# IO 2 Handbook for Coaches of Digital Learning in SMEs

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Authors:

Alexander Krauss, Dr. Alice Buzdugan, Rebecca Weidenhiller, Cornelia Merl, Lina Poessenecker, Stephanie Reiner
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ISOB — Institut für sozialwissenschaftliche Beratung GmbH

Geschäftsführer: Alexander Krauss

Amtsgericht Regensburg HRB 9137

Hauptsitz: Adolf-Schmetzer-Str. 32, D-93055 Regensburg

Tel.: 0049-941-46562680

Contact: krauss@isob-regensburg.net





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# 1 Introduction

The objective of this handbook is to inform future coaches and continuing support agents for the workplace or work-based learning as well as VET trainers in training centres 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 and 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 education 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 organisational development (OD) within SMEs. While only on rare occasions will it be possible in this project's scope 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 describing 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 essential tools for digital learning. These are videos, particularly 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. In addition, a learning platform will be developed, presenting supplementary material more flexibly and adaptively. 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.



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# 2 Coaching Small SMEs for Work-Based Learning

This chapter gives the rationale for the value of work-based learning (WBL). When we talk about the importance of digital media for web-based learning, it is assumed that owners, management and also employees see the value of learning in the workplace.

Why should they bother to think about the effectiveness of WBL if they do not see its overall value? Therefore, the following paragraphs will aid the coaches in presenting some arguments to partners in business on the why and how of WBL in general. Arguments for the use of digital media for WBL follow.

## 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 organisations."

The learning of individuals in the company but also of teams and the organisation 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:

- Customer demands determine the market: One of the trends for SMEs is that they develop from the repetitive production of ever similar products to providers of complete solutions for customers, including the analysis of customer demands, construction to customer needs, installation, and maintenance. 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.
- This has substantial implications for the work process: although classical routine work still plays a particular role, more demanding duties and tasks have become more prevalent. Often responsibilities cover a more comprehensive range of the production process, including the steering and monitoring of the production process. The effective design of the production process, therefore, becomes the focal theme for SMEs. Furthermore, flexible and smooth team-working and working in projects have become critical for work organisation.
- Changing technologies: While as late as in the 1980s, production and its productivity were 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.



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The best-known examples are the new opportunities of the networked economy. 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. Consequently, 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 reorganised 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 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.

Globalisation 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.

Last but not least, companies and societies in many countries face different demographic challenges. While some of the "old" industrial societies have faced a falling birth-rate and consequently a workforce that will be older on average, other countries are faced with a high level of migration into or out of their labour markets. As a result, SMEs face phenomena like not finding enough trainees, the right trainees, enough skilled applicants for jobs and having applicants or employees with a high need to adapt their skills and competencies.

Companies need to provide guidance and opportunity to adapt to the described megatrends of economic development. Because in the environment described above, the initial education in school and initial training can only be a start into a long work-life, the real opportunities of learning over the life will depend on the degree of learning opportunities companies provide and how they are delivered.



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Traditionally, in the slower economy of the past, companies used to rely on recruits from the initial training system for introducing new competencies to the company. The rest was cared for by day-to-day informal learning, one worker showing the other the trade tricks.

This is no longer enough. The vast majority of staff required to manage the disruptive trends described above is already working. So it is mainly the current staff who will be the learners in the learning organisation.

Organised, external, classroom-style further training has its place. Still, it has never really taken off, as relatively low participation rates, particularly those at the lower end of the qualification scale, demonstrate.

Obviously, the cost is too high: the difficulty in replacing employees on external training and the gap between general content learned and the actual workplace-situation needs prevent higher participation rates.

Also, relying on recruits from the labour market is a very tricky thing. It used to be easy when the jobs were easy and repetitive in the production and the service industry. Now, with more complex work processes, more complex technology, and reliance on smooth teamwork, the introduction time is much longer, and the costs are much higher.

Also, informal learning, still a backbone of in-company learning, has its limitations when a complex and interrelated work process has to be learned. In addition, the quality of the learning content is in question when it relies on each individual's own ideas of how things should best be done.

**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. Moreover, 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.**



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Since employees spend most of their lives at work, their well-being depends on their opportunities at work. This is particularly true for employees who have a low formal educational attainment because they are from a background of a family with fewer opportunities, which may never be had the chance to study or follow a long course of formal education, be it that they are from a migrant background with weaker language competencies and adaptation or matching problems concerning the fit between their education and experience and the requirements of workplaces in modern industry and services.

In particular, for these groups, SME learning systems must find learning opportunities. Those companies that do so will tap on a vast pool of talent, often overlooked and neglected by other companies.

## 2.2 Changing Theories and Approaches for Learning

"One of the most persuasive factors is the shrinking half-life of knowledge. The 'half-life of knowledge' is the period from when knowledge is gained to when it becomes obsolete.

Half of what is known today was not known ten years ago. The amount of knowledge in the world has doubled in the past ten 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, organisations 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. However, formal education no longer comprises the majority of our learning. Instead, learning now occurs in various ways – through communities of practice, personal networks, and the completion of work-related tasks.
- 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 to define and shape our thinking.
- The organisation and the individual are both learning organisms. Increased attention to knowledge management highlights the need for a theory that attempts to explain the link between individual and organisational learning.
- 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)



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## 2.3 Methodologies of Workplace Learning

This paragraph gives some background information on some of the essential general methodologies of workplace learning.[1]

Understanding the rationale of these methodologies is a prerequisite of including digital media in the learning setup for different groups.

This information intends to support the coach in their dialogue with the partners from the companies. The selection of the learning methods must be closely linked to the learning objectives and the learning content (see the section on roadmapping).

The learning objectives include the technical issues and the so-called vital competencies or soft skills related to changing attitudes and the personnel development of the learners.

Most of the time, the methodologies mentioned here will not be implemented by the companies. Still, they will instead be an inspiration in finding tailor-made, individual learning strategies for the company and are primarily used in a generic setup. A systematic reflection of this setup is one service of coaches and trainers when starting a dialogue with the companies.

Traditional methods 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

Decentralised 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

[1] An abundance of detailed information on planning and implementing WBL can be found, e.g. at https://www.wbl-toolkit.eu/index.php?id=3.



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– Self-qualification at the workplace with self-learning media
– E-learning with internet resources

### 2.3.1 Traditional Methods in the Company

These are primarily used in initial vocational training, [2]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 they do 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: implementation of the task by the learner
– Practice: practising 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.

**Traditional Methods and Digital Media**

All of these methods **can be supported by digital media.**

a) when learning a task, the learner can observe and take notes, e.g., using audio messages, making a video of the work process on a smartphone, using the smartphone to look up information about the task on the internet, looking for related instructional videos on YouTube, etc.

The work process, i.e., what the senior worker does, can be recorded straightforwardly and without much editing. Even in its "primitive" form, the execution of the task is followed not

[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



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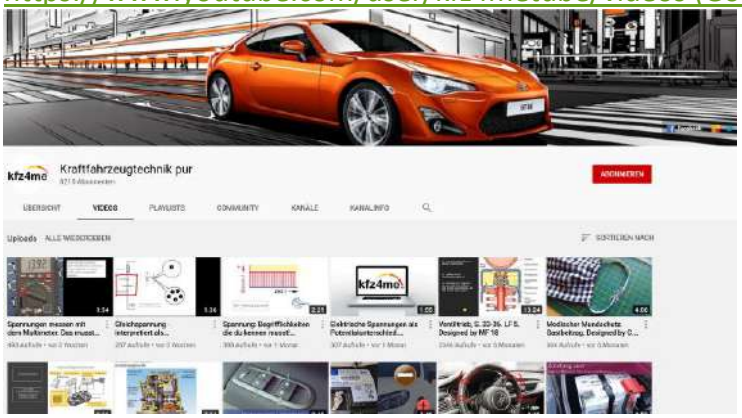
just once or twice but an unlimited number of times. Some hints on how to make such videos can be found in chapter 4.1

b) The same applies to "four-step instruction." As the instruction is given in a more systematic and prepared way, the senior worker will make sure to demonstrate the process in an intelligible and easy-to-follow way, e.g. slower than customarily performed. This is good for recording and sharing the recording. (see chapter 4.1 for technical guidance on how to film good videos). As the task is demonstrated and documented in a "correct" way, such videos can already be shared with more than one learner and – when organised in a portfolio of instructional videos – considerably increase the effectiveness of instruction. Learners can already study the videos of processes they are about to learn beforehand, so the interaction with the instructor already starts at step b).

c) Analytic instruction: the same as in b) applies to c). Usually, the amount of preparation, scripting, and work put into producing the video (or animation, graphic instruction, etc.) are higher as the material is intended to be reused.

Some examples of such learning videos can be seen at:
https://www.youtube.com/user/kfz4metube/videos (Good Practice Germany No. XXX)




Ill.: Screenshot Kfz4me YouTube Channel

### 2.3.2 Action Learning in the Company

Action-oriented learning methods in a company context aim to promote the learner's autonomy and self-activity.

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.



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In Germany, these needs have been synthesised in the framework concept of "**holistic professional proficiency",**[3] which means that the aim of the training of the worker in their **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
- **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

To develop this competence, the training methodologies have to reflect this desired outcome, i.e., challenge the learner to establish professional self-responsibility.[4]

Methodologies to develop these competencies include:

a) Project Method

The project method is widely used, sometimes even unconsciously, because it is regarded as team problem solving rather than team learning. A task or a problem from the actual working practice is analysed and solved by a project team.

As a learning method, a project is sometimes set up that simulates a problem similar to one that might come up in the actual work process. When used as a learning method, the setup of the process will emphasise a thorough analysis of the problem and the solution, as well as the documentation of the process and the identification of general lessons learned from the project. Examples are the assignment of a sufficiently complex task, e.g., "build a model steam machine," or "plan and execute a promotion campaign for the opening of our new department store."

b) Guiding Scripts Method

This method aims to orient the self-learning process, which predominantly happens in the project learning method. Its focus is the development of tools and instruments which can

[3] https://aevo-lernkartei.de/modell-der-vollstaendigen-handlung

[4] The discussion on "action learning" in the US context points at the fact that such competencies are not only being developed in the individual but are from the very start situated in a group context of work. Therefore, workplace learning must be conceptualised as an interplay of personnel and organisational development from the beginning. 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--snFiYLmGIrXNeO



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support the self-learning process. Guiding questions are the leading way to inspire self-learning.

A guiding script usually consists of guiding questions, a working plan, an evaluation worksheet, and a guiding headnote.[5] As this method has been criticised for being too direct and not supporting the self-responsibility of the learner, further development has been placing the assignments right into the work process. This is the crucial point of the following methodology.

c) Learn and Working Assignments Method

Instruction is not organised by individual tasks or systematic subjects but refers to the actual integrated workflow or business process. For example, a learning assignment would not be limited to learning certain aspects of bookkeeping, making a good or service, or selling a service. Still, it would comprise all aspects of a business process from the order by the customer until the delivery of the service and the follow up (business process-oriented instruction). The individual skills and competencies are checked off in the instruction flow until the desired portfolio of competencies is achieved.[6]

While the method is only rarely used in pure form, as the preparation of assignments can be quite an effort, particularly for small companies, today's guiding ideas are the backbone of the didactics of dual system apprenticeships in Germany. The work process is broken down to areas of specific competencies within the particular company, and the apprentices check off each area during their apprenticeship.

d) Learning Islands

Large companies essentially developed this method (e.g., Daimler Truck Division Gaggenau) to adapt the initial vocational training within the dual system (German apprenticeship system) to the new forms of production. The general idea of the concept can also be used for learning in SMEs. The concept of the learning island is based on setting up a selected production process in particular workplaces - island workplaces) outside of the normal production process. In these workplaces, the trainees/employees perform their tasks under the supervision of trainers according to previously established pedagogical and didactic criteria. Trainees work in actual work pieces with increased support and other resources (didactisation 1 of the workplace). This enables novices to do the job with minimum supervision. The

[5] Höpfner, H.: Leittexte – ein Weg zu selbständigen Lernen. Wichtige Fragen und ihre Diskussionen zur Einführung in den neuen Bundesländern. Ergänzende Teilnehmerunterlagen. Herausgeber: Bundesinstitut für Berufsbildung, Der Generalsekretär, Berlin, 1991

[6] BIBB (Hrsg.): Großmann, N.; Krogoll, T.; Meister, V.; Demuth, B. (2005): Ausbilden mit Lernaufgaben Band 1 - 3 Lernaufgaben erstellen, Konstanz, 2005



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competency to do the job gradually increases until the adequate competency level for taking a position in the regular workplace is achieved.

**Action Learning Methods and Digital Learning**

Obviously, all of these methods profit a lot from **using digital media**. We focus on the project method and on learning islands.

In the project method, digital media can be used to inform, plan, document, and holistically evaluate the project:

- For informing about the task, the learners will have to show media competency in retrieving the correct 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 SLACK[7] 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.
- Documenting each step, e.g., on video, helps to present the work process and show its outcomes to those present and a wider audience.

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

The project Kfz4me is an often-quoted example. Here apprentices in-car mechatronics have produced a comprehensive portfolio of typical car repair and maintenance tasks.

The production of the videos requires that the learner fully understands the process itself, its essential elements, how to show and demonstrate these. It requires the media competencies to produce and upload the material.

Usually, it also requires collaboration in a workgroup. Last but not least, the result, the training video, can be used in real life for the training of other workers.

In the case of the benchmark project Kfz4me, the project decided to have its own YouTube channel, where the videos are already viewed by hundreds of other learners, many of them

[7] https://slack.com DigiVET: tools for digital learning media (padlet.com)



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sharing comments and suggestions. Reportedly this vastly increased the confidence and motivation of the learners.[8]

Another example of using digital media in initial training guided by the idea of the holistic work process is the project KOLA, of which more information can be found at: http://www.httc.de/index.php?id=711

https://www.youtube.com/watch?v=O1oYUbKPa1M

A modern-day version of "learning islands" has been developed by the project "KEAP" (http://keap.digital/index.php?id=861). Here the project made a point of comprehensively "didactising" (making learnable) the work process at workplaces in the production industry. Each step is supported by media, videos, audio, interviews with experienced workers, graphics, linked text, video, and animations.

An even more similar example are technologies using virtual or embedded reality: https://www.social-augmented-learning.de/.

Video: https://www.social-augmented-learning.de/videos/) allows for practising work processes that are too complex, less obvious, or high risk in virtual reality until the task is mastered virtually. Then the learner can gradually transfer to the actual work process.

### 2.3.3 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 significant learning results, but whose aim is primarily problem solving, process innovation and improvement and/or the collective learning in the group.

a) Quality Circles

Quality Circles (jap. Jishu Kanri) are in-company workgroups. The aim is to utilise the knowledge and experience of employees for improving processes. This usually also improves the competencies of the employees as well as the working climate. Quality circles typically consist of three to ten employees who meet every two or three weeks for one to two hours, often facilitated by a colleague trained as a facilitator. The QC analyses problems of their field of work, often using creativity and problem-solving methodologies. The QC is also responsible

[8] Schäfer, M. (2020): Lehren und Lernen mit digitalen Medien und Technologien. Ein Lehrbuch für die Organisation der Lehre in der digitalen Welt. Leverkusen: Verlag Barbara Budrich



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for implementing and monitoring the solutions identified. Sometimes employees from different hierarchical positions are involved. [9]

b) Learnshop

"Learnshop" (LS) is a methodology used by German companies (e.g., BMW, Hoechst) that had to cope with integrating a high number of migrant workers with often minimal formal education. The term refers to "learning in the workshop." Learnshops also proved to be attractive for German workers in general. The groups meet about once a week for one to two hours. Topics involve broad themes like the general structure of the company, language training, cultural issues, technical skills, quality issues, etc. The starting points of learning in the groups are the problems of the individual participants in contrast to a fixed curriculum. If solutions and answers cannot be found within the group, experts can be asked. Often master artisans or engineers, or managers of the company are invited. Although bigger companies have developed LS concepts, the concept is suitable also for SMEs with a need for regular learning. Its main advantage is that the training needs of the participants steer the content of learning.

d) Job Rotation or Hospitation (Job Shadowing)

Job rotation (JR) programs organise the rotation of individual employees through the different workplaces to achieve more flexibility inside the company by making employees multifunctional to a certain degree and by developing a general understanding of the workflow. While JR aims at acquiring the skill to do the work, shadowing is present at the other workplace, including shadowing the worker there. It will result in an understanding of the tasks and duties of the position.

In the case of continuing vocational training, JR and hospitation help strengthen cooperation and teamwork because it allows each worker or employee to know more about the tasks and expectations of other employees and departments. This helps prevent frictions at interfaces between different functional units (e.g., production vs customer service). In addition, exploration of other areas of work is often supported by a list of guiding questions.

### Decentralised 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 [10].

[9] https://www.inc.com/encyclopedia/quality-circles.html; Deppe, J. (1992): Quality Circle und Lernstatt – ein integrativer Ansatz

[10] trello.com; basecamp.com, slack.com



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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. Electronic whiteboards make it easier to store and retrieve the visualisation of the group discussion. In addition, sessions can be broadcast 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

Learnshops can use all kinds of digital media. In particular, the learning material can be tailor-made for certain groups of learners and easily shared and reused on a broader scale. In addition, teaching materials can be more easily simplified and visualised than printed fabric but are produced to higher standards and more general quality principles compared to, e.g. worksheets created by the individual teacher or trainer.

Using a learning management system (LMS), such as Moodle, is excellent to organise such material. This will introduce the learners to expand their digital skills at the same time. In addition, material like videos, which have been discussed at several places in this handbook, can be included in the LMS as well, and the participants of the learnshop can be involved in producing their own content.

b) Job Rotation or Work Shadowing

This methodology can be made more potent by using digital media. For example, if all or most jobs are documented by video, the rotating worker can prepare for the rotation by watching the video several times. Therefore, the time with the current work can be used more effectively to discuss specific questions, exchange experiences and practice. The same is true for work shadowing. Digital media like blog entries and audio or video interviews with the job holder can focus the attention, make the experience sharable and enhance the systematic analysis of the respective job. In addition to learning about the job, this will strengthen the media competence of the trainee.

### 2.3.4 Self-Learning at the Workplace

This general term refers to all activities of an individual employee to learn their tasks and duties and expand skills and knowledge. Self-learning at the workplace requires a good design of the work, such as some latitude in the disposal of the time, and resources like media, guidelines on expected results, availability of feedback from superiors and colleagues.

Usually, it is helpful to define learning targets and set up a plan for the learning process. It can also be beneficial to reflect with a partner experienced in expertise about the issues dealt with, insights, and lessons learned. This will help the learning individual to appreciate his own progress. The use of learning methodologies and media can be entirely determined by the learners' learning styles and preferences.



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**Individual Vocational Training Integrated at the Workplace (Use of Methods Based on New Technologies)**

**E-Learning** allows for the representation of complex issues with the help of multimedia (audio, video, animation). Depending on the degree of interactivity, simulation systems can be differentiated from tutorial systems and presentation systems. The isolation of the learner can be overcome in different forms of web-based training, sometimes supported by a “tele-tutor” or “virtual facilitator.”

Nowadays, the most widely used form of E-learning 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,[11] allowing easy management and joint interactive development of learning content.

With this easy-to-use open-source solution, e-learning has become accessible for smaller companies reluctant to use tailor-made commercial e-learning systems due to their high cost and that had no use for standard programs, which were often not only too general in content but also of poor quality.

## 2.4 Integrating Working and Learning: Informal Learning at the Workplace - Individual Learning Environments – General Considerations

While many of the methodologies mentioned above are widely used in SMEs, experts like Jay Cross[12] and John Seely Brown claim that 80% of the learning in companies is informal. Informal elements are the essential part of the mentioned methodologies as well, as learners are, in the end, humans. So the actual learning depends on their interest and motivation and their attitude to be proactive and interested in their job. This means they are simultaneously learners, always keen to expand their professional knowledge and personal mastery, but they are also sources of knowledge for their co-workers. This is how employees and their co-workers on different stages of the hierarchy can form "learning communities," as they are a learning environment for each other.

The discussion on learning environments for informal learning has often become almost identical with the debate about fancy Web 2.0 applications, Wikis, Blogs, Moodle, and the

[11] https://moodle.org/?lang=en

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[12]http://theelearningcoach.com/elearning2-0/informal-learning-an-interview-with-jay-cross/

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



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like.[13] The success of Web 2.0 as a unique learning environment is unquestionable. The exploding number of users proves the fact.

But what about the situation at work? How would a personal learning environment look like here, where most people spend the most significant share of their lifetimes?

How can the workplace be a learning environment, and how can digital media and Web 2.0 applications be a part of this environment?

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 attainment.

What we found is that learning at the workplace cannot be taken for granted. There is still a degree of informal learning after the high-quality initial training in the dual system that Germany is known for and rightfully proud of. Still, only rarely can one find systematic and significant efforts to create a learning environment that will support the development of productivity and the individual's own development in the sense of lifelong learning.

This is true specifically for SMEs, which are the most crucial part of the German industry.

When we try to summarise our experience[14] in trying to change this situation by answering the question "how can we create productive personal learning environments?" there are nine lessons we learned, which have guided us in designing more concrete guidance in making plans for setting up learning systems that use digital media:

– Make people talk about what they did not talk about before
– Create a safe environment

[13] The paragraphs to follow are based on the author's talk at the "Creative Learning" Conference, Lisbon 2009, Krauß, A. (2009): Collegas Como Ambiente Pessoal De Apprendizagem; Colleagues as a Personal Learning Environment. In: Rodrigues, N.; Caiado, H.; Costa, E.: Creative Learning Innovation Marketplace - Matching New Business and New Learning. Lisbon 2010, p. 34-38 (pt) p. 150-154 (en)

[14] 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).



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- Workers are experts
- Discover, structure, focus, plan, act, review
- Write down, record, draw, shoot lessons learned
- Cultivate the communities and resources resulting from this
- Individual learning pathways through this learning environment
- Rule of thumb: 5 learning partners, 5% of working time is learning time
- Start and spread

We will discuss each of these principles in a few sentences.

a) Talk

Usually, workers are "doers", not "talkers": "Work, don't talk!" Men here are proud of not talking much or, according to a German saying: "One man, one word!"

When it comes to exchanging experiential knowledge, improving work processes, and introducing newcomers to the trade tricks, this is a limitation.[15]

We observed that by bringing people together in new constellations, by introducing external figures who know nothing about the work and have everything explained, talking about one's own work is stimulated.

Implicit knowledge becomes explicit and therefore discussable.[16]

Differences in the way of executing the same task are revealed, and the best solution can be found. The knowledge of the colleague becomes apparent and can be learned.

b) Colleagues as Safe environment and Experts

This will happen only if there is a safe environment. Neither a "teachers' attitude," implying that the teacher knows everything and the student knows nothing, nor an examination ("assessment") of individual "competencies" is conductive in this situation.

Workers are experts[17] and want to be respected as such. Although many of them have pretty unhappy school memories, they are often well trained and do marvellous and complex work. They are not empty vessels to be filled with expert knowledge.

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[15] On the importance of converting implicit to explicit knowledge along with the "Nonaka Matrix" ideas, check out (among many, e.g. the very succinct http://kmlearning.blogspot.com/2007/07/how-to-transform-tacit-knowledge-into.html.

[16] See the famous "Nonaka Diagram" on the dynamics of transferring and transforming various forms of knowledge. https://upload.wikimedia.org/wikipedia/commons/thumb/3/30/Knowledge_spiral.svg/700px-Knowledge_spiral.svg.png Nonaka, Ikujiro; Takeuchi, Hirotaka: The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation, New York: Oxford University Press 1995.

[17] Stahl, T. (1998): A royal road to quality assurance for continuing training? In: CEDEFOP (ed.): Vocational Training, European Journal, p. 33-45



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c) Facilitation of Work-Integrated Learning

What is much more necessary is a professional dialogue among equals.

Externals can facilitate this dialogue, and it should be. Unfortunately, the daily routine and pressure of the shop floor leave only little room for a productive learning dialogue. The first task of an external facilitator of learning is to create occasions for this dialogue.

The mere presence of a sensitive and interested outsider is a game changer on the shop floor. Telling the stories from the shop floor to an outsider, explaining one's own work to the colleague from the other department, answering the questions that no insider would have asked helps to rediscover one's own work, structure the situation with the methodological assistance of the facilitator, focus on areas of intervention (learning activities, initiatives to improve the work process), and plan and implement these initiatives.

d) Grow Resources and Environments

Facilitation can also help make this learning more sustainable by helping to review the initiative after a while and documenting the lessons learned. Often this process is materialised in a range of self-made media, like videos of exemplary work processes, pictures from benchmark work results or elaborate learning assignments, written by the workers with the help of the facilitator or simple "one point instructions," explaining the most important thing not to forget on a specific step in the work process on-site.

e) Five Learning Partners

The result of this "didactisation" of the work process is twofold: on the one hand, there is a growing pool of learning media created in the work process and/or tailored for the specific work process. But, on the other hand, crucial information is more accessible, and information, knowledge and standards outside the individual workers' experience are used more often and more productively as a consequence.

On the other hand, communities of colleagues and friends become learning partners. The dialogue is self-reinforcing. We have observed that the learning individual will grow a network of about five main learning partners and 20 others. There is no permanent dialogue, but who can be asked questions without inhibitions.

This is a treasure of knowledge and experience. The capacity for learning, for problem-solving, and for working autonomously and conforming to standards at the same time is hugely increased. We observed the best companies would use up to 5% of their working time for the more structured variants of such work-integrated learning.

f) Middle Managers and Digital Learning



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Middle managers and/or master workers (depending on the national context) who manage the production at the shop floor level are well-advised to foster and nourish such a learning culture. They are in a very critical position here. They are the ones who decide about the concrete situation at the workplace. They determine whether the idealism of ambitious personnel development initiatives is implemented or if an individual learning culture is developed. We have seen many examples in which the critical point is not so much that the initiatives must be in any respect "perfect" or comprehensive, but much more important is to make a start, to put on the "learning glasses," to take workers seriously and to start with the problems at hand. Other initiatives will follow, and in a short period, there will be a pretty comprehensive system.

Digital media can play an important role here. Although the learning topic is the same, individual learning styles will be very different. There will be at least one individual keen on using these new media in almost every learning group. Often they do so in their private sphere. The technology is quite accessible and allows "organic" growth, parallel to the actual learning process. This makes the difference to the traditional initiatives that required huge investments in comprehensive databases that had to be fed and maintained continuously and systematically. This was one reason why the top-down initiatives of knowledge management collided with the organic, bottom-up learning culture workers and departments developed for themselves, often leading to the demise of both of them.

The interplay of factors is complex, but in our experience, a living-learning culture can be supported and grown with the right kind of media. Only rarely is it the technology that initiates such a culture when there is no genuine need and benefit felt. The technology does not match the learning style of individuals and existing communities.

The characteristics of the new media and the participation-centred approach of many digital media certainly can support a participation-oriented learning culture very efficiently. Finding the right balance between fostering and encouraging bottom-up organic growth and systematising and unifying company-wide systems of production and learning will be one main challenge for management in the second decade of the 21st century. Still, one thing is already clear to see: only if the creativity, knowledge, and engagement of all employees, also those on the shop floor and of employees from a migrant background, with low educational attainment, young and old, are mobilised, will Europe continue to be one step ahead of the competition on productivity. Workers can be trusted here. They are experts. Companies better let them talk face-to-face and by using digital media.

## 2.5 Media Requirements, Purposes and Boundaries

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 has changed the way of communication. The "place-time matrix" of Johansen (1991) categorises the communication in synchronous (same place or time) and



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asynchronous (different place or time). **Synchronous communication** means having a real-time exchange. **Asynchronous communication** means exchanging information independent of time and place. [18].

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

Table: Place-Time Matrix (Johansen 1991)

Generally, the distinction is helpful to choose a suitable technology because each category has different requirements. Digital media only brings **absolute added value and fulfils the pedagogic value** if the learning content is appropriately adjusted. In the context of DigiVET, audio-visual media is produced (asynchronous communication). Although the independence of time and place brings many advantages and allows rapid information sharing within a high range, asynchronous media has some boundaries.

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.[19] 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-centred 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

[18] 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.

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



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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 be user-friendly and must run smoothly, which requires suitable hardware and an attractive look and feel

Another important aspect is the complexity of the information. Therefore, it is essential 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. **On the other hand, lean media** has a lower interaction rate, fewer visual or auditory cues, and better precision.

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. The "band of effective media use" is reached when the complexity of the learning content is neither oversimplified (impersonal, no feedback) nor overcomplicated (equivocal, information overload). The audio-visual media can reduce uncertainty because the technology can carry a large amount of information. However, the nonverbal cues, feedback, and customisation are limited.[20]

Consequently, media use depends on communication, which is shown in the "media synchronicity theory" of Dennis & Valacich (1999). **Convergent processes** need more synchronous communication to summarise information and dissolve ambiguities. **On the other hand, divergent processes** require less synchronous communication because they serve information sharing and reduce uncertainty.

| | form of communication | non-interactive example | interactive example |
|---|---|---|---|
| lean media | image | photos, pictures | / |
| | text | documents, email | instant messaging |
| | audio | podcast, recordings | phone |

[20] 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.



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| | | | |
|---|---|---|---|
| rich media | video | video clips | video conference |
| | face-to-face | / | monologue, dialogue |

Table: Characteristics of media regarding the richness of information processed (Daft & Lengel 1984)[21]

When selecting audio-visual media, the following factors should be checked:

1) the immediacy of feedback: How important is a quick and personal response?
2) Parallelism: How many channels and people are involved?
3) Symbol variety: How can the information be effectively transmitted?
4) Revisability: How extensively and frequently should the information be changed?
5) Reutilization: How often can the content be reused? [22]

To this end, the next chapter will present a general model of "roadmapping" the improvement of in-company, in particular SME learning systems.

[21]Daft, 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.

[22] Dennis, Alan & Valacich, Joseph (1999): *Rethinking Media Richness: Towards a Theory of Media Synchronicity.* In: *Proceedings of the 32nd Hawaii International Conference on System Sciences.* Hawaii. Schwabe, G. (2001). Mediensynchronizität - Theorie und Anwendung bei Gruppenarbeit und Lernen. In: Hesse, F; Friedrich, H. Partizipation und Interaktion im virtuellen Seminar. München / Berlin,Deutschland: Waxmann, 111-134 (Link)



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

The following chapters 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. Furthermore, 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 information intends to support the coaches in their dialogue with the partners from the companies. In addition, it prepares the coach for the development of digital learning roadmaps, which will be discussed later on.

As discussed, employees need to learn new sequences of work as fast as possible and increase their flexibility by widening the range of work they can do. Thus, flexibility and the ability to learn are new key competencies.

To develop employees toward increased sustainable productivity, work-integrated forms of learning are more valuable than traditional ones.

Themes for further learning and qualification result from the actual work and an assessment of the tendencies in the organisations of work within the company.

Training at the beginning of one's professional life (formal apprenticeship, learning in a professional school, initial training in the workplace) must be complemented by lifelong learning, partly by traditional methods but much more by non-formal and informal ways of learning in the workplace.

**To be useful, therefore, any attempt to introduce digital means of learning must assure that the aim of learning is analysed so that it is not using a tool for the "sake of the tool."**

The aim must be
- to analyse learning needs
- to identify adequate opportunities to learn
- to define learning arrangements and learning pathways to meet these learning needs.

Only then can it be analysed which of the many new digital learning options are the most appropriate to enhance the employees' learning experience and make the SMEs more productive overall.



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With this integration of learning into the work process, new ways of dealing with the qualification process become relevant. Thus, 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.

Learning cannot be delegated to a training provider (internal or external). Much more the learning needs must be analysed at the workplace, and learning will occur mainly in the workplace as **new actors become relevant**.

The most important are the persons responsible for the work process (master workers, production managers, managers, owners). They must take responsibility for the learning of the employee group. For example, managers must become coaches and supporters of the learning of their employees.

**Training facilitators** can support them in this by providing settings and methodologies. This is the role of the **in-company trainers**, which we will discuss in detail later on.

Therefore, the wider use of digital media will only happen if these key persons are convinced and have the skill to adapt these to their own needs.

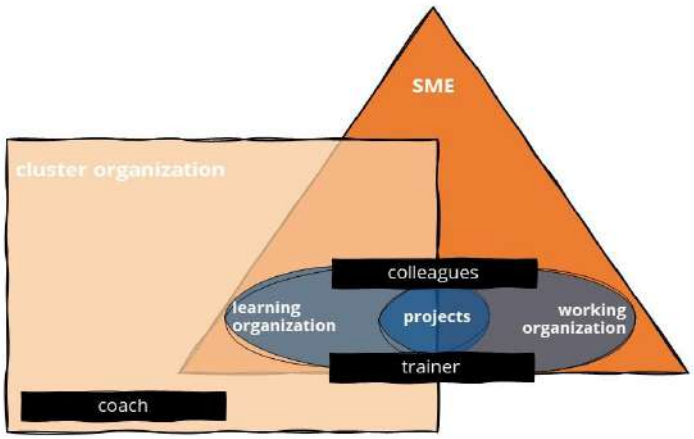


Figure: External support of internal learning and working organisation. Example of the cluster of sensors industry in Bavaria

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

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



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As in big companies, learning in SMEs also does not come about spontaneously. It has to be organised. Individual, group and team learning require a structure and adequate competencies of facilitation.

Usually, SMEs will create **in-company project groups** to plan and implement the process, which comprises a group of relevant individuals to analyse, plan and execute. The composition is variable and depends on the circumstances.

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

1) Identification and assessment of learning needs: **Who** must learn **what**?
2) 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 latest developments, etc. So identifying the target groups and defining their learning needs is the point here.
3) Organising learning: **Where, when,** and **how** can it be learned? **From whom** can it be learned?
4) SMEs are not a school but a place full of learning opportunities. This is proven by the SME being successful on the market. The expertise to make it successful is there. So why not nurture and share it?
5) So the "from whom" is usually not a problem, but the where and when is.
6) SMEs are businesses, not schools, and so learning is not their priority. The day-to-day activities tend to dominate, and the "important" things, among which is "learning," need to be well organised to stand up against the everyday pressures.
7) Digital media offer new opportunities in the where and when, as they make learning more flexible regarding place and time, and the how is enhanced by new opportunities and formats. 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.
8) Evaluating learning: What was the **result** of the learning? What was the benefit?
9) Also, this can be determined more easily by utilising digital communication. The improvements in learning analytics make it easier to see what is being used by the learners (e.g., within LMS), 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 sub processes, as shown in this chart:



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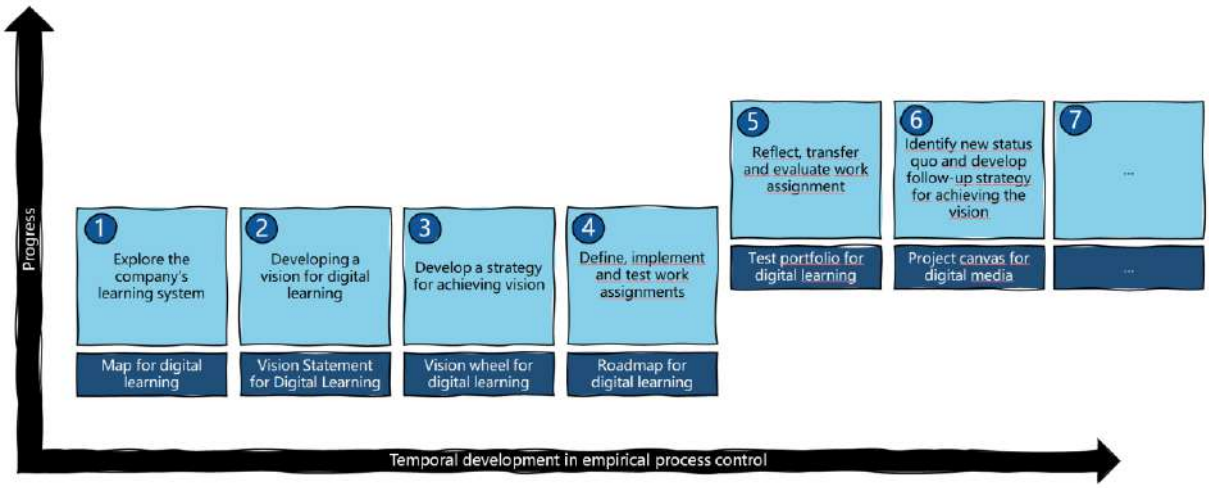


Figure: Stages of implementing digital learning in SMEs

A short discussion of the main actors and their respective roles will aid the understanding of this process.

## 3.1 The Actors: Coaches, Trainers, Employees

### 3.1.1 A new set of competencies: Coaches and Trainers for Digital Media Use in Company Workplace Learning

As described in the previous section, companies are not schools. Therefore, most learning is informal, taking place on a day-to-day basis individually and among colleagues. Sometimes, however, a more formal learning effort is required to achieve specific organisational or individual learning goals. In this case, the learning must be planned and supported. The different roles in such a process are described in the paragraphs to follow.

### 3.1.2 Tasks and Duties of a Coach and a Trainer

Coaches in the understanding of this handbook are all individuals who support SMEs in using more digital media in their learning system. They support in-company trainers to analyse the current learning system, plan change, and implement it with the help of in-company project groups mandated and supported by the relevant decision-makers.

The coaches integrate competencies of facilitating the process and a good understanding of digital media to inform learners about its use and refer to external expert expertise as needed.

The DigiVET project has analysed the main competencies needed by coaches and trainers.[23]

[23] DigiVET (2021): Competency Matrix and Policy Recommendations Report available through the website https://digivetproject.eu/



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Coaches are different from trainers in the depth and experience, and overall coverage of the competencies.

It is important to note, however, that the competencies **overlap**.

Both are experts in the same field, tackling it from specific perspectives but forming an overall learning community. Trainers will be aware in more detail of the company, its challenges, resources, and the social fabric in the SME.

The coach, in contrast, will have some insights in these but focus more on keeping up to date in methodologies of facilitation, getting an overview of the development of digital learning methodologies and relevant best practices. They will curate the relevant information to select and communicate the most important and appropriate to the trainers.

A dialogue can only start if the competencies overlap. The one who seeks to be consulted must formulate the need for consultancy and must be able to (at least in a preliminary way) formulate the starting question/problem. The one who consults must be able to count on an at least initial understanding of the field of inquiry. The one who seeks consultancy needs to understand the field to select the coach and appreciate the quality of the consultancy.

We speak of the **active and passive competence of consultancy** here.[24]

The understanding of consultancy here is one of a social intervention into a social system, which is based on different perspectives and will affect not only the individual or a small group, but, by working with these, affect the overall system, as one of the premier scholars on pedagogical development, consultancy put it. The following characteristics are characteristic of educational guidance:

1) The term guidance refers to a social situation in which an **everyday development task** or a difficulty with the help of a particular problem-solving procedure.
2) The basic prerequisite for their realisation is a manifest need for external support. Those seeking advice must be given an apparent reason for being motivated to reflect on the context of their problems with others and to rethink behaviour patterns.
3) The occasion for reflection - such as a difficulty that cannot be solved immediately or a hardly achievable development goal - **does not arise from an externally assumed need** but is based on an everyday situation experienced as a fact, in which those seeking advice are persons, groups or organisations.
4) Therefore, the reality check starts from the pragmatic relevance structure of the everyday world from the problem perspective of those seeking advice.
5) **Consultability**: The subject matter of the advice experienced by those seeking advice (the problem or the development goal) must be consultable, i.e., **the solutions must be**

[24] Schäffter, O. (2020): Organisationsberatung als Lernberatung von Organisationen https://www.erziehungswissenschaften.hu-berlin.de/de/ebwb/team-alt/schaeffter/downloads/organisationsberatung



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**suitable** for the advice of those involved, and it must be **subjectively accessible** and **professionally workable**.

6) **Passive** ability to seek and use advice: those who seek advice must be willing and able to use insights and courses of action as alternative possibilities. Individuals' subjective preconditions, groups, social conditions, and organisations' personal, social, and structural factors of "passive counselling" prerequisites can be taken up and optimised during the consulting process.
7) **Active** counselling ability: The counsellors must have the (related to the specific problem or development goal) required "active" counselling ability and expand it in the counselling process, expanding their field-specific competencies.
8) Counselling relationship: Counsellors and people seeking advice are **not in a "subject-object-relationship"** but strive for a reciprocal relationship, in which **symmetrical communication patterns** of the mutual interweaving of perspectives predominate.
9) **Emotional basis**: Counselling requires a participatory approach appropriate to the context and a working method with a minimum of mutual trust, emotional attention and mutual acceptance.
10) Emphasis on differences: those seeking advice and consultants necessarily have **different perspectives** on the subject of the consultation. This means that both sides are faced with the need to cooperate with each other, despite divergent assessments, to work out joint steps to clarify the problem and possible solutions. In the course of the clarification efforts, the consultants must endeavour to present their own values and the values of the "client system"... Therefore, the process structure of educational counselling is **open to objectives and or target-generating in its process structure**."[25]

The project DigiVET, in its initial study of required competencies for in-company learning with digital media, has implemented iterative research on the most needed competencies. The research included a literature review in all partner countries, a study of good-practice cases, experts' focus groups, and a survey of more than 120 trainers and coaches. This research narrowed down a comprehensive list of competencies that have been initially identified to an operable shortlist of competencies. These were determined according to which competencies were 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 shortlist of competencies resulted:[26]

[25] Schäfter, O.: Organisationsberatung als Lernberatung von Organisationen Pädagogische Organisationsberatung; (translation: AK, ISOB GmbH; https://www.erziehungswissenschaften.hu-berlin.de/de/ebwb/team-alt/schaeffter/downloads/organisationsberatung

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



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| |
|---|
| Selected competencies are ranked by the difference between the importance and development of competencies. |
| |
| **Planning and Production of Digital Media OVERALL** |
| – Theories and formats of multimedia learning |
| – The ability to design and produce instructional videos of an appropriate quality |
| – General multimedia design - The rules of designing these (DOs and DON'Ts) |
| – The ability to design and produce virtual/augmented reality systems of an appropriate quality |
| – The ability to set up and facilitate digital learning management systems (LMS like Moodle, etc.) |
| **Learning in a Company Context OVERALL** |
| – The ability to evaluate the outcomes of digital learning |
| – The ability to facilitate digital learning in the workplace |
| – The ability to develop learning pathways |
| – 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** |
| – Ability to search, collect, process and critically evaluate data, information and concepts |
| **Being Aware and Able to Apply Relevant Legislation OVERALL** |
| – The ability to implement learning systems that meet the requirements of data protection and data security regulations |
| **Transversal competencies for designing and implementing workplace learning in SMEs OVERALL** |
| – Being able to provide learning experiences that are appropriate for people from different cultures |

**Coaches**

Ideally, coaches should have many of these competencies at the starting point. In fact, very few have. This is an emerging professional field.

Therefore, each individual going into this will have to build on solid competencies in some of these fields while being more or less at beginner level at others.



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The important thing is to have a sound support system and workable links to relevant expertise inside the organisation and/or networks that can be activated.

As a process consultant, the coach will be responsible for the support and facilitation of the overall process. Therefore, these competencies are usually a good prerequisite. The technical expertise can be added, and, usually, the consultant can be helpful in many situations, employing skills that can be relatively easily acquired (e.g., on video shooting, LMS, etc.).

Coaches, therefore, will usually come from organisations like training providers, universities, and individual consultancy units. In the example of the German project CoDiCLUST, the coaches are situated in the cluster management organisation of the Bavarian Sensors industry, whose mission includes learning support to its members.

The important thing is to ensure that coaches are involved in a systematic process of professional self-professionalization. They use their experience in the field, their own research, work with experts, etc., to gradually expand their knowledge and skills, individually and collectively.

**Trainers**

Trainers as internal consultants know the company learning system and cooperate closely with the organisation's decision-makers.

Trainers have an essential curious attitude and facilitation skills to systematically explore the operational learning system together with the participants (process consulting).

Trainers can put themselves in the position of those concerned and assist in reflecting on and developing the situation (self-differentiation).

Trainers have an interest or experience in staff or organisational development and can support the participants in the methodology of further development of the organisation.

Trainers act as field experts for digital media and provide the participants with a pedagogical and media-didactical assessment concerning the development possibilities in the learning fields and know the state of research and external best practices (expert advice).

Also, the trainers, starting from their prior experience, gradually build their competencies by doing and reflecting on what has been done.

**In-Company Workgroups**

In-company workgroups on planning and implementing digital learning projects include a small group of people, according to their relevance to the process.

Criteria for selection include knowledge, influence, and expertise in different fields, which is needed for the project's success. In the first place, the potential users of the innovation must



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be represented, as these are the experts for the work process, and their acceptance of the usefulness of the innovation is the ultimate criterion of success.

**Employees**

The employees are the final beneficiaries of the innovation. Their acceptance of the change/innovation is the criterion of success and their benefit in learning opportunities for personal and professional development, along with higher profitability for the company, are the final aims of the exercise. Therefore, their participation is crucial.

The part of the handbook that follows suggests a systematic process to analyse the status quo in the company, to plan a roadmap for change towards more use of digital media, particularly visual media, to evaluate this innovation and initiate an iterative process of overall change the learning system.

The handbook does systematically present this process, assuming a concerted and dedicated change process within the SME.

Each of the parts of the process can be used on its own, however. In fact, in most of the organisational development processes studied, an **incremental approach** has been taken.

In many cases, the positive experiences made in small pilot exercises have involved ever more comprehensive efforts and “innovation routines.” On the other hand, premature efforts at overall change and the introduction of expensive and challenging high-tech solutions have resulted in failure and frustration.

As part of the competencies of coaches and trainers, a good grasp of the logic of an overall innovation process, along with knowledge and practice in using selected tools of analysis and planning, is required. Many of these tools are tested and tried tools of organisational development in general, having been developed and tested in the tradition of humanistic organisational development since the 1970s and further developed and refined in the more recent "agile" movement.[27]

The recent pilot project CoDiClust in Germany for developing and implementing digital learning solutions has adapted these tools to the specific demands of introducing digital learning.

[27] http://agilemanifesto.org/, which has been expanded in many fields, including learning, e.g. http://edutechwiki.unige.ch/en/Agile_learning



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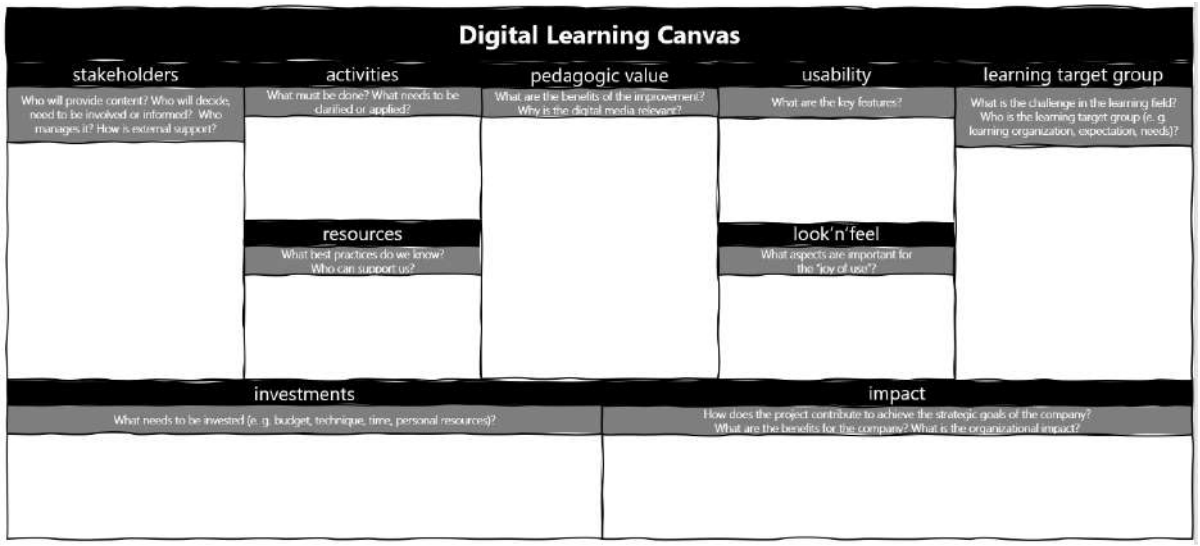
## 3.2 Roadmapping

Development needs focus. Therefore, the development in CoDiClust has made a point of laying out a pathway for companies on which they can go to integrate the use of digital media in a sensible organisational and staff development, using an approach that is simultaneously systematic and thorough and participatory.

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 visualises complex business issues simply and collaboratively") [28] 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 digital learning canvas can be used as a reflection tool to initialise the work process, e.g., in a workshop setting. In this context, it will be used by a learning group to break down and visualise the central aspects in one run. The details can be worked out in follow-up planning activities, such as the roadmap. The second use would be to use the digital learning canvas as a tool for analysing the current, not yet fully formulated (implicit) learning model (including the use of digital media) for various target groups. It is also a helpful tool for idea creation and dynamic reflection for developing, evaluating and editing digital media. It gives the first impression and orientation of the context and shows possible solutions. The third use would be to use the digital learning canvas for summing up more incremental and spread out analysis and planning activities. These three uses can be used in parallel or consecutively during the overall process.




[28] https://www.strategyzer.com/canvas



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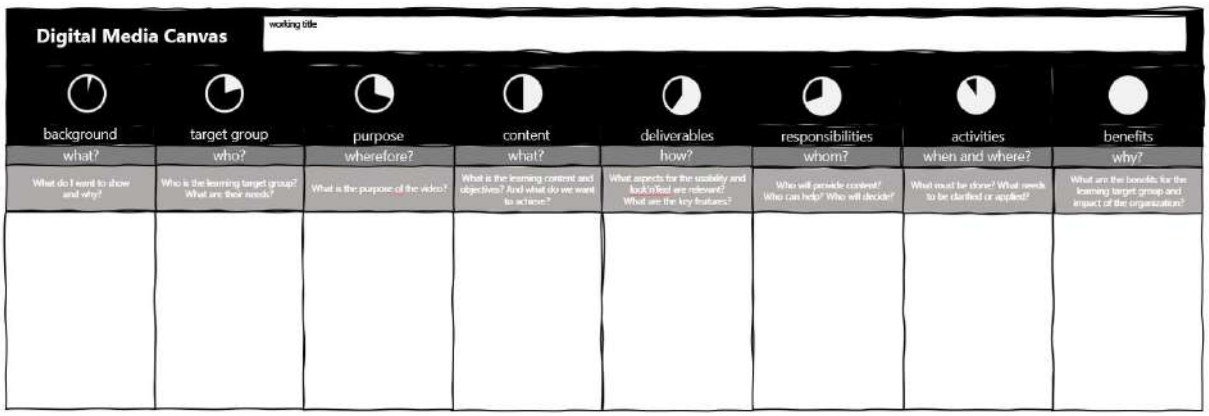
(3) The shortcut is the digital media canvas. It focuses on a specific media production process and is part of the storyboarding of the explainer video production.




**Roadmaps** are systematic and time-framed plans for the introduction of innovation or organisational change. Unlike a strict five-year plan, 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 visualises how the digital media will evolve over time to realise digital learning vision and achieve continual value for learners and business. A roadmap should be designed to adapt continually, guide decisions, and promote actions. Roadmaps lead to a mutual agreement (commitment) and show the task board what to include and what not to include. 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.[29]

A successful roadmap is visual, visible and accessible. It clearly identifies the purpose behind media production. Roadmaps do not include specific dates but rather identify time horizons:

- **now**: less than three months, based on an upcoming release, granular focus, specific scope, identified themes and details about functionality and features (e.g., designs, prototypes, demonstrations), less flexible, the definition of done.
- Themes are decision-making filters for tactical planning sessions, prioritisation to achieve a minimum viable product (MVP) for each time horizon, iteration or sprint.[30]
-
- **next**: 3-6 months and non-view or next iteration, business challenges, wide focus, developing and identifying measurable outcomes (e.g., designs, objectives key results (OKR) and key performance indicator (KPI)) and strategic themes, less valuable or risky tasks.

[29] Osterwalder & Pigeur (2010): Business Model Canvas. Osterwalder, Pigneur, Bernarda & Smith (2015): Value Preposition Design.

[30] Scrum.Org



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– **later**: more than six months, ideas and long-term view, high level, big picture, broad scope (e.g. future challenges, trends), very flexible

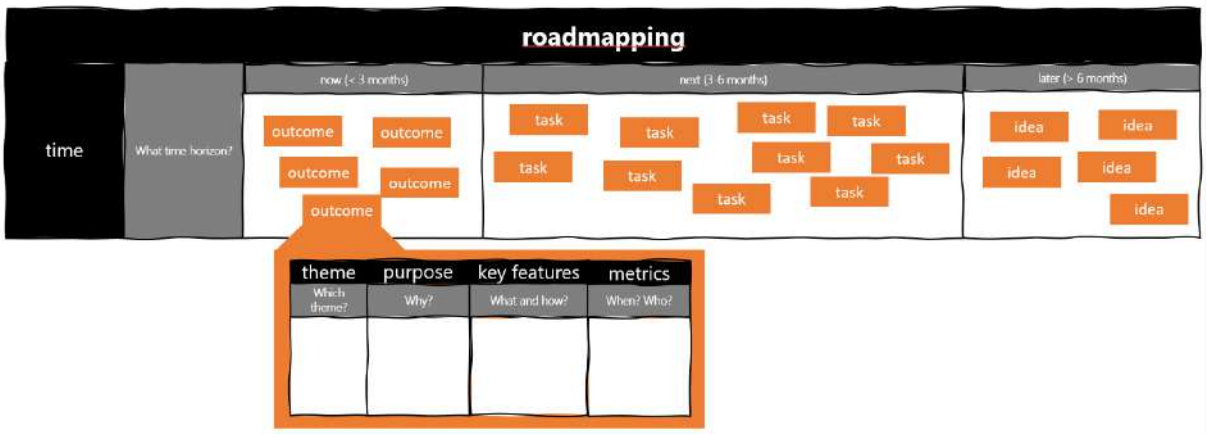


Figure: Roadmapping

The tools were further developed from those used by the CoDiCLUST project. While having been piloted with success with more than 30 companies of different sizes in Bavaria in Germany, feedback from other sectors and business environments is also highly appreciated.

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 several examples of filled-in templates (translated from German). By discussing the process of getting to such a canvas, we learned that our first draft of the "Roadmap for Digital Learning Canvas" was too complex for the target group of the DigiVET project. This is why we optimised the tools by defining a concrete purpose for usage to separate the instruments.



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## Roadmap for Digital Learning Canvas

| | | |
|---|---|---|
| **Company:** | **Department (where applicable):** | |
| **Field of action with intermediate objective**<br>*Which corporate learning field is affected? What is the operational field of action? What is the medium-term objective?* | | |
| **Description of the learning target group**<br>*Who is it? How is the current learning organisation?*<br>*What is their learning obstacle? What are the learning resources?* | **Initial situation**<br>*What is the operational challenge?*<br>*What are the previous strategy/department initiatives concerning digital learning?* | |
| **Objective for the project**<br>*What does the company want to achieve with the project?* | **Expectations of the learning target group**<br>*What is the learning goal?*<br>*What is the future learning offer?*<br>*Which learning medium is selected?*<br>*What is the attitude towards digital learning media?* | |
| **Motive for the project**<br>*What is the entrepreneurial mission?* | **Selected learning medium and benefits**<br>*What are the benefits of the selected learning medium?* | |
| **Ressources**<br>*Who's involved?*<br>*What is the cost and time spent?* | **Benefits for the company**<br>*What short-term and long-term benefits does the company have?*<br>*What further contribution does the project make to the company?* | |
| **Activities in the project**<br>*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)?* | | |
| **Evaluation of results**<br>*What's the result?*<br>*What are other measures?*<br>*What are the consequences?* | **Team cooperation evaluation**<br>*What's good so far?*<br>*What is to be improved? What's missing? What is the teamwork like? What should be the next measures?* | **Pilot's learning experience for digital learning**<br>*What are the learning experiences of the trainer?*<br>*What would he/she do or change?*<br>*What tip does he/she have the trainer colleagues?* |

Figure: Roadmap filled in - example



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# Roadmap for Digital Learning Canvas

**Company:** **Department (where applicable):**

**Field of action with intermediate objective**

*Which corporate learning field is affected? What is the operational field of action? What is the medium-term objective?*

**Description of the learning target group**
*Who is it? How is the current learning organisation?*
*What is their learning obstacle? What are the learning resources?*

**Initial situation**
*What is the operational challenge?*
*What are the previous strategy/department initiatives concerning digital learning?*

**Objective for the project**

*What does the company want to achieve with the project?*

**Expectations of the learning target group**
*What is the learning goal?*
*What is the future learning offer?*
*Which learning medium is selected?*
*What is the attitude towards digital learning media?*

**Motive for the project**

*What is the entrepreneurial mission?*

**Selected learning medium and benefits**

*What are the benefits of the selected learning medium?*

**Ressources**
*Who's involved?*
*What is the cost and time spent?*

**Benefits for the company**
*What short-term and long-term benefits does the company have?*
*What further contribution does the project make to the company?*

**Activities in the project**
*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)?*

**Evaluation of results**
*What's the result?*
*What are other measures?*
*What are the consequences?*

**Team cooperation evaluation**
*What's good so far?*
*What is to be improved? What's missing? What is the teamwork like? What should be the next measures?*

**Pilot's learning experience for digital learning**
*What are the learning experiences of the trainer?*
*What would he/she do or change?*
*What tip does he/she have for the trainer colleagues?*

Figure: Digital Learning Canvas

### 3.2.1 How to Get to the Digital Learning Canvas – and How to Implement It

In CoDiCLUST, we learned that roadmapping is not linear; it is a dynamic and agile approach with different methods to develop digital media in a diverse team.

### 3.2.2 Sub process 1: Exploring the Company Learning System and Analysing the Learning Field

At the beginning of the change, the actors should analyse the company learning system. It can be more or less comprehensive and detailed, depending on the circumstances and the mandate.

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

In some enterprises, a large part of these processes is explicitly regulated, e.g., in quality manuals; in some others, these routines have developed organically, and the practice in the enterprise must first be researched and formulated. Also, the difference between regulation and actual practise should be discussed.

A learning system can be represented in **several learning fields**. Examples of learning fields are training, induction, on boarding, continuing training, performance assessment, project work, and knowledge management. In addition, it can be represented as an employee's life path during his/her career or a description of target groups or typical situations within the company. The learning field can thus be described using the learning **target group** and learning concept (didactics, location). The latter also includes the form of learning, e.g., instruction, learning and work tasks, learning projects, etc.

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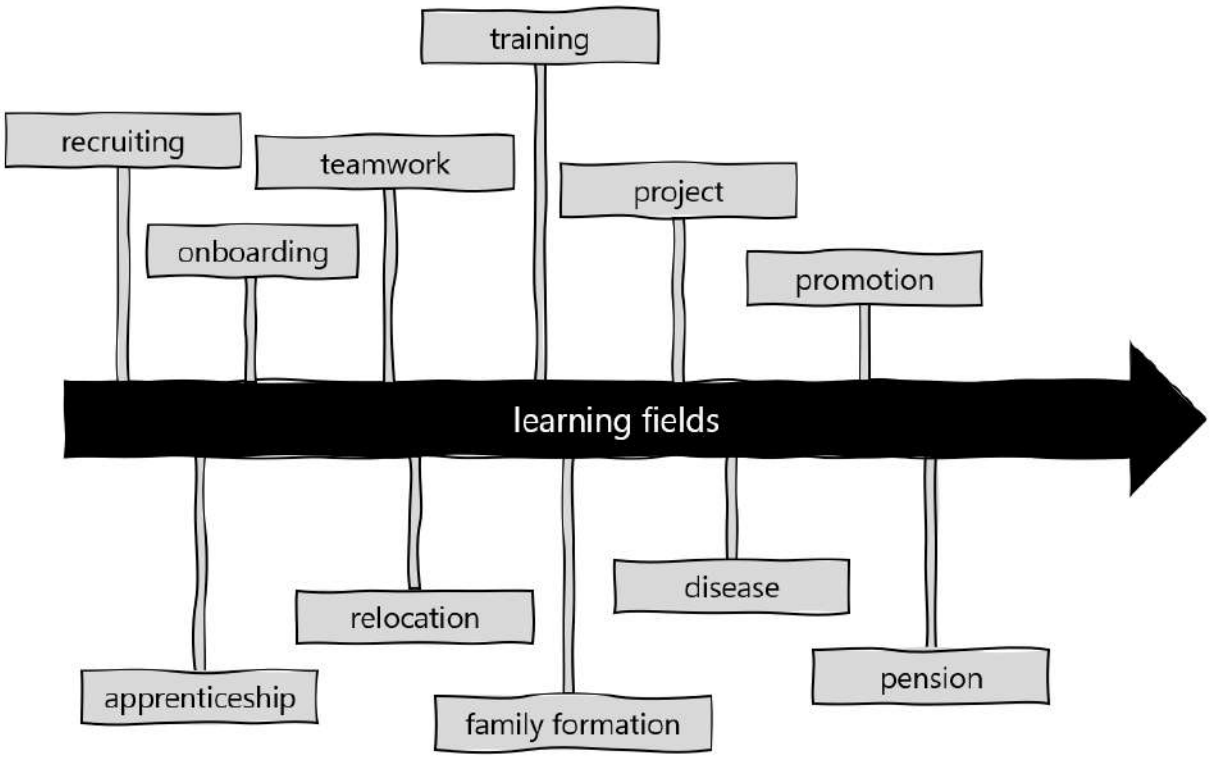


Figure: Fields of Learning

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?**

Therefore, exploration aims to get to know the company's learning system and understand its learning fields. This enables action strategies to be developed.

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

The learning system and its fields can be viewed in terms of **problems**, i.e., deficiencies or risks identified from the actors' perspective. For example, something does not work as it should, which negatively influences the participants and/or subsequent processes.

Or it turns out that there are **opportunities** that are not used enough. The results are okay but could be better. Improvement opportunities may come from unused internal resources (e.g., unused skills of employees) or external (e.g., new technologies or good practices elsewhere). These dimensions are not entirely discrete, but a small matrix helps to understand your considerations better:

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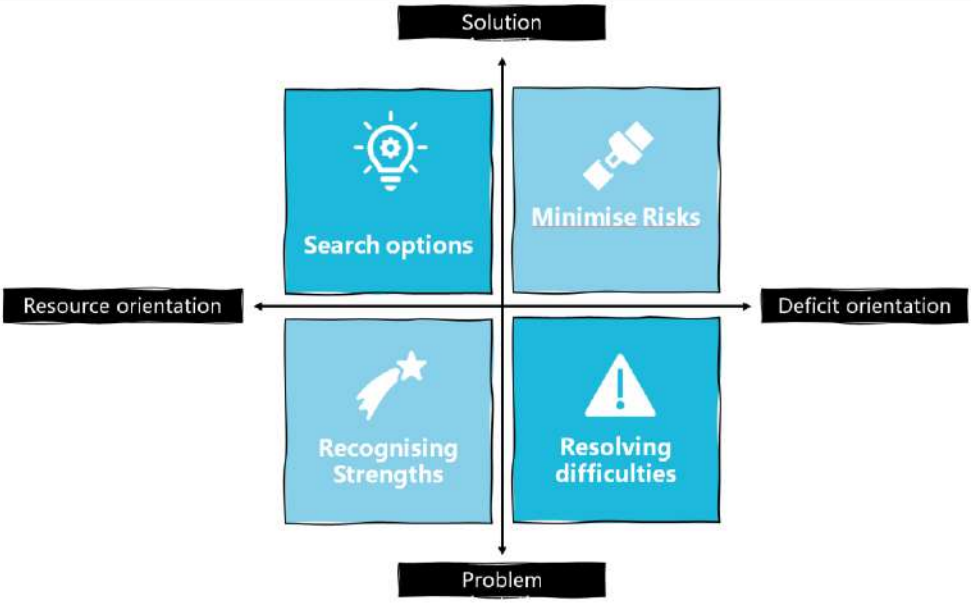


Figure: Perspectives in Exploring the Learning Fields of the Company Learning System

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?").

The trainer ensures that deficits are clearly described but also discussed constructively. In addition, the trainer ensures that those involved do not develop a "problem trance," i.e. an attitude that persists in naming the problem underestimates solution competencies and paralyses itself by possibly blaming others.

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:
- For example, 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?

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Deficit orientation attempts to improve the current state of affairs, paying particular attention to the current weaknesses and impairments. This approach is goal-oriented and often has a view on clear and realistic solutions.

Shortcomings, inadequacies, and limitations are discussed.

However, no fundamental diagnosis is made, but rather efforts are directed towards identifying and correcting the immediate deficits and risks within an overall unchanged system.

Correction is mainly achieved through reactive measures, such as reducing and avoiding damage.

This is good and appropriate in many situations. However, it would certainly not be possible to call the entire system into question for every minor difficulty.

Nevertheless, the trainer should take care that those involved neither fall into an "optimisation mania" nor into downplaying a potentially faulted overall system and thus neutralise the question of fundamental changes. It is not only important to do your thing right; it is also essential to do the right thing. The infamous example of perfectly produced concrete life vests is a good illustration.

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?

The systematic and obvious way of dealing with problems in an individual solution or even fundamental perspective, which has been described above, is, of course, a considerable advance over a problem trance, but this attitude also contains dangers. First, there is a danger of a "solution love," i.e., the participants are in danger of dealing with the problem only reactively and to a large extent within the framework of what they are familiar with and used to. They do not look at "completely different" possibilities.

As a result, the trainer, in many situations, will want to gently counteract a "solution love" and try to encourage more fundamental thinking ("out of the box") and to focus the discussion on as many possibilities as possible. This goal is served by such classical creativity techniques as brainstorming.

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?

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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.[31]

Trainers try to find and activate the resources of the organisation together with the people involved. These can be strengths of individual teams or individuals, good practices, and external conditions, such as financial resources or a good working climate. The aim is to make better use of existing resources to develop the company's learning system and thus create motivation for the improvement process.

The following questions are helpful in this context:
- 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 trainers guide the groups they work with to use all these perspectives to discuss the company learning system. A variant of facilitation is that the group is asked to take each perspective in turn. Alternatively, the group can split up, and a subgroup looks at the learning system from each perspective.

We have reached the following status: The discussion described above leads the in-company learning groups to recognise better the most important facets of the in-company learning system. The reflexive approach has brought to light the previously implicit empirical knowledge. This makes it tangible for further steps. First, the exploratory process is visualised. If a consensus has been reached, the shared knowledge can now be documented in a simple form using the "map for digital learning" and consequently communicated. The visualisation gives an orientation about the learning fields of the company learning system and can be individually viewed, described, and deepened in the joint exploration.

In the process of cognition, the "landscape" represented by this "map" becomes more and more familiar, and it can be determined where the organisation wants to go. Suggestions can be developed as to where the organisation might move in terms of introducing digital forms of learning into the learning system. Depending on the mandate and authority of the learning group, this consideration can lead directly to an objective, or it can be used to present possible objectives (alternatively) to managers who are entitled to make decisions.

This vision of change is developed in the second sub process.

[31] On the methodology of "appreciative inquiry", see http://appreciativeinquiry.case.edu/.

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The exploration results are ideally summarised in a mind map to illustrate the learning fields multi-dimensionally and put them into a relationship. A large amount of individual information is arranged under the moderation of the trainer but without a "set-in-stone" structure. It represents a reflection aid without normative character. This procedure thus stimulates both the right, logical-thinking and the left, pictorial-emotional brain hemisphere of all participants.

By discussing causes and perspectives, a sensitisation for the complex of topics centred on "digital learning in the company" is usually achieved simultaneously. The learning group members discover themselves as those affected by the change. They become participants through their participation in the learning group and develop a sustainable relationship through constructive cooperation, joint involvement, and solution development. This emotional attachment to the topic creates an urgency that makes an effort for change worthwhile.

What is **the role of the trainer** here? Here, too, they are in their dual role as process and technical experts. They moderate the discussion process, contribute leading questions and structuring, and organise the meetings. On the other hand, they also contribute specialist knowledge. As "caretakers" who regularly deal with the topic, they can point out benefits, possible solutions as well as technologies, conditions, consequences, and limits of learning with digital media in general and individual solution patterns and technologies, or they can integrate appropriate specialist expertise (specialist information, external advice, etc.). One of the trainer's services is to curate information that is difficult to research for the individual employee, i.e., to select and prepare information "to the best of one's knowledge and belief" in such a way that it is accessible to the members of the learning group with the available resources.

Trainers gain credibility from their knowledge and the wealth of experience in internal and external examples of action, from their knowledge of different technical options and their integration into inter-company networks of company and scientific experts working on the same topic. This credibility will grow further with the number, scope and complexity of successfully implemented innovation processes in the own company.

The inter-company coaches, company trainers and members of the project-related project groups form a **learning community**, i.e., a networked group with different intensities on the same topic, in this case, the possibilities of digital learning media for working people. They bring in different perspectives and interests, some with research and others with consulting. Above all, they act out of interest in a positive design of their working environment.

The experiences of those involved in the community act with social encouragement for their actions even in phases of difficulties and temporary disappointments inevitably associated with innovation projects convey confidence and strengthen the self-efficacy conviction of those involved.

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The **coaches** generally arrange inter-company contacts to companies working on similar topics and the regional support system consisting of, for example, the chamber of industry and commerce, training service providers, companies and universities and their researchers, etc., and provide support in documenting their results as a contribution to this community.

A further prerequisite for successfully implementing the described innovation process is that the trainer clarifies the assignment and role expectations 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?

A participation concept should be agreed upon with the decision-makers.

Possible variants include participation in designing a fixed overall strategy (top-down), the collection of suggestions for action and employee innovation initiatives (bottom-up), a mandatory expert panel consulted by decision-makers, or an initiative group based on voluntary participation.

Summary: The first sub process makes the initial situation transparent, enhances the competence of those involved, and stimulates organisational learning. The learning group participants acquire new knowledge, review their routines and information in dialogue with their colleagues, and work out an idea of how the current situation can be further developed. The first impression of a possible "roadmap for digital learning" is created, concretised in the third sub process.

### 3.2.3 Sub process 2: Development of a Vision for the Learning Field

Once the complexity of the company learning system has been grasped, those involved sometimes feel insecure and overwhelmed. This state of affairs has to be appreciated, and at the same time, confidence is needed to shape the change process. A shared vision provides orientation and motivation for the participants. The navigation image is the fixed star, in contrast to a course set in detail (SMART formulated action goals), indicating a direction without already restricting the course by finding too much.

A statement by the French writer Antoine de Saint-Exupery, who was himself an experienced navigator as a pilot, makes the power of a vision tangible: "If you want to build a ship, don't drum up people together to procure wood, assign tasks and divide the work, but rather teach people the longing for the wide, endless sea. “

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A vision is therefore positive-emotional, concise and meaningful. It describes an attractive state which the company wants to achieve and what, for example, human resources work stands for. However, the vision should not be too narrowly defined and should leave the exact path open.

Because organisational development is lengthy, dynamic, and complex, a too detailed plan would be a risk if circumstances change significantly.

A vision should create a resonant space that captivates employees' interests and makes them look forward to the future with curiosity and confidence. A vision motivates, inspires and creates a common understanding. This drive is vital in the process of change to initiate and accompany it in the area of tension between "reality and outdated structure" and "aspiration and new thinking."

In this context, the question arises of what a vision for digital learning could look like.

Digital learning does not mean digitising all learning in the company just because, for example, the technology or the means are there. Instead, it means developing a vision of what digital media can do positively in one's own company, what should be achieved with them and where they should be used appropriately.

A vision is therefore positive-emotional, concise and meaningful. It describes an attractive state which the company wants to achieve and what, for example, human resources work stands for. The vision should not be too narrowly defined and should leave the exact path and open. Since organisational development is lengthy, dynamic and complex, it would be a concrete end of the road and possibly a risk if circumstances changed significantly. A vision should create a resonance space that captivates employees and makes them look forward to the future with curiosity and confidence. A vision motivates, inspires and creates a common understanding. This drive is essential in the process of change to initiate and accompany it in the area of tension between "reality and outdated structure" and "aspiration and new thinking."

In this context, the question arises of what a vision for digital learning could look like. Digital learning does not mean digitising all learning in the company just because one could, for example, because of the technology or the financial resources. Instead, it means developing a vision of what digital media can do positively in one's own company, what should be achieved with them and where they should be used appropriately. This could, for example, look like this one:

> "We use the learner-friendly and modern digital learning media and methods available to enable all employees to complete their work tasks with a high level of quality and effectiveness. In doing so, we rely on our employees' constantly expanding individual competence and provide sufficient space for developing this competence. Learning media are co-designed by the employees according to their needs and used in a

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differentiated and flexible manner depending on individual and organisational requirements."

**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. It should, of course, be in line with the fundamental values of the organisation. This means that those involved should break away from the limitations of the actual situation and the fears and difficulties associated with it and consciously develop visions that seem unrealistic at this stage but achievable if all resources are used optimally. Because of this, a combination of solution and resource orientation (see sub process 1) is a promising approach. In addition, the creative process requires openness, appreciation, fun and imagination. With a free mind, every idea is welcome, and vision development has a chance. After the confidence-building activities, the trainer leads the creative process.

A vision does not float in a vacuum but is in the context of actual development. For this reason, the trainer, as a process expert consultant, first communicates the task and creates an awareness of the problem based on the findings in the first sub process.

Subsequently, the trainer points out the relevant, influential trends. For example, the necessity of lifelong learning, the facets and possibilities of digitisation, and new research findings from the field of education.

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 organisation are then identified.

The following questions have proven to be helpful 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. The vision statement is intended to counteract the saying "out of sight out of mind" and focuses on emotionality to generate the will to change and take the first unusual steps.

Of course, dreaming does not lead to the desired state. Therefore, in the next sub processes, a realistic view is taken to work out a concrete roadmap.

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The role of the trainer is to continue the confidence-building activities and try to act as a model for cooperation and learning. He or she is an enthusiast in the field of "digital learning". He or she carries out-trend scouting, in which the trainer exchanges experiences with the learning community and continues to educate him- or herself independently.

The facilitator counteracts creativity inhibitors such as ratio, habit, criticism, and time pressure in his or her role. In the beginning, he or she presents the actual task and its purpose to support the creative process as a process consultant in the best possible way. For this, he or she needs a good insight into the organisation and its strategic objectives. This is complemented by an empathetic and curious attitude, which creates a good framework for creative and efficient work.

The separation of these two approaches has a methodological background. It is necessary to consciously use divergent and convergent thinking in creativity processes and separate them in time. Divergent thinking means producing ideas to generate the most significant possible number of options (sub process 2). Here it is irrelevant whether or not the solution approaches are realistic. In contrast, convergent thinking aims to work out the idea systematically and focused way (sub process 3). As a result, it is a matter of selecting options for action from the divergent collection of ideas.

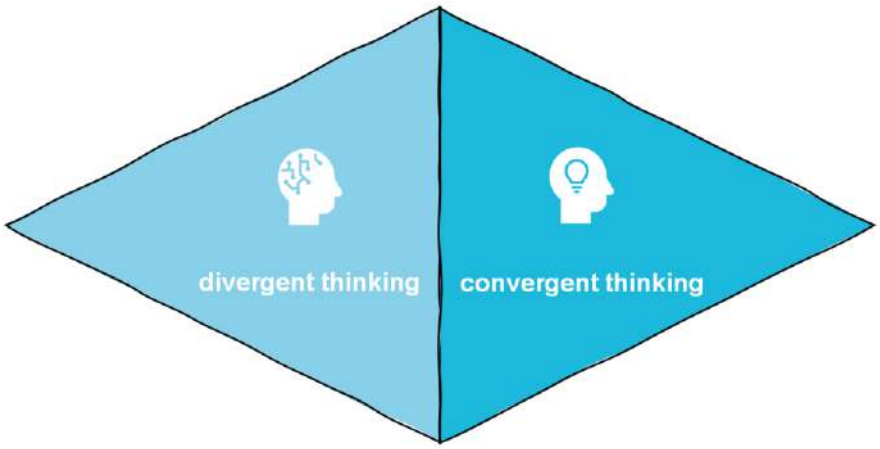


Figure: Divergent and convergent thinking

The trainer has the task of making these tasks clear to the participants in the sense of transparency, which is why separation into groups is advisable. Mixing the two ways of thinking otherwise leads to bad results, inhibiting creative and constructive cooperation in an uncertain subject area. But, on the other hand, the two ways of thinking promote each other in creativity.

In vision development, it is helpful if the group of participants is heterogeneous. Diversity creates innovation because different perspectives, experiences and competencies promote the creative process. Accordingly, the trainer makes sure that the participants come from

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various fields, cultures, educational backgrounds, age groups, and, if possible, hierarchies. The confidence-building activities help to get creative thinking going. The voluntary nature of participation usually results in a curious and open attitude.

Nevertheless, help is needed to get started in the creative process. In addition to suitable rooms and sufficient creative material, memory exercises can be helpful to lose inhibitions in thinking and gain pleasure in fantasy.

Most of the companies have a company vision. However, a company vision is not a vision of a particular learning system. Therefore, every learning field needs a specific vision to deliver value to your learners. The trainer is the initiator of developing a vision of the learning field with the stakeholders.

This is another reason why close contact between stakeholders and the trainer is mandatory. The stakeholders need to actively support the design of framework conditions and the development of a participation concept. To finally achieve singular islands of using digital media and achieve a thorough digital **media socialisation**, making the use of digital media the rule rather than the exception, good cooperation is needed, i.e., an interplay of action and reflection.

The development of visions is joyful work. Dreams and fantasies are in the foreground. In a real context, one's thoughts may be given free rein. The vision has the ambition to become a lasting and common source of inspiration. It provides orientation, creates enthusiasm for change, and promotes belonging in the team, which at the same time strengthens the basis of trust.

In summary, it is about having a vision for digital learning in the company and about developing it together. Both can be seen as meaningful, which helps the change process and the whole company, for example, in greater satisfaction, identification, and retention of employees.

### 3.2.4 Sub process 3: Developing a Strategy for Achieving the Developmental Goals

Positive feelings should be addressed in developing a fitting and engaging vision, and creativity in implementing the vision should be encouraged. It should, of course, be in line with the fundamental values of the organisation. This means that those involved should break away from the limitations of the actual situation and the fears and difficulties associated with it and consciously develop visions that seem unrealistic at this stage but achievable if all resources are used optimally.

Given this, a combination of solution and resource orientation (see sub process 1) is a promising approach. The creative process requires openness, appreciation, fun, and imagination. With a free mind, every idea is welcome, and vision development has a chance.

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After vision development, a strategic framework is needed to approach the desired state systematically. **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 consists of tasks and activities ideally described as a minimal viable product (MVP). MVP is a version of digital media that includes enough features to be usable by the learners who provide feedback for future media development and change requests.

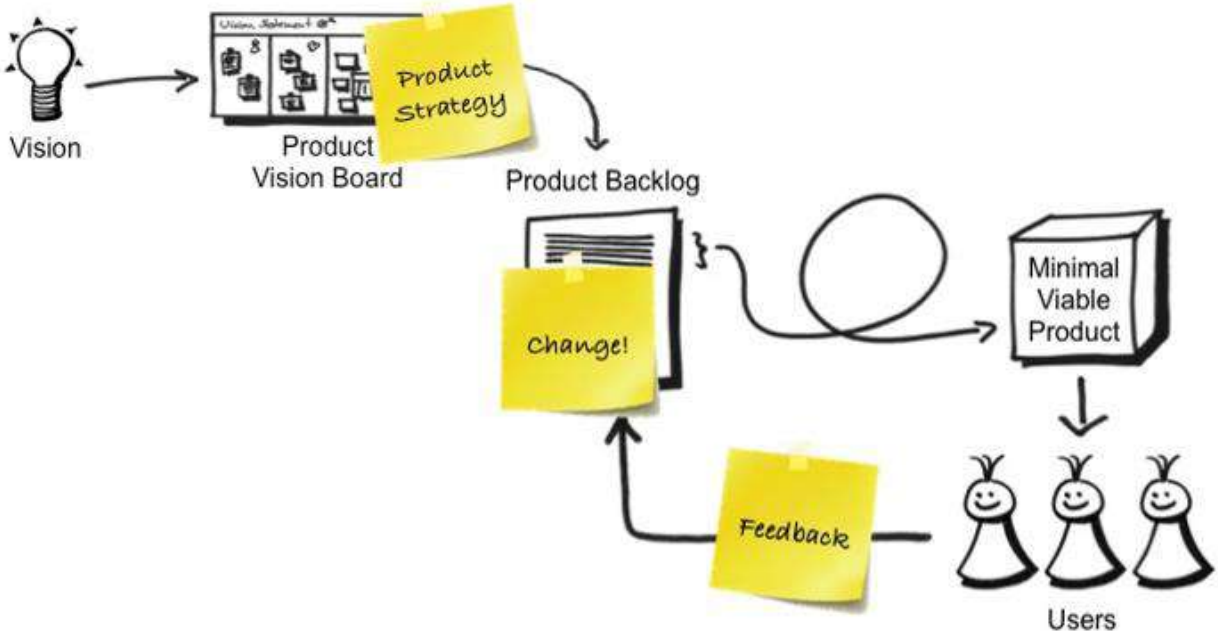


Figure: Hierarchy of strategy

It is a pearl of sobering wisdom that it is almost impossible to realise intended strategies in complex environments. Often parts of the strategy are not implemented, and new elements are added in the work process, for example, through impulses from the work environment, new technologies, or actions by individuals.

Therefore, the reality is that a strategy evolves in the work process. Accordingly, thinking (strategy development) and acting (strategy implementation) are understood as symbiosis. Because of this, participatory and agile organisational development processes have a higher chance of achieving the vision than strategies "from the ivory tower." Strategy implementation is generally not one-dimensional. It is rather a triad of people, technology as a work task and organisation, with people at the centre.

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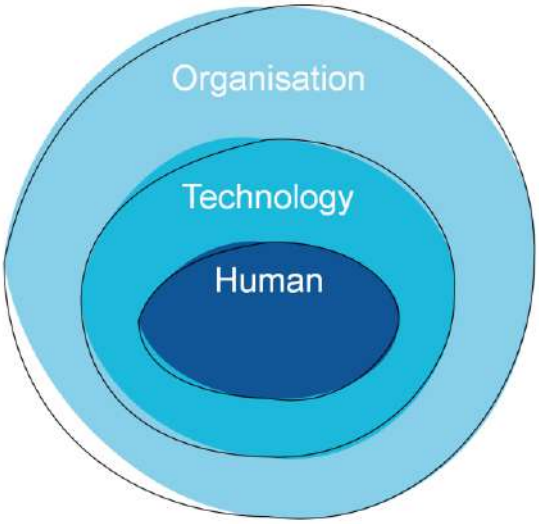
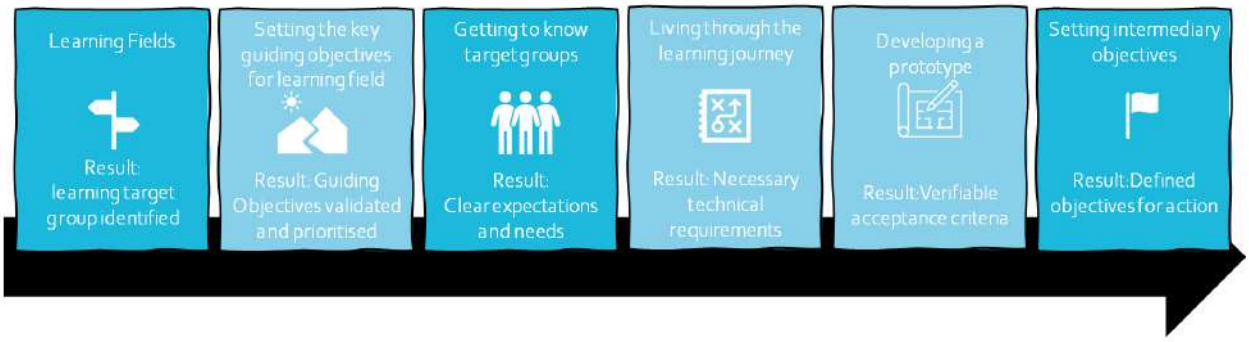



Figure: Levels of Organisational Development in Digital Learning

This human-centred 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.

On the other hand, it serves the efficient and ergonomic design of human-technology interaction within the individual work assignments (see sub process 4). Only when it is clear who needs technical support for learning (human) can suitable technical solutions be sought (technology), from which the media production process is derived (organisation).

The exact context of the learning field thus requires a human-centred way of thinking. Only when the learning target group is well-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-centred strategy formation, which is inspired by the design thinking process, extends over sub processes 3 to 5:



In the third sub process, **the trainer has the task** of sensitising people to the human-centred approach and its advantages. Only if the participants accept the way of thinking in this respect, the following sub-processes can be successfully implemented. An excellent option is to expose the learning group to appropriate best practices.

The most appropriate ones are those from the learning group's network of similar companies, colleagues from regional companies.

These can be easily visited and studied hands-on.

If these are less convincing or turn out to be not fully accessible, good practices can be studied, which are well documented. There are such documents in most countries.[32] While some of these are not fully published, usually, the companies can be contacted. They will be prepared to present their experience during events and welcome visitors to demonstrate what they have developed.

The **coaches** of digital learning here are to curate this portfolio of good practices to be aware of the main characteristics of the most important ones and build a network with the representatives of these practices so that the trainers can be referred to relevant colleagues from these projects if needed. This will make accessible a much wider network than the trainers could maintain for themselves.

The coaches can also use the knowledge about such practices by marketing them to their audience by making summary presentations and posting these in the network's primary social media, events, and 1:1 consultancy.

In summary, here too, acceptance is only possible if the individual discovers advantages and benefits for him- or herself or his or her stakeholder. Due to the different approaches, one can speak of a cultural change that requires time and learning experiences from the participants.

Furthermore, the trainer has the task of interviewing the persons for the project teams to implement the key objectives and name further stakeholders. Thus, the previously defined participation concept can be individually adapted to best support organisational development.

### 3.2.5 Sub process 4: Define, Implement and Experience the Work Assignment

The aims of this sub process are to

– analyse the learning needs and general conditions of the concrete learning target group in detail

[32] 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

- 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

After successful validation, concrete work assignments are formulated for the prioritised intermediary objectives. But before the actual development of a learning field strategy begins, the trainer takes care of defining the work order. This creates the basis for a trusting relationship with all parties involved. For in the interest of transparency, expectations and the scope of the assignment should be discussed openly, whereby the time frame and costs are fixed, and the scope remains variable.

The contact persons for **clarifying the mandate** are the relevant decision-makers, such as master workers, line managers, budget responsibilities, and the project team. In countries such as Germany, work councils are legally entitled to be informed about any training initiatives. Their consent is required for several measures, e.g., collecting and processing staff data. 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)?
- 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 sub process:

- 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)?

This will help counteract responsibility diffusion problems as early as possible, and responsibilities can be distributed among the project team. At best, one person is responsible for the technical content and decisions, for example, the department manager for induction processes or the human resources department for management development. Furthermore, there is a need for colleagues who support the analysis, conception, and implementation.

Possible candidates are staff from the personnel development department for the didactic concepts, the marketing or IT department for the graphic preparation and technical implementation of digital media. Another possibility is to involve employees or trainees in media production. The educational project "KFZ4me" has shown that participation drives both personnel and organisational development. On the one hand, the trainees learn by preparing

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the learning content. On the other hand, digital media are produced by the trainees, who in turn develop media skills.

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. Not every technical solution is suitable for the problems and needs of the learning target group. For example, learning videos with sound are unsuitable in noisy working environments. One possible solution is the creation of soundless videos. Similar to silent films, the images must convey the messages and be self-explanatory. In silent movies, this was accomplished through theatrical, exaggerated movements and dialogues on text panels. Currently popular are animations with "text inserts" that convey knowledge. However, knowledge of the technology of making animations only makes sense when the environment of the learning target group has been understood.

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

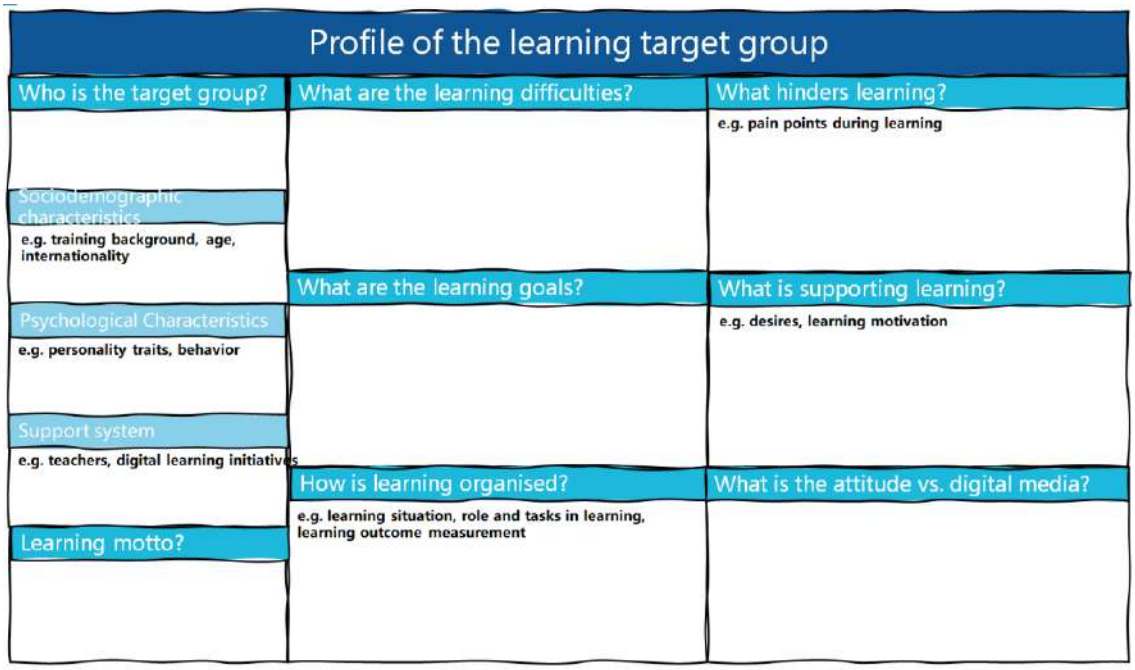


Figure: Profile of the Learning Target Group

Even if the analysis effort seems high, it can help to avoid errors and reduce risks. However, if an inconsistency is discovered after media production, changing the digital medium is nerve-racking and much costlier.

At the level of the team process, intensive involvement with the learning target group helps build consensus and make decisions. In addition, it is possible to check the key objective's assumptions (see sub process 3), especially the needs and offers.

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Then it is useful to look at the "learning journey of the learning target group." As in seminar planning, learning goals and learning content must be determined. In addition, a focus on the activity of the learning target group is needed since digital learning is much more work-integrated and self-organised.

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 occurs 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? | |

Figure: Learning Journey

Digital learning brings opportunities and a higher responsibility of the learners themselves in the work process.

Therefore, the elements of the learning journey have to be reflected on the criteria of acceptability of the learning process. When considering the limitations, the trainer pays

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attention to the "problem trance" problem (sub process 1). Acceptability criteria can help to counteract these identified obstacles in the long run.

The SCAMPER model is another approach that helps you find ideas and optimisation proposals for your learning field problem. It is similar to design thinking; however, it focuses more on finding unusual and creative solutions to problems and coming 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 results 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. However, by combining digital media with face-to-face learning, the learning field will 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 seeing 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 initially 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 entirely against their original purpose to see the learning field from a different perspective.[33]

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

[33] Thinking Methods: SCAMPER (ideaconnection.com)

| Criteria 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 behaviour | 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, 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 company's law department, the lawyers are being informed about legal changes by a newsletter. The content must be correct. An additional webinar is being organised 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. |

Table: Criteria of Acceptance of Explainer Videos[34]

In summary, the quality characteristics describe how the application should work (technology). It is a combination of technical requirements and the learning target group. A design sketch extends the technical description to develop a prototype. Depending on the type of application, the purpose of the design sketch and the maturity of the learning target group, the procedure differs (organisation).

[34] Adapted from "Qualitätsmerkmale ISO 9126"

| Design sketch | Description with purpose |
|---|---|
| Storytelling,<br><br>role play, read-it-out-loud | Description of the function of a solution to obtain initial feedback ("works-like-prototype") through storytelling or role-playing |
| Storyboard<br><br>(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<br><br>(chapter: podcast) | Structuring and lively preparation of auditory content |

Table: Procedures for the Development of Design Sketches for Explainer Videos[35]

The design sketch contributes to transparency and can be used for evaluation purposes. The learning target group can use the various prototypes to provide direct feedback to the project team so that the digital media can be adapted and further optimised if necessary. This reduces the probability that the actual digital medium is a misproduction.

| Evaluation method | Description and purpose |
|---|---|
| Onsite survey | fast feedback from the actual learners of a digital medium ("feedback button") |
| Online survey | a 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 |

Table: Methods for Evaluating the Design Sketch for Explainer Videos[36]

In summary, the fourth sub process clarifies what is to be achieved with the digital medium and how learners can accomplish this. By using the analysis tools, all the information is now

[35] 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

[36] https://www.usability.de/leistungen/methoden.html

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available to create an effective intermediary goal. Finally, the media production process details are explained in chapter 4 (use of media in WBL).

An action goal is a valuable and acceptable sub goal that can be achieved at a certain time under the given framework conditions. Due to its concreteness, each action goal is measurable and validatable. Ideally, the concretisation includes various indicators to monitor and assess the progress of the project systematically. The action goals also include concrete technical requirements with acceptance criteria.[37] Nevertheless, **the way to implementation is negotiable** and must be discussed in the project team.

Accordingly, the project team needs sufficient information to be able to assess the effort, value and implementation tactics of the action goal. It is, therefore, helpful if action goals are subject to a few external factors of influence, such as external supplies. The project team is responsible for achieving the intermediary goal. For the realisation of the action goals, one or more persons take responsibility for the implementation. At best, the action goals are scheduled in such a way.[38] a regular evaluation of the digital medium and team reflection[39] is possible. In software development using SCRUM, a maximum of four weeks has been proven to be the best way to promote the development of individuals, teams and digital media. For each planning meeting, the trainer, therefore, has the task of planning the reflexive arrangements.

The **art of the project team** is to find a suitable selection of intermediary objectives and the target group-specific definition of the vision. Ideally, we start with the least risky ones, at which point the experiential knowledge is used as a resource to deal with the more complex and uncertain intermediary goals. A distinction is also made between tackling **urgent** objectives right away and making time and setting a schedule for working on the critical objectives. **Urgent** assignments are characterised by the fact that they lose their meaning in the near future, for example, due to deadlines, disruptions, or soon avoidable risk factors.

An example of **urgent** work assignments could be an emergency reaction to the loss of vocational schooling for trainees during the Corona pandemic. In this crisis situation, the company has to find a quick, pragmatic solution so that the training as theoretical learning could continue. At the same time, this usually is not a normal part of in-company learning. However, it might be assessed that such fall-back plans have to be a permanent part of the learning system in the future. So this emergency reaction might result in a new intermediate goal for improving the overall learning system.

In contrast, you can respond to **important** work assignments in a considerate manner. However, they have a strong influence on the achievement of objectives and therefore require special attention. For example, in the CoDiCLUST project, the introduction of an LMS was often

[37] definition of done, ready user stories

[38] Sprint planning

[39] Sprint retrospective

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seen as an important intermediary goal by the project partners to create a good foundation for digital learning infrastructure that can be used flexibly in the organisation.

**The trainer** has the task of discussing with the members of the organisation when drawing up the roadmap. This is also the last step of the people-centred strategy formation: organisation.

**Once it is clear who the learning target group is (people) and how the digital medium is to be used (technology), it needs to be clarified: How can the digital medium be produced efficiently and effectively?**

In this context, it is worth mentioning that it depends on how it forms and implements the strategy. For example, in smaller companies, it is quite conceivable to work out the roadmap with a small group representing the whole company and implement it jointly after approval by the decision-makers.

In larger SMEs, developing individual learning field strategies with individual departments or units can be more effective, such as induction and CVET. The implementation of the strategy is then carried out in cooperation with key players in the individual departments, where relevant, supported by human resources development units and/or technical specialists on the respective work process or the production of the digital media themselves.

Given this, it is crucial that the trainer knows the organisation well and that the distribution of roles is clear. Decision-makers must, after consulting with the learning groups, set the priorities. Of course, the trainer can help with prioritisation and should keep the priorities in view across disciplines and topics and intervene accordingly if the overall strategy is disturbed or influenced by individual sensitivities.

**Therefore, the strategy developed is** not a working paper but **a commitment** by all parties concerned. However, a commitment is not a promise that the roadmap that has been drawn up will materialise in exactly the same way. It is always a snapshot. By commitment, we mean that we can rely on those involved and those responsible for doing everything possible **to achieve the defined guiding and intermediary objectives**. There is never a one hundred per cent predictable and plannable procedure in an organisational change process because of the many unknowns that only arise in the work process. Promising on-time delivery would also affect employees' cooperation and learning process, which is what organisational development is all about.

Accordingly, it makes more sense to plan the procedure realistically according to the current state of knowledge and **adapt it regularly** (sub process 6). **The trainer** has the task of evaluating with the participants what has been achieved and achieved and which surprises occurred, and finding a suitable procedure to deal with the changed framework conditions in the best possible way. In addition, he or she moderates the reflection sessions on team development, and coaches individuals. Suppose the participants cannot commit because of

obstacles, dangers or fears. In that case, the trainer has to discuss, mitigate or eliminate the issues, record a joint commitment and communicate it to the management.

The development of a roadmap is also a **competence-building measure**, as the learning field has to be explored in detail. Many relevant persons have to communicate with each other intensively when the planning is done. This intensive examination of opportunities, risks, approaches and target hierarchies is a success factor for the change process. It helps all concerned understand better the details and the overall logic of the respective process.

Extract from the t**rainer role profile**

The trainer creates a framework for clarifying tasks and roles and facilitates a joint commitment from all project participants.

The trainer invites those involved to participate, promotes cooperation, encourages reflection and supports competence building.

The trainer acts as a process consultant, focusing on supporting the process 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).

### 3.2.6 Sub process 5: Reflecting and Evaluating the Work Assignment

In the subsequent phase, the magic of organisational development is created, described by Stahl's learning spiral.[40] Empirical process control creates an iterative, incremental process. The learning experiences thus flow directly back into the work process of organisational development. This effect is also the aim of phase 5: reflecting, transferring, and communicating the mission. In this course, 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**.

Similar to a navigation system, strategy building requires a reflexive examination of the starting point (where do we find ourselves?), the desired destination (where do we want to

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

go?) and the means of achieving the target (how do we get there within a specific period?). If we are on the way and the strategy is implemented, we need a regular review of the current location (where are we up to date?) and the funds used up to now (what did we need so far?).

This **iterative** approach to the desired target has two benefits. On the one hand, it serves **risk** management to reach the desired destination using available means, **identify possible obstacles in time,** and develop new solutions ("fail cheap!"). Secondly, reflection serves as a **driving force** in which experience as a resource feeds into strategy building and thereby accelerates the implementation of the strategy. In the course of this, the trainee has to encourage the following reflection processes.

**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 actual achievements?

The expenditures used (inputs) and the actual learning success of the learning target group (outputs) are essential success factors of the digital medium. For this purpose, learning target controls were taken into account in the design process to systematically record the **quality of the digital medium** at the implemented time.

After the digital media has been implemented, the actual learning outcome should be assessed. The trainer initiates an evaluation process in which, together with the learning target group, it is examined whether the selected digital medium fulfils its purpose. In addition to the **traditional** learning goal control (to what extent have the learning objectives been achieved?)**, the learning experience** of the digital medium should also be evaluated (how acceptable is the use of the digital medium?).

This assessment is vital to measure the effort and yield of learning. Even with a poor design and navigation system, the desired learning goals can be achieved with a particular, probably increased effort. However, these efforts have a direct effect on learning, especially on media socialisation. In the learning experience, the employee makes individual experiences through interaction with digital media. Consequently, **socialisation with digital media** has to be viewed and evaluated (what do media do to people and vice versa?).

- 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?

This discussion is necessary for the trainer to learn more about acceptance criteria for further assignments. In this context, it is also required to evaluate the digital medium's further impact on the learning target group (outcomes).

Within this experience, situation **emotions** play a central role because they are the motor for our actions (how does the employee perceive the digital medium?). For example, this determines how eager and effective employees learn with digital media. Experiences are stored in connection with an emotion in the brain as memory and influence our attention, judgments, and behaviour. This is especially true in the case of negative experiences. Even if the wealth of experience is continuously refined over time, the initially small sphere of activity significantly influences the overall and long-term personnel development. For this reason, the learning experience is to be considered as well as the learning goal. The learning experience includes the experience before use, during use (usability), and after application.

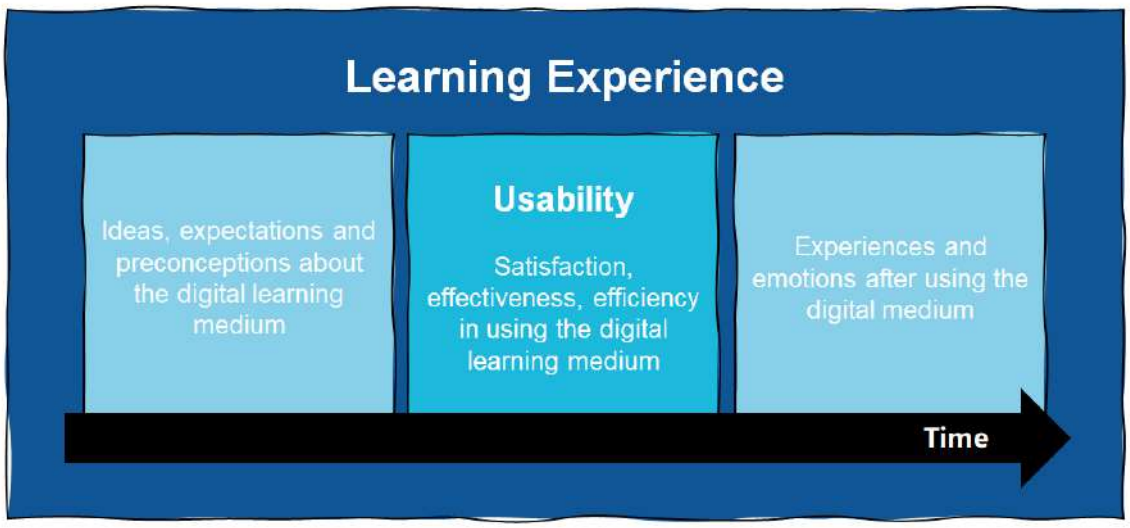


Figure: Learning Experience and the Impact on the Learning Outcome

The project review helps to identify essential aspects of the learning experience and influence it accordingly (sub process 4; see “learning profile” and “learning journey”). With the help of these work aids, ideas, expectations, and prejudices of the learning target group can be captured for the most part. The usability of the learning experience can be influenced by the direct feedback of the learning target group. Due to the iterations, the feedback becomes more and more concrete and ideally approaches the desired state (sub process 4; see "design sketch"). With the help of the evaluation, the experiences and emotions can be determined after using the digital medium (sub process 4; see “evaluation methods”).

Finally, it is once again clear that an **agile approach** is helpful for the efficiency and quality assurance reasons. The approach thus promotes the task of fulfilling the actual learning objectives. Therefore, in the project review of the project completion, great importance must also be placed on the milestones to make the development process and the learning experiences transparent. At this point, it should be mentioned that the trainer does not take

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over the maintenance of the digital medium (operations), but at best, takes place directly in the learning field.

**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-organise increased?
- Is the group better prepared to identify its learning needs?
- Is it better prepared to produce better digital media?

Self-organisation and commitment are the magic words in times of digital learning. The joint project work creates an ideal framework for developing reflectivity, innovative strength and decision-making skills. The trainer creates a space within a work assignment for this competence formation.

The project retrospective aims to create a constructive, trustful and open review of the project team to learn from past experiences and improve cooperation for future objectives or work assignments. The trainer organises the meeting after the end of an iteration or the completion of the project. Good project retrospectives promote the positive conclusion of a development step. Poorly executed and moderated project retrospectives, on the other hand, can be pointless and exhaustive. Therefore, the trainers take on the role of moderator.

The project retrospective is a collaborative process of all participants. Because of this, all project participants identify what went well in the work process and what could be improved. Meanwhile, ideas have been discussed that increase the productivity of the project work. In addition, conflict areas are identified and dealt with, obstacles are uncovered and resolved, and improved communication. For this purpose, the trainer discusses lessons learned together with the project team and prioritises beneficial actions and measures. The overarching purpose of the project retrospective is team development in the form of team spirit, structure, and commitment of team members.

In general, the success of a project retrospective is measured by the involvement of project participants. Accordingly, the issues should be relevant to everyone, and the discussions should be aimed at the whole team and not individuals. The trainer takes on a different date for all other topics that concern only certain groups of persons or individuals. The result of the project retrospective is a list of feasible measures that improve the project process and teamwork. As a result, the project retrospective is a framework for demonstrating, discussing, and jointly developing optimisation approaches. The trainer ensures that the project retrospective takes place without hectic activity and in regular form.

With the help of the project retrospective, experience is recognisable. Reflection is the first step in the work-integrated learning process to **transform the experience of knowledge**. After

the transformation, the documentation and communication of the findings follow. Finally, these experiences can be incorporated into the work process, whereby both media competence and the interdisciplinary competencies of the project participants are trained and expanded.

All these aspects of ***personnel development***, of course*, impact* the organisation (impacts), such as structures, processes, and culture. Accordingly, the learning experiences flow directly into the organisational change process in interaction with media and in project work. Accordingly, the trainer has to assess what the task of work in the organisation contributes to (what influence does it have on the organisation's structures, processes, and culture?). This type of reflection contributes to **organisational development** (sub process 6).

In summary, organisational development means consistent personnel development and vice versa; personnel development processes result in new forms of organisation in the work process. This creates a ***learning spiral*** that contributes to the incremental development of the individual and enterprise. The phrase" power *of habits*" makes this clear. People tend to repeat decisions even when conditions change. According to this, past behaviour is a good predictor of future behaviour. Habits require little attention because they are **spontaneously triggered by a situation**. Therefore, it is often difficult to change the unconscious processes. Usually, motivation is not enough to create **new routines**. It takes time, training, encouragement, and support to learn new behaviour.

The following methods can be used for project retrospectives:

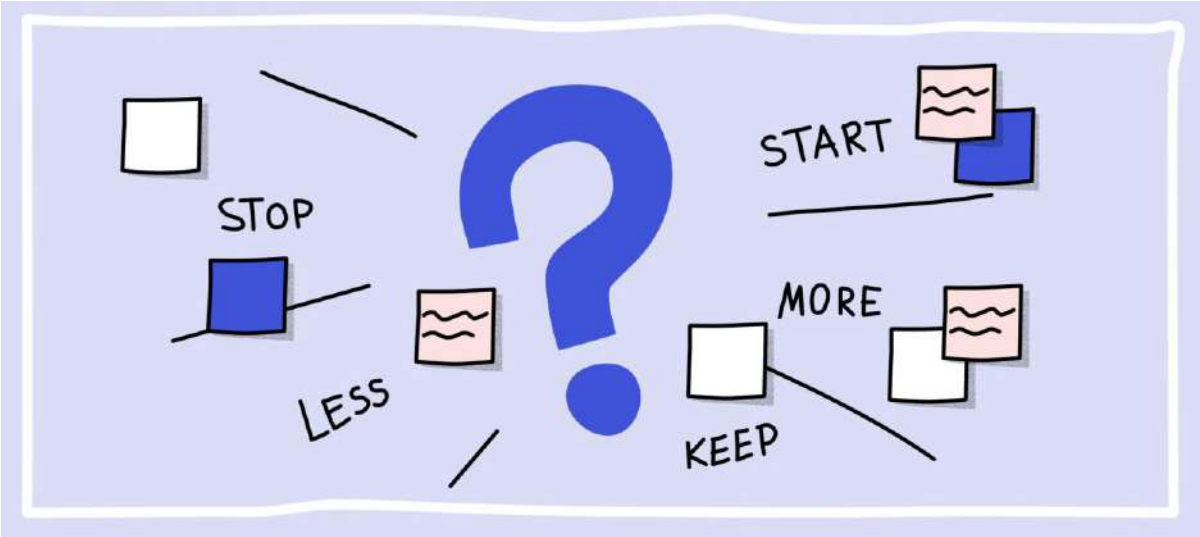


Figure: Stop-Less-Keep-More-Start

Therefore, the transfer mission of trainers consists of communicating the immediate results and, at best, supporting them with marketing elements. In addition, the trainer also has the task of transferring the indirect consequences to promote the organisational development process (sub-process 6). The organisation's feedback and error culture are sustainably shaped in the guided reflection processes, and interdisciplinary competencies for the digital learning

world are developed. These include self-organisation, commitment, reflectivity, teamwork, innovative strength and decision-making. These go hand in hand with the agile values: responsibility, focus, courage, respect, and openness.

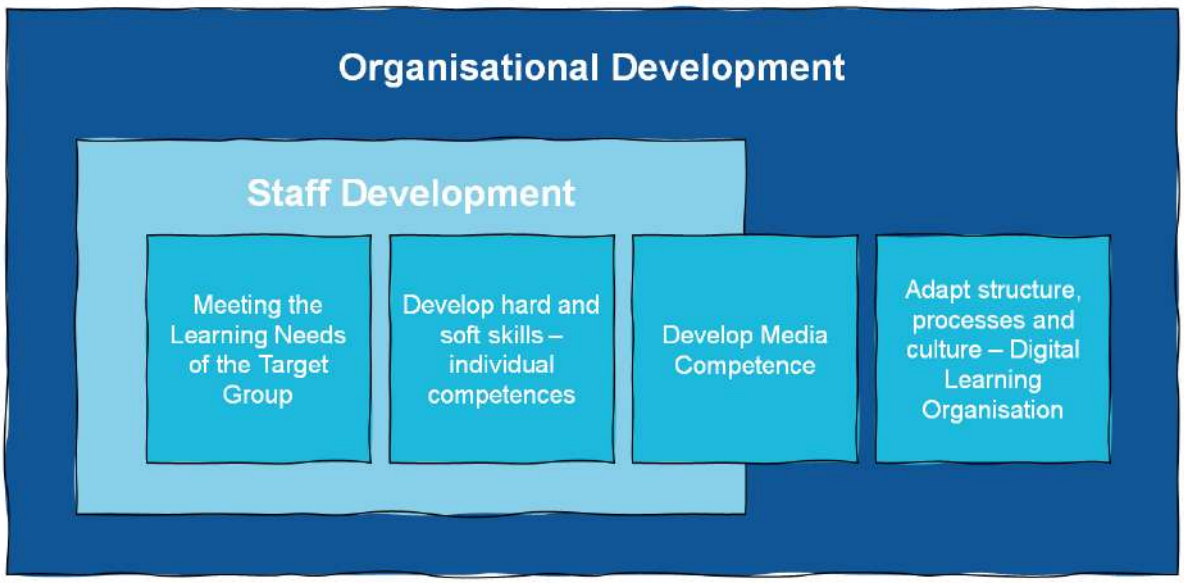


Figure: Staff Development and Organisational Development

### 3.2.7 Sub process 6: Transferring and Developing a Follow-up Strategy

The trainer has the credo: Understand the past, analyse the present and shape the future.

After the learning outcome has been quality assured, the work order has been evaluated, and the teamwork reflected, the past has been reworked. The status quo is recorded and can now be set about the desired vision or actual conditions. In the sub process, organisational development is, therefore, more prominent.

Generally, they are two ways of developing a follow-up strategy. On the one hand, the trainers and the workgroup evaluate the learning outcome to transfer the learning experiences and good practices to other learning fields. On the other hand, the learning outcomes, 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 organisational 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 organisational change throughout the organisation. 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?

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- 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 competencies 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?

On the other hand, the current state of the learning field should get recorded by the reproduction of knowledge. Then, using the digital learning canvas and digital learning roadmap and all explained work aid, such as the learner's profile, the trainer, and the workgroup, get an overview of the status quo. On that basis, a follow-up strategy is developed. Often, these developments, which take place step by step, have a significant impact at a later stage (how can the implemented digital media be continued in the same learning field?). This is followed by the *reorganisation* of insights (to what extent can the selected digital media be used for other learning fields?), and only then does the *adaptation* of experience arise (to what extent can the digital media used to be adapted and expanded?). The transfer is, therefore, to be understood as a process promoted by the trainer.

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, organisational resources) and by increasing attention to the relevance of "digital learning" (e.g., project marketing, trend scouting). *In addition, 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 sub process starts again and then takes place on a rolling basis until the achievement of the vision is satisfactory for all parties involved.

Roadmapping is a process of methodological socialisation, i.e., a conscious and planned influence on the employees to learn the media skills, for example, in the form of training on the operation and use of a digital medium. Nevertheless, in workplace environments, pure formal learning is insufficient because every work process requires adaptation. Accordingly, it

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is also about the development of competencies. The employees must be given room for individual, mental maturation.[41] This aspect of media socialisation depends on experience and involves individual learning processes (work-integrated learning).

Each employee contributes actively to the media socialisation of the organisation.[42] One example is optimising and expanding digital media based on experience and best practices. In summary, employees should play an active role in producing digital media to shape the organisation's media socialisation and digital culture.

[41] See "Constructivist theory", e.g.: Reich, K. (2010): Systemisch-konstruktivistische Pädagogik. Einführung und Grundlagen einer interaktionistisch-konstruktivistischen Pädagogik

[42] Niederbacher, A.; Zimmermann, P. (2011): Basic knowledge of socialisation: Introduction to socialisation in childhood and adolescence. Wiesbaden.

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# 4 Digital Media Production

As described above, the competency to actively produce digital media is one of the core competencies of coaches and trainers. While a good proficiency in media production is certainly desirable, it must also be mentioned that the production of media for use in vocational training follows different rules from media for social media and/or professional media production. Commercial image videos or instructional films produced by professional companies cost around €2000 per minute without the development and scripting. This is an amount that is prohibitive for many uses in training. The use of such films is limited to very general topics in which a high number of users can be expected so that the cost is widely distributed. The more common YouTube videos, on the other hand, are now also often produced to quite professional standards, but in any case, they are made to attract and retain an audience through entertainment and funny hosts/protagonists. In the chapter to follow we do not cover such videos: The requirements for useful explainer or instructional videos for workplace learning is not to appeal to thousands, but to be useful for those in the company who need the specific content. They also need not be entertaining, as it can be assumed that the users will be intrinsically interested in the content. Also, the visual design does not have to be flashy or even technically perfect, if they are good enough to clearly show the information. The general rule is to use the least possible resources to do the job. This means the less time is used for shooting and cutting, the higher the probability that such media are in fact produced. We discuss some general rules and tips for production as examples of explainer videos. Similar rules apply to audio material, graphics, animated videos, etc.

## 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.

There are several ways to proceed in the production of learning media. On the one hand, learning videos can be purchased ready to use. The disadvantage here is that the content is not specifically tailored to the company and often does not correspond to the corporate design.

It is possible to order learning videos externally. This procedure is less time-intensive but can be very expensive. In addition, a high degree of communication is required, as there must be constant consultation between the provider and the client.

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. However, it must be considered that the high-end quality of a film production

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company cannot be expected. Nevertheless, with some practice and knowledge, it is possible to produce acceptable media.

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.

### 4.1.1 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.

The preparation phase stands for pre-production. Here it is a matter of conceiving the medium and planning the production steps precisely. Depending on the medium, different intermediate results can be achieved here. In any case, this includes a kind of basic concept, an outline or script, a visualization if necessary and in any case a production plan, i.e., a to-do list for the next phase of production. In the creation phase, the preparation steps are carried out. The last phase is the post-production phase and it is roughly oriented towards post-production. For the creation of digital learning media, some areas have to be added, which would not be included in the post-production area in normal film production.

**Preparation**

What do we need the preparation for? The preparation phase is the most important. 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.*

The basic concept contains all the basic conditions that have to be observed.

These basic conditions are partly to be evaluated individually for each project and partly the same for each project of the company. For example, medium and target groups can differ in

each project, but the existing equipment, budget and legal framework remain the same. It is important to evaluate these basic conditions again and again so that they remain up to date.

Most of the time, this preparation phase begins inconspicuously. In the beginning, there is the task to create a learning medium about certain content.

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?

It makes sense to think of a structured collection of questions that need to be answered. From the answers to these questions, the general conditions for the learning medium should first of all emerge.

**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:**

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Figure: Basic Script Template: The basic concept should help to order the chaos and get a clear line in the idea (adapted from the "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.

How is the learner guided through the content? Should storytelling methods be included, or is an introduction and a summary at the end sufficient?

After the questions from the catalogue have been answered, there should already be a clearer picture of the finished learning medium. This should be formulated in the next step. This means that everything visible and spoken text are formulated in an outline or script. This helps to better calculate the length and production effort.

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Illustrative material: **Script**

The script describes the scenes. One is easily tempted to describe what the viewer should see/learn in the picture. Instead, it is important to describe what should be seen in the picture and what the text is like. Then you can test (in combination with the storyboard) if the desired effect is achieved.

Standard format from film: (Corresponds to about 1min per page - works in explanatory video only conditionally, since description and dialogue do not always correspond to the usual film relations)

Font: Courier
Scene start: Headline:

```
Int/Ext                    Place                    Time

Description of the action

          Narrator
          Dialog indented center
```

On this basis, screenplay structures can be modified for your own purpose.
Animations and interactive elements should also be described in the script.
It is advantageous to document and use your own templates. This is helpful for a quick work flow.

[Note:
Introduction
Relaxed dog
Nervous dog
Summary
test]

Illustrative material: **Script**

A script for an explanatory video can look like this:

**Title:** Explanatory film about dog psychology - recognising relaxed dogs

**Learning content:** The viewer can distinguish a relaxed dog from an excited dog in everyday life.

**Target groups:** Dog owners, (to go for a walk without danger), shy people, parents (risk assessment)
**Duration:** 45 seconds

**INTRO**
(Dog School Logo - Headline Subject)

**1. Split-Screen  Photos: Aggressive dog/ sleeping dog**

**Voice over**
This video shows you by which body characteristics you can recognize whether a dog is relaxed or nervous. It can help you to identify which dogs you should avoid. Of course a certain amount of caution is always necessary, dogs are not always predictable. However, knowledge of physical characteristics can help you to better assess everyday situations.

**2. Slide  Overview Procedure Video**

**Voice over**
First I will show you the characteristics of a relaxed dog. After that I will show you the characteristics of a nervous dog and what the differences are between a joyfully excited dog and a tense, impressive dog.
Then you can test your knowledge in a quiz.
At the end you will see a short summary.

**3. Animation  Scheme (drawing) relaxed dog**

The animation shows with arrows the corresponding areas of the dog, which point "down". Before (neutral) - After (relaxed)

Illustrative material: **Script**

**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.

CoDiCLUST

Illustrative material: **Script**

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)

Figure: Basic Script Filled in: The basic concept should help to order the chaos and get a clear line in the idea (adapted from the "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.

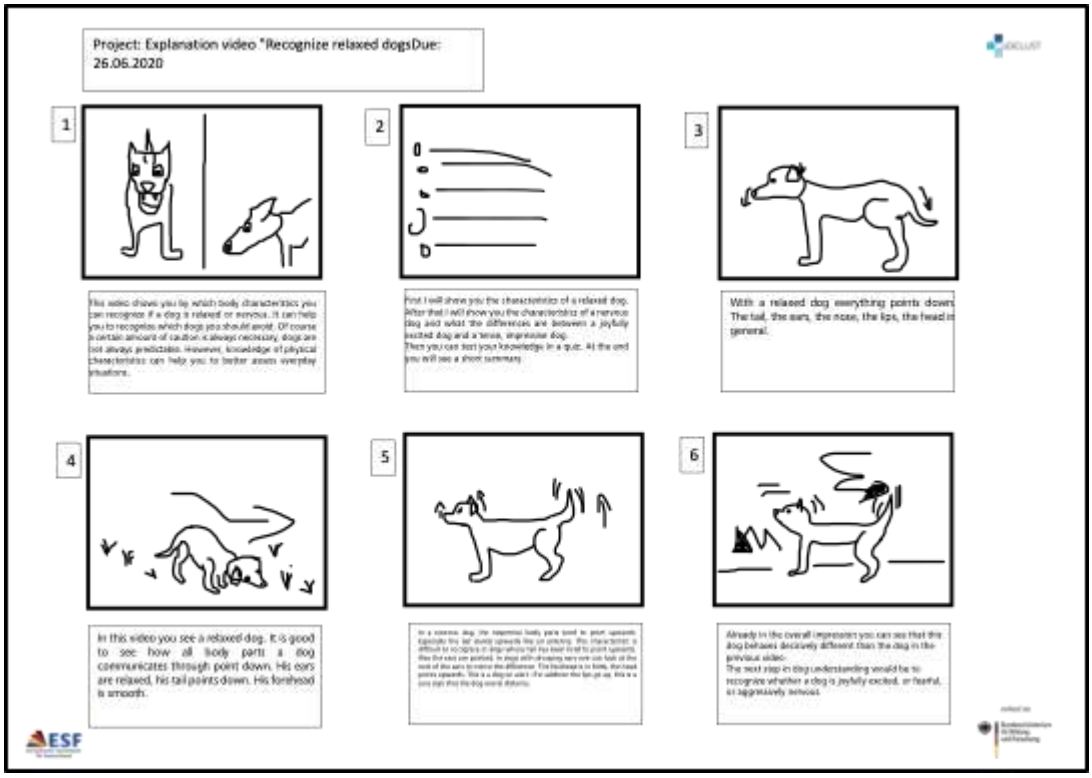


Figure: Storyboard (adapted from “CoDiClust” project).

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.

This plan consists of a table that lists each individual part of the medium, including the creation period, people and objects involved, equipment, etc. This plan is the starting point for the next two phases and should therefore be worked out thoroughly. The more precisely this plan is worked out, the shorter the phase of creation.

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Demonstration material: **Production plan**

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 | |
| | | | | |

Demonstration material: **Production plan**

**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 H5P click element | | Animation Screenshot |
| I2 | 8 | Quiz | | |

Figure: Production Plan: The production plan functions as a structured to-do list (adapted from "CoDiClust" project)

## Visualization

The advantages of visualization before the realization phase are clearly time-saving and reducing frustration. A small visualization can help to already recognize problems in the preparation. Often you can get a better idea of the result with a sketch. Especially if you try to combine creative means with didactic methods, this little sketch can help you to make a decision. And when larger projects such as videos, playful elements and entire e-learning courses are added, a storyboard is essential in the preparation. Especially in the beginning, when you still have to develop your own routine to create e-learnings, accurate visualizations help to implement them. Later you can judge for yourself when a sketch is useful.

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

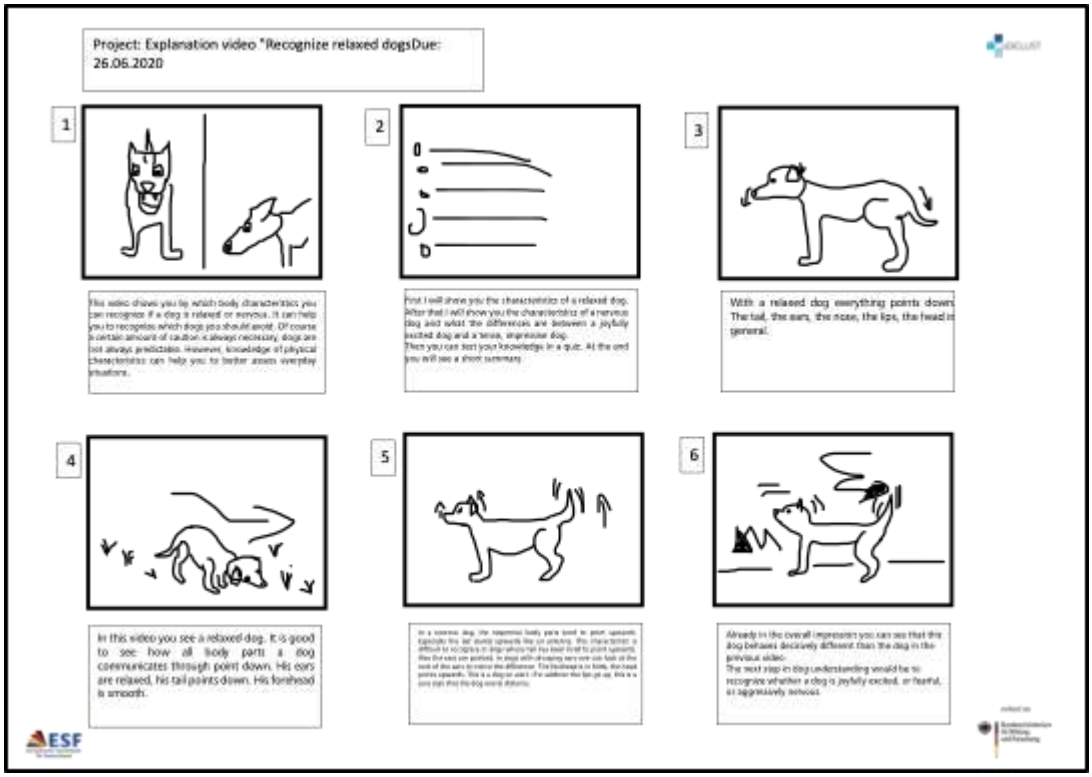


Figure: Visualisation is your friend (adapted from "CoDiClust" project)

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.

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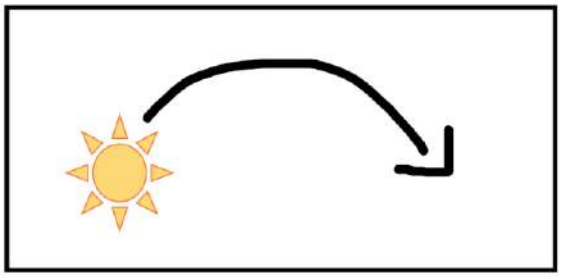
There are many ways to create a storyboard. On the one hand, it depends on what you want to do at all and on the other hand, what your preferences are. If you're already a PowerPoint professional, there's little point in learning a storyboarding tool. But the easiest way is to sketch the whole thing on a normal piece of paper.

*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)

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**Creation Phase**

After all preparatory steps have been carried out, there should now be a concept in which the framework conditions and learning objectives are set. In addition, a script in which our project is described in writing and a storyboard in which we have at least visualized the most important pictures. This resulted in a production plan, which is now a kind of to-do list. This list is the most important document in the creation phase. The other documents remain as reassurance during the creation or as communication support with employees.

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. During the creation of the raw material, it is important to ensure that, on the one hand, the specifications from the preparation are met and, on the other hand, that the material meets the company's own quality standards.

The creative quality of a learning medium is not synonymous with making it look good. Rather, it should be conducive to learning, which includes that the more one is distracted from the actual learning content, the less one is absorbed by the learning content. These possible distractions include an overloaded picture on the one hand and errors in recording on the other. If, for example, the focus does not remain on the object, this is perceived as a disturbance and the learner's concentration is distracted.

The preparation phase is therefore extremely important because only if the content to be produced is completely clear can all attention be paid to the creation of the raw material, thus reducing the number of errors. In the following points, the most common errors during filming are listed. During the recording, more disturbing factors may occur. The list should therefore be supplemented individually.

- *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 working. Especially if a long shoot is planned or many external people have blocked this appointment.

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- *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 are 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 colours 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 post-processing phase includes the compilation of the created raw material, its implementation and testing. As in the preparation phase, a good organisation can help to make the process more effective. After all points of the production plan have been worked through, all material should be available in digital form.

The first thing is to view and sort the material recorded. Recordings that are shaky or otherwise of poor quality should be directly excluded and deleted to save storage space. Shortlisted recordings should be renamed accordingly to make them easier to find later. If the file name can include the respective picture number from the storyboard, this will be a great help in the next step. Material that is only intended to be used as a gap filler or replacement should also be named accordingly.

For the next step, 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.

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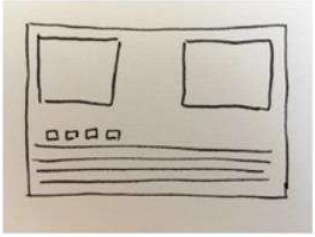
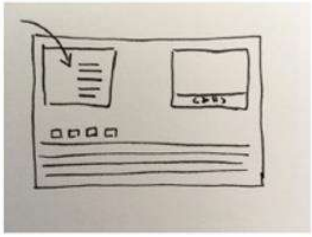
**BUT HOW DO YOU CUT?**

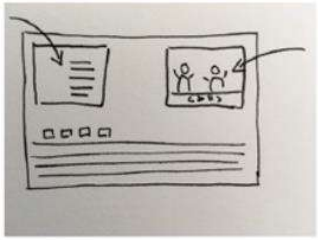
All cutting programs work according to a similar pattern:
There is one work surface:



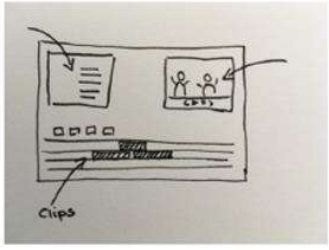
Mostly a window in which you can sort your raw material, i.e. video clips, slides, pictures, sound recordings etc:



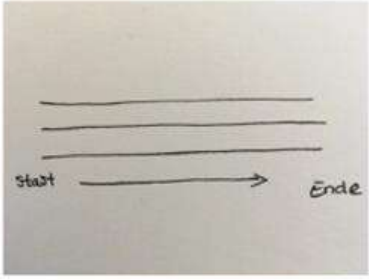
There is a preview window in which you can view your project:



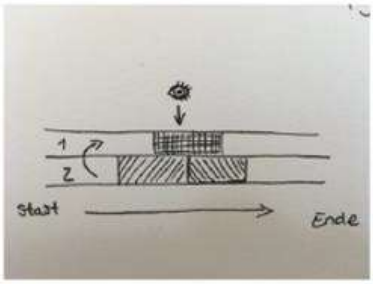
There is a timeline in which all tracks are located:



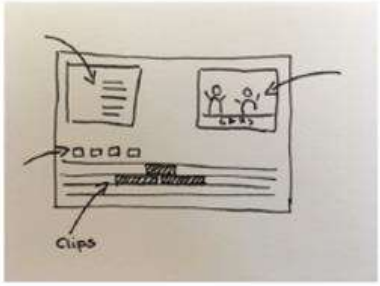

The timeline works linear (like time) from left to right.

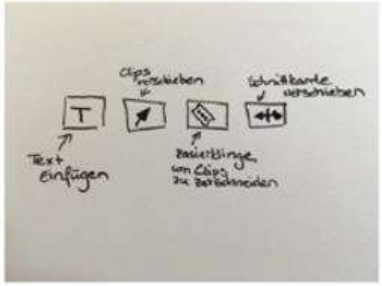



And from bottom to top, like a stack of paper. That is, the top track overlays the bottom track, and so on.




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.

Figure: Cutting

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After the visual part of the work has been put together, the sound should now be edited. If the sound is only recorded now, the audio track must then be placed under the video. After all, tracks are in the timeline, the volume of the video is adjusted.

If desired, subtitles should be inserted into the video as the last step before rendering. They should be easy to read. A so-called belly band, a high-contrast colour bar under the text, makes them easier to read.

The next step is to export your video. This means that all the tracks and clips will be saved into a file that can be played by a video player later. This file can have for example the extension .mp4 or .mov. The resolution and the aspect ratio must correspond to the format that is compatible with the learning platform. A video for the internet does not have to be of cinema standard.

The optimal format requirements can usually be found on the websites of the platform providers or can be obtained from the respective system administrator. Before the video is uploaded and put online, it should be tested in any case. On the one hand on the self-created quality criteria, on the other hand by a third person, who pays attention to comprehensibility and errors. Even if no more changes can be made in this project, the process is important for future processes.

### 4.1.3 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. This is what the first part of the chapter is about. The decision for the right equipment is the subject of the second part.

**Media Format Selection**

Although this chapter is mainly about making videos, it is important to know in which cases this medium is appropriate and when another medium is more beneficial.

Often, when selecting a media form, the software or tool that has been in use for a long time or is currently in vogue is used as the starting point. If one has already had some experience, this can certainly be assessed, but a change of perspective should always take place. That means, especially if there is no general teaching concept yet, the decision for the media format should be thought from the direction of the content to be taught.

To be able to assess which digital learning medium is suitable for the content, knowledge of the different learning media must exist and there should be an understanding of their advantages.

There are visual, audio and audio-visual media. In the following section, the media and their advantages and disadvantages are listed. However, it should be remembered that there are

different formats, which will only be discussed in isolated cases. 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 media can also be equipped with interactive elements, so that the user does not only passively consume the content, but also has to become active himself to support his learning success. As mentioned, the contents can be processed with any of these media. But the medium is not always useful.

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?

On the question of "what is to be taught" one can refer to the keywords "proportionality" and "use" orientation. Proportionality means the relationship between production effort and learning content (e.g., the difference between an apple and a pear should be shown). For this purpose, no elaborate explanatory video has to be created. A diagram or a photo is completely sufficient here.

However, if you want to teach about the cultivation of apples and pears over the centuries, a more elaborate media format may be worthwhile. The benefits are more related to the strengths of the individual media. While no video is needed to describe a bird because it can be shown well with pictures and little text, a video can be more suitable for the courtship dance of the bird of paradise because the movements are harder to put into words.

The medium should also be adapted to the target group. If the target group is overstrained by the operability of the learning unit, the desired learning effect cannot occur. This means that people with less affinity for the media can handle a text better than an interactive video.

The definition of the target group also determines the accessibility of the learning media. If the computer or tablet on which the course participants are to learn cannot be made available to them, it must be ensured that they have access to the learning media elsewhere. This also means that e-learning can only be prepared in the way that users can access it. For example, the research team in the jungle with low internet reception cannot be sent an explanatory video on the latest safety regulations. In this case, a PDF with small amounts of data should be chosen.

Regardless of the target group and the content of the course unit, the conditions required for the creation of the course unit must also be fulfilled. This includes the question of whether

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budget and technology are available for this product and whether the corresponding media format can be created in the time until publication. When all these questions have been clarified, a decision can be made on the media format. From the decision of the media format, the selection of the required equipment can also be derived.

**Equipment Selection**

The selection of the equipment is divided into hardware and software. The following section can help to decide on a tool or piece of equipment. It is not a recommendation but a guideline to find the right purchase. After every section follows a section describing some examples. Those are listed to get an insight.

*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. Even if an explanatory video should be the right medium for the learning content, you first need to know what kind of video to produce to know what hardware is required. A longer planning and testing phase can save time and money in the long run. This means working with already existing hardware, even if it is only the smartphone. From these tests, it is possible to deduce what features the required hardware needs to have, and then the right device can be purchased. It is perfectly okay to experiment at the beginning of the learning phase and perhaps borrow different devices to test what is necessary. It also helps to set up a detailed learning phase for the hardware, because the better you know a device, the easier and faster you can work with it in the long run.

Of course, you can already achieve a lot with a smartphone. But those who often want to film small details will have more success with a reflex camera or a system camera and a good object.

If one often works at the table and wants to film work steps, one could think about the acquisition of a document camera.

For all cameras that work not only in automatic mode, but it is also worth knowing what "colour balance and exposure time" actually means. These settings favour even light and colour impressions in the pictures.

Video suggestions:

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Color Balance:

Exposure:

With a camera alone it is of course not done. In most cases, a tripod is also needed. But if you have to film out of hand frequently, you could be better equipped with a gimbal than with a normal tripod.

These handheld tripods have an integrated system that makes the shaking of the hand appear smoother or even out so that the shots become more fluid.

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 speaker

.

Additional light can also be helpful if you need to record work steps where the details should be visible.

For larger but rare projects, more complex equipment can be rented before expensive purchases are made.

*Hardware Selection 2*

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

For the cameras, a good luminosity in conditions without daylight should be the main criterion. As an example, iPhones (from edition 6) as well as Samsung mobiles from generation S 7 yield sufficient results.

Tripods are readily available.

Good lighting is key to good results, therefore you should consider buying extra illumination devices, which are also readily available.

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.

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*Software Selection*

As before the hardware procurement, a requirements analysis for the software should be carried out. 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. Detailed documentation is important for the identification of the needs.

It is often not necessary to invest in complex software if only half of the functions are used and the “learning curve” is too steep, i.e., a lot of time has to be invested before getting to any results.

When buying the software, it should also be considered whether people with little knowledge should also be able to operate the software well. Then it is worth looking for a program with a simple user interface instead of a multitude of effects.

The simplest device is the photo and video cutting programme integrated into 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). A review of more advanced but free software can be found here (YouTube of course is a great resource for videos on every aspect of filming, but be sure not to get lost in the ocean of information!):

Open Source
Video Editing
Software

Shopping:

Although the focus here is on internal production, material may have to be purchased again and again. This can be anything from music licenses to stock photos to rights of use. These costs should be predictable and calculable through good planning.

Software Examples

Big and professional editing software is not necessary for low budget production. But it is helpful to know the market, some names and how to classify them. Most professional Software Companies also provide affordable versions with viewer functions for semi-professional users.

Premiere by Adobe

Adobe provides software for all in one media production. All software applications work together and are matched with each other. It is designed for designers and agencies that

produce a complex digital and non-digital output. The components can be used as stand-alone programmes. Photoshop, Illustrator, Premiere and After Effects are some of the more popular applications. Photoshop is an image editing program, Illustrator is for creating illustrations on a vector basis, Premiere is the main video editing software and After Effects is for compositing and video effects.

Premiere is only available over the cloud service of Adobe and only as a subscription.

Final Cut by Apple

Final Cut is the video editing solution by Apple. It is tailored for Apple products. This software is not part of a bundle and comes without a subscription. Its base is similar to every other editing program. As with many Apple products, this one too comes with a clean and minimalistic user interface.

Apple provides its users with a free editing program named iMovie, which has fewer functions but is enough for semi-professionals.

Media Composer by Avid

Avid produces not only software but also hardware made for professional film production. The components are developed for studio set-ups.

Similar to Adobe, Avid works as an all-around solution for video production.

Like the other professional providers, Avid created a free version for semi-professional users. It has fewer features, but enough to create good videos.

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

*Increasing Effectiveness by organizing the Workflow*

In order not to have to start all over again with the next projects, it is worthwhile to reflect after completion of the project. In this way, it can be checked where there were still problems and the process did not run so smoothly. Some changes during production cannot be avoided. But mistakes can be learned from and conclusions can be drawn that will save time and effort in the next project.

Good documentation is helpful here. Another way to work effectively is to create templates. The opening and closing credits can be saved as a finished video or sound file so that it only needs to be inserted into the working file.

It is also possible to prepare working file templates of the respective editing programs. Here, structured work instruction is necessary to prevent employees from accidentally overlaying

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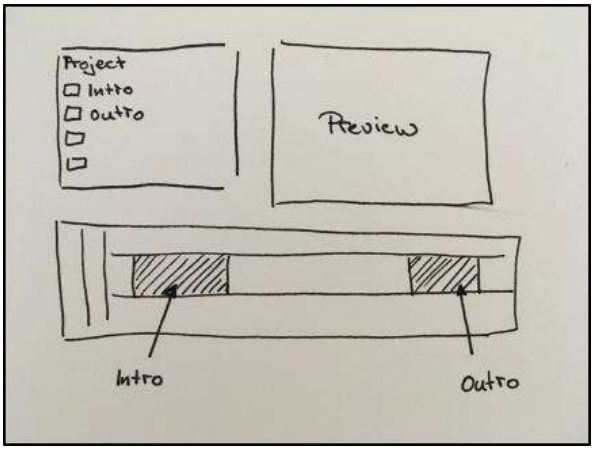
the template. Clearly arranged routines and file labels help you to find your way through the data chaos.

Sustainable working is characterized by good handling of documentation, organizational structures and templates. For example, the intro and outro of a video do not have to be developed and compiled anew for every production.

This is a factor that falls within the budget calculation of a media production. This and the other factors form the basis for estimating how long a learning medium will take in production and how much it will cost.




A template should be:

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

The subsequent reflection on the learning media should also show where further training and competence transfer among employees would be helpful. To be able to work more effectively, individual processes could possibly be given up. For example, the employee who works on the machine and therefore knows it well could create a video or picture of the machine himself and send it to the trainer.

There are several ways to train employees so that they need less time to produce media. First, by building up more skills and thus making fewer mistakes, or by learning how to make their work processes more effective through planning and sustainability.

The area of planning includes, on the one hand, building up sufficient media competence to ensure a smooth production process and, on the other hand, sufficient flexibility to be able to react specifically to obstacles. For example, an employee with little knowledge of media production can, in the event of a sudden storm, transfer an expert interview from outside to inside. Even an employee with a high level of media competence can react to the resulting changes in lighting conditions so that no time-consuming colour correction is necessary for post-production.

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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. If the quality does not meet the requirements, an analysis can then be made to determine where further skills are needed. These quality criteria include the "effectiveness of the learning material", i.e., how good the learning outcomes are after the use of e-learning, and quality criteria that allow a visual check to be made before the learning material is released.

Will it become more affordable over time? Generally, a structure and material collection helps to become more effective over time. In reality, it looks like this: Someone creates a PowerPoint presentation for learning activity - if the material is going to be in a shared folder, the next person can use and develop that presentation and even create a template for further presentations.

Do:
- Create a place to share 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

### 4.1.4 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 |
|---|---|---|---|
| micro-video | short instructional videos to learn about a single topic | explain a simple concept in a few steps or create a series of micro-videos 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 | teaching about interpersonal learning | DigiVET Translation Q & |

| | | | |
|---|---|---|---|
| | multiple instructional methods (e.g. guidance, quizzes, interactive elements) | topics (e.g., compliance, harassment) to improve content retention and build a relationship | A Valerij & Rob - YouTube |
| screencast or slide casts | screen recording designed to get an answer about a specific topic | a screencast is often called "just-in-time teaching" and is used for quick, informational instruction | How to digitize a company's learning system - 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, "flipbook", 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 specific topic | sharing experiences and telling a story about a specific learning content (e.g. lessons learned, good practices, fails) to build motivation | |

Table: Types of explainer videos[43]

### 4.1.5 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:[44]

[43] gute-lernvideos.pdf (medienpaedagogik-praxis.de)

[44] Project DigiVET: Documentation of Focus Group Austria, p. 10

- 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, 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 excitingly.
- 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 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.
- Leonie: "If you are shooting in one place and the lighting conditions are good, two smartphone cameras are enough for shooting; 2 cameras allow more interesting shots and make editing easier.
- Usually, the internal microphones of smartphones are too weak for good sound quality, but you can connect external microphones.
- When you start, I recommend watching YouTube videos and recording according to instructions and trying out how it works best. A good and easy way is to use a PowerPoint presentation as an introduction, cut it out with the Windows Snipping Tool and then paste it into the video. TIP: To avoid jumps, photos must be the same size.
- If you are a bit more experienced, you can work with 3 cameras so that different perspectives can be snipped together. It is ideal to work with a tripod to get a good picture quality.
- To cut the pictures: In the beginning, you probably got by with the tool Movie Maker from Windows, because it is easy to use. Here, one must pay attention to a leading and trailing of approximately five seconds in which nothing happens.

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- If you want to work with an introductory voice, make sure that this is a new voice, otherwise, you will confuse the viewers. Again, an external microphone should be used to ensure good quality. With this "voice on the off", make sure that the microphone is positioned further away, otherwise, this voice will be louder than the others.

**Tips on the didactic concept:**

- 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."
- Irina: "First, one should deal with the question of whether a topic is better explained by graphics/animation or by real protagonists. If you choose graphics and animation, you have to consider that you need someone who is good at drawing and also a lot of visual material is needed. The variant with the protagonists is probably easier for SMEs.
- When making learning videos with protagonists, you have to bear in mind that it is about finding people who are very eloquent and feel comfortable in front of the camera. From my professional experience, I can say that this often leads to an overestimation of one's own abilities. So, it is not easy to choose the right people. You can do this by asking the interested parties to record a professional explanation in two or three sentences on their smartphones. Afterwards, several people should decide whether they like to listen to the protagonist to arrive at a decision that is as objective as possible.
- In the low-budget area, it can be said that it is quite possible to make good videos with a smartphone because the picture quality is good. The problem is the sound: therefore, it is advisable to use an external microphone.
- One more tip on how a simple film can look professional - explained in two steps: 1) protagonist speaks into the camera (if possible in front of a neutral background); 2) protagonist "does something" that has to do with the subject (e.g. operates a machine and explains it). This one longer task can then be cut relatively easily. If you use two cameras, this is already more complex when editing.
- In my opinion, it is especially important to prepare a video well and to pay attention to the length. In our contributions, we pay attention to a maximum length of 3.30 min. per unit. My tip for learning videos is to make several parts and to keep each part as short as possible. This length is also easier for the protagonists to keep up. Here is a short description of the procedure:
- The text should be rough, but the protagonist should speak as freely as possible

- If a smartphone is used, plug in an external microphone
- Pay attention to the incidence of light and the position of the protagonist(s)
- Record short sequences only
- For cutting: Adobe Premiere is also available in a cheaper "light" version; otherwise use freeware.”

On competencies needed the focus groups advise:

- "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.

Unlike videos, podcasts can be produced with little technical effort. However, due to the lack of an image layer, great care must be taken with the presentation, the quality of the recordings, the editing and finally the editing of the content. 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

the history and evolution of tech and science podcasts. Topics that do not need an image can be presented entertainingly and directly 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:

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PODCAST TITLE

EPISODE Number and Title

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

MUSIC Intro, Title

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

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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 is 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.

Various tutorials on the Internet. provide basic knowledge for audio editing, montage and sound processing.

Usually, each podcast has a music layer. Depending on the content and creative orientation of the podcast, music can be reduced or used very intensively. Music serves to label the podcast with intro and outro, which are the same for each episode and provide recognition value.

Music can structure and subdivide the podcast, close and separate chapters and thus often create welcome breaks. But music can also illustrate, amplify and emotionalize and is thus considered an important stylistic device in the production of audio pieces.

Music for podcasts is subject to strict copyright regulations. If you want to use music, you have to find out exactly if and how certain pieces of music may be used at all. Some providers specialize in music for podcasts, where music can be purchased and used for podcasts.

There are, depending upon the function and target group of the Podcast various possibilities to publish a Podcast and make it available for the public and listeners.

Podcasts are searched, found, streamed and downloaded on the Internet, but platforms such as Spotify, Deezer or iTunes, etc. are also major podcast providers. Podcast listening platforms and apps don't store your podcast's information. Instead, they receive the audio files from a podcast hosting service via an RSS feed.

**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. These are mostly not less intelligent or capable practically, but less used to formal learning arrangements. Often they feel that they had bad experiences in school and are therefore very averse to formal, classroom-style learning arrangements.

Some of them therefore want to “do something practical” or “just work.” Others are open to more formal learning or even a certification of learning outcomes. For these, in-company further education can be a “second chance.”

A special group of learners with weak language skills are “functional dyslexics.” 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.[45]

As in all cases discussed in this handbook, a thorough identification of learner´s needs and aspirations is key to setting up learning systems.

From the point of view of the company the main reason for also including learners with low mainstream language skills or low formal qualifications is to have a wider pool of labour, as “ideal”, well-educated and trained mainstream employees are often in short supply.

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.

[45] Nickel, S. (2021): Funktionaler Analphabetismus - HIntergründe eines aktuellen gesellschaftlichen Phänomens. https://www.bpb.de/apuz/179347/funktionaler-analphabetismus (retreived 21.11.2020). See also the OECD survey of adult skills for numbers on individual countries: https://youtu.be/Cot_YgDAsTw

We will discuss both cases with respect to learners with weaker mainstream society language skills and for learners with lower formal education.

### 4.3.1 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.

Here the principle **"show, don´t tell!"** fully applies.

Choosing the wrong instructional tool can be not only ineffective, but also dangerous.

In many cases the composition of the workforce has changed, but the systems of instruction have not. Instructions are either verbal, master worker to beginner, or companies rely on collegial instruction. In some cases, there are written instructions, such as handbooks, quality assurance documents, or shorter written instructions.

In all cases, there can be dramatic consequences if learning is only through an accident or valuable material is destroyed so that the instruction has not been understood.

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
- 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.

This, however, implies a higher effort, as good subtitles must be developed that point out the key elements of the work process, and it must be made sure that an appropriate translation is been done by a person who understands the work process, specialist vocabulary for the process in both languages and can be engaged in such production.

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In addition to the difficulties of the language, reading difficulties may emerge, or the processes in the video are so complex that they are difficult to understand, if the viewer has to read and watch at the same time.

In a multilingual group of workers/learners this multiplies the effort for producing such content.

It should be checked therefore for its pros and cons vs. a “SHOW”-only video production.

One of the “pro” factors is the learning effect of such production, which will be discussed below.

Some additional tips on SHOW-only videos:

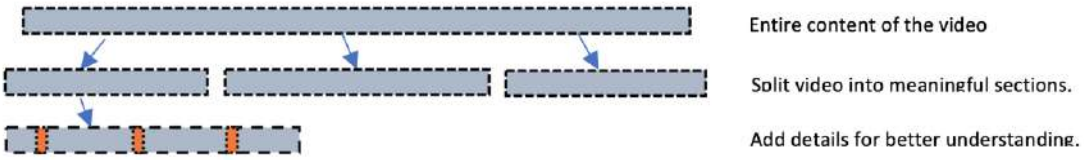
Videos that are purely visually constructed must be conceived differently from those that have an audible component.

The individual images have to stand still much longer, and actions have to be performed more slowly so that they can be grasped and possibly supported by arrows, animations and inserted forms.

It is also important to pay close attention that there are no unnecessary information and distractions in the picture.

If symbols for better understanding are used, a cultural check-up should be made beforehand to find out whether the symbols used could be misunderstood in other cultures.

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.

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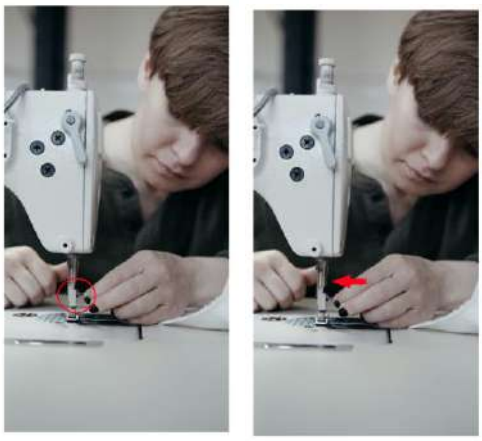
The film can be stopped and circles can be drawn around the important detail. Arrows can be useful to indicate a direction.

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.

### 4.3.2 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.

The same effect is to be achieved through a higher, academic, general skills education, such as a bachelor or master degree. This includes the expectation that the individual is able and willing to inform him- or herself about requirements of a certain challenge, collect and integrate appropriate information and evaluate own work results.

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In a work environment, a lower qualification is defined by the need for more detailed instruction and supervision.

In a traditional “fordist” factory environment this challenge has been solved by technically breaking down the work process to sequences that are so simple that they can be learned by any one in a very short time.

This form of industry and clerical work was common in Europe until the mid-eighties and was a huge success in integrating a high number of formally uneducated workers to the traditional industries, including migrant workers.

A still very present form of such “standardised” work are the systems of fast food restaurants such as “McDonalds” where the work is broken down to small sequences and these are supported by all kinds of visual and auditory aids and pointers. All that is required from the worker is to execute these sequences over and over again with ever higher perfection.

The advantage of such work arrangements from a didactical perspective is, that, as the work process is repetitive, instructional material to support this work process can also be produced with more resources, as it can be used by more people for a longer time.

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

Also here the supporters/facilitators of such learning must make sure that all learners have access to the devices on which the system is intended to run and understand how to use them.

They have to introduce the learners to the system and make sure that they are actually being used.

In all cases the learning outcomes need to be assessed by supervising the learner executing the work process correctly. Filling in a quiz on how to do it is nice, but not enough.

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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

### 4.3.3 Principles of Skill Building for Learners with Weak Mainstream Language Skills

In general, each individual should aim at a good mastery of the mainstream language of the country he or she is working in. This will support further learning and also facilitate social contact on all levels. Only in some very specialist high skilled sectors and in some metropolitan areas (and here in certain transnational "bubbles »of society) is English established as a common communication language so that learning the country language is not absolutely mandatory.

Companies with employees with weak language competencies should carefully look at the language competencies of their employees and inspire and support improving the language competencies.

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. While in company supervisors and personnel development specialists should make sure that functional illiteracy is identified, they should also be aware of the support systems that are available for such learners.[46]

The same applies to learning the language for non-native learners. A number of traditional courses exist but also very good online learning systems.[47]

All supervisors and colleagues should be encouraging and helpful towards non-native speaking colleagues. You don't have to be a trained language trainer to do this! For example, in every conversation you have with a trainee or colleague, everyone can help him or her to use his or her own language skills and to try out what he or she has just learned by creating a relaxed atmosphere. Some tips on how to be helpful are:

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

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

[47] e.g. for Germany: https://deutsch.vhs-lernportal.de/wws/9.php#/wws/deutsch.php?9c797a8739297e2fdbc18f3830378361
https://youtu.be/ql7J-srh6iA

– Avoid proverbs and ironic expressions

But do not be afraid! Thinking of these tips will help you reflect on lingual habits that you are unaware of. Just try and build a good connection with your colleague and work on it. Communicating acceptance is the most important factor!

In addition to these general tips, digital media can also enhance the learning experience.

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

However, there are specialist fields in learning language for professional situations where such courses need to be complemented by vocabulary and phrases that are specific to a certain profession or even a specific company.

Here producing videos which show typical situations of the trade or company in the country language in clear language and subtitled in multiple languages can be a means of learning language and relevant vocational knowledge at the same time.

Producing such videos as a team exercise can be a means of reflecting and learning the work process, as shown in the previous chapter.

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/

https://www.youtube.com/channel/UCr8DYKbeCvhxFPCqxxBCWzw/videos

### 4.3.4 Principles of Skill Building for Learners with Low Formal Qualification

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

There are multiple examples of quite comprehensive systems of digital media that support building such profiles.[48]

Of specific interest are those approaches which use the creation of digital media as the main means of building competences.

[48] 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

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.

Teaching the specific work process is a learning project for the learner.

The learners are motivated to analyse and describe the process that they are supposed to learn as well as possible.

The individual steps are:

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. The challenge has to be chosen with an eye on the double challenge of mastering the specific technical challenge as well as the media production challenge. Both must be chosen in a way that the learner is challenged, but not overburdened. There should be a high probability that the challenge can be mastered. 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.[49]
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.

[49] cf. Schäfter, p.50 ff.

4) Filming/creating visuals. Only then the audio is being illustrated by pictures, animations or "real" video. Schäffer recommends using pictures or already existing videos first and only later adding the challenge of filming.[50]

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 the 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!).

The medium should also be "robust" i.e., playable on the players used by the expected users, e.g. using MP4 as standard.[51]

Schäfer points to the difference between tutorials, which have the main intention to enable the viewer to just "do the job" and "explainer videos," which elaborate content ...more deeply and substantiate it theoretically. ...they use more graphic text elements…".

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.[52]

## 4.4 Learning Management Systems

As has been discussed in the prior chapters, the use of digital media in vocational learning can have many forms and formats. Most of the time they are being used to support traditional forms of learning incrementally.

Therefore, the use of digital media should <u>not</u> be confused or identified with "e-Learning;" in particular it should not be identified with using learning management systems. These are

[50] cf. Schäfer p. 55f.
[51] cf. Schäfer p. 124 ff.
[52] cf. Schäfer, p. 45

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nowadays very common in academic learning environments and also some vocational ones. Most of the LMS point at this most common use by using language as “course,” “student,” etc., which imply a quite traditional teacher-student and formalistic learning environment, which can be appropriate in some situations, but less acceptable in others, such as groups of expert peer learners.

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 DigiVET uses such a LMS. Therefore, the section to follow will discuss in brief some characteristics of 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 analysing 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 maintained. 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, scalable, 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:

- 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

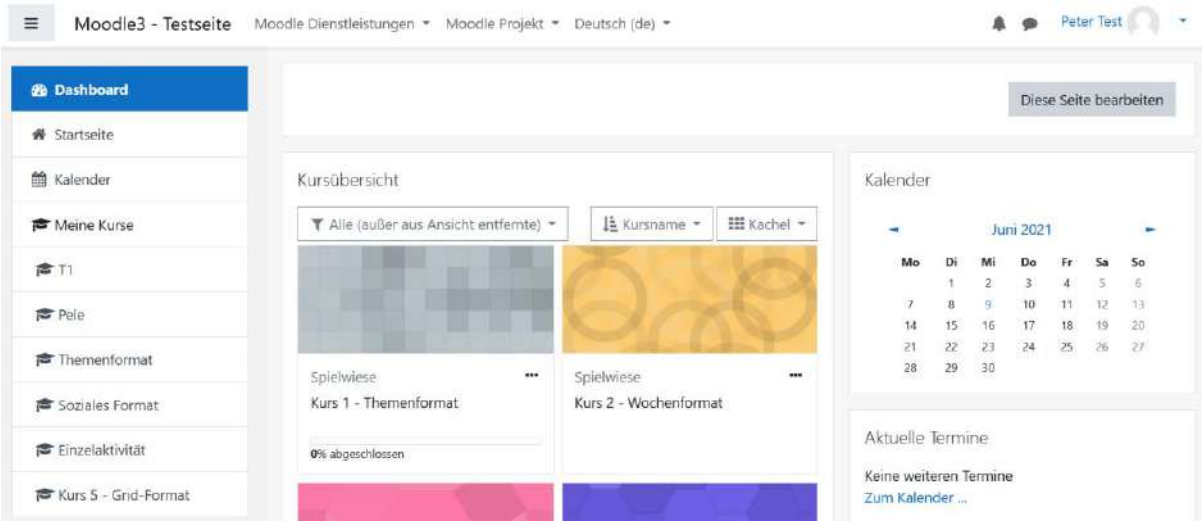
LMS is primarily designed to pass, share and track the learning content, while the modern **learning experience platform (LXP)** is used for curating and aggregating learning content to create a more personalized learning experience (e.g., content collaboration, knowledge sharing).

Learning Management System Examples:

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

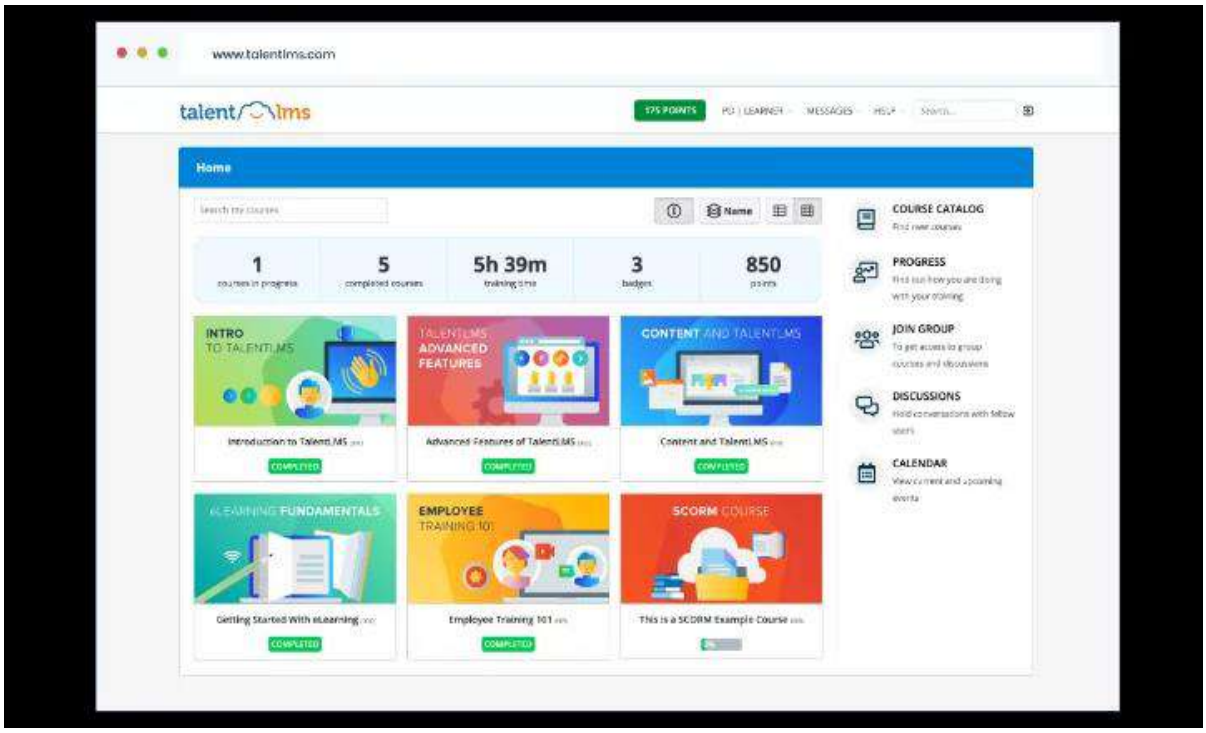
Moodle has a social learning functionality that allows learners and instructors to send direct messages to each other on course forums.

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

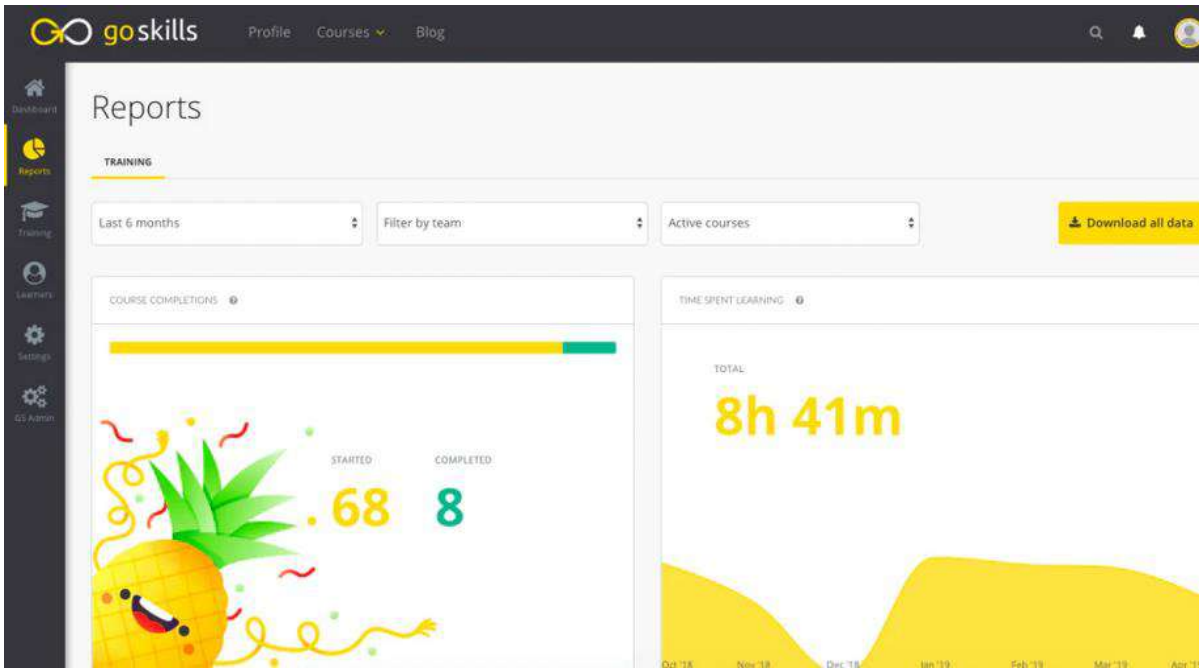



TalentLMS is an open-source LMS for businesses of all sizes.

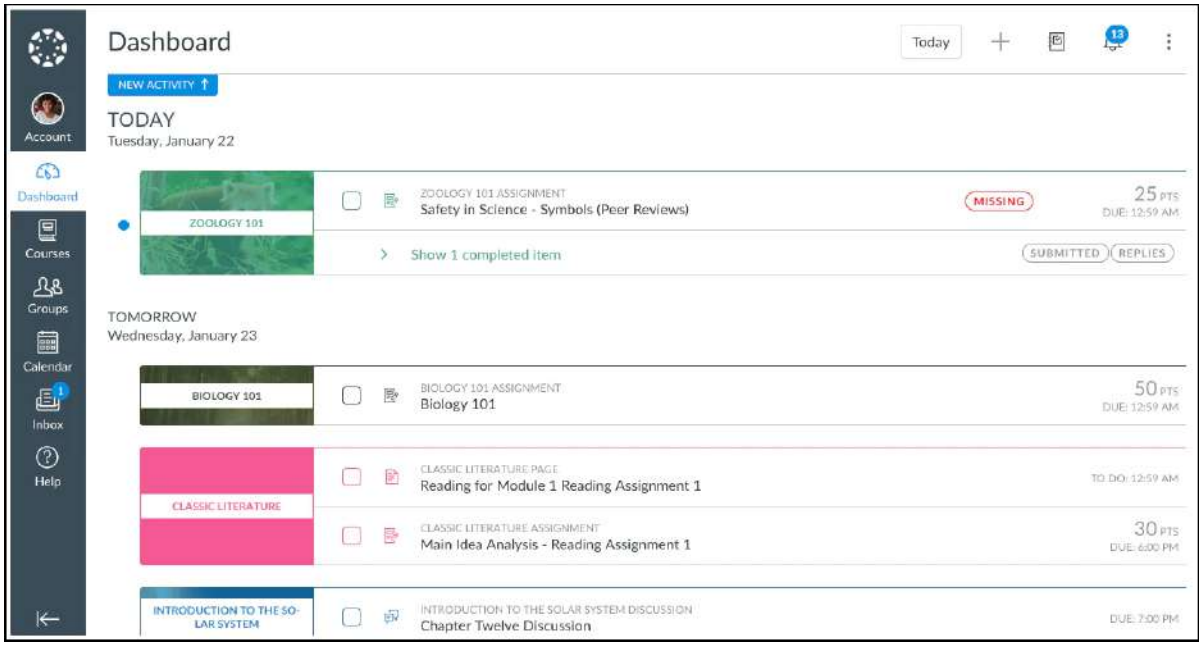
One unique aspect is that TalentLMS offers tailor-made solutions for specific industries, such as manufacturing, automotive, food and beverage: https://www.talentlms.com/platform



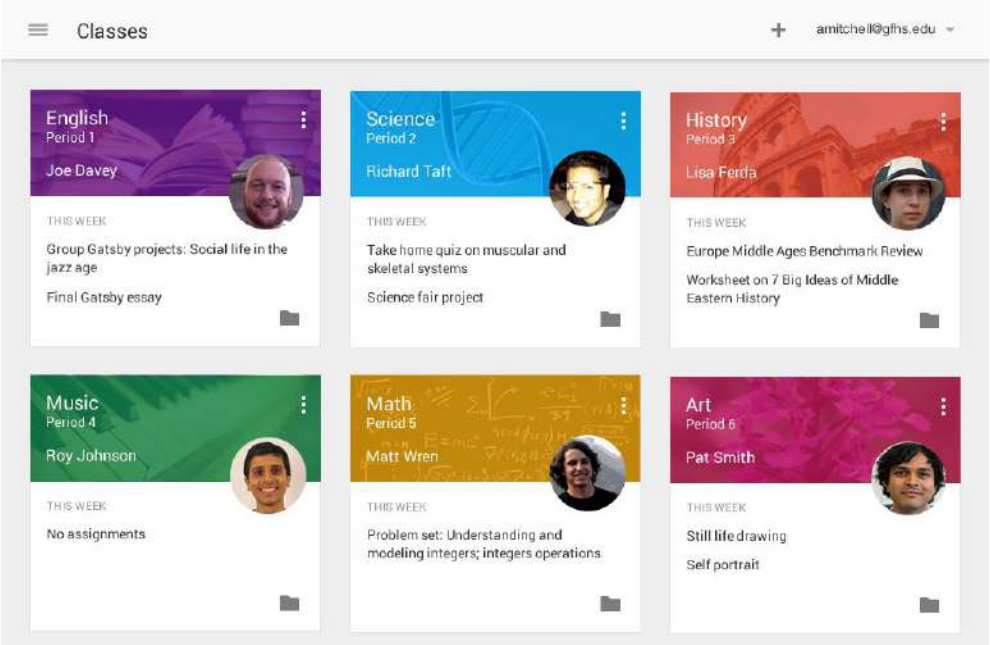

GoSkills is a cloud-based LMS for teams of any size. The basic functions are free and can be upgraded for 29 EUR per learner per month: https://www.goskills.com/




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)

Another, wider perspective is to see the organization's learning system as a virtual environment. It is a networked application with different software programs that allows users to interact with the technological environment and other users. 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)
- life 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.[53]

[53]Rossmann, 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).*

Co-funded by the Erasmus+ Programme of the European Union

# 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 digital media practices in VET.

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

For the case of Germany, as an example, we point to a few, which we found to be exciting and at the same time well documented. Also, users not proficient in the 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.

**Kfz4me (Project-orientated Teaching and Learning with YouTube):** Kfz4me is about creating and using 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 are thus available for reuse scenarios - in "flipped classroom" mode. Kfz4me integrates digital media into the training process so that trainees develop their factual competence and deal with questions of media use and media design. https://www.youtube.com/channel/UCIo9Imq-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 centre to document their own solution steps for practical tasks. The movies 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. In addition, the digital learning platform and the media they make themselves give trainees additional access to their training content and enrich the learning environment. As a result, 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 analysing the eye movements recorded with the eye tracker, complex 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 an LMS that supports collaborative learning processes.

http://www.via4all.de/

**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. Furthermore, the acquired knowledge is documented utilizing videos, images and texts and made available to other employees. In this way, a continuous increase in employee experience 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

The general concept of strategically planning and guiding the use of digital media in VET has been laid out in chapter 3 of this handbook.

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

These final remarks reflect some of the learnings by the partners on guiding digital learning in small company VET.

Especially in digital learning, the learner needs good guidance so that he or she does not feel overburdened.

The use of digital media in VET is a still-developing field. There is not yet a tried and tested body of knowledge and experience on using digital media. Therefore, the development and use of such media is a shared learning experience.

This requires curiosity and openness from all actors.

A friendly and accessible attitude of coaches and trainers is the prerequisite of successful guidance.

This means that coaches and trainers should provide them with sufficient channels to address the concerns and questions of their peer learners (formerly known as “students”).

Here, too, a structure is needed that makes it easier for the trainer and the trainee.

It may be worthwhile to set up a "frequently asked questions" (FAQ) section in LMS or other fora or communication platforms used for quick access and mainly easy to solve problems.

Support and help can also be provided by creating forums where learners help each other. Here it is necessary to allow learners to subscribe to news so that activities passively inform them.

Regular "virtual clinics" in the form of chats or video chats are another way of support. But, again, it is beneficial for more complex problems.

It can be helpful for trainers to establish procedures for various problems that may arise, especially for more general topics that are not directly related to the learning content. This is especially true when more than one trainer is involved in the training.

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To support individual problems, company trainers should establish consulting hours available for peer trainers and learners.

It has proved to be successful when trainers can meet in digital consulting hours to find answers from the company trainer and exchange experiences with other trainers. Also, external experts or colleagues from other companies can be invited.

If these hours occur regularly, they can even be used as opportunities for small continuing education units to keep trainers up to date, for example, copyright issues.

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