who will decide?	What must be done? What needs to be clarified or applied?	What are the benefits for the learning target group and impact of the organization?

(3) **Roadmaps** are systematic and time-framed plans for the introduction of innovation or organisational change. Unlike a strict five-year plan, which is often announced as a one-time event and top-down, it is an agile, collaborative roadmap for producing digital media. Therefore, it deals with roadmapping, not the roadmap. It visualizes how the digital media will evolve over time to realize your digital learning vision and achieve continual value for your learners and your business. A roadmap should be designed to adapt continually, guide decisions, and promote actions. Roadmaps lead to a mutual agreement (commitment) and show what to include and what not to include to the task board. It motivates all project team members and stakeholders to achieve shared outcomes and to provide resources. The roadmap is a decision-making framework and a collaboration tool.¹⁷



III.: Roadmapping

¹⁷ Osterwalder & Pigneur (2010): Business Model Canvas. Osterwalder, Pigneur, Bernarda & Smith (2015): Value Proposition Design.

The tools were further developed from those used by the CoDiCLUST project¹⁸. The roadmaps of CoDiCLUST are published here: https://www.sensorik-bayern.de/CoDiCLUST/material/CoDiCLUST_Roadmaps_aus_der_Praxis.pdf

We present the version of the canvas, as of October 2020, along with a number of examples of filled-in templates (translated from German)¹⁹.

Digital Learning Roadmap Canvas

Roadmap for Digital Learning Canvas		
Company:		Department (where applicable):
Field of action with intermediate objective <i>Which corporate learning field is affected? What is the operational field of action? What is the medium-term objective?</i>		
Description of the learning target group <i>Who is it? How is the current learning organisation? What is their learning obstacle? What are the learning resources?</i>	Initial situation <i>What is the operational challenge? What are the previous strategy/department initiatives concerning digital learning?</i>	
Objective for the project <i>What does the company want to achieve with the project?</i>	Expectations of the learning target group <i>What is the learning goal? What is the future learning offer? Which learning medium is selected? What is the attitude towards digital learning media?</i>	
Motive for the project <i>What is the entrepreneurial mission?</i>	Selected learning medium and benefits <i>What are the benefits of the selected learning medium?</i>	
Resources <i>Who's involved? What is the cost and time spent?</i>	Benefits for the company <i>What short-term and long-term benefits does the company have? What further contribution does the project make to the company?</i>	
Activities in the project <i>Objective of each action? Specific activities for each action (S)? How will the result be measured (M)? How is it acceptable (benefit) (A)? Realistic y/n (R)? Deadline (T)?</i>		
Evaluation of results <i>What's the result? What are other measures? What are the consequences?</i>	Team cooperation evaluation <i>What's good so far? What is to be improved? What's missing? What is the teamwork like? What should be the next measures?</i>	Pilot's learning experience for digital learning <i>What are the learning experiences of the trainer? What would he/she do or change? What tip does he/she have the trainer colleagues?</i>

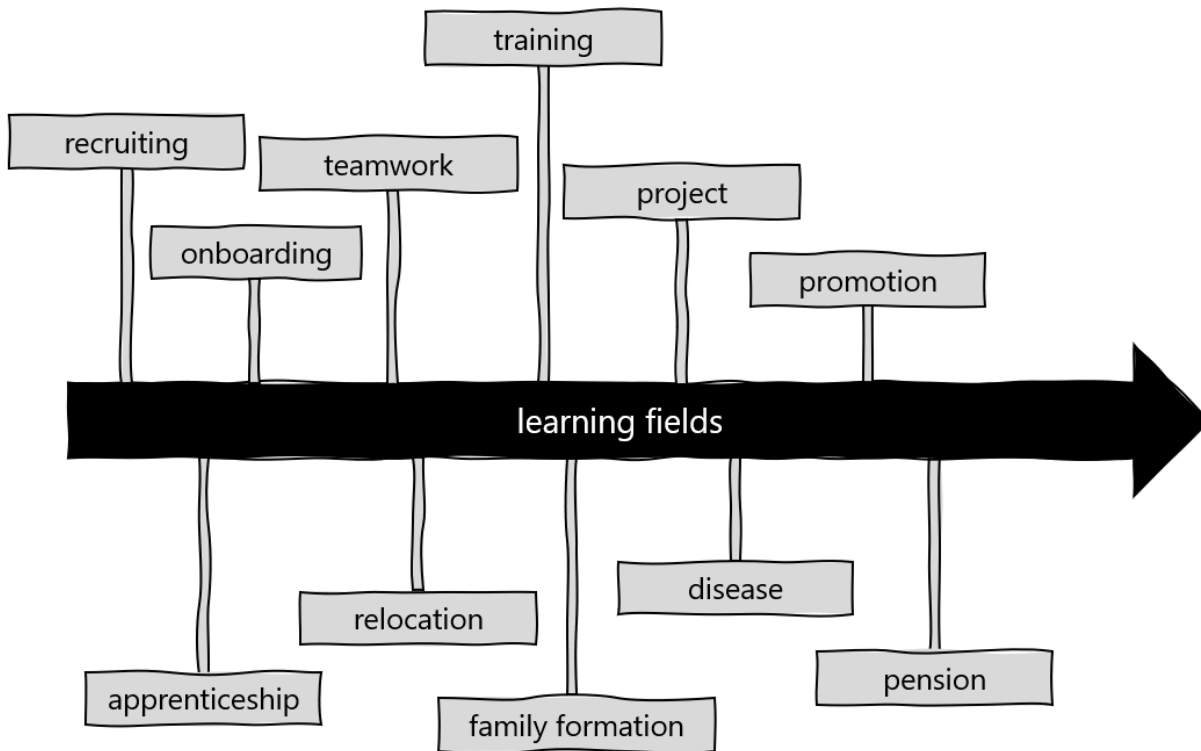
III.: Roadmap filled in - example

¹⁸ While having been piloted with good success with more than 30 companies of different sizes in Bavaria in Germany, feedback from additional sectors and business environments is also highly appreciated.

¹⁹ By a discussion of the process of getting to such a canvas, we learned that our first draft of the “Roadmap for Digital Learning Canvas” was too complex by the target group of the DigiVET project. This is why we optimized the tools by defining a concrete purpose for usage with the consequence of separating the instruments.

Subprocess 1: Exploring the Company Learning System and Analyzing the Learning Field

By the **learning system**, we understand all processes that serve a company for initial and continuing vocational education and training, as well as for continuous formal learning (goal-oriented, often with documented learning outcomes) or informal learning that accompanies the work process and is usually not explicitly tested.

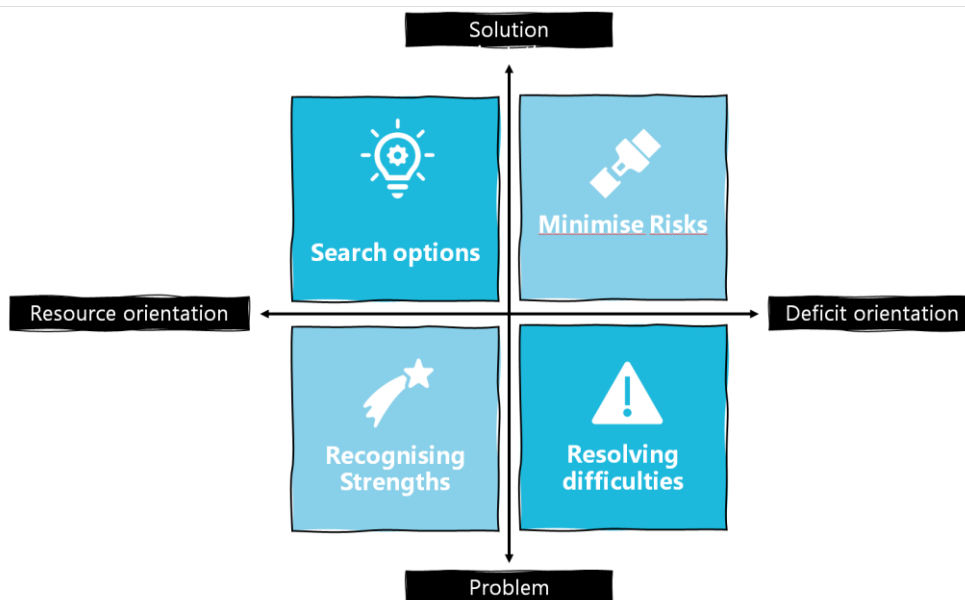


III: Fields of Learning

Expressed in simple terms, the following question must be answered to understand your company's learning system: **Who learns what, how, where, with whom, and when?**

The purpose of exploration is therefore to get to know the company's learning system and to understand its learning fields. This enables action strategies to be developed.

This can be analyzed from **four perspectives**:



III.: Perspectives in Exploring the Learning Fields of the Company Learning System

The problem-based analysis is a search for traces of damage and errors. This view should reveal current problems and formulate them as clearly as possible ("Where does the shoe pinch?").

Helpful and legitimate questions for creating an awareness of the problem include:

- Where do deficiencies and problems show up in the current learning system?
- Who has the problem?
- What are the causes?
- What are the consequences of the problems?
- What is sustaining the problem?

At the next stage, the trainer should promote a solution orientation towards the problems identified and provide suggestions for a systematic solution process:

- Who has to do what to solve the problem?
- What is the solution approach?
- What is the first step?
- Who takes it, who is responsible?
- Until when?
- How is the solution reviewed?

Valuable questions are:

- Apart from our detailed problem, where do we have potential that we are not yet using?
- Where are fundamental challenges foreseeable?
- What are we missing?
- What must happen to prepare for these challenges?

Effective questions are:

- What new possibilities are there?
- What if we had no time and financial limits?
- What would happen if the problem suddenly disappeared?

Resource orientation is the "treasure hunt" for helpful contexts, exceptions to problems (where does the problem not occur here and why?), and patterns of success elsewhere.²⁰

- What is going really well at present and where?
- What can we learn from this?
- What will help us?
- What can we build on?
- Which strengths and possibilities of influence do we have?
- What similar challenges have we already mastered?
- Where do we already succeed?

The results of the exploration are ideally summarized in a mind map to illustrate the learning fields multi-dimensionally and to put them into a relationship.

A further prerequisite for a successful implementation of the described innovation process is that the trainer makes sure that the assignment and role expectations are clarified transparently for all parties involved.

Questions to be clarified include:

- What is the task of the learning group?
- Is the group to act in an advisory capacity or is the result of the analysis and action plan to be implemented?
- Who is responsible for what?
- Who decides?
- Who has to report to whom and when?

Subprocess 2: Development of a Vision for the Learning Field

A vision motivates, inspires and creates a common understanding. This drive is important in the process of change in order to initiate the process of change and to accompany it in the area of tension between "reality and outdated structure" and "aspiration and new thinking."

The trainer supports the vision process by developing a fitting and engaging vision with the project team. He or she should address positive feelings and creativity in implementing the vision should be encouraged.

Possible stimulating questions are:

- What can digital learning mean for us?
- Who should be involved?
- What developments have already taken place?

The deep emotions and drivers of the organization are then identified.

²⁰ On the methodology of „appreciative inquiry“ see: <http://appreciativeinquiry.case.edu/>

The following questions have proven to be useful in this process:

- What should our learning system stand for?
- How do we want to offer?
- What are our concrete actions?

Finally, the findings are linked and concluded with the following question:

- How is our learning system in the future?

By developing a vision statement, the trainer summarises the overarching action of digital learning in companies. The vision statement can be expanded with pictures, sketches, and symbols.

In his or her role, the facilitator counteracts creativity inhibitors such as ratio, habit, criticism and time pressure. In creativity processes, it is necessary to consciously use divergent and convergent thinking and to separate them in time. Divergent thinking means the production of ideas to generate the greatest possible number of options (subprocess 2). Here it is irrelevant whether or not the solution approaches are realistic. In contrast, convergent thinking has the purpose of working out the idea in a systematic and focused way (subprocess 3). As a result, it is a matter of selecting options for action from the divergent collection of ideas.

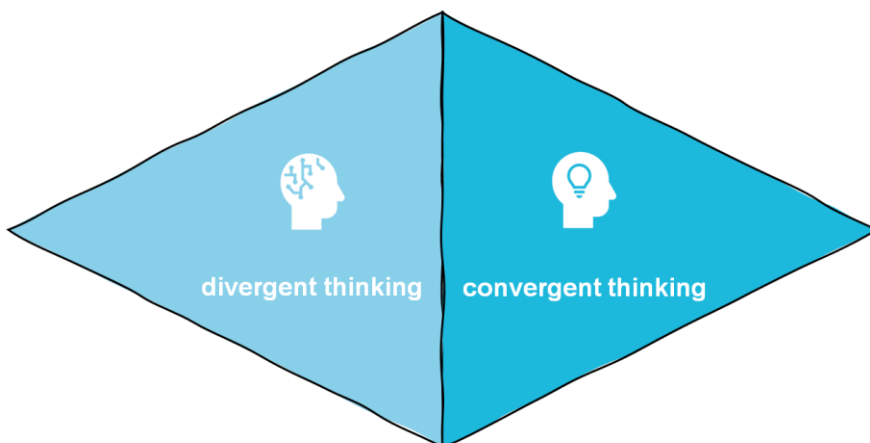
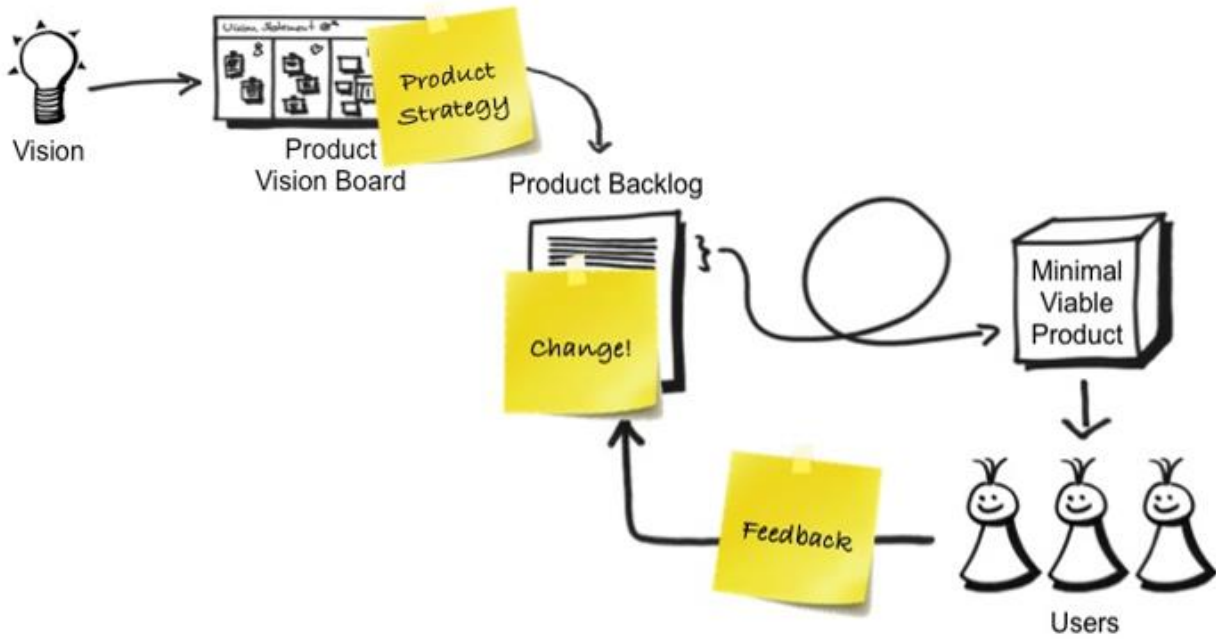


Fig.: Divergent and convergent thinking

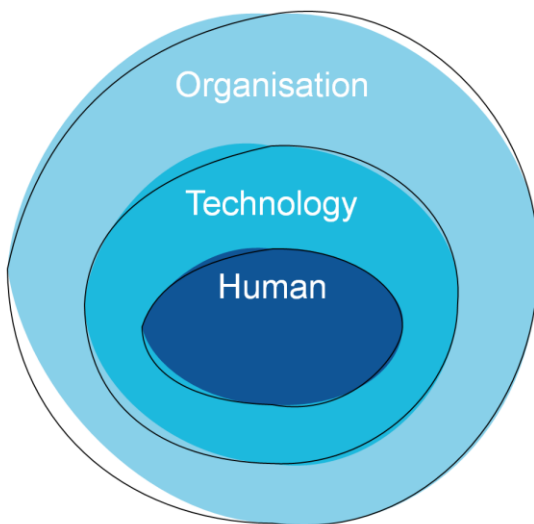
Subprocess 3: Developing a Strategy for Achieving the Developmental Goals

After vision development, a strategic framework is needed to systematically approach the desired state. **Strategy refers to the skill of managing change.** Accordingly, it includes the **long-term** orientation of the learning field **and describes the path (strategy)** to the desired vision. The strategy includes tasks and activities which are ideally described as a minimal viable product (MVP). MVP is a version of a digital media which includes enough features to be usable by the learners who provide feedback for future media development and change requests.



III.: Hierarchy of strategy

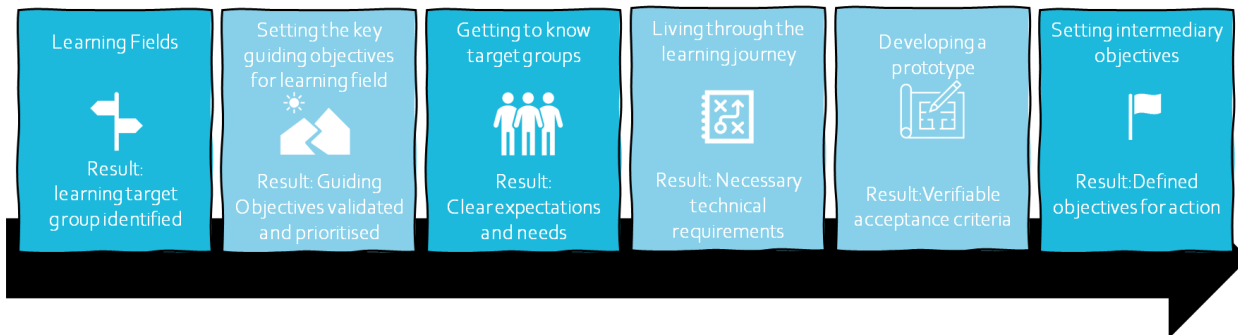
Therefore, the reality is that a strategy evolves in the work process. Accordingly, thinking (strategy development) and acting (strategy implementation) are to be understood as symbiosis. Strategy implementation is generally not one-dimensional. It is rather a triad of people, of technology as a work task and of organization, with people at the center.



III.: Levels of Organisational Development in Digital Learning

This human-centered strategy formation is helpful for two reasons. On the one hand, a lengthy and complex change process requires more flexibility to use the learning processes of employees in strategy implementation for renewed strategy development.

The exact context of the learning field thus requires a human-centered way of thinking. Only when the learning target group is understood, priorities can be identified and the requirements for digital media can be specified more precisely. This is complemented by the experimental design of the prototypes and the testing and verification with the participants. With this dialogue in development, the probability is higher that the learning target group will use digital media as a learning opportunity. The procedure of human-centered strategy formation which is inspired by the design thinking process extends over subprocesses 3 to 5:



In the third subprocess, **the trainer has the task** of sensitizing people to the human-centered approach and its advantages. Only if the way of thinking in this respect is accepted by the participants, the following subprocesses can be successfully implemented. An excellent option is to expose the learning group to appropriate best practices.²¹

Subprocess 4: Define, Implement and Experience the Work Assignment

The aims of this subprocess are to

- analyze the learning needs and general conditions of the concrete learning target group in detail
- define learning pathways, learning objectives, and learning content for digital learning media
- designing a digital learning media
- plan activities to develop the digital learning media

The following questions have proven to be useful:

- How is it determined that the assignment was a success (success criterion)?
- What long-term benefit is expected from the work assignment (purpose)?
- What is there at the end of the work assignment that does not yet exist (result)?
- What is to be achieved urgently, if possible, and possibly (priorities)?

²¹ In Germany the portal E-Qualification includes more than 100 good practices of Digital Learning in initial and further training which have been approved by the Ministry of Education and Research and the community of those involved in pilot projects which developed these practices. <https://www.qualifizierungdigital.de/de/equalification-2020-5637.php>. While some of these are not fully published, usually the companies can be contacted and will be prepared to present their experience during events and or welcome visitors to demonstrate what they have developed.

- Who should be informed and involved in the work assignment (stakeholders)?

This enables the trainer to discover possible everyone’s agendas. Due to his or her new role, it is also advantageous to clarify the role of the trainer in this subprocess:

- What are the expectations vs the trainer?
- What are the limits of responsibility?
- What kind of support does the learning group need? (facilitation, referrals, information, etc.)
- Which concepts are best suited to describe the role of the trainer (e.g., crisis manager, motivator, caretaker, strategist, producer, mentor)?

The first step in developing a learning field strategy is to deal intensively with the learning target group. Only then does it make sense to think about technical development.

The "profile of the learning target group" adapted serves as a working aid to analyze the archetypical learners.

Profile of the learning target group		
Who is the target group?	What are the learning difficulties?	What hinders learning? e.g. pain points during learning
Sociodemographic characteristics e.g. training background, age, internationality	What are the learning goals?	What is supporting learning? e.g. desires, learning motivation
Psychological Characteristics e.g. personality traits, behavior		
Support system e.g. teachers, digital learning initiatives	How is learning organised? e.g. learning situation, role and tasks in learning, learning outcome measurement	What is the attitude vs. digital media?
Learning motto?		


III.: Profile of the Learning Target Group

The following questions can help identify the target group’s learning opportunities:

- When does the learning target group learn?
- What does the target group learn?
- Where and with whom does the learning target group learn?
- What is the learning target group's task in the learning process?
- What are the learning objectives and learning contents?
- What kind of interaction takes place with the digital media (e.g., information, coordination, cooperation)?
- What are the limitations and obstacles in the learning event (e.g., lack of network function, volume, language barriers)?

- What are the positive and negative experiences of learning?
- What solutions, ideas, and improvements are there?

Learning journey of the learning target group ____		
Learning events	When, where and with whom will be learned?	
Tasks of the learning target group	What does the learning target group do in the company?	
Learning objectives	What are the learning objectives?	
Learning content	What are the learning contents?	
Digital media	How does a technical interaction take place?	
Experiences	What are positive and negative experiences with various media?	
Resources	What ideas and potentials are there?	



III.: Learning Journey

The SCAMPER model is another approach which helps you to find ideas and optimization proposals for your learning field problem. It is similar to design thinking; however, it focuses more on the process of finding unusual and creative solutions to problems, but also to come up with innovative ideas. The seven SCAMPER techniques are:

- **Substitute:** Find a part of your learning concept that you could replace with digital media if it will result in improvements, such as efficiency gains. This will help you test which alternative works better, like a trial and error process.
- **Combine:** Often the learning field does not need something entirely new because the solution already exists. By combining digital media with face-to-face-learning the learning field is going to be more efficient.
- **Adapt:** Sometimes a digital media that works in one learning field can be used as a good practice to solve another difficult learning situation.
- **Modify:** Modify an aspect of your situation by magnifying and see whether it gives you a new insight or whether it adds any value. This will help you identify which part of your learning concept is the most significant.
- **Put to another use:** This is very similar to “adapt.” However, it means putting an existing learning concept to another use by using it differently than it was originally intended.
- **Eliminate:** The elimination goes along with Lean and Six Sigma by eliminating the waste of the learning concept.

- **Reverse:** Reverse the orientation by doing things the other way around and completely against their original purpose to see the learning field from a different perspective.²²

Furthermore, it is important to check out the criteria of acceptability to design a user-friendly digital media. The following criteria are important to check before starting with the media design:

Criterion of acceptability	Reflective question	Example
Adaptability	How much should learners be able to change the learning content themselves?	Blue-collar workers should be able to extend and adapt the technical documentation themselves to support the new colleagues in their initial training.
User behavior	How often and in which situations should the users be able to access the information?	In a production facility, semiskilled workers should be able to independently remedy the sudden malfunction of the machines using digital work instructions.
Changeability	How often does the content change?	In a production line the industrial safety takes place once a year and only changes slightly.
Physical understandability	Are there physical barriers to learning?	In a production plant the noise level is usually high. This is why the explainer videos need to be without sound and only visual.
Dependability	How critical is the accuracy of the information in the learning content?	In a law department of a company, the lawyers are being informed about legal changes by a newsletter. The content must be correct. An additional webinar is being organized to make sure that everyone has the correct understanding.
Transferability	How adaptable must the content be to the needs of different target groups of learners?	Operators should work to the same standards but rely on different educational prerequisites, which need to be considered in the instruction.

III: Criteria of Acceptance of Explainer Videos²³

²² [Thinking Methods: SCAMPER \(ideaconnection.com\)](https://ideaconnection.com/thinking-methods/scamper/)

²³ Adapted from "Qualitätsmerkmale ISO 9126"

In summary, the quality characteristics describe how the application should work (technology).

Design sketch	Description with purpose
Storytelling, role play, read-it-out-loud	Description of the function of a solution in order to obtain initial feedback ("works-like-prototype") by means of storytelling or role-playing
Storyboard (chapter: media production)	Extension from storytelling; sketching to check the comprehensibility and clarity of the learning content ("looks-like-prototype")
Style tiles	Drafts for defining graphics (e.g. font, colour, buttons, integration of links)
Manuscript (chapter: podcast)	Structuring and lively preparation of auditory content

III: Procedures for the Development of Design Sketches for Explainer Videos²⁴

The design sketch contributes to transparency and can be used for evaluation purposes.

Evaluation method	Description and purpose
Onsite survey	fast feedback from the actual learners of a digital medium ("feedback button")
Online survey	questionnaire that the learning target group can complete over the Internet to give feedback
Monitoring	observing the learning environment of a learning target group
Focus group	with the help of group discussions the wishes of the learning target group are bundled

III: Methods for Evaluating the Design Sketch for Explainer Videos²⁵

In summary, the fourth subprocess makes clear what is to be achieved with the digital medium and how learners can achieve this. By using the analysis tools, all the information is now available to create an effective intermediary goal. The details of the media production process is explained in chapter 4 (use of media in WBL).

²⁴ Vogel, J.; Schuir, J.; Thomas, O.; Teuteberg, F. (2020): Design and testing of a virtual reality application to support prototyping in design thinking processes. HMD Practice of Business Informatics 57. p. 432-450. Retrieved 26.03.2020

²⁵ <https://www.usability.de/leistungen/methoden.html>

Extract from the **trainer role profile**

- The trainer creates a framework for clarification of tasks and roles and facilitates a common commitment from all project participants.
- The trainer invites those involved to participate, promotes joint cooperation, encourages reflection and supports competence building.
- The trainer acts as a process consultant, focusing on supporting the process in order to clarify disagreements, disregarding his or her expert advisory role that he or she may have in some other parts of the process (e.g., in the media production process).
- The trainer accepts different thinking and promotes new approaches to finding a common position as a project team (process consulting).
- The trainer provides concrete offers of help and advice to accompany the organisational development in the best possible way and to achieve the desired result (expert advice).

Subprocess 5: Reflecting and Evaluating the Work Assignment

In the subsequent phase, the magic of organizational development is created, which can be described by Stahl's learning spiral.²⁶ Empirical process control creates an iterative, incremental process. The learning experiences thus flow directly back into the work process of organizational development. This effect is also the aim of phase 5: reflecting, transferring, and communicating the mission. In the course of this, the trainer uses the work aid "project review" and "project retrospective."

"You don't learn from experience, but from the reflection of the experience." (John Dewey)

The path to a digital learning world is marked by strategy building and strategy implementation. Both are mutually dependent and the bridge between the two areas of work is a **systematic process of reflection**.

Project Review

First, it is necessary to take some time for the "**project review**" to examine how satisfactory the learning outcome of the learning target group is:

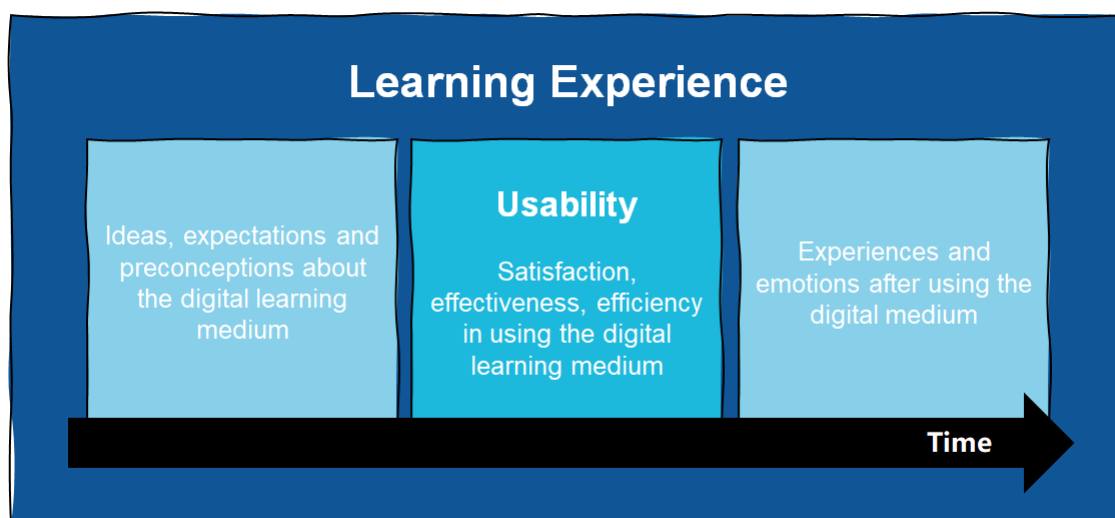
- Is it accepted by the group?
- Does the digital medium cover the learning needs?
- What is the ratio between the funds invested and the real achievements?

Consequently, **socialization with digital media** has to be viewed and evaluated (what do media do to people and vice versa?).

²⁶ Stahl, T. Nyhan, B.; d'Aloja, P (1993).: The learning organisation, ADAPT office, Brussels

- Does the work with this specific medium increase the general media proficiency of the learners? In which ways?
- What are the transferable competencies?
- Does it increase the competence not only of media use but also planning and production of media?

The learning experience includes the experience before use, during use (usability), and after application.



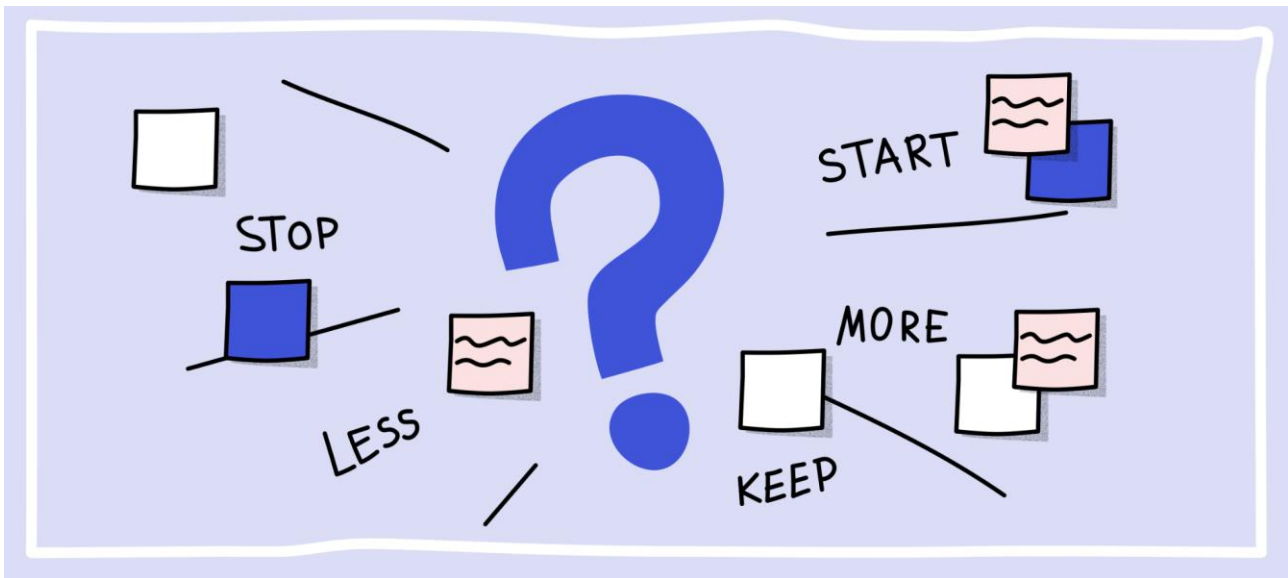
III.: Learning Experience and the Impact on the Learning Outcome

Project Retrospective

In addition, the trainer should reflect on the impact on the transdisciplinary competencies of the project participants and the project team process by using the “**project retrospective**”, in which he or she reflects the course of the project together with the project members:

- To what extent have individuals and the project team evolved? Who contributed what?
- Has the ability to self-organize increased?
- Is the group better prepared to identify its learning needs?
- Is it better prepared to produce better digital media?

The following methods can be used for project retrospectives:



III.: Stop-Less-Keep-More-Start

In summary, organizational development means consistent personnel development and vice versa; personnel development processes result in new forms of organisation in the work process.



III.: Staff Development and Organisational Development

Subprocess 6: Transferring and Developing a Follow-up Strategy

Generally, they are two ways of developing a follow-up strategy. On the one hand the trainers together with the work group evaluate the learning outcome to transfer the learning experiences and good practices to other learning fields. The learning outcomes, which are usually only available at the end of the project, are communicated as the learning target group. The lessons learned can also be used for project marketing, which plays a central role in fundamental organizational changes. The trainer is responsible for the development of such activities. This is also why a participatory approach has been developed to attract and

bind multipliers for organizational change throughout the organization. The following questions can support the transfer:

- What changes can we make?
- What should we maintain?
- How can we involve the executives?
- How can we measure that the change has been achieved?
- How can we measure progress?
- How do the planned changes affect our organisation?
- What expectations do we have for each other?
- How will we deal with each other in the future?
- What way of working do we need?
- Who does what until when?
- How does the change affect our team spirit?
- What can I personally contribute to achieving the goal?
- What competences help me?
- Where do I need additional permission to act?
- Where do I need support?
- How do the changes affect my motivation?
- What needs do I have in this context?

The basis for this transfer work is **knowledge** about the subject area of digital learning. It is also obvious that the transfer process presupposes a **reflexive confrontation**. The trainer creates a framework for this in the project reviews and project retrospectives. Here, the trainer uses constructive, respectful methods and clear structures, such as “rules of the game.”

The **trainer** creates **willingness** among the participants by **setting impulses** (e.g., best practices, organizational resources) and by increasing attention to the relevance of “digital learning” (e.g., project marketing, trend scouting). *The trainer can create awareness* by conveying information (e.g., company learning system, transfer work) and taking on responsibility (e.g., clarification of roles and responsibilities).

Following this phase, the third subprocess starts again and then takes place on a rolling basis until the achievement of the vision is satisfactory for all parties involved.

4. Digital Media Production

As described above, the competency to actively produce digital media is one of the core competencies of coaches and trainers. The general rule is to use the least possible resources to do the job.

4.1 Explainer Videos

What does the production process consist of? Learning media can consist of different media. The media can contain texts, audio, presentations and even videos. The creation of videos is the most complex type of media. Therefore, the following chapters will focus on the creation of explanatory videos. The individual phases and methods for planning and producing the explanatory videos can be transferred to the creation of other learning media.

The production of your own learning videos should therefore be cheaper in time and space than outsourcing. There are possibilities to produce acceptable media without large investments.

This chapter consists of two parts. The first part describes the general manufacturing process step by step. The second part deals with how the production process can be optimized and what investments might be necessary.

Making Media - The Process

The three phases of explanatory video production are based on the phases of film production, as they are the closest to it. There they are called pre-production, production and post-production. They have been slightly modified and adapted to the requirements of learning media. They can be modified for other learning media. There are some examples at the end of the chapter. The phases are similar to those of project management in the sense that verifiable intermediate results are established after each work phase. These can and should be adjusted accordingly to improve the final product.


The individual phases and their contents are described below. It starts with the preparation phase, derived from the pre-production. This is followed by the creation phase, derived from the production and the post-production phase, derived from the post-production.

Preparation

What do we need the preparation for? The preparation phase is the most important phase. It is the starting point of the project. This is where you define what a product will end up with and what it should look like. It is used to create the learning medium in a way that is appropriate for the target group and as effective as possible. A good preparation phase saves time, costs and a lot of frustration. In the preparation phase for an explanatory video the following intermediate products are created: *A basic concept, a script, a storyboard*

and a production plan. But the questions that have to be asked next already give an idea of the extent of the phase.

- What exactly should the learners be able to do at the end of the learning unit?
- Who are the learners?
- Will they sit down and learn on the computer?
- How do I manage to capture their attention?

Illustrative material: Concept

Working title:

Technical Framework Conditions:

Access:

Equipment:

Budget:

Deadline:

Format:

Legal framework:

Learning Goal:

Target group:

Content:

Interaction:

Rough procedure:

Justification:

Implementation:

Medium:

Duration:

III: Basic Script Template: The basic concept should help to order the chaos and get a clear line in the idea (adapted from “CoDiClust” project).

This list of questions should be evaluated and improved after each project. An important component of learning media is the red thread. The most colourful tools do not help the learner if he clicks around confused and lost. That is why it is important in the planning phase not only to think about your tools, but also about the sequence of the contents.

Voice over

With a relaxed dog everything points down.
The tail, the ears, the nose, the lips, the
head in general.

4. Live action: relaxed dog day

A relaxed dog runs sniffing over a meadow and to his human.
Video is stopped and animated arrows point to the head, tail
and ears.

Voice over

In this video you can see a relaxed dog.
Here it is good to see how all body parts a
dog communicates through are pointing down.
His ears are relaxed, his tail points down.
His forehead is smooth.

5. Animation Scheme (drawing) nervous dog

The animation shows in before (neutral) after (nervous) the
respective parts of the body, where you can see what mood the
dog is in.

Voice over

In a nervous dog, the respective body parts
tend to point upwards. Especially the tail
stands upwards like an antenna. This
characteristic is difficult to recognize in
dogs whose tail has been bred to point
upwards. Also the ears are pointed. In dogs
with drooping ears one can look at the root
of the ears to notice the difference. The
forehead is in folds, the head points
upwards. This is a dog on alert. If in
addition the lips go up, this is a sure
sign that the dog wants distance.

6. Live action nervous dog day

A nervous dog runs back and forth in fast steps without
concentration. He stretches his head up again and again to
check the situation. Thereby he pricks up his ears.

Voice over

Already in the overall impression you can
see that this dog behaves decisively
different than the dog in the previous
video.

The next step in understanding a dog would be to see if a dog is joyfully excited, or fearful, or aggressively nervous.

7. Int. Activ Test

An H5P quiz on the topic must be completed before the video continues.

Quiz content

1. from which parts of the body can the mood of a dog be read

Scheme - click on it

2. in a nervous dog these body parts tend to show

a. Below

b. Top

8. slide, summary scheme/split screen

The two animated dogs can be seen side by side

Voice Over

Both moods can be read on individual body parts of a dog. With relaxed dogs they point downwards and with excited dogs they point upwards.

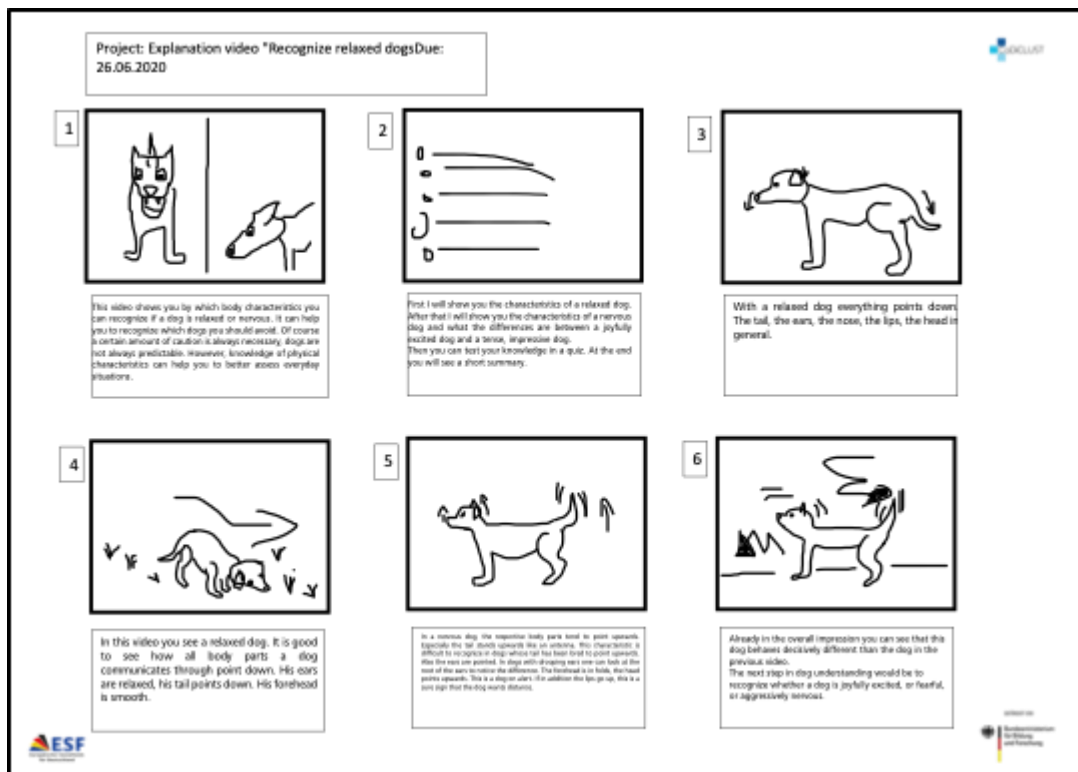
OUTRO

(Thanks a lot / Credits/ Logo)

III: Basic Script Filled In: The basic concept should help to order the chaos and get a clear line in the idea (adapted from “CoDiClust” project). The script describes everything that is spoken, seen or heard in the learning medium.

Although the script is a good help, novices should especially create a storyboard. In a storyboard, individual pictures are sketched out in advance to be able to see exactly what should be seen later in the picture and

how much space should be left during production for possible text integration. Storyboards are also a good way to detect errors before production and thus save a lot of time in post-production.



III: Storyboard (adapted from "CoDiClust" project).

A storyboard is a visualization of the script. The last point in the preparation phase is the production plan. Modified from the shooting schedule, this is the to-do list for the creation phase.

The production plan is slightly modified from the shot list used in the film. Since the creation of explanatory videos often involves mixing different types of media and creating interactive parts, this name makes more sense.

In the production plan, the creation of the individual segments is recorded according to creation period and sequence. It is described which materials are necessary and which special features have to be considered.

Production plan

Project:

Due:

Live-action movie:

No.	Storyboard No.	Take	Content	Length	Location	Miscellaneous
R1	4	Establishing/ Still	Relaxed dog runs over meadow	30 Sec	dog meadow	Paula and dog
R2	4	Close/Still	Head of relaxed dog	20 Sec	dog meadow	Paula and dog
R3	6	Establishing/ Still	Excited dog in a kennel	30 Sec	Animal shelter	Dog Hector
R4	6	Close/Still	Excited dog's head	30 Sec	Animal shelter	Dog Hector

Animation

No.	Storyboard No.	Take	Content	Length	Miscellaneous
A1	3	Close	Neutral dog to relaxed dog - tail goes down, ears hang etc..	20 Sec	See animation description
A2	5	Close	Neutral dog to excited dog	20 Sec	See animation description
A3	9	Close	Relaxed dog to excited dog	20 Sec	See animation description

Slides

No.	Storyboard No.	Content	Length	Miscellaneous
F1	2	Content Video Overview	10 Sec	

Photos

No.	Storyboard No.	Content	Length	Miscellaneous
P1	1	Aggressive dog	10 Sec	Stock photo
P2	1	Relaxed dog	10 Sec	Stock photo

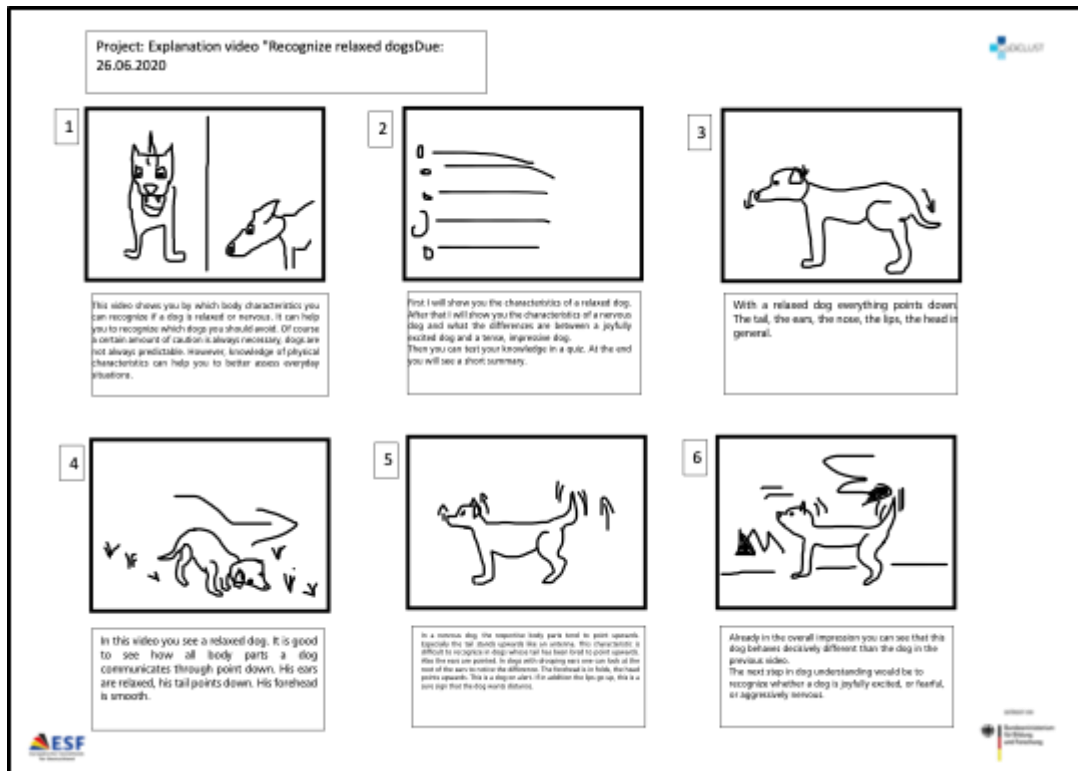
Interactive Elements

Nr.	Storyboard Nr.	Content	Length	Miscellaneous
I1	7	Picture dog HSP click element		Animation Screenshot
I2	8	Quiz		

III: Production Plan: The production plan functions as a structured to do list (adapted from “CoDiClust” project)

Visualization

What exactly is visualization? A visualization means to sketch what you will see on the monitor later. The important thing is to make sure that you actually sketch what you see and not just what happens. This way you can later estimate whether what you see actually has the desired learning effect.



III: Visualisation is your friend (adapted from "CoDiClust" project)

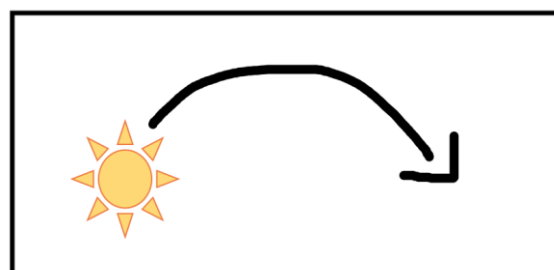
Various media can be visualized - from presentations to explanatory videos, everything is included. I can concentrate on a sequence of images as well as on an overall impression that I want to convey. This means that the course on the learning platform only needs a picture in which the arrangement of the different units is sketched. An explanatory video needs a series of sketches, so that one can imagine the finished film.

Tips for Drawing a Storyboard:

Arrows to mark the direction

of people or objects:

(inside the frame)



Arrows to mark the direction
of the camera:

(outside the frame)



Creation Phase

The creation phase is the middle phase of the project. It contains the creation of the raw material, which is compiled and implemented in the post-processing phase.

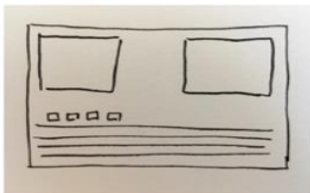
- *Avoid backlighting:* When photographing or filming against the light, either the background is overexposed, i.e., completely white and blinding, or the person who is supposed to be filmed is so underexposed that he or she cannot be seen. Therefore, it should be ensured that the main light source is always behind the camera. If the camera cannot be easily moved, it helps to hang the window and work with artificial light.
- *Background noises:* Ambient noise can be very annoying in sound recordings. Therefore, they should be avoided as much as possible. This means that whenever the camera is running the phone should be turned off, completely off, because the vibration alarm can also be heard on later recordings. Several versions of the same content should be produced. This way it can be ensured later that a replacement version is still available should a car pass by unnoticed. A directional microphone helps to pick up the sound of the speaker. A muff for the microphone can help to filter the noise of the wind
- *Prepare technique:* The technology should be prepared. The evening before the recordings, it should be checked that all batteries are charged and that there are enough storage media. Possibly check if the technology is really working. Especially if a long shoot is planned or many external people have blocked this appointment.
- *Use a tripod:* It can be tempting to shoot the required material "just quickly" from the hand. If the individual sections are to be put together later, however, the camera shake can become a great challenge. Shots taken with a tripod or gimbal can be edited together better. Zooming and panning is also possible from a tripod. Quieter pictures are also possible here.
- *Subtitles and text:* Often videos or photos have to be extended with explanatory text. Sufficient space should be allowed for this text during production. For example, the person explaining the text must be indented on the left or right side. Sufficient space should also be provided for subtitles. If the background or image has different colors in the lower third, the subtitles should also be provided with a high-contrast bar. This serves to make the subtitles easier to read.

Follow-up

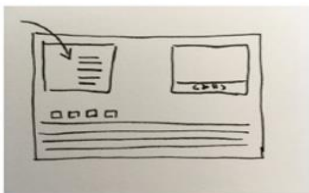
The first thing is to view and sort the material recorded. For the next step an editing software or an authoring tool should be available. The explanatory video is assembled in the respective timeline. Thanks to your storyboard and the caption in the file names, this should be relatively quick.

BUT HOW DO YOU CUT?

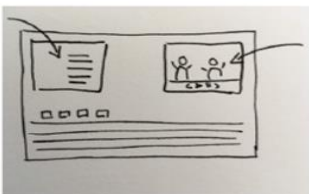
All cutting programs work according to a similar pattern:
There is one work surface:



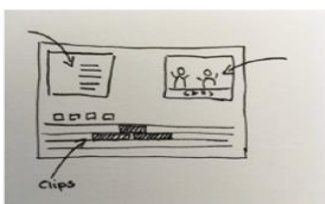
Mostly a window in which you can sort your raw material, i.e. video clips, slides, pictures, sound recordings etc:



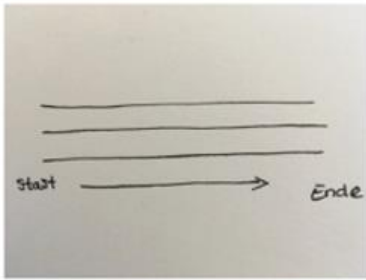
There is a preview window in which you can view your project:



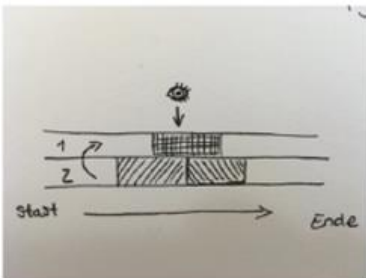
There is a timeline in which all tracks are located:



The timeline works linear (like time) from left to right.

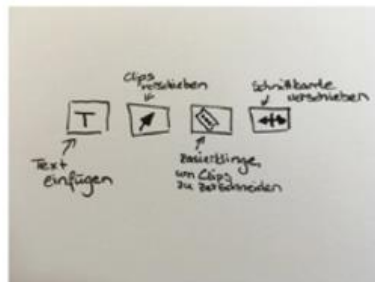
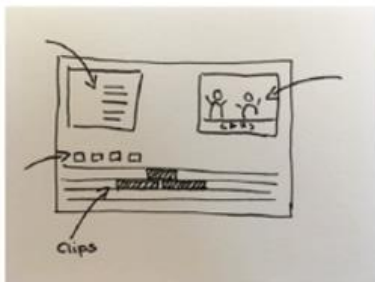


And from bottom to top, like a stack of paper. That is, the top track overlays the bottom track, and so on.



This timeline is used for work. This means that the individual clips are moved around, trimmed and superimposed on each other until the preview window shows the film you have thought about at the beginning.

There are tools for this, for example to cut video clips.



How these things look in detail is a little different in every software. Also, some programs have more tools and options for changing your clips than others. So it makes sense to test the software before making a final decision.

III.: Cutting

Making the Right Choice - Media Format and Equipment

Many decisions have to be made during the entry into e-learning production. One of them is which medium is suitable for which content.

Media Format Selection

There are visual, audio and audio-visual media. The individual formats are also defined according to different criteria and in turn have advantages.

- Visual media: text, picture and video (without sound)
- Auditory media: audio recording
- Audio-visual materials: video (with sound)

These media can be combined on a learning platform to form a course or distributed individually through various other channels. The following questions will help you to decide:

- What is to be taught?
- Who is the target group?
- How will the target group reach the medium?
- What are the technical and financial requirements?

Equipment Selection

The selection of the equipment is divided into hardware and software.

Hardware selection 1

When it comes to preparing learning material for digital lessons, one of the first questions is often about the hardware, especially the right camera.

Video suggestions:



Another piece of hardware is the microphone. For many speaker recordings or interviews it is worth investing in a directional microphone instead of using the camera's integrated microphone. This integrated microphone often picks up background noises that later appear as loud as the speakers.

Hardware Selection 2

Simple hardware can be used. As today cameras of the better smartphones and a number of “action cameras” (GoPro being the most common) can get you excellent results.

For the cameras a good luminosity at conditions without daylight should be a main criterion.

The most underrated element is the sound. For instructional uses a good narrator sound can save also a visually weak video. Therefore a quality external microphone should be purchased.

Software Selection

Test phases with open source software or test versions are suitable for this. In many cases the open source programs are sufficient for the limited requirements of low-budget productions.

The most simple device is the photo and video cutting programme integrated in Windows, which can be used almost intuitively. An example of commercial solutions, which already includes multiple templates and suggestions for design includes Canva (canva.com).



Shopping:

Software Examples

Premiere by Adobe

Final Cut by Apple

Media Composer by Avid

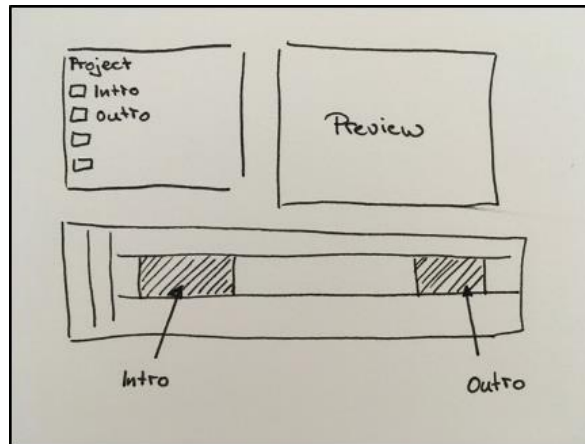
Other solutions include DaVinci Resolve by Blackmagicdesign, Movavi and Filmora by wondershare.

Increasing Effectiveness by organizing the Workflow

Sustainable working is characterized by good handling of documentation, organizational structures and templates.

A template should be:

- Accessible for everyone who needs it
- Appropriately labelled
- Up to date
- Equipped with a manual



An equally important follow-up process is the review of the learning material produced. This should correspond to a list of quality criteria that you have previously created.

Will it become more affordable over time? Generally, a structure and material collection helps to become more effective over time.

Do:

- Create a place to share for learning material
- Create templates that can be used by all instructors
- Create a structure for naming, storing, using, and developing templates
- Make everything abundantly clear

Types of Explainer Videos

Although designing and producing videos is a systematic process, there are different types of explainer videos. Each type has a different purpose and fulfils a different learning need.

type	description	purpose	DigiVET example
microvideo	short instructional videos to learn about a single topic	explain a simple concept in a few steps or create a series of microvideos to split a topic into logical chunks (“learning nuggets”) to increase the engagement of your learners	Digital Learning Project information Stephanie - YouTube
tutorial video	instructional video (“how-to”) of a complex work process with multiple instructional methods (e.g., guidance, quizzes, interactive elements); maximal 10 minutes	teaching a topic visually to improve the understanding of the work process;	Trainer Explainer creating Storyboard with Stephanie No 3 final version - YouTube
training video	life videos (e.g., interview, talking head) by using multiple instructional methods (e.g. guidance, quizzes, interactive elements)	teaching about interpersonal learning topics (e.g., compliance, harassment) to improve content retention and build a relationship	DigiVet Translation Q & A Valerij & Rob - YouTube
screencast or slidecasts	screen recording designed to get an answer about a specific topic	screencast are often called “just-in-time teaching” and are used for quick, informational instruction	How to digitize a company’s learning system with Stephanie - YouTube
presentation	recorded lecture, real takes or presentation	making the learning content available after the event (e.g. webcam, recorded PowerPoint slides)	
animation	cartoon and teasing videos (e.g. common craft, “flip book”, vyond)	visualize learning content by using symbols, illustrations and pictures for attraction	
handcrafted explainer videos	whiteboarding, panel painting, tablet capture, table video or animation videos (e.g., simpleshow, PowToon,)	more personal explaining of the learning content by using common visualization	
story-based videos	storytelling and giving impressions about a	sharing experiences and telling a story about a specific	

	specific topic	learning content (e.g. lessons learned, good practices, fails) to build motivation	
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III.: Types of explainer videos²⁷

Real World Tips for Video Production

Next to the experience of the CoDiClust project that has been the basis of the knowledge shared in the previous chapters, the DigiVET focus group in the partner country Austria included some experienced experts in media production in public media and filming in an industry context, who shared their most important learnings:

“Here are some tips for low-budget learning videos:²⁸

- Define the target group precisely and then decide which learning type you want to address: auditive, visual or haptic, as this must be considered in the concept.
- If you want to use film (video) well, some technical conditions have to fit: Consider lighting conditions, use two cameras to avoid jump cuts, work with short takes to make it easier to cut, use an external microphone to improve the sound quality.
- Didactic considerations: Focus clearly on the topic and don't put too much information into single parts; rather produce a series (i.e., several parts); in good videos a tension is built up.
- Define the learning topic clearly: here you could work with a simplified storyboard, so that you can visually imagine the process before shooting.
- Working with "real people" (protagonists): always remember that they are usually not actors and often tend to appear stiff and unnatural when filming. Therefore, it is better to let the protagonists do something.”
- “Bernd: All in all, I make less real films but rely on animated films, which has many advantages: you can always use the same protagonists, ..., which has a recognition value; through the anonymity, delicate issues can be addressed (e.g., forms of misconduct at work, etc.).
- In any case, people who make educational films should be familiar with the principles of dramaturgy, e.g., you depict the work of a roofer: possible dangers should be shown in an exciting way.
- Regarding the didactic concept: a common beginner's mistake is "picture-in-picture," which only confuses the viewer. Everything should be kept simple and presented as haptically as possible, e.g.: When talking about a device, this should be clearly visible. Explanations for operating a device must be given step by step - "together" with the viewer, so to speak. One recommendation is to break the learning task down into as small parts as possible and then put it back together again using a well-structured sequence.

Tips on the didactic concept:

²⁷ [gute-lernvideos.pdf \(medienpaedagogik-praxis.de\)](https://www.gute-lernvideos.pdf)

²⁸ Project DigiVET: Documentation of Focus Group Austria, p. 10

- If you want to teach well, the content has to be tailored to the target group and the following things have to be considered: The content should be presented as simply as possible at the beginning and then built up step by step. Not too much and not too little, which is of course difficult. In any case, it is advisable to give practical examples and to present complex issues as simply as possible. These are only a few basic rules of a very complex area.
- The didactic structure should be well planned: a kind of simplified storyboard can help. It is important to play through situations before shooting and get feedback on whether the content is understandable.
- It is advisable to prepare posters that present the learning content well.
- Realistic examples from practice are best understood.
- If protagonists are "busy", a learning video usually looks more authentic."

On competences needed the focus groups advises :

- "Translation knowledge" is in demand: there is the expression "curse of knowledge", which sums up a problem: It is often difficult for highly skilled people to break down knowledge to the essentials, because it is difficult to put themselves in the role of the learner. Often the professional demands on learning films are much too high and therefore it is important to ask again and again how much knowledge is required for which target group.
- Developing problem awareness (e.g. role reversal): We have all made the experience that explanations are not always immediately understandable. You should be aware of this and try to empathize with other people when dealing with new topics. Empathy is required.
- "YouTube" is not a cure-all: without previous knowledge, explanations found there are not always comprehensible and there is also the danger of getting lost in too much knowledge. With the YouTube videos it quickly becomes clear that there are big differences in the "speakers": Only a few manage to start at step zero, intuitively put themselves in the position of the learners and build up a topic step by step."

4.2 Podcasting

Podcasts are first and foremost audio plays, which can be very freely designed in their implementation. Podcasts are usually divided into seasons and episodes, with the season being the main topic, the main story, and the episodes being the individual episodes that are subordinate to the main topic. These can build on each other as episodes or individually treat different aspects of the over-theme.

Not all topics can be dealt with in podcasts, but the medium is very well suited for conveying knowledge for the following reasons:

- podcasts can be listened to independent of time and place (on the train, on the way to work, in bed in the evening)
- the majority of users have their playback device with them: their smartphone or an mp3 player
Hardware such as videos, i.e., a PC with screen or laptop, is not necessary.
- high-quality productions can be realized with little technical effort.
- concentrating on the essentials conveys sound knowledge

The basic decision before producing a podcast is the one about the content. Which learning contents are suitable for treatment in an audio piece, which should be better implemented in a video or otherwise? There are countless podcasts for learning foreign languages, podcasts on history and evolution or tech and science podcasts. Basically, topics that do not need an image can be presented in an entertaining and direct way as learning podcasts.

A further decision in the preparation: who narrates the podcast, who leads the listeners, who presents the content? This is the question about the host, the presenter, and it should be answered seriously and with care, because it is decisive for whether the podcast is heard and what is heard will stick. A podcast cannot consist of simply reading content out loud, the content must be processed and presented.

A manuscript should be prepared before the audio material is recorded. In this manuscript, the moderation parts, the feeds (interviews, archive material, etc.), music inserts and other annotations are recorded in linear order. It forms the basic framework for the recording itself as well as for the post-production. Ideally, a manuscript should look like this:

PODCAST TITLE

EPISODE Number and Title

Author	
Editor	
Production information (Which speakers? Which sounds/music?)	
Summary of the episode	

MUSIC Intro, Titel

MOD Hello and welcome to a new episode of ...Today we are busy ... I met the Doctor ... and asked her ...

OV Interview Doctor... von 1.12 – 2.14

"I believe that the earth was created because"

MOD

MUSIC Break

MOD

MUSIC Break

MOD Thanks for listening and see you next time at....

MUSIC Outro

The structure of a podcast is:

1. Intro with music
2. Introduction
3. Content
4. Goodbye and preview
5. Outro with music

For the production of a podcast (recording), manageable equipment is required. Depending on the content and use, different microphones and different recording devices can be used. Probably the simplest solution with acceptable results is to record with a smartphone and external microphone. There are no limits to the expansion with reporter microphones, stereo microphones or even multi-track recorders, but the more expensive, the more technically complex the recording conditions become.

Overviews and bundle offers can be found on the Internet in large numbers. Even if the technical equipment remains clear, the audio recordings and their quality are of decisive importance for the podcast. Only technically flawless recordings can be further processed and the better the recordings are, the better the finished podcast and the less time is needed for post-production.

There are innumerable audio editing programs and software that vary greatly in their complexity and possibilities. Even the simpler programs require some training, but then they run with acceptable results.

The freeware programs **audacity** of ocean audio are free software that can be used for the simple editing and editing of a podcast. All other programs, such as Protools, Cubase, Logic, etc. are not recommended for beginners due to their complexity.

Podcasts in a VET Learning Environment

A few examples of VET learning related Podcasts are:

<https://nursing.com/podcasts/>

<https://humblemechanic.com/feed/podcast/podcast>

<https://stellaculinary.com/>

4.3 Digital Learning for Learners with Weak Language Skills or Lower Formal Qualifications

Digital media can be a special opportunity for non-traditional learners. Populations become more heterogeneous. This includes learners with migration backgrounds, which often means that the mainstream language in the country is not the native language of the learner, but also includes learners with disabilities, who are more and more integrated in regular working environments. Also in many countries in Europe, the rate of school dropout is high, and so the in-company learning system needs to consider that there are learners with little formal education and lower qualifications. A special group of learners with weak language skills are “functional dyslexics.”²⁹

This, however, implies a number of requirements for the learning system:

- a correct working process must be assured through correct and effective instruction
- arrangements for upskilling and/or initial training must be adapted to the needs of the heterogeneous groups of learners.

Digital media can contribute to both aspects.

Instruction for a Safe and Effective Work Process for Learners with Weaker Mainstream Language Skills

For employees with weaker mainstream language skills visual digital media, i.e., video and pictures. are the ideal instructional tool.

Therefore the rules to follow apply:

Make short video sequences or series of pictures or animations, which can be understood without narration or additional subtitling that clearly SHOW the work process

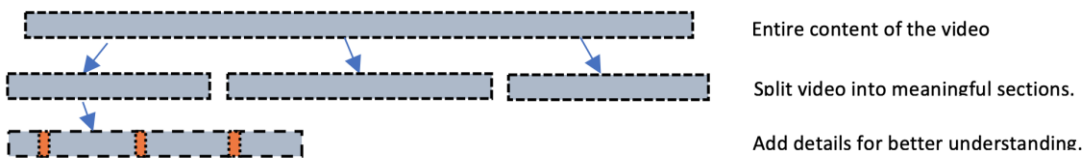
- Clearly point out critical phases in the process or peril points of the process
- Use icons or pictures of the sequence to reference the video
- Use QR codes to direct learners to the video material or otherwise clearly instruct learners which videos to watch

²⁹ In Germany quite spectacular numbers have been reported. It is estimated that about 4.5% of the population is unable to understand even basic written sentences and a further 10% can only understand individual simple sentences, but cannot understand even moderately complex texts. See Nickel, S. (2021): Funktionaler Analphabetismus - Hintergründe eines aktuellen gesellschaftlichen Phänomens. <https://www.bpb.de/apuz/179347/funktionaler-analphabetismus> (retrieved 21.11.2020). See also the OECD survey of adult skills for numbers on individual countries: https://youtu.be/Cot_YgDAsTw

- Make sure that the learner has access to appropriate devices to watch the video or provide these to the learners.
- Make sure that the learner can operate these devices appropriately
- Check the results of the learning, e.g., by supervising the learner implementing the process, in particular in the case of potentially dangerous work processes

Where it can be assured that the learner is proficient in his or her native language (i.e., not functionally illiterate in the native language) subtitling of video sequences can also be used.

Splitting videos: An attempt should be made to divide the content of the video into smaller videos. This allows the content to be elaborated in more detail and still have a length in which the learner can concentrate.

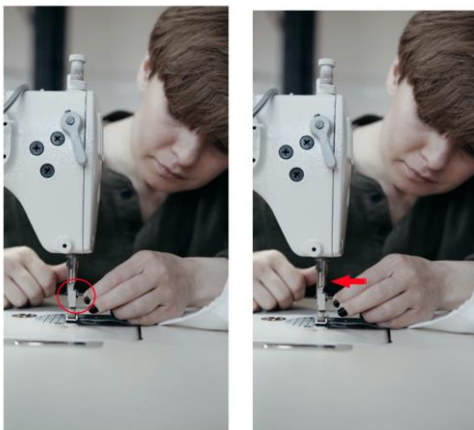


Slowing down details: Processes that are filmed should be played back at normal speed. Afterwards, important details can be played back at lower speed so that the learner can take a closer look at them. Under certain circumstances, animations can be added to clarify the focus.

Adding emphasis: To focus the learner or emphasise on particular details, symbols can be added.

The film can be stopped and circles can be drawn around the important detail. Arrows can be useful to indicate a direction.

International warning symbols can be used to emphasize danger.



Forms and Arrows can point out where to look.



Many warning symbols are international and easy to understand

Testing: Especially important on purely visual videos is the testing. Videos should be tested with people who are not familiar with the topic. That way, misunderstandings can be best clarified.

Instruction for a Safe and Effective Work Process for Learners with Lower Formal Education

In some of the partner countries, like Germany and Austria, the initial vocational training aims at a “holistic work competence,” i.e., the ability of any skilled worker graduating from the dual vocational training system to plan, execute and evaluate complex work processes in their field mostly autonomously.

As learners with lower formal education generally are less used to self-learning, i.e. actively retrieve and organise information and follow up on the learning with a high degree of self organisation and persistence, the following rules apply:

- mirror the complete work process with didactical material, so the learner does not have to identify what is important
- create a good overview of the process
- make short sequences of up to a minute
- use lively and motivating “entertaining” formats
- make sure that there is a motivating transition to the next sequence
- use simple language
- where relevant, produce the material in all languages spoken by the staff, to make sure that all content is understood
- use encouraging forms of learning outcomes assessment, such as gamification elements, but avoid negative feedback, as many of such learners have been discouraged by such negative feedback systems before

Think of the example of airline safety instructions. In the end the flight attendant makes sure that all belts are correctly fastened.

https://youtu.be/ja_cH494z98

Principles of Skill Building for Learners with Weak Mainstream Language Skills

As mentioned, functional illiteracy is a relevant topic. Contrary to foreigners not speaking the language of the country of residence, functional illiteracy is often connected with personal shame.³⁰ The same applies to learning the language for non-native learners.³¹

Some tips on how to be helpful are³²:

- Speak correctly
- Speak slowly and clearly
- Formulate short sentences
- Allow questions
- Avoid dialect
- Include explanatory loops when explaining new facts
- Avoid proverbs and ironic expressions

Principles of Skill Building for Learners with Low Formal Qualification

Digital media can be used for the systematic development of professional competences.³³

Teaching the specific work process is a learning project for the learner³⁴. The learners are motivated to analyse and describe the process that they are supposed to learn as well as possible. The individual steps are:

³⁰ For Germany e.g.: <https://schreiben-lesen-rechnen.vhs-lernportal.de/wws/9.php#/wws/855988.php>
XXXPartners: add corresponding systems

³¹ e.g. for Germany: <https://deutsch.vhs-lernportal.de/wws/9.php#/wws/deutsch.php?9c797a8739297e2fdb18f3830378361>
<https://youtu.be/ql7J-srh6iA>

³² High quality media-based language courses are probably the most well known use of digital media for learning, which courses like the very popular BBC English courses have demonstrated for decades.

<https://www.bbc.co.uk/learningenglish/course/lower-intermediate>; An example of such a learning system has been developed in the Erasmus+ project “TourEng” for learning English in the tourism sector:
<http://www.toureng.eu/> and <https://www.youtube.com/channel/UCr8DYKbeCvvhFPCqxxBCWzw/videos>

³³ There are multiple examples of quite comprehensive systems of digital media that support building such profiles: e.g., for carpentry <https://zimmererzentrum.de/de/online-lernen/>
<https://www.youtube.com/c/ZimmererzentrumBiberach>

There are more than 120 examples of projects on digitalisation in initial training in Germany to be retrieved at <https://www.qualifizierungdigital.de>

³⁴ The project “kfz4Me” has already been mentioned at several places in this handbook as a best practice. In this chapter a few more details about the didactical concept that was used in this project will be described. The general idea of the approach is “learning by teaching.” Only those processes that can be explained clearly by the learner can be considered as “learned.” The proof of learning is an object that can be used by others as learning material, i.e., an animation, video or other digital medium.

1. isolating a specific process from the general work process: the instructor, together with the learner, identifies a specific process that is appropriate for being learned and explained by the learner. This step is the critical step for adapting the difficulty of the learning challenge to the abilities of the learner. Beginners and learners with lower formal qualifications start with very simple and short sequences, while advanced learners are asked to produce material on complex and longer processes. Topics are found in the context of the learning situation and distributed to the learners. Themes can be found in a group through, for example, card enquiry and collection of ideas. The topics are ordered in terms of their complexity and requirements. Then micro-topics are defined until the requirements are such that the double burden of subject mastery and media mastery can be managed. As a rule, films deal with one detail only. In order to be useful as learning material for third parties, the resulting films must be stored in systematic form on a learning portal. This requires quite meticulous facilitation by the instructor.³⁵
2. Scripting: The script is the basis of the following steps audio and video. The learner is asked to develop a very good text on a particular detail. This is intended to develop his or her written language competency. The learner is asked to use short and clear sentences, of usually not more than eight words. The text should be discussed with the peers and instructors. About 600 words will result in one minute of video.
3. Audio: Schäfer advises to focus heavily on a good audio quality. The text should be recorded using a good microphone, preferably in film cutting software.
4. Filming/creating visuals. Only then the audio is being illustrated by pictures, animations or “real” video. Schäfer recommends using pictures or already existing videos first and only later adding the challenge of filming.³⁶

The principles of guiding beginner learners are:

- match learner and challenge
- assess not only the end result, but each step to keep up motivation
- start with short sequences and details and gradually expand the topic and the challenge of media production
- start with much supervision and support and then expand the autonomy of the learner

Right from the beginning the media projects should consider the accessibility of the media for learners with handicaps:

Perceptibility: Good contrast, simple backgrounds, large font sizes help. Attention should be paid to high-resolution rendering so that details of the visuals also can be seen.

Usability: The medium must be controllable by the viewer, speed, stops and volume, etc., must be controllable for the user on all expected players.

Understandable: The text should be well prepared and appropriate for the users. Logical, short sentences, appropriate language level according to the expected users (which can also mean no speech at all!).

³⁵ cf. Schäfer, p.50 ff.

³⁶ cf. Schäfer p. 55f.

The medium should also be “robust” i.e., playable on the players used by the expected users, e.g. using MP4 as standard.³⁷

The impact on the learner, not the (potential) end user is key here. Therefore also multiple videos on the same topic can be produced, which would be wasteful in other contexts.³⁸

4.4 Learning Management Systems

While the focus of this handbook is the understanding and strategic planning of the use of digital media, LMS are being used to organise such media and to make them accessible to users. Also the project DigVET uses such a LMS. Learning Management Systems (LMS) are software applications which help to organise educational resources and training programs. The purpose of a LMS is to deliver and track learning processes in one place and should be a tool for self-organized learning. The structure of a LMS depends on the organization’s objectives, but the LMS should simplify the process.

It should include the following basic **functionalities**:

- course registration and delivery
- managing users, courses, roles and generating reports
- creating and administering courses and upload learning content
- designing performance-based tasks and tests (e.g., skills tracking, calendar)
- tracking and analyzing learner’s data (e.g., training history, performance)
- offering social learning and different communication channels (e.g., video conference, instant chat, forum)

No LMS suits every organization’s needs. Basically, you consider the following types.

Installed LMS are directly installed on the company's server and need to be in-house maintenance. In comparison, **cloud-based LMS** is hosted on the supplier’s server and software is offered as a service (SaaS).

The cloud-based solution is better accessible, faster deployed, scaleable, easier to maintain and often less expensive.

Free or open source LMS are often helpful for small organizations with a tight budget.

However, the legal conditions are more difficult, so it cannot be recommended for bigger companies.

Obviously, it is also possible to develop an individual **software** which allows a total customization but the costs are often unrateable.

The **software selection processes** should include the following questions:

³⁷ cf. Schäfer p. 124 ff.

³⁸ cf. Schäfer, p. 45

- How intuitive is the user interface? Does the learner feel confident? How does it look and feel? How can the software be personalized for a better user experience? What is mobile learning? What is gamification? How is social learning?
- Is it possible to integrate data from other databases (e.g., talent management, HR administration, collaboration software, wiki)? How can data be migrated?
- How is the usage of content management? Is it easy to organize online training resources into a meaningful learning path? How flexible are the assessment options? How easy, multilingual and customizable is the LMS? Which are the reports?
- How is the technical support? What is the capacity of the data storage? How is safety and regulatory compliance? How is the cost structure (e.g., one-time charges, running costs)?

LMS usually show different **roles with specific responsibilities**:

- **administrator**: controls the LMS, updating, grants user access, notifications
- **trainer/instructor**: uploading courses, making learning content available, review course interest lists, schedule class offerings, plans and carries out training sessions, notifications
- **manager**: view team details and performance, request or recommend training program for team, manage approval and escalations
- **learner**: login, complete training, consume learning materials, complete assignments, create basic account details (e.g. time zone, password), track learning process, participate (e.g. forum, survey)
- **guest**: consumes public trainings

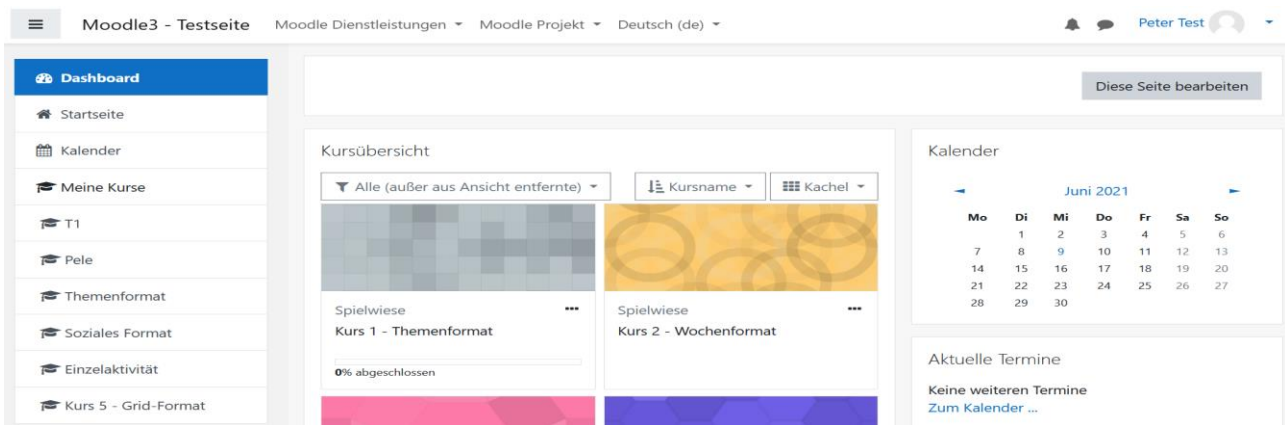
LMS is primarily designed to pass, share and track the learning content, while the modern **learning experience platform (LXP)** is used for curating and aggregating learning content to create a more personalized learning experience (e.g., content collaboration, knowledge sharing).

Learning Management System Examples:

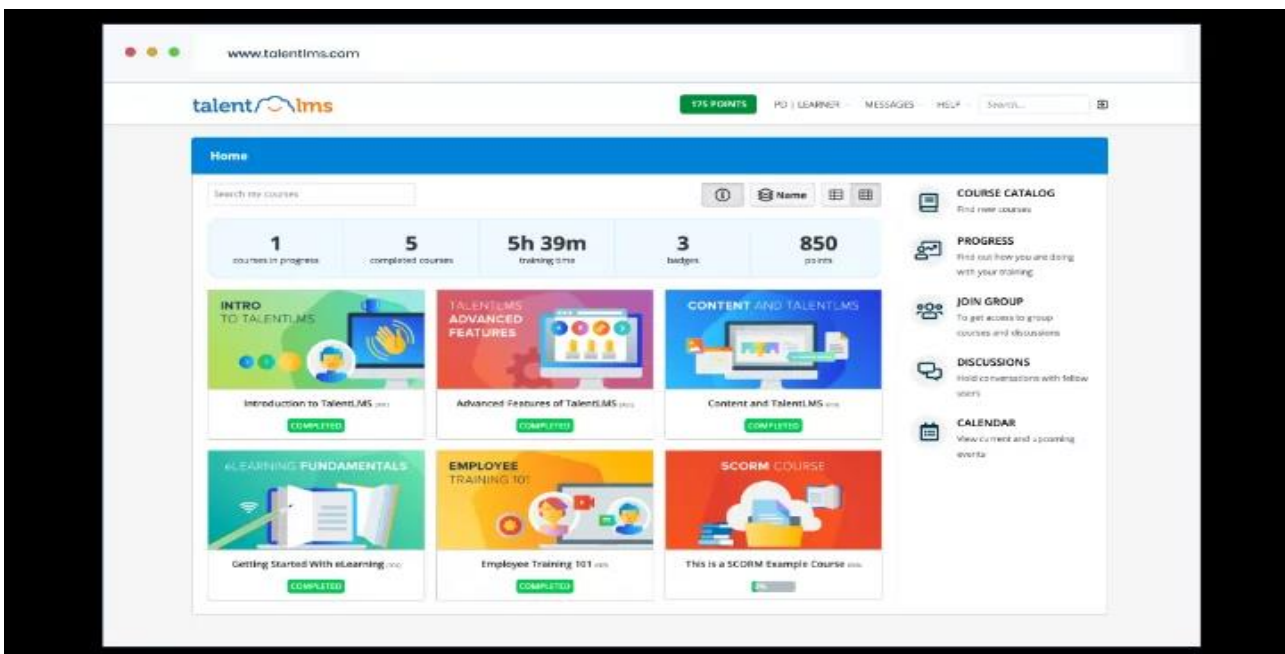
Moodle is a free LMS which offers a standard set of features up to 50 users.

Moodle has a social learning functionality that allows learners and instructors to send direct messages to each other on course forums.

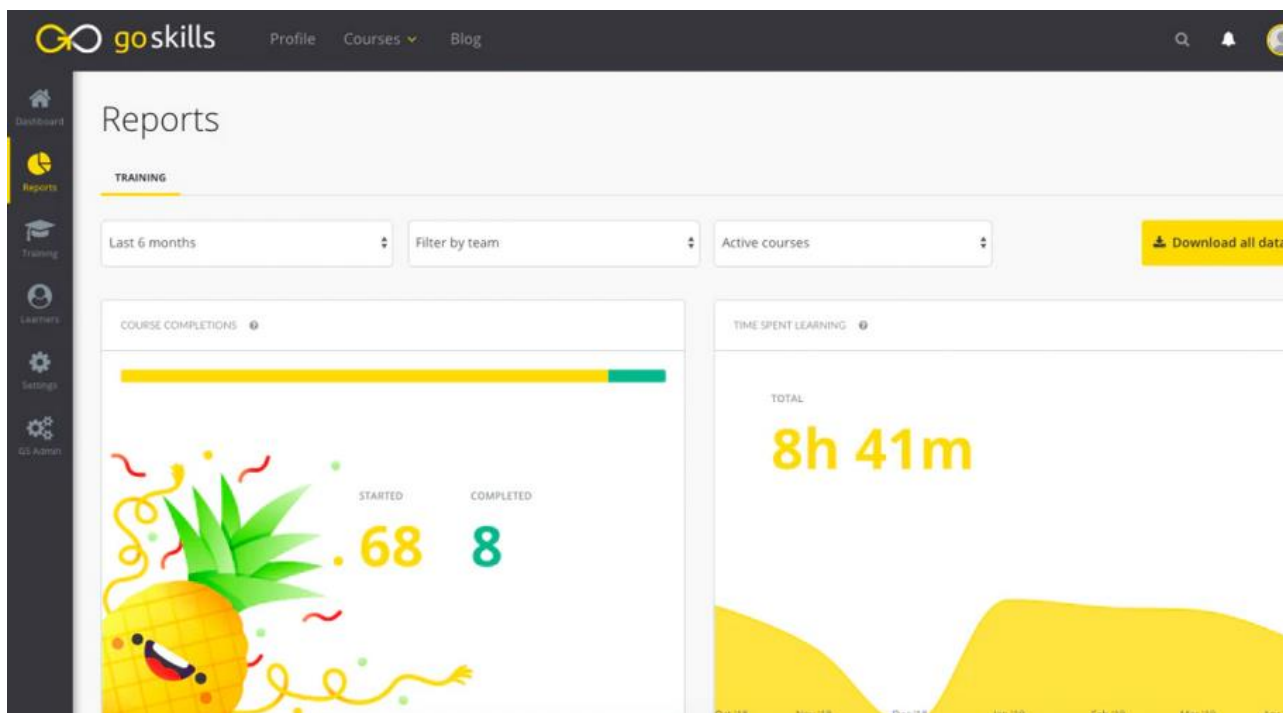
Moreover, it is mobile-friendly and has a high reach: <https://moodle.de/>



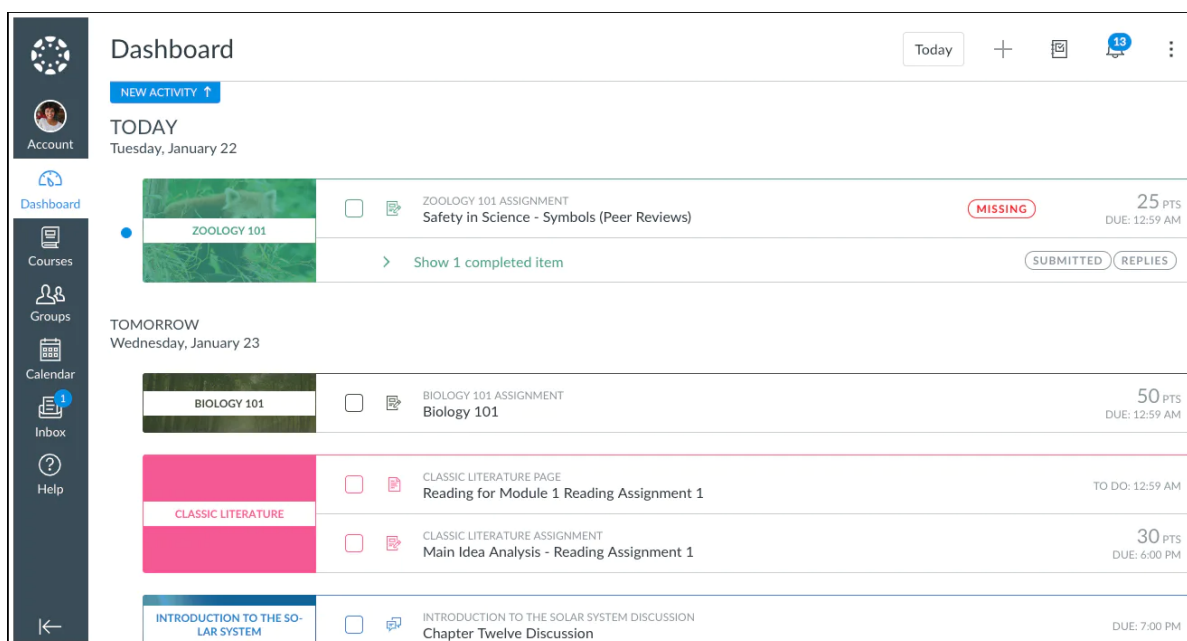
TalentLMS is an open-source LMS for businesses of all sizes. One unique aspect is that TalentLMS offers tailor-made solutions for specific industries, such as manufacturing, automotive, food and beverage: <https://www.talentlms.com/platform>



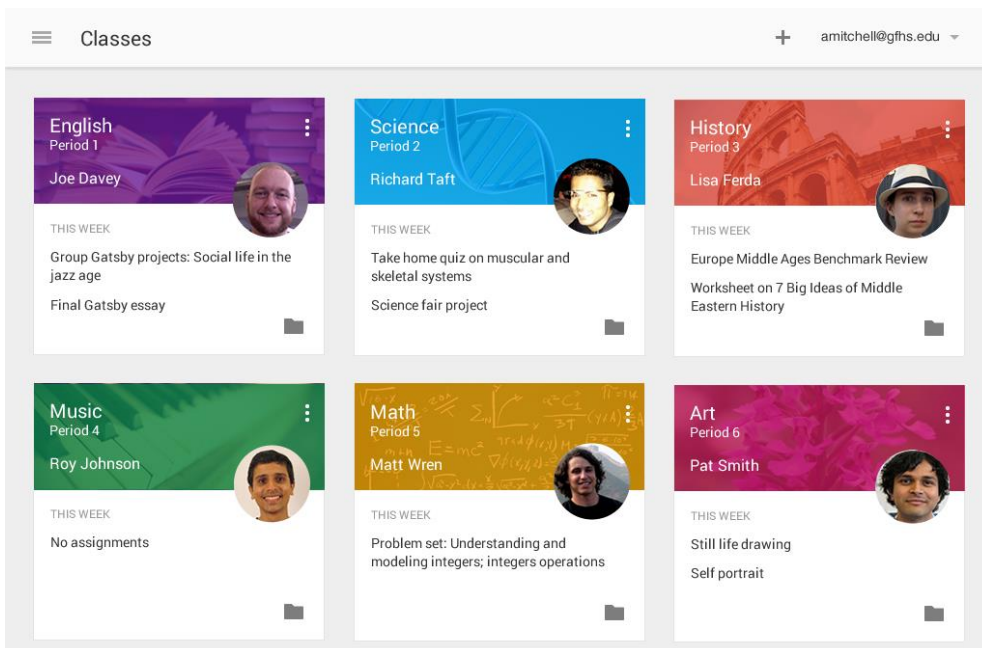
GoSkills is a cloud-based LMS for teams of any size. The basic functions are free and can be upgraded for 29 EUR per learner per month: <https://www.goskills.com/>



Canvas is an open-source and cloud-based software that is designed to empower trainers and learners by making an engaging learning environment available. It is a learning object repository where trainers can use quizzes and create discussions: <https://www.instructure.com/de/canvas>



Google Classroom is a free tool which helps trainers to manage and assess the learning progress, while enhancing connections with learners from school, from home or on the go: <https://classroom.google.com/u/0/h>



4.5 Virtual Environments and Enterprise Social Network (ESN)

Typical examples for virtual environments which can also be part of the LMS or might be integrated asynchronous communication:

- mailing list (e.g., MailChimp) or micro-blogging (e.g., Twitter)
- email (e.g., GoogleMail, MS Outlook)
- discussion forum (e.g., Vanilla Forums, vBulletin)
- blogging (e.g., WordPress, Joomla)
- wiki (e.g., XWiki, DokuWiki, MediaWiki)
- recorded lectures or web-based Training (WBT) (e.g., Loom, Quicktime)
- document and file sharing (e.g., OneDrive, GoogleDrive, Dropbox)
- collaboration tools (e.g., Trello, Asana)

synchronic communication:

- instant messaging and chat (e.g., Whatsapp, MS Teams, Slack)
- live webcasting (e.g., YouTube, Switcher, OBS Studio)
- audio conference (e.g., Spike, OpenVoice)
- video conferences (e.g., Zoom, BigBlueButton, MS Teams, Skype)
- shared whiteboard (e.g., Mural, Miro, MS Whiteboard)

Another important term in this context is “Enterprise Social Network” (ESN). ESN is a communication platform or social network for organizations. Every employee has his or her own user account where he or she can find the company’s news and information (e.g., organigram, contact person, blog, wiki), communication channels (e.g., chat) as well as learning material. Often ESN also includes collaborative

features (e.g., project management, calendars). In comparison to a LMS a ESN is a strategic instrument for employee retention and engagement because it allows employees to connect with each other and build their own learning network.³⁹

³⁹Rossmann, A.; Stei, G.; Besch, M. (2016): *Enterprise Social Networks – Erfolgsfaktoren für die Einführung und Nutzung – Grundlagen, Praxislösungen, Fallbeispiele*. Wiesbaden: Gabler. Leist, S. (2021): *Social Media Leitfaden: Sicher unterwegs in den sozialen Medien*. Kurs der virtuellen Hochschule Bayern (open vhb).

5. References to Selected Good Practices

As a result of in company practice (which is rarely documented and published for the general public) and funded development projects, there are numerous good practices of using digital media in VET.

The DigiVET IO 1 reports each include a selection of good practices from each partner country⁴⁰.

Kfz4me (Project-orientated Teaching and Learning with YouTube): Kfz4me is about the creation and use of explainer videos for the development of media, language and subject competence. In Kfz4me, trainees work on technical tasks, create technical texts and develop an MP4 film that can be accessed on the Internet under a free license and is thus available for reuse scenarios - in "flipped classroom" mode. Kfz4me integrates digital media into the training process in such a way that trainees develop their factual competence and deal with questions of media use and media design.
<https://www.youtube.com/channel/UClo9Imq-pW6oRNtz6fJje1w>

KEAP (Competence Development at the Production Workplace): KEAP is about company experts who develop digital learning units for learning processes at the production workplace. KeaP uses an IT-supported teaching-learning structure to prepare and digitize learning processes at the production workplace in a process-oriented manner. Experienced specialists explicitly capture implicit knowledge about work processes in digitally configured learning units for colleagues.
<https://blog.multimedia-communications.net/portfolio-item/keap-digital/>

Melinda (Media-supported Learning and Innovation in Craft Work): In the Melinda project, a "virtual classroom" was therefore set up as a closed platform that trainers and trainees can access with smartphones, tablets or computers. Among other things, young people can make short films during inter-company training at the vocational training center to document their own solution steps for practical tasks. The films are viewed and approved by trainers and then uploaded to the LMS, to which the trainees have access. Supplemented by information and work assignments, this creates a learning archive for the respective training year. The digital learning platform and the media they create themselves give trainees additional access to the content of their training and enrich the learning environment. The exchange within the class and with the instructors is made much easier, regardless of time and place.
<https://www.komzet-netzwerk-bau.de/projekte/melinda/>

VIA4all (Video Interactive and Augmented - Work Process orientated Lifelong Learning): VIA4all offers an e-learning platform that shares videos of work processes. The video recordings are made with the aid of an eye tracker worn by experienced employees on the one hand and novices on the other during a work process. By analyzing the eye movements recorded with the eye tracker, difficult work processes requiring special attention can be identified. Special attention will be paid to these processes when editing and enriching the videos. The videos are embedded in a LMS that supports collaborative learning processes.
<http://www.via4all.de/>

⁴⁰ For the case of Germany, as an example, we point to a few, which we found to be interesting and at the same time well documented. Also users not proficient in German language today will generally be able to access the main content and ideas using web browsers with automatic translation functionality as Google Chrome and/or machine.

PriME (Professional Reflective Mobile Personal Learning Environments): PRiME aims to create a mobile information and training system for mobile employees in operational use (e.g., service technicians) that can be individually assessed and designed. This digital media-based learning and knowledge management system and the corresponding applications for mobile devices are intended to improve self-directed learning at the workplace and provide immediate assistance in the work process. Acquired knowledge is to be documented by means of videos, images and texts and made available to other employees. In this way, a continuous increase in experience among employees is to be ensured, which is needed in the respective work context.

<http://prime.rwth-aachen.de/>

DIA (Digitalisation, Inclusion and Work - New ways of vocational training in the hotel and catering industry): Learning content is made accessible via mobile devices in both workplace-integrated (informal) and institutional (formal) learning with digital media and thus made available to more people, including those with impairments. In this way, the shortage of skilled workers in the hotel and catering industry is decisively countered.

<https://www.dia-online.de/>

6. Final Remarks on Guiding the Use of Digital Media

This framework has been based on the experiences of the German Ministry of Research project “CoDiClust” as well as contributions from partners in the scope of the initial research of this project. The initial draft has been expanded and revised based on the feedback from the partners, in particular the discussion and feedback within a training session of all partners, which has been implemented online over 5 weeks in winter 2020.