Beiträge aus der Praxis der beruflichen Bildung – Nr. 22

Didactic Design of E-learning Measures

E-learning in Vocational Education and Training

On behalf of
Federal Ministry
for Economic Cooperation
and Development

Capacity Building International
Germany

Imprint

Published by:
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Picture credits:
Photo on the title: © InWEnt, Wolfgang Müller · Page 1: © InWEnt

Design:
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Printed by:
Druckerei Bunter Hund

ISBN 978-3-939394-42-6

Introduction:

Division "Technological Cooperation, System Development and Management in Vocational Training" of InWEnt is seated in Mannheim and conducts on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) advanced training programmes. Under the banner of "sustainable development", its work focuses on questions of technology cooperation, system development and management in the field of technical and vocational education and training. Its dialogue and training programmes are targeted at decision-makers from the public and private sectors, junior managers and multipliers from vocational training systems.

In 2003, the Division has begun to present a series on everyday practice in vocational training. The intention of this series is described in the title itself ("Beiträge aus der Praxis der beruflichen Bildung" = series on everyday practice in vocational training). The division aims to support its programmes of international personnel development in the above-mentioned areas with technical documentation in both printed and electronic form.

These reports
- originate in the partner countries, taking into account specific situational demand
- will be tested with and for experts in vocational training in the partner countries in conjunction with respective practice-oriented training programmes on offer, and
- with a view to global learning, will be improved and adapted prior to publication according to the recommendations of the partners or the results of the pilot events.

Thus, the Division "Technological Cooperation, System Development and Management in Vocational Training" is applying the requirements of InWEnt´s training programmes to its own products in the above faculties: i.e., these can only be as good as their practical relevance for the experts of vocational training systems in the partner countries.

To this effect, we look forward to critical and constructive feedback from all readers and users of this special series.

Our thanks go to Dr. Patrick Blumschein and Dr. Michael Fischer who made invaluable contributions to these activities.

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Abstract:

In this study guide you will learn how you can integrate e-learning into your educational plan in a meaningful manner on the basis of a didactic concept. In this context, we shall introduce you to the Instructional Design approach, which provides the organisational framework.
All explanations in this guide have been written with a view to the potential use of e-learning for the purpose of making the limits and opportunities of this teaching method more tangible. Instructional Design is a planning science that provides rules for didactic-planning actions building upon scientific research findings. Under this concept, any educational measure should start with a precise analysis, which then forms the basis for all further didactic planning and action. Evaluation measures are integrated with the implementation of educational measures in order to obtain the necessary level of quality assurance. These processes are interlinked with each other systematically and allow for a maximum of efficiency and effectiveness in the learning process. The advantages of this new model of didactic-planning action stem from the high degree of transparency and its foundation on psychological aspects of learning. After all, learning concepts can be optimised only if one has an accurate understanding of how people learn. E-learning yields amazing opportunities in this regard.

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1. E-learning and Didactic Design

1.1 Definitions of E-learning

E-learning is a new phenomenon with a variety of facets. It is therefore difficult to find a uniform definition of e-learning. In terms of the word, e-learning shares similarities with innovations in other areas, such as e-banking, e-business or e-commerce. E-learning refers to electronically based or supported forms of learning in training and further training (cf. Schüpbach et al 2003, 9). Following the period from approx. 1990 to 2000, when e-learning was developed and given its direction, we now distinguish between two types of e-learning (cf. Fig. 1): computer-based training (CBT) and web-based training (WBT). CBT refers to offline offerings, that is, learning materials on CD-ROMs or DVDs, which can be used even without being connected to the internet. However, the user certainly requires a computer capable of multimedia applications (i.e., computers manufactured after about 2003).

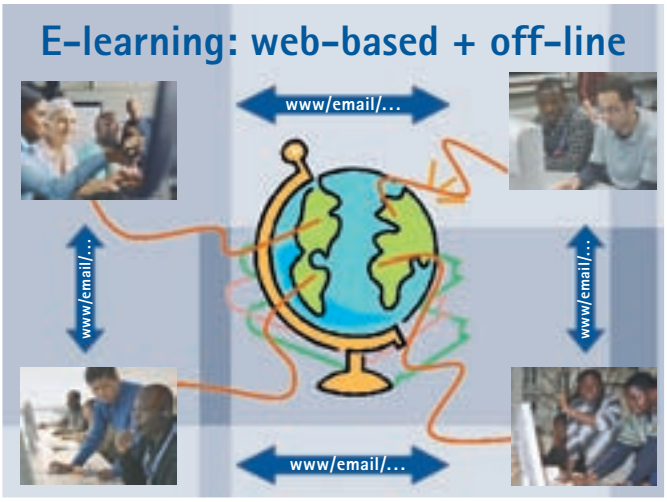


Fig. 1:
Computer-based learning online and with local data carriers.

From a didactic point of view, the learning environment must provide on the data carrier all the elements necessary for the successful use of the program. Web-based systems work without the storage media CD-ROM or DVD – we call them "online offerings". Content is provided online, which has the advantage that the user can communicate with the "teacher/tutor" via the internet, as well as with other students, and exchange materials. CBT, however, allows for larger volumes of data to be made available more easily, for example, when film material is incorporated. With WBT this would be very difficult, because large data volumes can be transmitted only slowly. Today there are very few learning products that are exclusively classified as CBT or WBT. The current market is dominated by "mixed products", which combine elements of both CBT and WBT with classroom-attendance phases. These products follow the blended learning approach. Using didactic know-how, the search is on for the "best teaching strategy" for realising a learning objective in a specific target group in a specific situation. Blended learning also means combining in a meaningful way different social forms, methods and media. In this context, e-learning is given a top position because it lends itself to flexible deployment. E-learning is therefore also defined as a type of computer-based lesson. But e-learning is not a form of learning, because learning is a human activity. The provision of material and learning tasks online or on a CD-ROM may explain the "E" in its name, but it is still a far cry from "learning"!

1.2 Benefits of E-learning

E-learning may describe an entire learning environment, or a part of it. It can support traditional forms of training and further training by providing a parallel track to learning processes, or serve as preparation before and follow-up after such processes. For the most part it can be deployed independently of time and location, and serves as a communication platform for both learners and teachers.

E-learning can make media more accessible that are rarely used in traditional classroom settings (films, interactive tests, simulations, virtual group work, chats, etc.). In the process, forms of action can be realised that foster more intensive analysis of the material to be learnt than is often found in traditional training and further training courses (simulated lab experiments; dialogue scenario for a typical business transaction; learning of foreign languages with an infinite number of chances for repetition without becoming embarrassing; working in a team over an extended period of time; solving complex tasks, etc.). E-learning can help take the burden off seminars that are expensive and complicated to organise and where attendance is required – some of the learning process can unfold „virtually". It can make for an enriching experience when experts from around the world elucidate different perspectives of a problem or issue in a virtual discussion forum, or when online sources of information are incorporated. E-learning can reach user groups that would normally be hard to reach or motivate (rural population, illiterates, etc.). E-learning can also have a more favourable effect on the heterogeneity of groups of learners than seminars with required attendance, because it allows for more individual learning. Learners choose their own approach, time and quota of learning. Overall they enjoy much more freedom of choice in the learning process, which increases their personal motivation and, ultimately, the quality of the learning experience. E-learning provides learners with fast and appropriate feedback on their learning behaviour – "just-in-time" support. E-learning can be made to fit the individual's learning behaviour, thus achieving the best possible result: an e-learning system will always remain patient and polite where a teacher might already have lost his or her nerves. E-learning is less tightly connected to a specific location. Learners can use it whenever they feel like it or have access to the internet (also cf. Khan 2005).

As we have seen, there are plenty of arguments for the use of e-learning. But e-learning alone cannot solve all the existing problems of educational institutions. At first, e-learning is nothing more than a media and technology-based teaching concept and not a panacea. If one wants to solve problems through e-learning, a strategy will have to be in place that must focus primarily on didactic aspects. In this guide we will introduce you to a suitable tool for such purposes: Instructional Design (also cf. China 2003, 21).

Fig. 2: Example "user view" of the e-learning platform of InWEnt.

1.3 Phase Model of Instructional Design

A good start is half the battle! When designing an educational measure, one should not be influenced so much by the technical possibilities, but instead develop a concept that leads to the desired result through efficiency and effectiveness. This concept must be a didactic one, because it is not merely about realising, "virtually", exciting simulations or games, but about the development of previously defined competences or about building them from scratch. In developing learning environments, the focus, ultimately, must be on the didactic design – or the selection, arrangement and design of possible learning content and turning it into actual learning content, while remaining focused on competence and the learning objective (Fischer 2006). A suitable framework concept

for this is Instructional Design (ID), a concept for educational planning created in the US. ID deals with the process of planning and realising educational measures. Decisions are based on the psychology of learning and business aspects. The origin of ID goes back to research done by American scholars such as Glaser (1962) and Gagné (1965). In this guide, Instructional Design is explained on the basis of the ADDIE approach. ADDIE stands for the five elements Analysis, Design, Development, Implementation and Evaluation, which are systematically linked with each other (also cf. Niegemann et al 2004, 47). We shall provide a detailed description of these elements particularly in the context of e-learning and, thus, a guideline for your own planning of educational measures. An initial summary overview can be seen in the box below (Fig. 3).

Fig. 3: The phases of Instructional Design according to the ADDIE model.

2. Gathering Information: Analysis Phase

The analysis phase in the Instructional Design process is often underestimated in terms of the work that is required. In our expanded view of Instructional Design, we group together the following work steps for a successful (didactic) analysis: strategic planning, needs assessment, target group analysis, analysis of the intended expertise and situational analysis. At the end of this phase, one should have a catalogue with operationalised learning objectives that will define the further procedure.

2.1 Strategic Planning

Strategic planning (Kaufman 2003, 12) occurs at three levels: The Mega, Macro and Micro levels. Visions and general principles are defined at the Mega level. These are comprehensive in nature and address the organisation's philosophy. The organisation's missions are mapped out at the Macro level. For example, when an organisation has formulated as its vision e-learning competence for all staff members, it will become the organisation's mission to develop and implement a training concept for its staff. The Micro level, finally, serves to negotiate specific procedures for implementing the organisation's mission and vision. If one does not start with the analysis at the Mega and Macro levels, but moves straight to the Micro level, it can easily happen that measures are created that have no longer any connection to the organisation's philosophy and guiding principles. To prevent this, and thus counter the disintegration of the organisation's culture, Kaufman (2000, 85f) recommends strategic planning in seven steps (cf. Fig. 4):

2.2 Needs Assessment

A need is defined as a gap between the actual and the target condition (Kaufman 1992, 86-94). This gap can be closed with appropriate means, e.g., through training and further training measures. In many cases, the analysis of neither the actual nor the target condition is very easy. Therefore we recommend following the seven steps developed by Kaufman (2003) in order to design changes in the company as productively as possible, and not only to secure the success of the educational measure but also to achieve broad acceptance among all decision-takers. The customary methods of needs assessment include questionnaires and interviews with staff members, but analysis of the economic

Strategic planning Roger Kaufman

1. Have the circumstances of the educational institution changed? What are the critical factors to be considered, and why is a new plan necessary? (brainstorming meeting with representatives of stakeholders of the institution)
2. Development of the ideal vision: What is the intention of the educational institution, and how can one ensure that or whether the measures will be successful? (brainstorming, discussions with staff, etc.)
3. Carrying out needs assessment (cf. Chapter 2.2)
4. Carrying out SWOT analysis: Using the data from the needs assessment, one can identify the strengths and weaknesses of as well as the opportunities and threats for the organisation. Note: the entire institution must be included.
5. Verification of strategy: Can the desired results be achieved at the Mega, Macro and Micro levels?
6. Development of strategies for achieving objectives: Identification of best options for achieving the desired results. What changes must the organisation undergo to accomplish this?
7. Implementation, evaluation and continuous improvement of strategy. For this purpose, the organisation must choose a quality-assurance strategy.

Fig. 4: 7 steps of strategic planning according to Kaufman (2000).

data of an occupational field or company is also important. Other methods include the "expert's assessment" (DACUM) or occupational and functional analyses (AMOD, SCID). The SOCER model of Kaufman (2003, 132) helps in any type of needs assessment (cf. Fig. 5):

2.3 Target Group Analysis

The analysis of learning characteristics is, from a purely didactic point of view, one – if not the – decisive criterion for any type of educational measure. This is especially true of e-learning measures. We can combine the following under the heading of learning characteristics (cf. Schüpbach et al 2003, 62ff):

- Socio-demographic characteristics: language, age, gender, socio-economic background, cultural background.
- Previous knowledge of learners: Factual knowledge, rule based knowledge, problem-solving knowledge in a specific area of expertise, abilities and skills.
- Motivation and interest: Are the participants more likely to be motivated by rewards and sanctions than by the subject matter itself? Is there at all a general interest in the topic as well as in the training or further training?
- Learning habits: What do learners expect from the training or further training? How do they usually learn? Are they able to deal with problems independently, or are there barriers that have to be removed first? Are they familiar with e-learning and co-operative forms of working, or do they require an introduction first?
- Study times and self-assessment: When and how long can they study continuously? Are study periods of at least 15 minutes feasible? Can weekly and monthly study plans be realised? Can the learners assess the required study time for a task reliably?
- Experience and competence: Do the learners have experience in the specialised subject, with computers and e-learning or educational measures in general? Do they have competences in

Fig. 5:
The SOCER model for carrying out a needs assessment (Kaufman 2000).

the following four areas? Professional, methodological, social and autodidactic competence?

– Resources: Do the learners have access to the resources they need for their learning? What is the quality and quantity of the resources available?

2.4 Analysis of the Expertise to be Obtained

Apart from the target group analysis, it is crucial to identify the expertise of the subject matter covered by the educational measure. For this purpose, we have to visualise the expertise (expert knowledge) in question and then determine the necessary competences on the basis of occupational and functional analyses. This will then yield an important contribution to the definition of learning objectives and, eventually, to the design of the learning environment.

Description of learning characteristics that...	What are the characteristics?	How can these characteristics be integrated into the learning environment?
... are directly linked to the needs identified		
... concern the guidelines / philosophy of the organisation / institution		
... concern directly the requirements of the organisation / institution		
... affect the learners themselves		
... cannot be captured with the existing survey methods		
... collide with the existing limitations of the ID project		
... can be implemented in the design specifications for the ID project		
... affect directly the problem to be solved by the ID project		
Other characteristics...		

The occupational analysis answers the question as to what employees actually do as part of their jobs. What does a typical working day look like? What activities are carried out individually or in co-operation with others? What are the tools they use? What are the day-to-day functions/tasks that must be managed? As concerns your planning of an educational measure it is very important that you understand that the occupational analysis refers to the detailed description of all activities connected to a specific function/task. We can distinguish two types of activities and tasks, that is, tasks of a more cognitive nature and those that tend to be specific to certain tasks. In the first case, the problem-solving process is a mental one (understand, select, evaluate, differentiate), while in the second case one relies on observable acts that are easier to capture than mental processes. But when preparing a competence profile both aspects must be taken into account.

The desired competence profile of the learners will be gained from the analysis of activities, functions and tasks of the target condition. For this purpose, technical, methodological, social and personal competences are described that specify exactly the given activities and functions according to set quality criteria (cf. Fig. 6). "From a pedagogic point of view, the term 'competence' refers to human abilities that underlie actions appropriate for the situation and, in fact, make such actions possible in the first place. Professional decision-making competence refers to the mature potential of professional abilities that enable people to act in accordance with the performance requirements that attach to specific professional situations" (cf. Reetz 1999, 39). Decision-making competence includes, apart from technical competence, also substantial components of social, methodological and personal competence. But that does not mean that expertise and expert knowledge should no longer be justified as concepts. Instead, what it does mean is that learning today is understood much more so than before as a development process culminating in "personal mastery" (also cf. Senge 1999).

Doing a detailed analysis of the subject area of an educational measure is an absolute must for the development of all training and further training measures. It is only then that learning objectives, content selection and design of learning environments become feasible.

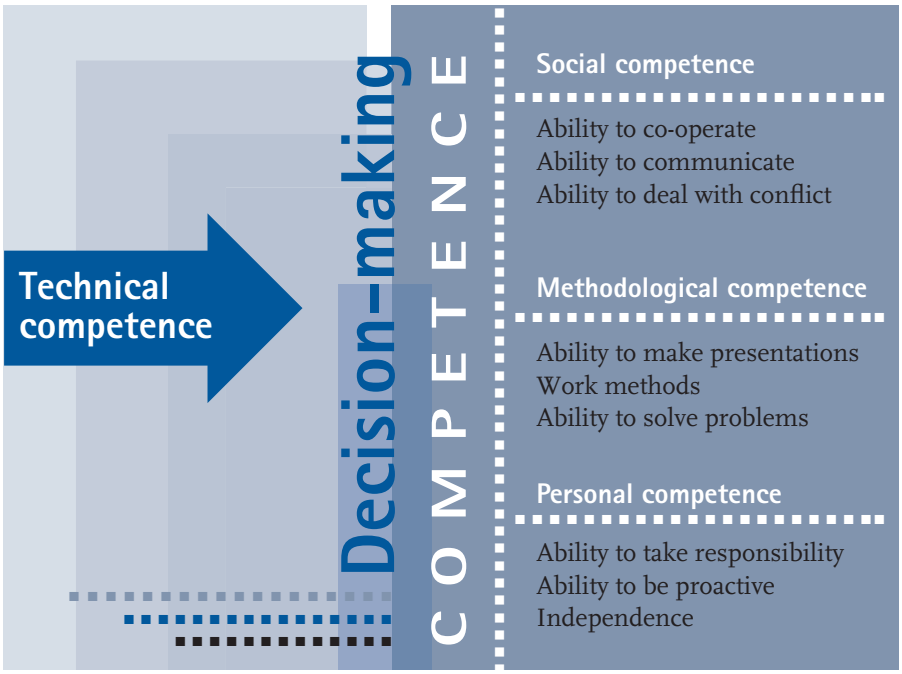


Fig. 6:
Decision-making competences and responsibilities in professional training.

2.5 Situational Analysis

A further analytical step involves the observation of the learning, application and development environment, which is what we call the situational analysis (cf. Rothwell/Kazanas 2004). In the following section we will describe the three areas in greater detail. There are also links here with the target group analysis and the analysis of the expertise to be obtained.

The learning environment is the location where the individual learns and studies. The concept of the learning environment comprises everything that exerts direct influence on the learning process, such as media, materials, methods, the room as well as teachers and other learners. The learning environment can be a classroom, a study at home or the workstation in an open-plan office, incl. the computer, headset and learning software that the individual works with. A learning environment can be affected positively or negatively by external factors. If the learner is repeatedly disturbed by people coming and going, or if his/her concentration is impaired by construction noise, this constitutes examples of negative effects. The following checklist is helpful in analysing the learning environment (cf. Fig. 7):

The application environment is the authentic framework in which newly acquired knowledge is to be applied. It is here that we can see whether the educational measure has fulfilled its purpose and whether the learner can apply the newly acquired knowledge. Thus the central question must be: How can the learner transition

Fig. 7: Checklist for analysing the requirements of a learning environment.

successfully from the learning environment to his/her day-to-day application situation? Allow yourself to be guided by the following questions:

- What are the conditions to ensure that the acquired knowledge can be applied?
- What are the resources to be made available?
- What obstacles may be encountered?

The development environment refers to the working environment of the team of developers creating a learning environment. Especially when it comes to e-learning, developer and realiser are often not one and the same person. Consideration should therefore be given to the types of experts necessary (content expert, didactics expert, designer/graphical designer, programmer, information technology engineer), to whether the relevant equipment is available (e.g., author software, learning platform) and whether the financial funds are available to develop a learning environment. For example, if you require a specific author program to create the learning environment, but you can never obtain it, you will not be able to realise the project in this manner. The same is true if you need a qualified programmer, but your budget does not allow for it – and so this list could go on and on.

2.6 Definition of Learning Objectives

The transition from the analysis to the design phase is shaped by the definition of the learning objectives. The learning objectives represent the condensed result of the previous analyses (needs,

(modified according to Meyer, Humbolt University Berlin 2003)

The three target dimensions of competence-based didactics

Affective objectives	Cognitive objectives	Psychomotor objectives
raising awareness awareness, readiness	**remember** reproduce knowledge	**act based on observation** imitate, still uncertain
being interested readiness, basic motivation	**comprehend** describe, explain, illustrate	**act as per instruction** manipulate, understand process
think develop values obligation, acceptance	**apply** solve, execute, calculate	**act in self-directed way** specify & control movement
organise understand & categorise value	**analyse** differentiate, structure, compare	**act with confidence** co-ordinate, sequence, harmonious, coherent
internalise internalised value system	**evaluate** assess, decide, select	**act instinctively** routine, internalisation, economical, natural
	develop develop a plan, create, conceptualise	

Fig. 8: The three target dimensions of competence-based didactics (cf. Meyer 2003).

target group, expertise to be obtained, situation). Or, put differently, the learning objectives reflect the operationalised competence profile as seen from different angles. In cognitive psychology, this involves three target areas: cognitive, affective and psychomotor learning objectives (see chart). In formulating the learning objectives, it is important to render them as precise – that is, measurable – and observable as possible (operationalisation). Only in this way will you be able to determine subsequently whether your educational measure has been successful or not.

2.7 Summary

The analysis phase is a key phase in the didactic design of educational measures, regardless of whether the course is one that requires physical attendance or one offered "virtually". Mistakes made here percolate across the further development and become more serious each time. A summary of the main points of the analyses can be found in the following illustration (Fig. 9).

Fig. 9: Checklist for the analysis phase of the Instructional Design process.

3. Designing Learning Environments: Phase of Didactic Design

In this work phase, which is called "design" in the terminology of Instructional Design, the following question drives action:
What are the didactic means with which I can achieve the identified learning objectives in the best and easiest way?

To answer this, you will need an understanding of learning theories and teaching strategies. It would help if you were familiar with the strengths and weaknesses of teaching strategies and had some experience with them. After all, it is not the choice of medium that determines the success of an educational measure, but the well-founded (in research) methodological design of the learning environment.

3.1 The Processual Character of Instructional Design

The phase of didactic concept design in the development process must not merely be seen as a second step in a linear development process. In practice the various work phases (analysis, concept design, implementation and evaluation) overlap; for example, when you implement a didactic idea in the form of a prototype in order to see whether the desired learning effects can, indeed, be realised (more on that later). If the desired effects are not realised or if one experiences situations that are not what could have been expected, the procedure will have to be modified, with the relevant area being corrected by way of follow-up analyses and assessments. Instructional Design therefore is not a linear process but a systematic process that unfolds via recurring feedback loops.

3.2 Learning Theory Fundamentals in Instructional Design

As mentioned above, Instructional Design is based on findings of the psychology of teaching and learning in connection with the learning processes in adults. The main focus of our efforts is at first not on "teaching" but on "learning". "Teaching" is a means to an end. In order to design a successful learning environment, you will first have to know how adults learn competences. In the following we will give you a brief introduction into the fundamentals of the psychology of learning as well as the key terms and models. You can view this part as an "excursion into theory" that forms part of this overall text.

3.2.1 Paradigms of Teaching and Learning

With the advent of cognitive psychology in the field of didactics at the end of the 1960s, the concept of learning has changed drastically since then, and still does today. In the past it was thought that knowledge could be "programmed" without any conscious effort on the part of the learner. Today, however, human learning is understood to be much more complex. Learning is a conscious act in people that has a lot to do with their general attitudes and momentary state of mind. Learning builds upon previous knowledge and is often difficult to reproduce. Researchers have found that learning is especially successful: a) if the process occurs in authentic situations; b) if the learner has a lot of options to control the process himself/herself; c) if there is direct and qualified feedback on the learning behaviour; d) if the process involves solving a problem in co-operation with others; e) if the learner reflects on his/her actions/behaviour and can perceive himself/herself as an individual who acts competently (cf. Edelmann 2000, Seel 2003).

At the time of behaviourism (i.e., prior to the cognitive changes), learning was seen as nothing more than a process to control behaviour, with the learner incapable of contributing much to its success. The learner's mental processes were seen as a "black box" of which nothing was known – as a result, it was ignored. Several programs date back to that time (software as well as course material), which followed for the most part these steps:

The psychology of learning has left behaviourism behind. Today learners are treated as self-aware individuals capable of comprehension. The view of humankind held by learning theorists has changed: Today, learning is generally seen from a constructivist-cognitive point of view. Despite everything, programmed instruction in the sense of behaviourism has drawn attention to essential principles, which are important to this day: clearly structured and prepared media materials, continuous measurements of success or even a freely definable learning pace (cf. Edelmann 2000, Seel 2003).

3.2.2 Constructivist View of Learning

Some of the literature refers to a paradigm shift from cognitive learning theory to a constructivist understanding. This seems somewhat exaggerated, although there have been major expansions and restructuring of the cognitive view of learning (cf. Gerstenmeier/Mandl 1995, Jonassen 1996). This is reflected, for example, in the increased attention to emotional and motivational elements in the learning process. Examples in this context also include demands for greater self-direction in the learning process (cf. Pekrun/Schiefele 1996a). In addition, there is emphasis

Programmed learning – The early years

- Content is presented in small, structured parts.
- Each portion of content is followed by a question the answer to which shows whether the learner has understood the content.
- Each answer is analysed immediately, and the learner receives qualified feedback (true/false).
- The level of difficulty of the tasks is increased gradually after successfully working through the individual questions.

The following didactic principles date from the early days of computer-based learning:

Prompting	Point to the desired behaviour, e.g., by demonstrating, paraphrasing the solution; providing part of the solution.
Fading	Through relevant repetition and gradual reduction of assistance, the learner can eventually find the right solution without any help.
Shaping	Any behaviour in the desired direction is reinforced (rewarded).
Generalisation	The newly acquired knowledge is to be transferred to other application scenarios (transfer).
Demarcation	Differentiation of new knowledge from areas in which it cannot be applied. This serves to stabilise the new concept.

Fig. 10: Principles of programmed instructions.

on the social learning context and the authenticity of learning. In summary, one could say that learning environments that encourage problem-solving in a co-operative manner are ideal.

Now, you could, based on your experience, argue that learners are often not capable of making their own decisions regarding the content to be learnt, the way of learning, the time frame, etc. – indeed, you could argue that these considerations are rather confusing or consume inappropriate amounts of time and energy of the learners. This would result in the basic motivation being lost, as well as in the learning content itself being worked through not thoroughly enough. At first glance, this objection seems justified. But let us look at this aspect more closely.

3.2.3 Metacognition and Learning

In the era of the constructivist view of learning, the field of metacognition takes up a central position from the point of view of learning psychology. Metacognition is simply the "thinking about one's own thinking". On the one hand, metacognition involves knowledge of oneself and one's own learning competences,

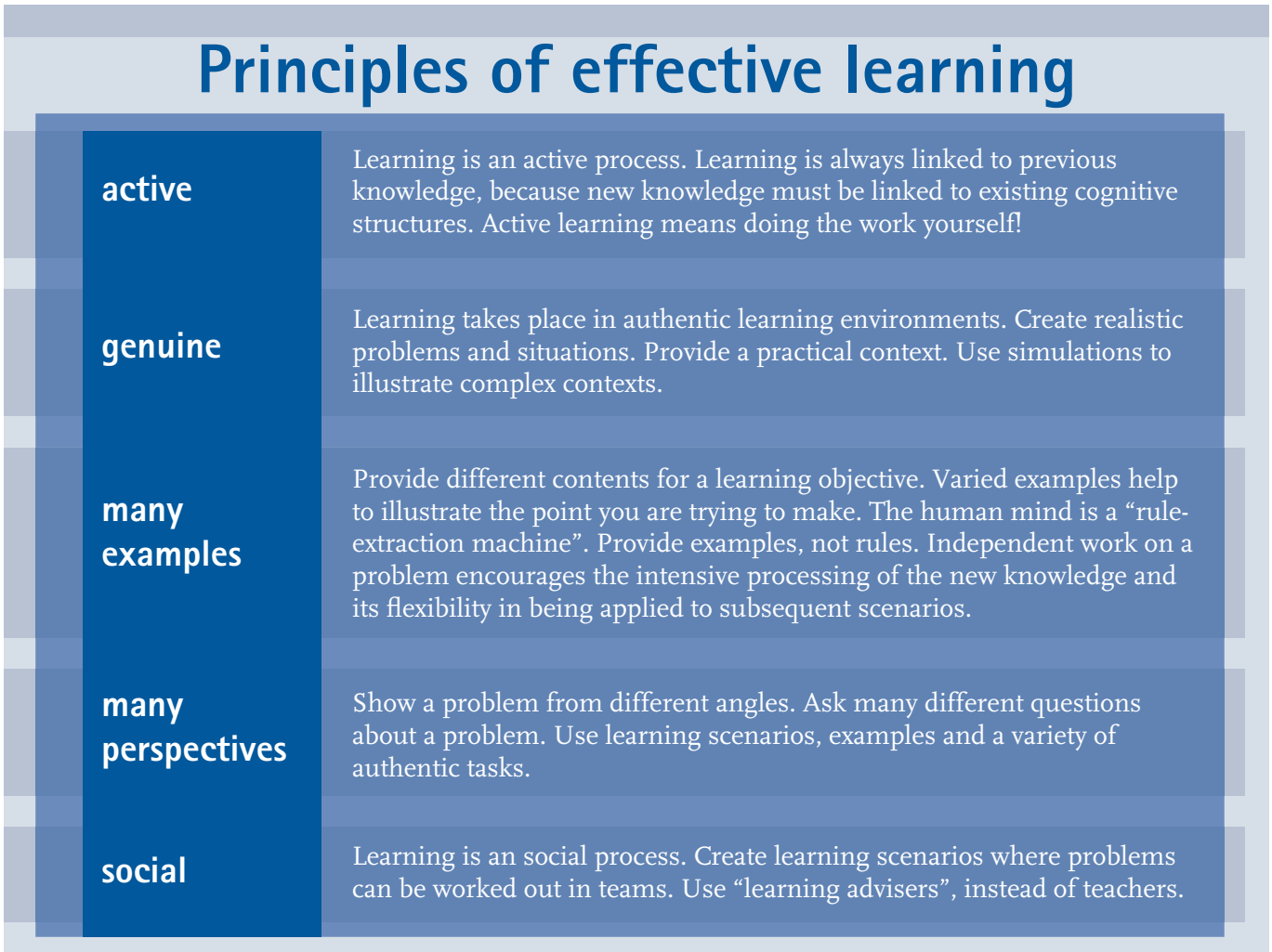


Fig. 11: Principles of effective learning according to current research.

knowledge about one's personal previous knowledge, knowledge about the difficulty of a task or even knowledge of one's own learning strategies and those of others. On the other hand, metacognition also refers to the processes of controlling thought or learning, that is, to an area called "volition". This means that the learner plans his/her learning process; he/she monitors, assesses, evaluates and regulates it accordingly (cf. Schiefele/Pekrun 1996a, 262). If man is by nature an independent, self-determined and self-responsible being, and in this way also learns best, then any learning environment will have to account for this as well. When planning an educational measure, it is therefore necessary to foster the development of metacognitive skills in learners. Computer-based learning environments can foster and support the environment for the active development and application of such sophisticated skills in an especially favourable manner. Especially in the free use of the internet, control strategies and self-assessment become essential components of successful action, with a competent tutor providing the best possible support for such action. Without metacognitive skills, it is easy for the well-known lost in hyperspace (cf. Romiszowski 1997, p. 32) phenomenon to occur.

3.2.4 Significance of Motivation and Emotions

Motivational and emotional aspects of learning take high priority in any kind of learning environment. This is especially true of computer-based learning arrangements. Previously these areas were largely excluded from research efforts, as these areas were elusive for the purposes of empirical research. Fortunately, this is no longer the case. Especially in the current concepts of constructivist learning approaches, the factors of motivation and emotion are of great importance.

Emotion can be described, borrowing from Pekrun/Schiefele (1996, 154), as subjective experience or the mood of a person. The causes of emotions are manifold. In the learning process, they, for example, derive from the comparisons between the subjectively perceived difficulty of a task and assessment of one's own competence. Such comparisons can trigger emotions such as fear, hope, boredom, etc. Research has shown that positive emotions lead to a more creative, rather deeper, approach to the learning material, while negative emotions often lead to a superficial treatment of the subject. Moreover, negative emotions (e.g., test anxiety) claim precious attention, which is then no longer available for the actual learning process.

Motivation is another important factor in learning. Motivation encourages learning processes, maintains them and provides the objective. Learning motivation can be encouraged via the transparency and clarity of the learning process, through exciting and practically relevant content, a pleasant learning environment, or through the application of a variety of teaching methods and use of media. Deci and Ryan (1993, p. 229) list three other needs, inferred from their research, which are conducive to learning motivation: The need for competence and effectiveness, the need for autonomy and self-determination and the need for social involvement and belonging. These research findings have significant implications for the design principles of e-learning, as reflected, for example, in the demands for situatedness, authenticity, problem-oriented tasks and learning in groups.

3.2.5 Summary – Learning Today

Let us summarise again the main points of the teaching-learning theoretical approaches outlined here for the design of computer-based learning environments.

Since the direct and creative influence of the expert during the teaching-learning process in computer-aided learning environments is very difficult, the preparations require more elaborate efforts accordingly. To create a viable product, basic questions of didactic reduction, task analysis, material and media selection, as well as considerations on the topic of motivation and methodology must be addressed diligently and professionally. The demand for constructivist-oriented learning environments is a timely and convincing one if one considers the underlying cognitive processes of learning. The needs formulated by employers also increasingly call for independent and responsible actions by workers. Under the constructivist teaching-learning paradigm, the position of the expert has a different role than before. The expert is no longer the "teacher" and "imparter of knowledge", but an organiser, moderator and adviser in learning processes. This role fits best for the definition of learning as an individual, self-directed and active process of knowledge construction. This is an opportunity for e-learning, because in e-learning per se the learner has to act in a self-directed manner, while the teacher moves into the background (cf. Thissen 1997, Kerres 2002).

3.3 Didactic Teaching Strategies

With the background knowledge in learning theory we present to you in this section three examples of didactic teaching strategies, which will provide you with design guidance for the implementation of an educational measure by means of e-learning. From the variety of teaching strategies (see chart on teaching strategies), we have chosen the three that we think are especially suitable for e-learning measures. These are based on the findings of learning research and also show a degree of historical development in relation to the role of self-determination in the learning process. In "descriptive teaching" the control power lies heavily on the side of the teacher. In the approach of "cognitive apprenticeship", the learner has much more influence on his/her learning process, and when it comes to "problem or case-based learning" under the goal-based scenarios, the learner finally has broad discretionary control. The following is a detailed account of the selected teaching strategies, first in general terms and then in relation to e-learning. The illustration below includes, apart from these three teaching strategies, the lecture or presentation, which can be considered an extreme form of "descriptive teaching". The sandwich method embeds activating methods in descriptive teaching processes and thus opens up descriptive teaching to allow more active participation of the learners. This method is very important in classroom settings. At the other end you will find the project method, which is almost never regarded as a teaching strategy anymore, because it assumes the involvement of competent team members who act very independently and autonomously. Professional work in companies is very often organised in the form of projects.

3.3.1 Descriptive Teaching

The concept of descriptive teaching assumes that a competent teacher/expert can convey the content in a meaningful manner. The structuring of the content and the sequencing are the responsibilities of the teacher. Classroom teaching ("talk and chalk"), such as a presentation or lecture, is largely considered descriptive teaching. From the point of view of cognitive psychology, the following aspects are important in ensuring a meaningful learning process that aims to expand the cognitive structure of the learner (cf. Straka/Macke 2002):

- The curriculum must be treated sensibly and with relevance to the learners, i.e., they need an entry point into the new knowledge.
- The teacher is an expert with practical experience.
- Teaching takes the form of instruction, with media support.

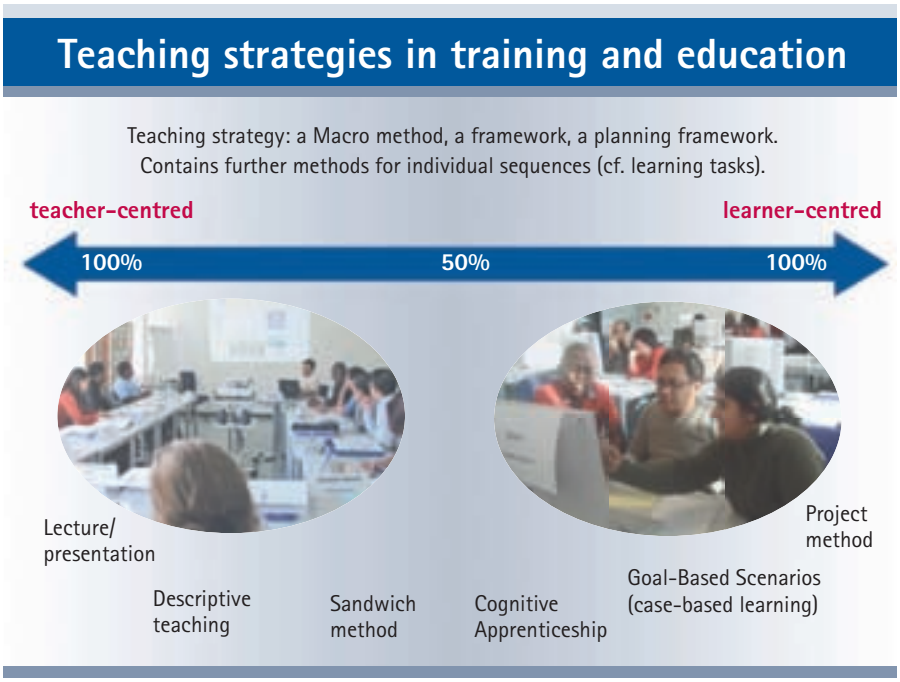


Fig. 12:
Teaching strategies for self-directed and active learning.

– The teaching sequence starts with a pre-structured learning aid. This is what we call "Advance Organiser" (cf. Straka/ Macke 2002, p. 100; Ausubel 1968). It contains information about the objective, content, process and benefits of the newly acquired knowledge as well as about how the learning sequence is embedded in the wider learning context.
– The start into a course with the Advance Organiser is then followed by the phase of knowledge transfer. In this context, attention must be paid to clear language and clear sequencing: e.g., from general to particular, from familiar to new, from specific cases to general ones, from concrete to abstract.
– Depending on the complexity of the subject, exercises to strengthen the knowledge and feedback to the teacher can be placed between each sequencing step. It is important that each step builds on the previous one, i.e., learners must be secure in their new knowledge in order to continue learning successfully.
– The learning phase is completed by associative integration. This means that the knowledge is embedded in the wider context of the participants' existing knowledge, with the contextual implications being illustrated again.

Very many computer-based learning programs incorporate the strategy of descriptive teaching, as outlined here. The subject is taught within a larger context and structured in modules. Each module begins with an introductory sequence and then takes shape. Each module is followed by exercises to verify the learning success (feedback is provided by the system or a tutor). Other characteristics of such e-learning systems, which are often also called tutorial learning programs, are:
– Information compiled in a graphically elaborate manner (colours, sounds, animations, video sequences)
– Repetition of key messages
– Modular design of the program

3.3.2 Cognitive Apprenticeship

Cognitive Apprenticeship goes back to a theory of Collins, Brown and Newman (1989). In brief, it is based on the idea, itself dating back to the Middle Ages, of the "Master-Apprentice" relationship that has shaped vocational training. The master is an expert in his domain, while the novice, i.e., the apprentice, observes him at first, studies his actions and tries to understand. Gradually the novice is initiated in the activities of his master. He takes on individual tasks himself under the supervision of the master. Finally, the master advises him on a real, genuine and comprehensive task. This is the time when the novice can show what he has learnt. He is motivated to master the task, because he visualises the overall result at the end. The master supports him in his learning. He helps him, points him towards the right path, assists him with technical expertise and advice on how to proceed – wherever the novice still lacks such insight and experience. Over time the master's role is diminished once the novice has internalised the necessary knowledge and skills. At the end of the learning process, the novice reflects on the process with other learners and the master. The learners exchange information on how they have solved their problems, and what difficulties they have encountered. They also discuss whether the approaches of the other learners might have led to the same result. This is important in order to ensure the sustainability of the learning process – as well as to learn how to learn! Subsequently, the novice is given an opportunity to apply his newly acquired skills in a slightly different situation. In doing so, he learns to expand on the new knowledge and differentiate situations where it cannot be applied. This description of the Cognitive Apprenticeship approach shows that it is an improvement on the traditional "four-step apprenticeship", expanded to include the metacognitive factors "articulation and self-reflection", which are crucial to one's learning success.

In a research project, the Department of Educational Science of the University of Freiburg, Germany has developed a multimedia learning environment that incorporates the concept of Cognitive Apprenticeship. The subjects, students of a secondary school, were to be familiarised with the economic cycle. Within a CBT learning environment, an expert explained the model of the economic cycle and circular flow of money. He explained these processes using examples that illustrated these concepts by resorting to analogies, e.g., water cycle model (evaporation, condensation, drainage, etc.). Then, the learners were able to obtain more information on the individual issues, solve problems, listen to experts, view examples, use structural illustrations and watch animations. Finally, they were tasked with developing an explanatory model of the economic cycle and comparing it to the expert model. Subsequently, the learners presented their solutions to each other and discussed alternatives (cf. Seel et al 2000).

3.3.3 Problem/Case-Based Learning: Goal-Based Scenarios

The concept of problem and case-based scenarios was introduced by Schank (1993) in connection with virtually supported learning environments. The learners are confronted with a challenging and motivating problem, which they are to explore and solve within a multimedia learning environment. By solving the problem, they accomplish the desired objective. On the way there, the learner works on a number of different tasks. It is largely up to the learner to decide on the method and time frame. The learning environment should be as authentic as possible and allow for information and interaction at different levels. Most of these learning environments tend to include the following elements: Work environment, help function, expert interview, glossary, simulated lab experiment or something similar, conversations with colleagues, news stories, film sequences, audio recordings, tools for conceptualisation and design, and much more. In planning such a learning environment, the following components of a GBS (Goal-Based Scenario) must be thought about and processed:

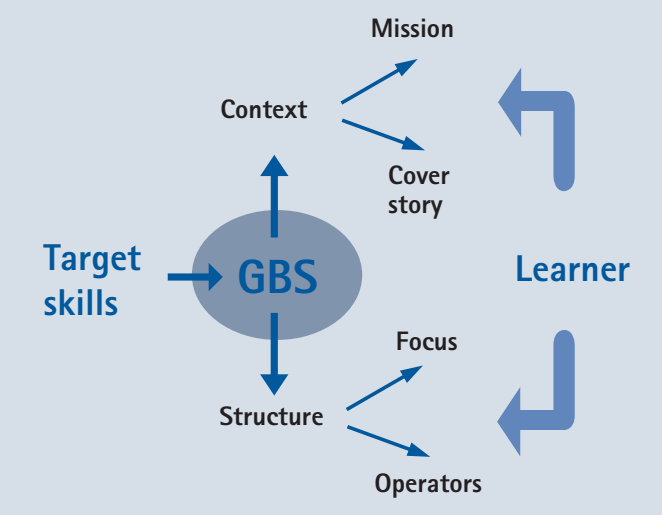


Fig. 14: The components of a Goal-Based Scenario according to Schank (1993).

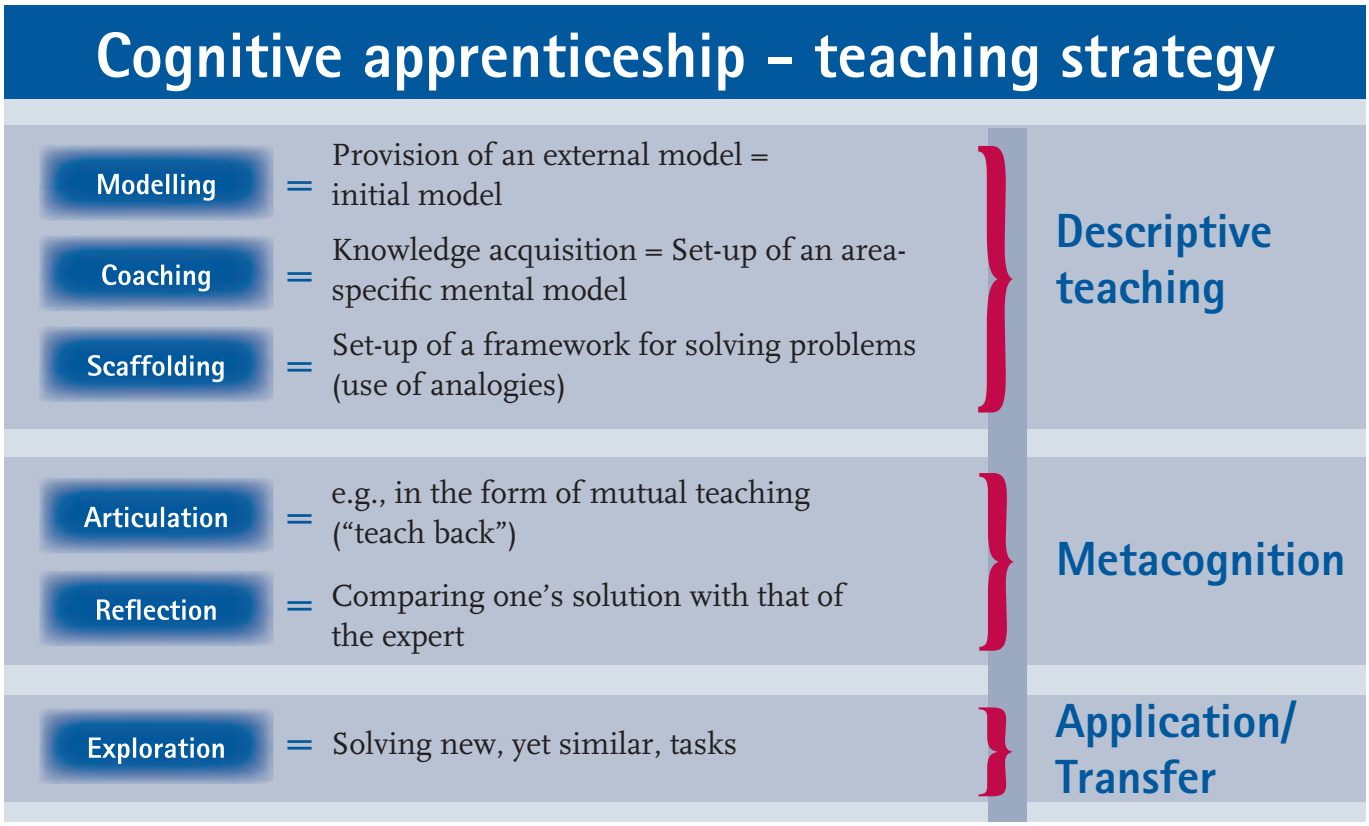


Fig. 13: Model of Cognitive Apprenticeship as a teaching strategy in e-learning.

– Target skills: The desired target skills must be defined. What matters in this context is that the learning objectives must have been formulated as exact and differentiated objectives, because these elements of a GBS are being organised in relation to the target skills (cf. the importance of effective analyses).
– Context: The context consists of a "cover story" and a "mission".
– Cover story: The cover story provides the operational framework. It should be plausible, enticing, coherent, realistic and consistent. The following chart will illustrate this.
– Mission: The mission is supported by the "nature" of the cover story. It contains the mandate that culminates in the achievement of the learning objective. In addition, the design of the mission must take into account all differentiated sub-

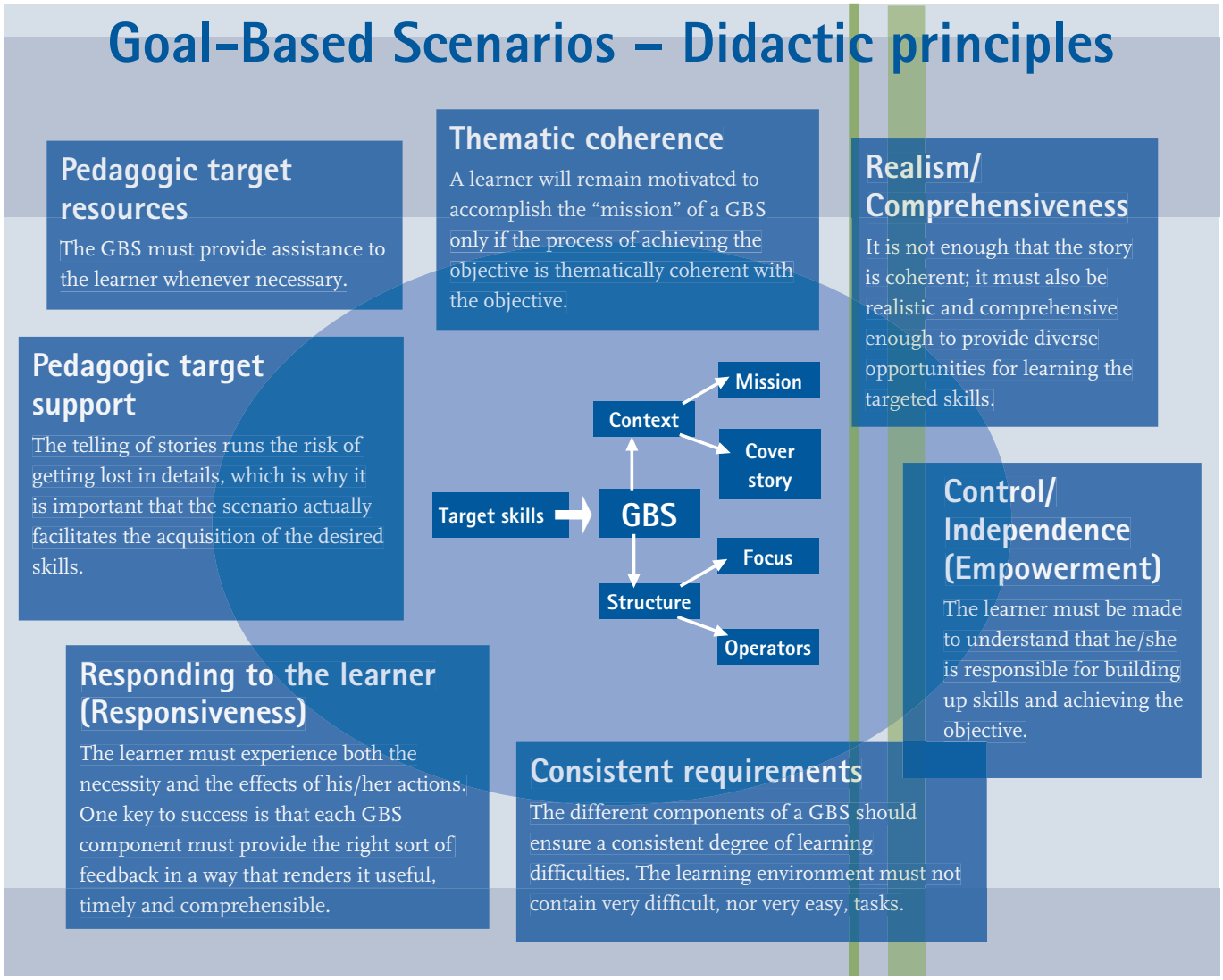


Fig. 15: Didactic principles in the approach of Goal-Based Scenarios according to Schank (1993).

Fig. 16:
Example of a task definition as found on the learning CD-ROM "Formación basada en competencias".

objectives. For this purpose, the learner must be aware of and understand all the criteria that lead to the objective. Therefore, the mission always contains objectives that the learner has set for himself or herself or that he or she is willing to adopt. The mission is so broad-based that it allows for a variety of learner's activities.

- Structure: The structure of a GBS is determined by the focus and operations.
- Focus: These are general classes of tasks that can be divided into four types of varying degrees of difficulty: (1) Explanation of phenomena, diagnosis of systems, predicting results. (2) Learners control processes; they operate within one system (e.g., flight simulator, gaming simulations like SimCityTM). (3) Discovery-based learning in microcosms, learners are to work out regularities, know the rules, deal with different explorations. (4) Learners are to create something new, e.g., development of a learning environment (very challenging).
- Operations: These are the concrete activities such as providing guidance, answering questions, forming artifacts, searching information and selecting alternatives.

For the successful design of a GBS it is imperative to ensure that the fundamental interests of learners be taken into account and further strengthened with respect to the subject matter. This can only happen if the learners largely control their own learning behaviour. The following chart shows the action-driving principles of GBS.

We have chosen the Goal-Based Scenarios as an example of problem-based learning environments. The learners are fairly free in making decisions on the learning process. This requires a high degree of self-discipline as well as a solid understanding of dealing with the learning environment. It is crucial that you can implement each of the teaching concepts discussed in this article in its "pure form" as well as in a "mixed form". For the CD-ROM "Fundamentals of Biotechnology", which we developed for InWEnt, we have implemented the GBS concept in its "pure form"; in the InWEnt program "Formación basada en Competencias", we have combined it with the teaching strategy of "descriptive teaching".

3.4 Didactic Three-Level Planning Concept

Didactic planning requires a framework that drives and directs action. Such a framework can be created only if the analysis results are incorporated as guidelines as well as interpreted and implemented on the basis of current competence-based didactic principles. The learning-theory fundamentals and teaching strategies described so far are to serve as a stepping stone for you. This section of the chapter will tell you how to proceed in building such a framework and what to look out for. Before we begin and introduce you to an action-directing "Three-level planning model" (cf. Niegemann et al 2004, p. 72-74), we should like to familiarise you briefly and specifically with the topic, using the following chart.

3.4.1 The First Planning Level: Strategic-Didactic Decisions

This level contains the following seven areas of decision-taking. Note that strategic decisions taken at this level will affect the decisions of the other two levels:

- Organisation of information processing (structured, following a given specialist structure, ranging all the way to free problem-oriented approaches)
- Abstraction level (concrete situated representation or decontextualised)
- Knowledge application (listen, record, or rather apply, evaluate, design)
- Control instance (largely external control of the learning process or rather self-directed and self-controlled learning behaviour)
- Communication direction (one-way communication or rather reciprocal communication)
- Type of learner activity (receptive behaviour, or rather continuous activity of the learner)
- Social form of learning (individual, largely isolated learning, or more co-operative and collaborative learning)

3.4.2 The Second Planning Level: Didactic Design Decisions

At this level, educational and technical choices are made that can be seen as behavioural rules for the Instructional Design (list modified according to Niegemann et al 2004, 73).

- Structuring of the material:
  This includes the selection and reduction of content, the segmentation of the subject into units and sequencing – that

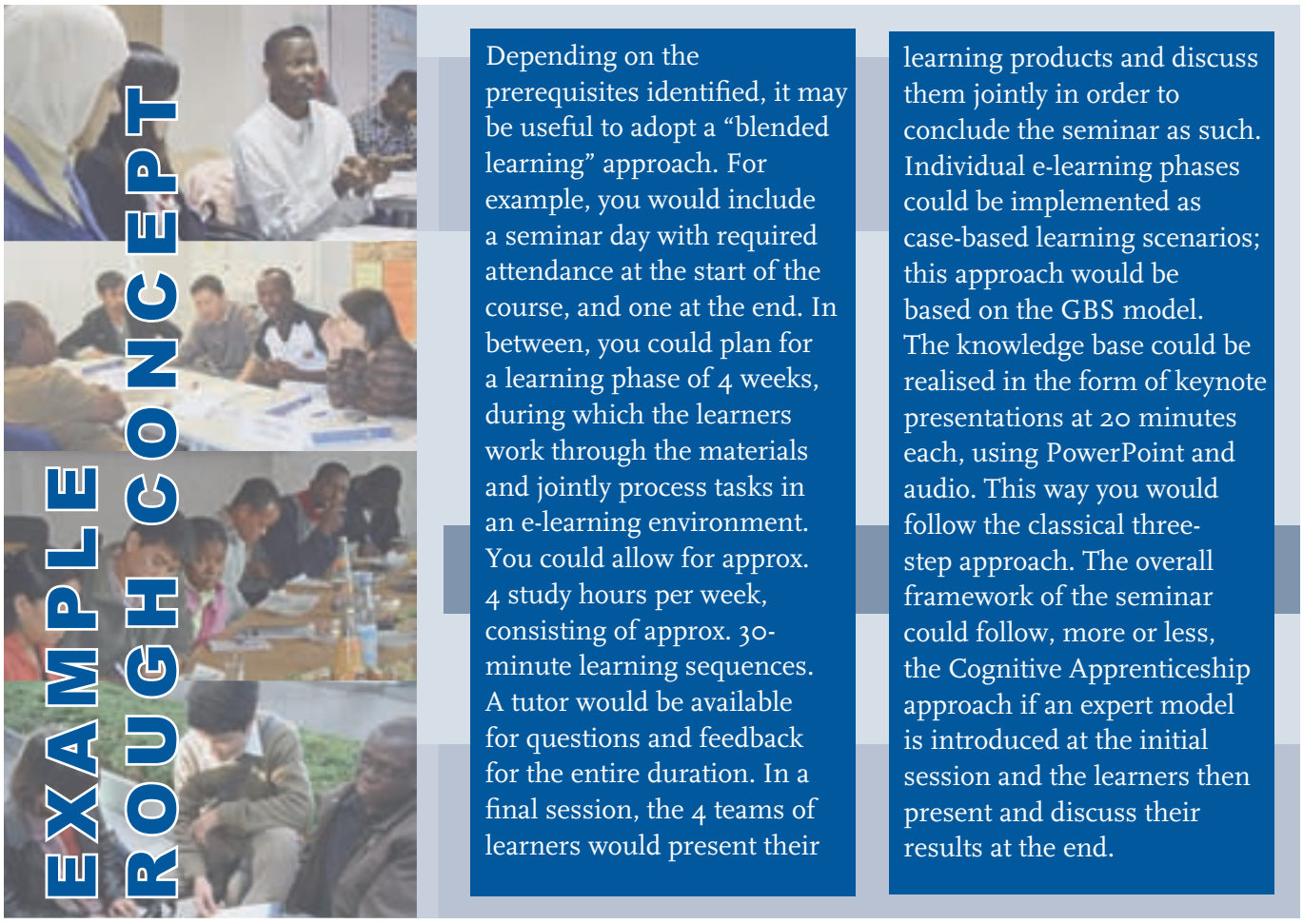


Fig. 17: Example of a rough plan of an educational measure that can serve as the basis for further detailed planning.

is, the question of whether the course should go from general to specific or from easy to complicated, etc.
- Considerations on the use and selection of symbolic systems: Should only video be used, written texts or audio recordings? For example, keep in mind that, when developing a learning program for preschool children, the entire functionality of the program must be realised without a single written word!
- Selection of methods achieving the desired objective: Significant overall teaching strategies and models have already been defined at the first level. This refers to Meso and Micro methods, such as the use of group work methods, word processing procedures, evaluation methods, etc.
- Defining the technical base: This concerns the question as to which of the technical options available to me do I really want to use? This is done in comparison with the analysis results by taking into account learning-objective-oriented aspects and efficiency.
- Interaction and adaptation design: Will there be a tutor, how do the working groups work together, how can the needs of advanced participants be addressed without intimidating the beginners? These are all questions that you will have to deal with at this planning level.
- Motivation design: Of fundamental importance here, too, is the target group's analysis basis. Does a reward strategy exist, how can the learners experience themselves as competent actors?

3.4.3 The Third Planning Level: Didactic Graphical Design Decisions

This level is about pragmatic-technical questions in connection with the graphical design of the learning environment: What are the factors to be considered when creating the screen design? How are teaching contents to be represented? What should the graphics look like? What about the colour scheme? These are examples of the questions that need to be addressed at this planning level. Intensive software use also raises software-ergonomic questions. Another topic, which has been ignored far too often, concerns the legal issues in dealing with media in multimedia learning environments. What are the licensing models, and what are the costs of the rights to images? May I use the intended text; what are a publisher's terms and conditions for including a chapter from a book in the learning environment?

Once you have developed the planning framework, you can start with the implementation phase. You will find more information on that in Chapter 4. First, read this brief excursion on the "didactic quality of e-learning."

3.5 Didactic Qualities of E-learning

For the purposes of didactic planning it is important to know what e-learning can and cannot do. These questions are crucial when setting to work full of enthusiasm, wanting to use e-learning at all cost (cf. above). As a matter of principle, the use of e-learning does not improve the learning process. It will be improved only if one uses didactic decision-making knowledge for good reason. This includes, above all, having a clear concept of the learning objectives, contents, methods and previous knowledge of the learners. This has already been explained in the chapter on "Analyses". A well-founded decision in favour of e-learning may also be based on the didactic functions of e-learning, as is true of web-based systems and offline offerings described in the following section (also cf. Thissen 1997).

3.5.1 Web-Based Systems

Learning platforms represent a virtual space in which HTML pages, task sheets, texts and other documents or file formats are provided. The advantage of a learning platform lies in the fact that the learner can study independently of place and time (cf. Schulmeister 2005). Furthermore, learning platforms serve different didactic functions (also cf. Chapters 1 and 2):
- the learning platform as a "treasure trove" (searching information not directly belonging to the subject matter)
- the learning platform as an information exchange (a file exchange takes place between trainers and learners)
- the learning platform as an exercise area (learners process tasks and receive immediate qualified feedback from a coach)
- the learning platform as a communication medium (trainers and learners exchange views "virtually" on lessons, homework, etc.)
- the learning platform as a collaboration space (learners work in teams on a common task)

Fig. 18:
Example of a learning platform as an open source product: Moodle.

In a learning platform (Moodle ®, Blackboard ®, Web-CT ®, IBT-Server ®, CLIX ®, etc.) entire tutorials can be integrated, which have been produced, for example, using Macromedia Director or Toolbook. One might therefore theoretically supply smaller CBTs in full over the network in a learning platform (but this is dependent on the data volume to be transmitted).

Several tools are now available for determining the quality of an online learning program. Thus, in 2001 the German consumer protection foundation "Stiftung Warentest" published a checklist for choosing a good online course (www.warentest.de: Issue 11/2001) (also cf. the extended checklist of Benkert 2001). It contains the following points:

- A methodical approach to learning is available and comprehensible.
- Detailed description of the curriculum, not just keywords.
- Variety of learning success verifications, which also includes group work.
- Technically qualified tutors.
- Co-operative learning in groups, chat, forums, etc. will be used where justified.
- Specification of the target group.
- Information on study time and course length.
- Technical requirements are described; support is guaranteed.
- Costs of the course are transparent.
- Offline learning is feasible and has been taken into consideration.
- Completion of the course is clearly defined. Certificates are reliable credentials.

3.5.2 CBT Systems

Learning environments on CD-ROMs and DVDs still have an enormous potential (also cf. Chapters 1 and 2). Their main advantages are found in their being independent of the internet and the fact that large amounts of data can be provided. This makes them practical for use on notebook computers everywhere, and learners can play long and complex video and audio clips without having to wait for a download. Intelligent learning assistants (virtual tutors or dialogue partners) can be integrated into the software of the learning environment and thus provide the necessary feedback in the learning process. Still, we recommend that CBT systems be combined with a web-based system, where possible, in order to allow for communications among learners and between learners and human tutors or experts. In such a case, tasks provided on an external data carrier can be processed by a "learning team" via a network in a collaborative manner.

Fig. 19:
Welcome screen of the CD-ROM
"Formación basada en competencias".

The learning environment that we developed for InWEnt, "Formación basada en Competencias", is an example of such a combination between a CBT and WBT system. In the present further-training program the virtual learning phases were supported via a CD-ROM as well as through the exchange with tutors and learning partners in the Shared Workspace (SWS).

3.6 Design Principles for Old and New Media

According to Clark/Mayer (2002) and Niegemann et al (2004, 193ff), we can distinguish six main design principles for e-learning. Mayer bases these principles on findings from empirical research (cf. Mayer 2001). These principles apply both to old (e.g., overhead transparencies, worksheets, blackboard) and new media. New media tend to be attributed some added value, which seems founded solely on the fact of "being new". But at closer inspection, it is often found that these media are not that new after all. What is new, however, is how media can be combined in any random manner within a constrained space (time and place) – multimedia!

3.6.1 The Multimedia Principle

It helps the learning process if the course material is enhanced by visual elements, such as graphics. This principle contains a meaningful combination of the two forms. In other words, simply making a text look more appealing by putting a few pictures here and there is not the purpose. Instead, the text must be related to the images (graphics) and vice versa. Niegemann et al (2004, 194) lists three examples of a learning-effective arrangement: a) Graphics as an illustrated overview of contents that shows the relations between the elements graphically; b) graphics to illustrate processes, such as temperature changes in a heating circuit; and c) graphics as a helpful tool for setting tasks. For example, the virtual representation of an office and its functions, etc. can help to facilitate the learning process in connection with a specific task.

3.6.2 The Contiguity Principle

Related images and texts should also be presented close together. In multimedia learning environments it is particularly important to avoid having to scroll down the screen. Many contents, for reasons of space, are displayed on different pages even though they are thematically linked to each other. The following recommendations will prove useful in this context (Niegemann et al 2004; 195f):

- Place words closely to the graphic and draw a line between the two parts.
- Use mouse-over texts that provide explanations whenever the mouse cursor touches on the corresponding spot in the graphic.

– Always display the graphic and text together. Avoid scrolling and try to incorporate mouse-over texts.
– Answers to questions should be given on a single page.
– Do not cover up the graphic and its related text by links or other information.
– Provide explanations and instructions for exercises simultaneously; avoid turning of pages and scrolling.

3.6.3 The Modality Principle

To add explanations to graphics or animations, spoken text is better than written text. This principle can be explained by the way people process information through two different channels. If we receive image-based information through our visual sensory channel, our cognitive system is less burdened than when the related text-based information is provided auditorily (also cf. Cognitive Load theory according to Sweller 1999; Mayer 2001). In some cases, however, it may be useful to provide the text visually and auditorily, for example, when a formula needs to be explained.

3.6.4 The Redundancy Principle

Closely linked to the modality principle, the redundancy principle states that the simultaneous presentation of written and spoken text can impair the learning process. Clark and Mayer (2002) recommend that, at first, additional screen text should not be added to graphics and images when the text is also provided auditorily, as this would distract the attention of the learner away from the graphic. So, less is more! The multiple use of text can be useful if no graphics are used, the learners have enough time to process the task and they can choose themselves their preferred source of information. In this context, it is interesting to note learning environments in a foreign language, where the written text component is very important for successful learning.

3.6.5 The Coherence Principle

Adding "interesting material" to the learning environment can impair the learning process (cf. Niegemann et al 2004, pp. 199f). As a matter of principle, the tasks and materials of a learning environment must be geared towards the objective of the educational measure. Additional information should be placed in the appendix or on supplementary pages, but not in the actual task area of the learning environment. The same is true of entertaining stories that are not really part of the subject, or passages of very detailed text. If "interesting materials" distract from the actual objective, or if they interrupt the learning process, they are not longer considered conducive to the learning process and should therefore be left out. Confusing or distracting information on the supposed solution is not helping either.

3.6.6 The Personalisation Principle

Clark and Mayer (2002) recommend using personal-style language in order to address the learners as directly as possible. The prevailing view in the past was that a matter-of-fact, impersonal and abstract style of language was less confusing, but this view no longer holds true today. In addition, the authors recommend that pedagogic, virtual or human learning assistants should be implemented in e-learning environments that interact with the learner in the form of dialogue. This recommendation also reflects the call for authentic learning environments, as also happened in competence-oriented didactics influenced by constructivist epistemology. In Schank's (1993) Goal-Based Scenarios, this principle is also encountered, for example, when he incorporates a "story-teller" or talks about learning scenarios. Pedagogic assistants, or "agents", do not have to be real persons; very often cartoon characters or mascots will do the trick. Integrating such intelligent agents with a learning environment usually requires considerable programming and, thus, financial efforts – but often it will be worth it!

4. Developing Learning Environments: The Phase of Development

The development phase under the ADDIE approach is very closely linked to the design phase. Some authors assume that the two phases have become merged in the process (cf. Dick et al 2001). The development phase is the phase of the actual production of the learning environment. It must therefore be planned well. Also, the production team must be managed. In an expanded view of Instructional Design, the development phase is thus guided by didactic project management. From a more narrow didactic point of view, the development phase is where the learning tasks are constructed. We shall look at both these aspects at least briefly.

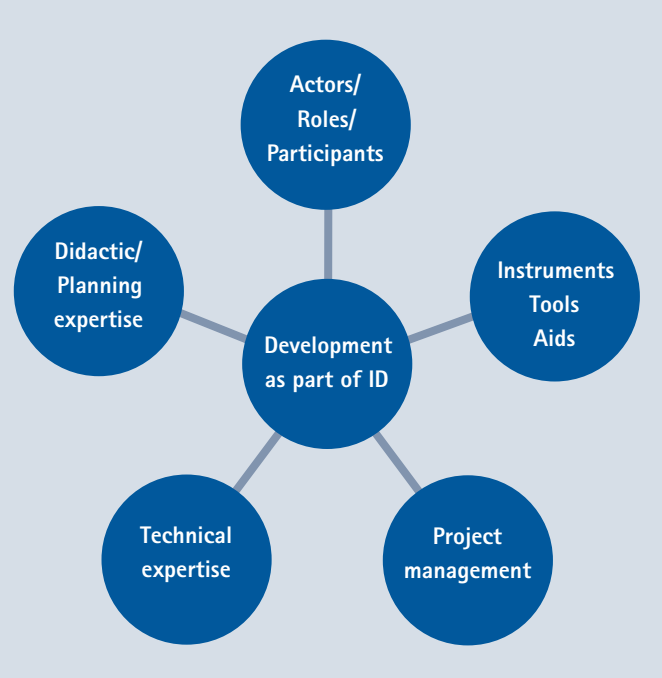


Fig. 20: Possible actors and roles in the Instructional Design process in designing a learning environment.

4.1 Didactic Project Management

A successful Instructional Design is possible only when carried out as a team effort (see chart above). The various actors and roles must complement each other and interact with each other purposefully. The Instructional Designer can hardly perform all the tasks in such a complex field alone, but must co-ordinate and didactically supervise the project. Many times, for example, a programmer will be necessary in order to implement the learning environment. It also rare for the Instructional Designer to have the necessary expertise to ensure the desired quality of content. If the intention is for films and audios to be used, competent specialists will have to be recruited as well. The same is true of texts and graphics, etc. There is always one question that comes up in this context: "Make it or buy it?" By this time it has become clear that a perfected didactic concept is indispensable, because this type of work is very cost-intensive. We therefore recommend that you proceed in accordance with the principles of project management. Gantt charts can be fairly useful in this context (see chart below).

No	Activity name	Duration
1	Kick of	1 Day
2	**Phase 1**	**16 Days**
3	Activity 1	3 Days
4	Activity 2	3 Days
5	Milestone	0 Day
6	Activity 3	8 Days
7	**Phase 2**	**7 Days**
8	Activity 4	3 Days
9	Activity 5	3 Days
10	Activity 6	3 Days
11	Project close out	1 Day

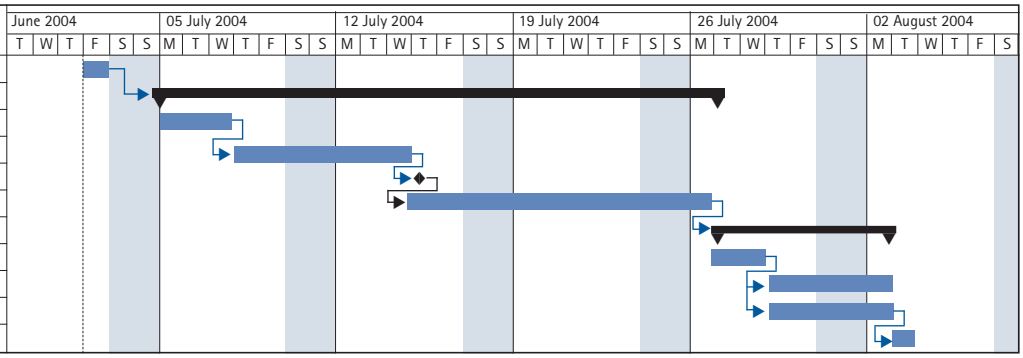


Fig. 21: Example of a Gantt chart showing the organisation of the project flow.

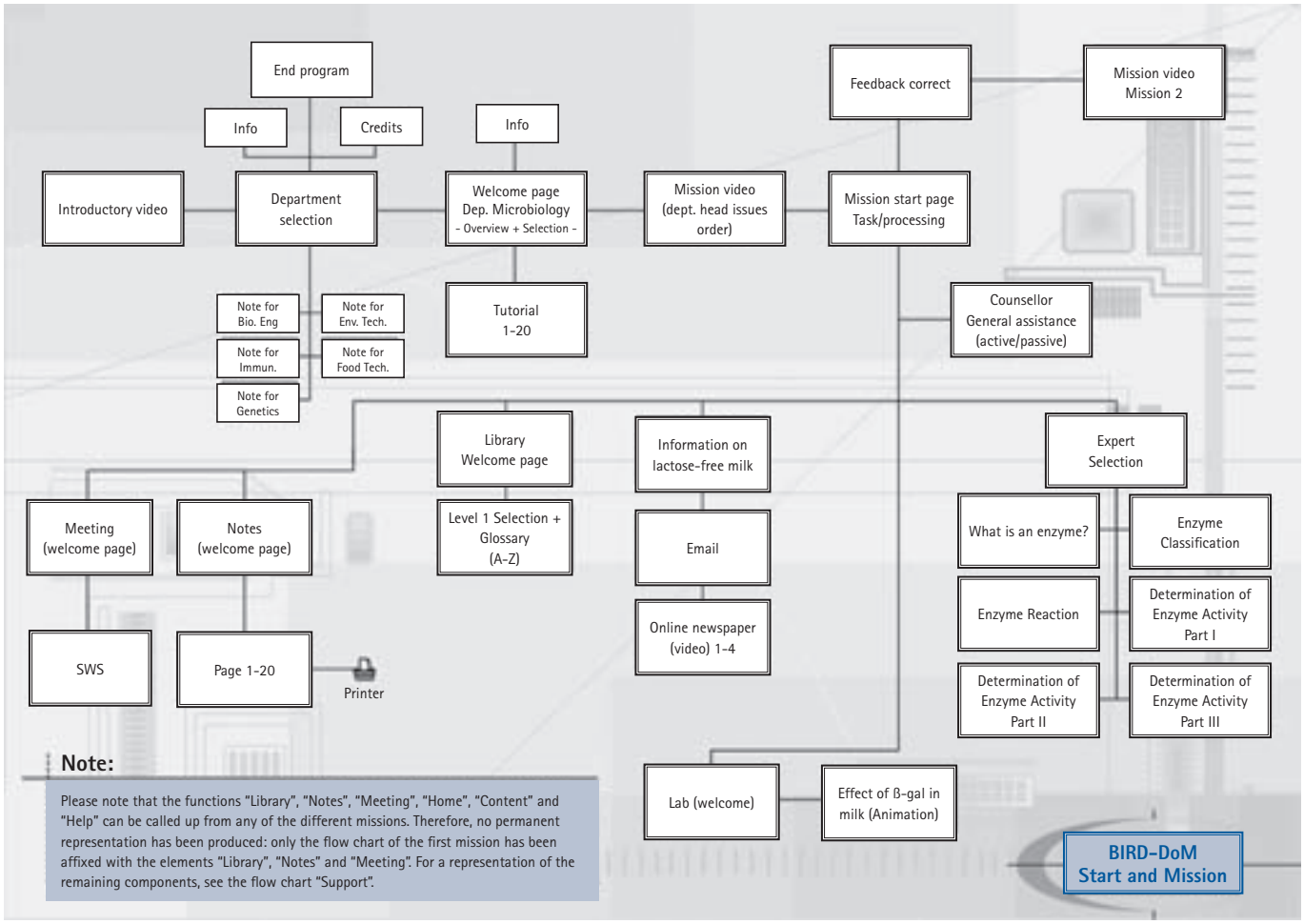


Fig. 22: Example of a flow chart showing the organisation of a multimedia learning environment; it also serves as the basis for writing a script.

The total structure of the learning environment with virtual and attendance components is best illustrated by way of a flow chart (see chart above). It provides orientation for all those involved and serves as the basis for preparing the script, which eventually contains all the detailed instructions, for example, for the programmer (see chart below).

4.2 Designing Learning Tasks

From a more narrow didactic perspective, the design of the learning tasks takes centre-stage in the Instructional Design process. Learning tasks are the link between the cognitive processes in the learner and the surface structure of the learning environment. Thus the learning environment must provide the structure, so that the learning tasks embedded therein can trigger the intended actions in learners. Given this intermediary nature of learning tasks, they serve different functions: They trigger actions; they provide information on content; they cause feedback; and they provide the teacher (or learning system) with crucial feedback on the learning progress of the learners. As a result, tasks can come in different formats. In the case of closed tasks, the learner can make a choice, such as in multiple-choice or yes/no tests (e.g., written driving test, evaluation questionnaires, etc.). Such tasks only provide feedback on the learning success. Learning itself

virtually does not occur. Open tasks, however, allow learners more freedom of choice, but they are also more complex and more demanding (e.g., explaining something, writing a letter, writing a program for a CNC milling machine, carrying on feedback discussions, etc.). This is why instructions in this context must be very exact. Since the learners have to deal, in these task formats, very closely with new knowledge concepts and their own, there is an intensive learning process unfolding. By way of explanation, we shall illustrate this using the "jigsaw method" (also known as "group puzzle"). This method is of great importance in training and further training, because it corresponds to the approach of competence-based didactics in a very special way.

Let us assume that there are 16 participants in an online course, divided into four groups working on four different subjects. In this case, every participant would at first work intensively on a text or on the materials taken from the document pool. The learning task set would involve discussing the text or materials in the respective expert group in the chat room in order to arrive at a joint summary, which would then be posted to the forum. With such a task, individual knowledge is communicated, restructured and applied. Another learning task in this context is the acquisition of new information and internalising it by putting one's own interpretation on it. The group work of the expert group is then followed by the work done in the puzzle group. This means that the experts divide themselves into four groups again, each one consisting of four persons from the different subject areas. Each participant must now take the knowledge gained from his/her own expert group and share it with, and explain it to, the other three group members. This can be done in the forum and/or chat room. This, too, is a complex and open task. This learning task shows whether the learners can restructure their new knowledge, are capable of compromise, are able to work in teams and whether they can critically discuss the new knowledge. The ultimate objective of this complex didactic method is the building up of knowledge that can be applied. We try to achieve this through intensive communications within the team, because all participants are forced to process information continuously. This approach requires learners to distil, restructure, supplement, expand and re-contextualise their own knowledge.

Script scenarios – Case-based learning under change management

N°		Title	Content	Links	Media	Files
1	Intro scenario	Mr Hahn, 32 years, business administrator is happy. He has made it. He will take over the marketing department of the Future Ltd headquarters in Frankfurt. Mr Hahn still lacks practical experience and needs an advisor to support him in his decisions. Please take on the advisor's role. Enter your first and last name in the following box.		Photo of Mr H.	Leadership, Batch 1, photo 03	Always indicate advisor's name (person with access authorization). Here called x.
2	Company description	Being the advisor, you need information about Future Ltd: Future Ltd is a manufacturer of water pumps for washing machines; a medium-sized company; 150 employees in Germany; is represented on all continents by subsidiaries and joint ventures.		Find photo of company, water pump, (e.g., impeller wheel) and washing machine	Own photos of 14y	
3	Learning objectives	At the end of the scenario, the CIMT attendance seminar will leave you with in-depth knowledge and competences regarding leadership skills and intercultural know-how, professionalized management know-how as well as feed back on your own work situation.				

Fig. 23: Example of a script in table format with detailed information regarding the realisation of a learning environment (e.g., introduction of the scenario, description of the company, learning objectives, media, links, etc.).

4.2.1 What Are The Key Aspects In Designing Learning Tasks?

- Tell the participant as clearly and as unambiguously as possible what he/she is to do.
- Only use unambiguous words and terms.
- Avoid complex syntax.
- Avoid empty filler words in setting the task.
- Avoid double negatives.
- Avoid being unnecessarily and overly accurate in setting the task as well as in giving the answers.
- Avoid unnecessary difficulties that are irrelevant to the criterion to be measured.
- Avoid concealed hints that would allow for the right answer to be chosen without the actual expertise.
- Avoid stereotypes and recurring platitudes.
- The learning task should stimulate independent work.
- Design the learning environment in such a way that the learners can see what the result or product of the work should look like.
- Show the learners what is to be done with the work product after completion of the learning task.
- Let the learners know how much time they have for completing the work.
- Inform the learners about where to get assistance from if they cannot master the task on their own and about the aids they are allowed to use.
- Make sure that the learning task is complex enough yet still easy enough in order to be meaningful. (according to Herbig 1972, 96-100 and Grell & Grell 1990, 273).

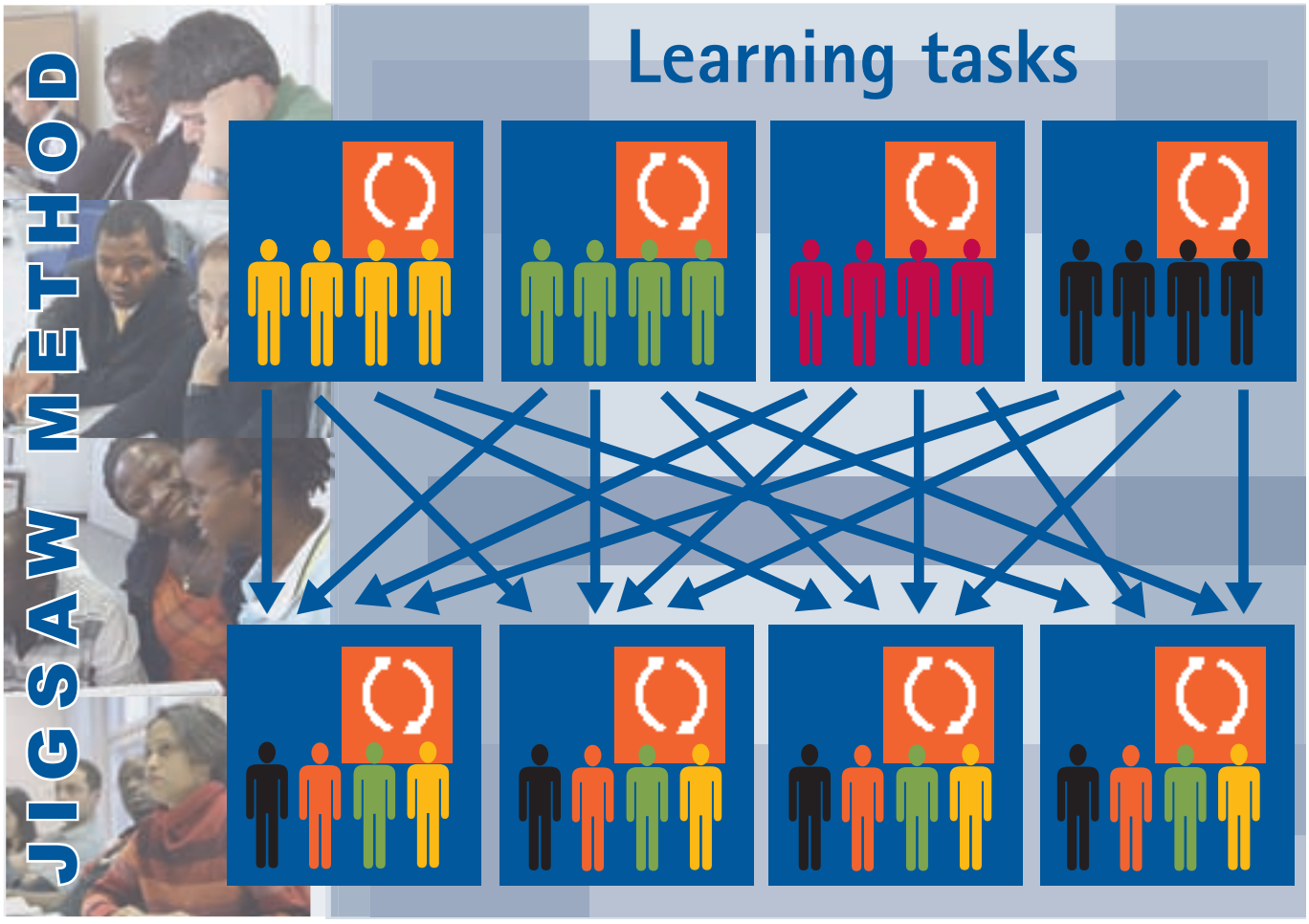


Fig. 24: Schematic structure of a learning sequence according to the "jigsaw method".

5. Implementing Learning Environments: Phase of Implementation

Surely, everyone will agree when we say that implementation – the actual realisation of the educational measure – is the most exciting point in the entire Instructional Design process. After all, we want to know whether all the efforts have been worth it and whether our concept is successful or not. As well, this shows how important quality assurance and/or evaluation strategy is in the didactic planning process. We shall address this point in the next chapter. But the implementation of educational concepts is not something to be taken lightly. One often hears comments like "We have done enough, so nothing should go wrong" – far from it! In our view, two aspects are of particular importance to a successful implementation: The organisation of the educational measure and public relations. We shall address both these aspects in greater detail in a moment. But first we should introduce the Rapid Prototyping concept: especially with more comprehensive educational measures, this concept constitutes an indispensable strategy in Instructional Design (cf. Tripp et al 1990, Blumschein 2001).

5.1 Rapid Prototyping

Rapid Prototyping (RP) requires a feedback process in Instructional Design, which proceeds as follows: Conceptual design (needs assessment, development); implementation of an initial, small-scale system (e.g., a first module of the learning environment); evaluation; improvement; evaluation; improvement, etc. (cf. Tripp et al 1990). In Rapid Prototyping, therefore, one develops at first a small functional subarea of a learning environment in order to test the effect and final result in combination with the development process (cf. Figure 24). In doing so, it is important to select a subarea that is as representative of the entire product as possible. Testing an attendance course is of little use when the remainder of the educational measure is delivered online. But the efficiency of production can be increased substantially through meaningful Rapid Prototyping, especially with comprehensive projects, which is therefore indispensable.

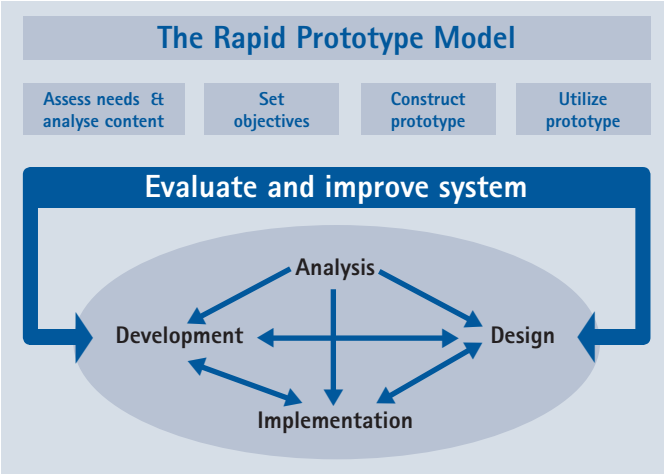


Fig. 25: Arrangement of Instructional Design according to the Rapid Prototyping model.

5.2 Organisation of Educational Measures

From daily teaching practice, we all know only too well that small details can really mess things up. We would therefore like to summarise the aspects again that can help to ensure the success of your course.

5.2.1 E-Learning Checklist:

- Each participant has free access to a computer (if possible, each participant has his/her own notebook computer including free internet access at all time)
- Each participant has an access key for the learning platform, which he/she has already tested. He/she has the necessary skills for using the computer and is familiar with the software. You will have specified and verified these skills beforehand: e.g., opening and reading PDF documents; using PowerPoint and other Office programs; managing emails; uploading and downloading files; allocating a variety of file formats and knowing how to use them; basic knowledge of data security; installation of upgrades, plug-ins and standard programs, etc.
- You have scheduled an introductory course on how to use the learning platform and the other programs that form the basis for online and/or CD-ROM/DVD-based learning.
- You have done the basic calculations for tutor hours per learning unit and participant per week. You have made sure that there is a sufficient number of tutors.
- Tutors are competent or trained in their fields and are also very knowledgeable in the use of software programs. You have also accounted for a tutor for special computer problems, who will be immediately available in the critical learning phase. Many of the problems in e-learning concern basic computer problems and have nothing to do with the learning program itself – but they can still have devastating effects on the program!

– You have incorporated in your plan processing times for the reading and processing of study papers of participants in the case of internet-based programs. Do not underestimate the workload connected to the processing and assessing of the papers of your e-learning participants. The quality of e-learning is substantially dependent on the fast and qualified feedback from a tutor or teacher!
– In the case of larger projects, and particularly new projects that are still rather unknown among potential participants, we recommend a "taster course", free of charge, in order to overcome any prejudice or barriers to acceptance more easily. People, after all, want to know what they are getting themselves into.
– How do you implement evaluation measures? What do you want to accomplish with the evaluation?

5.2.2 Public Relations

In didactic planning, public relations is usually ignored. This can have very negative consequences. You may have created an educational concept, with immense effort, and are about to start your course ... but hardly anyone has registered. How come?

Most of these problems can be eliminated early on by providing timely, suitable and comprehensible information. Inform the target group of your planned educational measure in a timely fashion. Present the educational program in detail and clearly. Pique their interest in the course and make sure to design registration forms that are unambiguous and binding. If you have prepared an information brochure, test its effect on one person. From the point of view of the target group, the key question regarding advertising material is: How does it benefit me?

5.2.4 Checklist for Advertising E Learning Programs:
(List assembled according to Ballstaedt 2000, 376f):
– What is the benefit of the program for the target group? Is there any special significance for the personal/professional development of the target group? What are the advantages of the course?
– What makes it unique?
– What is the special significance of the topic, and can it be further reinforced by referencing current developments?
– What are the advantages for potential participants?
– Who organises (institution) the event and who is responsible for the content (teacher)? What are the special competences of the organiser(s)/teacher(s)?
– What topics will be covered? How thoroughly are they to be treated during the course?
– How is the learning process organised? What methods will be used?
– What are the admission requirements for participants? What are the prerequisites?
– Where can one register? Is there a break-off date for registration?
– How long does the course last? (From when to when?)
– What sort of qualification, certificate or diploma is issued upon completion and on what terms and conditions?
– What are the costs to participants?
– Who is the designated contact person for questions? – contact address, phone number, WWW page, email, etc.

6. Quality Assurance of Educational Measures: The Evaluation Phase

Evaluation is a tool for assessing and evaluating performance. In our case, it is used to assess the quality of the educational measure. In other words, it is about quality assurance or quality control. Formative evaluation methods are employed in respect of quality assurance in the development process of Instructional Design. Summative evaluation methods are used for the purpose of quality control for the completion of the development phase. Here, they serve, for example, to measure learners' acceptance of the learning environment (cf. Ballstaedt 2000, p. 234). In this context, Ehlers (2002, 3) outlines four possible definitions of quality with respect to educational measures:

- Quality, as the exception, refers to the exceeding of standards
- Quality, as perfection, refers to the state of being error-free
- Quality, as a practicality, refers to the degree of utility
- Quality, as an adequate value, is measured by the price-performance or cost-benefit ratio
- Quality, as a transformation (...), refers to the further development of the learner through a learning process

An evaluation can be successful only if one's own understanding of quality has been clarified beforehand. Building on this, it is then possible to define criteria that will serve as quality indicators. Gooler (1980, p. 10) suggests that the following questions should be addressed in this respect:

- Function/purpose: What is the purpose of the evaluation? What objective is it supposed to achieve?
- Target group: Who is the intended recipient of the evaluation data?
- Subjects/topics: What are the main issues to be addressed as part of the evaluation?
- Resources: What resources are necessary to carry out the evaluation? Are these resources available?
- Proof: What type of data basis is acceptable with respect to the issues raised? What data basis is seen as sufficient?
- Methods of data collection: What methods of data collection can be applied in order to obtain the desired data? What are the opportunities and limits of such methods?
- Data evaluation: How will the data collected be evaluated?
- Reporting: How will the findings be reported? Who will receive such report and when?

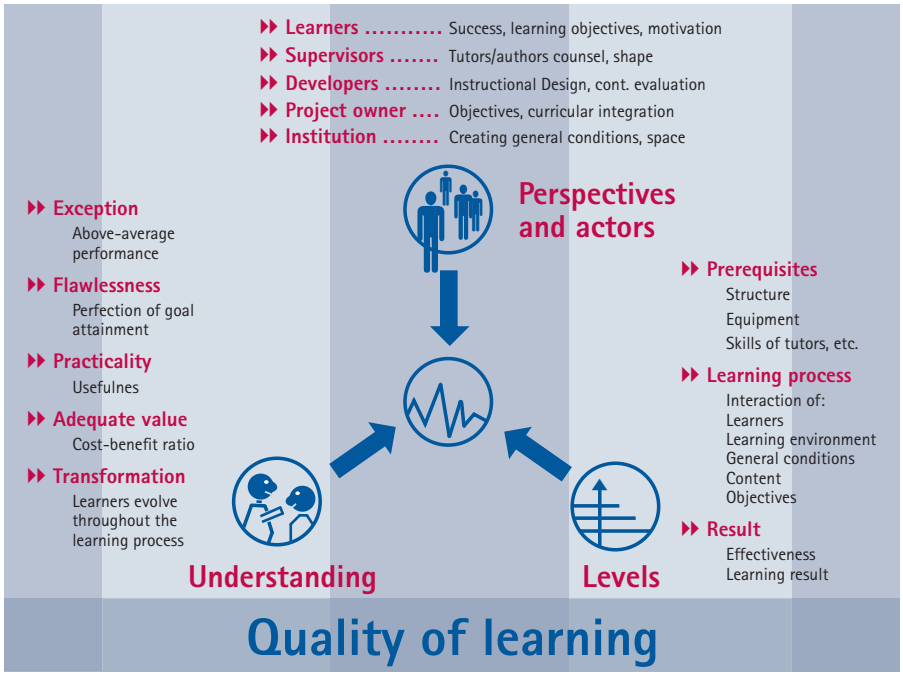


Fig. 26:
Three interpretations of quality assurance in the context of didactic planning (cf. Ehlers 2002).

The answers to these questions will result in a strategic evaluation plan. The only thing missing then is information regarding the methods to be employed. Furthermore, it is important to understand that evaluation is not an end in itself. In addition, there is always a desire for self-evaluation and improvement.

6.1 Functions of Evaluation

6.1.1 Internal Control

Are the tasks to be performed in the Instructional Design process being carried out according to the specifications? Are previous decisions taken into account and checked for validity and implementation? This function could be described as the "inward looking control and decision function".

6.1.2 Strategic Function

The results of evaluations can help to strengthen acceptance of an Instructional Design project among decision-takers by supplying proof of the benefits.

6.1.3 Awareness Function

Evaluation can help to align the assumptions and decisions from the development and planning phases with the actual effects occurring during the application phase. This way, evaluation can also stimulate the creation of hypotheses that rather tend to be oriented towards theoretical research (cf. Ballstaedt 2000, pp. 233f).

In many Instructional Design projects, even simple survey and data collection methods can produce feedback vital to the further process. Theoretically more demanding questions, however, require more complex survey techniques, which can be implemented only rarely in the day-to-day routine of Instructional Design.

6.2 Evaluation Fields

As a matter of principle, all components of a learning environ-ment can be subjected to evaluation-materials, video clips, whiteboards, examinations and their results, as well as the planning/development/application phases and/or specific elements contained therein. Product evaluation is a term that refers to the evaluation of products (texts, materials, etc.) Process evaluation deals with processes such as procedures, interactions, learning approaches, etc. (cf. Ballstaedt 2000, p. 235). Other authors have identified three main areas of evaluation: Acceptance, learning success and transfer, i.e., the application of the newly acquired knowledge and skills in one's professional practice (cf. Reinmann-Rothmeier et al 1997, pp. 276f and pp. 313f).

As has been made clear so far, the Instructional Design process is not a linear process: the results of one phase (output) enter the next phase as a basic condition (input). But if it is shown, in the course of the process, that the underlying conditions do not apply after all, adjustments will have to be made. Evaluation methods in this context are called „formative" because they control process quality.

6.3 Evaluation Methods

The most common survey methods are observation, surveys and tests. These methods are applied in multiple forms, which can range from fairly informal to extremely complex procedures, depending on the purpose or function of the evaluation. If results are to be verified and decisions to be taken, the methods will have to meet other requirements than those applicable to circumstances where empirically confirmed findings are sought for theoretical research (cf. Reinmann-Rothmeier 1997, pp. 320-333 and Ballstaedt 2000, pp. 261-272). The following is a brief description of surveys and tests, as well as observation methods. For further information, please refer to the cited specialist literature.

6.3.1 Surveys

Surveys are used to obtain subjective assessments from individuals of specific circumstances. Like observations, they can be structured to varying degrees; but with surveys there is another distinctive feature that is important: the distinction between oral and written surveys. The oral type of survey is the interview. An interview can be open (freestyle questions and answers), semi-structured (central questions and topics are supplied) or structured (interview key questions that are processed one after the other). The open and semi-structured interview is used for formative evaluation and is generally useful in the initial phase of development processes, as basic ideas are yet to be generated at that stage or decisions have yet to be confirmed in terms of their focus (explorative approach). Assessing interviews is often an elaborate process, which is why the number of interviews is limited. Of particular note are interviews with a written survey.

The written survey is conducted by means of a questionnaire. There are "open" and "closed" questions:

Open Questions
- Respondent is not given any answers and can answer freely;
- Open to a rich flow of information, but very complex to evaluate;
- Open questions tend to be used for the purposes of formative evaluation at the beginning of the planning and development process.

Closed Questions
- Respondent is given categories of answers;
- Closed questions allow for systematic evaluation;
- Closed questions tend to be used for the purposes of summative evaluation when answer categories are already known.

Preparing a questionnaire is time and labour-intensive and should only be done if the data cannot be obtained in any other way, if the results can be evaluated unequivocally and if the findings allow for conclusions to be drawn about possible consequences! Before a questionnaire is drafted, the fundamental questions related to the strategic evaluation plan should have been clarified. As well, the form of questionnaire should have been finalised beforehand (open or closed questions, etc.).

6.3.2 Tests

Compared to the aforementioned written surveys, tests are defined as scientific routine procedures for the purpose of examining empirically delimited characteristics of behaviour or performance. In this sense, tests must be subject to comprehensive methodological requirements. The use of tests for evaluation purposes is especially useful if the evaluation is to meet an awareness function in terms of theoretical foundation. In addition, the methodological quality criteria must be met as well: Objectivity (do different evaluators arrive at identical results?), reliability (do repeated measurements produce the same measured results?) and validity (does the test really measure what it is supposed to measure?). The use of tests for evaluation purposes can be both formative (to measure entrance requirements, e.g., previous knowledge) and summative (to measure effectiveness, e.g., increase of knowledge).

The development of tests is far more complex than the development of simple questionnaires that are used, for example, for a single project only. As a rule, you will therefore be able to develop tests only as part of large-scale evaluation projects.

6.3.3 Evaluation of E-Learning Measures

When evaluating e-learning measures, depending on the subject area of the evaluation, it is possible to choose any of the three methods presented here – be it as a stand-alone evaluation tool or also in combination. It should be noted, though, that the evaluation criteria must be based on the current competence-oriented learning paradigm. For the realisation of a virtual learning environment, this means that the learner must be given a chance to acquire and construct action-relevant knowledge independently.

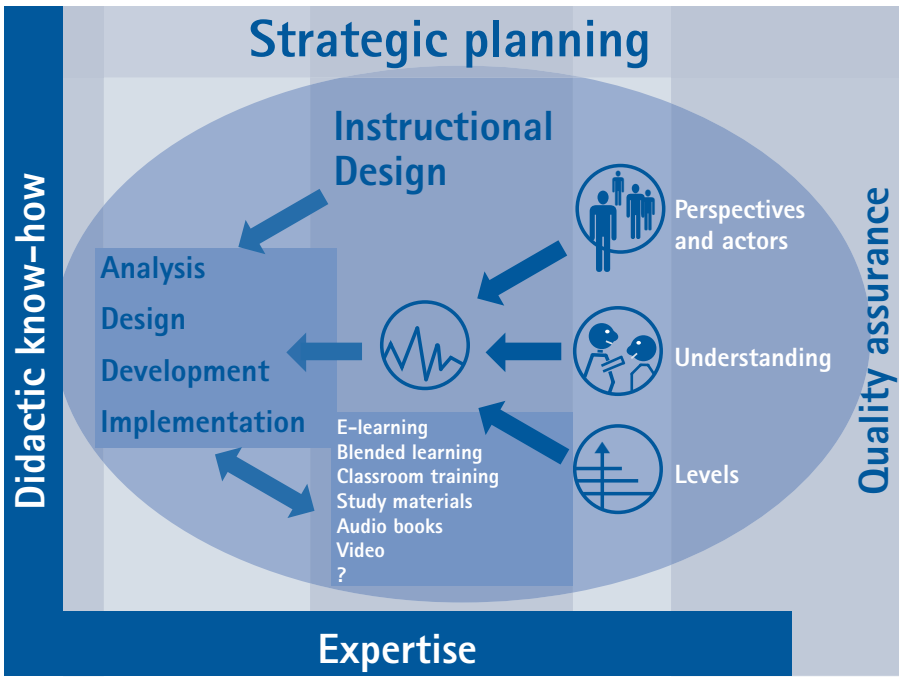
This can be guaranteed by implementing specific didactic principles. Apart from embedding the content in a context that is relevant to the participants and authentic, learners should also be able to deal with the material actively. The material should be presented from different perspectives and in different ways in order to reflect the complexity of real tasks and the different learning types. Another didactic principle for virtual learning environments requires that the learner can shape and define his/her own learning approach as well as time, duration and pace of study. It helps the learning process if the participants are not just left on their own, but made to study in co-operative groups while supporting the learning process with a "tutor on demand". One example of a questionnaire for evaluating the planning, execution and control of e-learning measures in this regard is the "e-GuList" (guidelines for the design and evaluation of e-learning systems). It is a tool that was developed by students at the polytechnic "FH-Hagenberg" in 2003 as part of the course "Engineering for computer-based learning" (see Literature).

7. Summary of Didactic Design of E-Learning

E-learning today has acquired a tremendous educational potential. It is a useful and promising concept and product for a range of different issues. Still, e-learning is not a panacea for all existing problems. From the perspective of didactic and strategic planning, e-learning is a means that can be deployed meaningfully in the process ranging from an accurately described problem to an equally accurately described solution. The strategic planning concept that drives action in this regard is Instructional Design. This model, which replaces general didactics, is geared to the system, because it integrates all subsystems, including their specific peculiarities, into an overall frame of reference. ID is based on guidelines that are scientifically established, and also includes economic and evaluative test criteria, in addition to didactic practical knowledge. Its procedures are transparent, reproducible and established (cf. Seel 2003, Blumschein 2001). We have provided an exemplary description of this approach in this booklet, so that you can apply this concept to your own planning.

The following points are to illustrate again the benefit of computer-based learning programs. At the same time, we hope to open up perspectives for your own projects with this list (adapted from Thissen 1997):

- The learning program is not merely a tool to impart knowledge. It helps the user to ask questions and to understand the issues before answers can be discovered.
- E-learning programs help the user to deal with the subject intellectually. It treats the user as a complete person, challenges him/her, provokes and stimulates him/her.
- E-learning is to create authentic worlds of experience. It must be authentic and help the learner to construct knowledge. Abstraction is a human thought process that takes place whenever we deal with concrete contents.
- E-learning offers help – it does not teach but creates connections and links for the learners (anchor). Learning builds on previous knowledge.
- E-learning activates the learner as much as possible. It provides an opportunity for the active construction and reconstruction of knowledge.
- E-learning is one tool of many – it is a means to an end.
- The learning system acts as partner, adviser and coach.
- E-learning adapts to the learner and can also be adjusted by the user. It thus creates the conditions for individual and reflective learning.
- E-learning per se is not cheaper, faster or better.



It is not because things are difficult that we do not dare, it is because we do not dare that things are difficult. (Seneca)

Fig. 27:
Integrated view of strategic planning from the perspective of Instructional Design and quality assurance (Blumschein 2006).

8. Literature and Other References

Ballstaedt, S.-P. (2000): Planung, Entwicklung, Durchführung von Fernstudienangeboten: eine Handreichung. Deutsches Institut für Fernstudienforschung an der Universität Tübingen, DIFF. 2nd and fully revised ed. – DIFF. Tübingen.

Benkert, S. (2001): Erweiterte Prüfliste für multimediale Lernsysteme. (http://homepages.compuserve.de/-StephanBenkert/Promotion/EPL.htm, Accessed: February 2006):

Blumschein, P. (2001). Webbasiertes Lernen: Der Weg der Zukunft? In Handbuch Hochschullehre (Nr. 33, B1.21). Bonn: Raabe Verlag; pp. 1-34

Bruns, B.; Gajewski, P. (2003): Multimediales Lernen im Netz. Leitfaden für Entscheider und Planer, 2nd ed., Berlin, et al: Springer.

Castendyk, J. (2002): E-Learning Report. Bedarfsanalyse und Nutzerprofile als Rahmenbedingungen für die Einführung von E-Learning in Volkshochschulen – Ergebnisse von Studien. Ausgabe 2/2002, Landesverband der Volkshochschulen Niedersachsen e.V., Hannover.

China, R. (2003): E-Learning ernstnehmen. Personalwirtschaft 02/2003. (Distance Learning Consulting GmgH, Kassel. (www.dlconsulting.de, Accessed: February 2006); pp. 16-21.

Clark, R. C.; Mayer, R. E. (2002): E-Learning and the science of instruction. Proven Guidelines for consumers and designers of multimedia learning. San Francisco: Jossey-Bass/Pfeiffer.

Collins, A., Brown, J. S. & Newmann, S. E. (1989): Cognitive Apprenticeship: Teaching the Crafts of Reading, Writing and Mathematics. In L. B. Resnick (Ed.), Knowing, Learning and Instruction (pp. 453-494). Hillsdale, New Jersey: Lawrence Erlbaum Ass.

Deci, E. L. & Ryan, R. M. (1993). Die Selbstbestimmungstheorie der Motivation und ihre Bedeutung für die Pädagogik. Zeitschrift für Pädagogik, 39, p. 223-238.

Dick, W., Carey, L. & Carey, J. O. (2001): The Systematic Design of Instruction. 5th edition. New York: Longman; pp. 2-14.

Ebel, R.L. (1955): Writing the Test Item. In: Lindquist, E.F. (Ed.): Educational Measurement. 2nd Edition, American Council of Education. Washington D.C.; pp. 185-249.

Edelmann, W. (2000): Lernpsychologie, 6th fully revised ed. Weinheim: Beltz.

Ehlers, U. (2002): Qualität beim E-Learning: Der Lernende als Grundkategorie bei der Qualitätssicherung. (www.medienpaed.com/02-1/ehlers1.pdf, Accessed: 25.03.2002).

Gooler, D.D. (1980): Formative Evaluation Strategies for Major Instructional Development Projects. In: Journal of Instructional Development, Vol. 3, No. 3; pp. 7-11.

Grell, J. & Grell, M. (1990): Unterrichtsrezepte. Weinheim & Basel: Beltz.

Gerstenmaier, J.; Mandl, H. (1995). Wissenserwerb unter konstruktivistischer Perspektive. Zeitschrift für Pädagogik, 41; pp. 867-888.

Häfele, H.; Maier-Häfele, K. (2005): 101 e-Learning Seminarmethoden. Lebendige und einfache e-Methoden zum nachmachen, 2nd ed. Bonn: Manager Seminare Verlag.

Herbig, M. (1972): Aufgabentypen zur Leistungsüberprüfung. In: Klauer, K.J. & Kornadt, H.J. (Ed.): Lehrzielorientierte Tests. Beiträge zur Theorie, Konstruktion und Anwendung. Düsseldorf: Schwann; pp. 74-100.

Hoffman, J.; Margerum-Leys, J. (n.d.): Online document on Rapid Prototyping. (http://www-personal.umich.edu/~jmargeru/prototyping/#top, Accessed: Feb 2006).

Jonassen, D. H. (1996): Computers In The Classroom: Mindtools for Critical Thinking, Englewood Cliffs, NJ, USA: Prentice-Hall Inc.

Kerres, M. (2002): Bunter, besser, billiger? Zum Mehrwert digitaler Medien in der Bildung. Informationstechnik und Technische Informatik, 44(4); pp. 187-192.

Khan, B. (2005): Managing E-Learning Strategies: Design, Delivery, Implementation and Evaluation, George Washington University, USA.

Macke, G.; Straka, G. A. (2002): Lern-Lehr-Theoretische Didaktik. Münster, New York, München, Berlin: Waxmann.

Mayer, R. (2001): Multimedia Learning. New York: Cambridge University Press.

Morrison, G., Ross, G.R. & Kemp, J.E. (2001): Designing Effective Instruction. 3rd Ed. New York: Wiley; pp. 267-295.

Niegemann, H. M.; Hessel, S.; Hochscheid-Mauel, D. et al (2004): Kompendium E-Learning. Berlin, Heidelberg: Springer.

Pekrun, R.; Schiefele, U. (1996): Emotions- und motivationspsychologische Bedingungen der Lernleistung, in: Weinert, Franz E. (Ed.): Psychologie des Lernens und der Instruktion, Göttingen: Hogrefe (Enzyklopädie der Psychologie, Themenbereich D, Serie I, Band 2); pp. 154-180.

Pekrun, R.; Schiefele, U. (1996a): Psychologische Modelle des fremdgesteuerten und selbstgesteuerten Lernens, in: Weinert, Franz E. (Ed.): Psychologie des Lernens und der Instruktion, Göttingen: Hogrefe (Enzyklopädie der Psychologie, Themenbereich D, Serie I, Band 2); pp. 249-278.

Reetz, L. (1999): Zum Zusammenhang von Schlüsselqualifikationen – Kompetenzen – Bildung, in: T. Tramm (Ed.), Professionalisierung kaufmännischer Berufsbildung: Beiträge zur Öffnung der Wirtschaftspädagogik für die Anforderungen des 21. Jahrhunderts. Festschrift zum 60. Geburtstag von Frank Achtenhagen. Frankfurt/M; pp. 32-51.

Reinmann-Rothmeier, G. & Mandl, H. (2001): Virtuelle Seminare in Hochschule und Weiterbildung: Drei Beispiele aus der Praxis. Bern: Hans Huber; pp. 16-20.

Reinmann-Rothmeier, G., Mandl, H. & Prenzel, M. (1997): Qualitätssicherung bei Multimedialen Lernumgebungen, in: Friedrich F.H, Eigler G., Mandl H., Schnotz W., Schott F. & Seel N. M. (Ed.): Multimediale Lernumgebungen in der betrieblichen Weiterbildung: Gestaltung, Lernstrategien und Qualitäts-sicherung. Neuwied, Kriftel, Berlin: Luchterhand; pp. 267-333.

Romiszowski, A. J. (1997): Web-Based Distance Learning and Teaching: Revolutionary Invention or Reaction to Necessity?, in: Khan, B. H. (Ed.): Web-Based Instruction, Englewood Cliffs, NJ, USA: Educational Technology Publications.

Rothwell, W. J.; Kazanas, H. C. (2004): Mastering the Instructional Design Process, 2nd Ed., San Francisco: Pfeiffer.

Schank, R. C. „Goal-Based Scenarios: A Radical Look at Education." The Journal of the Learning Sciences, 1993, 3(4); pp. 429-453.

Schoenfeld, A. (1987). Cognitive Science and Mathematics Education. Hillsdale, NJ: Erlbaum Assoc.

Schüpbach, E.; Guggenbühl, U., Krehl, C. et al (2003): Didaktischer Leitfaden für E-Learning. Bern: hep-Verlag.

Seel, N. M. (2003): Psychologie des Lernens: Lehrbuch für Pädagogen und Psychologen, 2nd and updated ed., Munich, Basel: Reinhardt UTB.

Seel, N. M.; Al-Diban, S.; Blumschein, P. (2000): Mental Models and Instructional Planning, in: Spector, J. Michael (Ed.): Integrated and Holistic Perspectives on Learning, Instruction and Technology: Understanding Complexity, Dordrecht: Kluwer Acad. Publ.

Seel, N.M. (2003). Modelle des Instructional Design. In: ENTER. Lernen und Lehren mit neuen Bildungsmedien. Eine internetbasierte postgraduale Weiterbildung, Modul 3. Kaiserslautern: Zentrum für Fernstudien und universitäre Weiterbildung.

Senge, P. M. (1999): Die fünfte Disziplin: Kunst und Praxis der lernenden Organisation, 7th ed. Stuttgart: Klett-Cotta.

Schulmeister, R. (2003): Lernplattformen für das virtuelle Lernen: Evaluation und Didaktik, Munich, Vienna: Oldenbourg.

Schulmeister, R. (2005): Zur Didaktik des Einsatzes von Lernplattformen. In: Maike Franzen (Ed.): Web Based Training, EMPA-Akademie.

Thissen, F. (1997): Das Lernen neu erfinden – konstruktivistische Grundlagen einer Multimedia-Didaktik, in: Sommer, W.; Beck, U. (Ed.): Europäischer Kongress für Bildungstechnologie und betriebliche Bildung, Tagungsband der Learntec 1997, Karlsruhe.

Tippelt, R.; Schmidt, B. (2005): Was wissen wir über Lernen im Unterricht? Pädagogik 3/05; pp. 6-11.

Tripp, S. D., & Bichelmeyer, B. (1990). Rapid protoyping: An alternative instructional design strategy. Educational Technology, Research and Development, 38(1); pp. 31-44.

Wilson, B. G.; Jonassen, D. H.; Cole, P. (1993). Cognitive approaches to instructional design, in: G. M. Piskurich (Ed.), The ASTD handbook of instructional technology). New York: McGraw-Hill; pp. 21.1-21.22.

8.1 Internet Sources (Last Update: February 2006)

http://www.checkpoint-elearning.de/
on Learntec in Karlsruhe

http://www.lernqualitaet.de/
on quality assurance in e-learning

http://www.iltec.de/elearning/elearning-praxis/checklisten/checklisten.php
many checklists for e-learning and further training

http://www.schule-bw.de/unterricht/evaluation/esq/
re: key qualifications and competences

http://www.bookstoread.com/framework/
Page of Badrul Khan, E-Learning Information (English)

http://carbon.cudenver.edu/~mryder/itc_data/idmodels.html
Page of Martin Ryder, Uni Denver, Instructional Design (English)

http://www.memory-key.com/StudySkills/science.htm
Info on memory and learning (English)

http://www.stangl-taller.at/STANGL/WERNER/BERUF/PUBLIKATIONEN/PARADIGMA/default. html
Page of Werner Stangl on learning psychology and didactics, etc.

http://www.checkpoint-elearning.de/university/news/
Web portal about e-learning in Germany

http://cblinux.fh-hagenberg.at/public/ guidelines/
“e-GuList” of FH – Hagenberg on evaluation of e-learning systems

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September 2009 · 4.01-0020-2009