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General Department of Vocational Training (GDVT)
37 B Nguyen Binh Khiem Street
Hanoi, Viet Nam
T +84 4 397 45 207 (Department of Administration and International Affairs)
F +84 4 397 40 339

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
2nd Floor, No. 1, 17 Alley, Ta Quang Buu Street
Hanoi, Viet Nam
T +84 4 397 46 571/-2
F +84 4 397 46 570
I www.giz.de
I www.tvet-vietnam.org

Author: IBC Berufliche Bildung und Consulting GmbH
Editing: Josef Ametsbichler (CIM)
Translation: Bui The Dung
Layout: WARENFORM/Mariette Junk (cover page)
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MODULE 1:

Consider psychological theories on human learning

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Specific objectives of the module

Advance Organizer

The specific objectives of the modules are:

- Knowing and understanding some historically important prototypes of learning and their limitations.
- Knowing and understanding that learning is a complex and more-dimensional process.
- Knowing and understanding
  - different types of qualities of information,
  - different motor and cognitive actions,
  - learning by acting and observing,
  - commonalities and differences between motivation, interest, and emotion.
- Knowing and understanding types of learning outcomes
- factual, conceptual, and procedural knowledge about the world and oneself,
- external conditions in school and company.
- Knowing, understanding and being able to act according to the three core questions for instruction.
Purposes of the module

It is intended that

✓ after having studied the handouts or participating in a seminar about the topic, you will develop a well structured knowledge base on an actual concept of human learning which integrates the major research results in this field.

✓ You acquire an overview of the progress made in the field of learning research of the last century by introducing some prototypes of learning.

✓ having worked through this module you should know and understand that planning acting and learning always has to consider the three levels of the individual-environment model.

✓ within the three level individual-environment model the focus is to be on the actual event which is a combination of information and action which has several dimensions.

✓ the elements of the three levels (internal and external conditions and actual events) have to be specified independently.

✓ acting and learning are at the same time equal and different.
Structure of the module

Consider psychological theories on human learning

General Information
Theories of learning: http://psychclassics.yorku.ca/author.htm
Reader: M1-2, (also CD-M12 Theories of learning data base)

Unit 1: Ancestors of contemporary learning theories

Prototypes of learning

As long as educational institutions exist, learning has been an explicit or implicit topic of consideration. However, learning is not limited to educational institutions at all. Learning also takes place outside these institutions as it does in private and work settings and during the whole life span as well (Unit 2/6). Acquiring personal features like concrete and abstract concepts or rules, the ability to solve problems, attitudes, motives are the focus of contemporary research on learning. Progress was made to specify and validate learning types. On the one hand, these learning types are intermediary results on the way of decoding and understanding human learning. On the other hand these learning types have ancestors called prototypes which are still valid or integrated in advanced learning concepts.
Associationist learning

British associationist psychologists stated theories about how ideas are linked. Their focus was how complex ideas such as a "flower" or a "number" are constructed in the human mind from elementary sense impressions. In other words, they were interested how such "complex ideas" are learned in the first place. The results of their considerations are:

1. Contiguity of the sense impressions or simple ideas that were combined to form a new larger idea.
2. Repetition of these contiguous ideas.

Psychologists like William James and John Dewey added some new interpretations to this associationist model. They emphasized the connection of behaviour and sense impressions. As a consequence the process of behavioural organization became an essential feature of their prototype of learning.

Trial-and-error-learning and the law of effect

Edward L. Thorndike (1938) shifted from the approach of collecting anecdotes about animal behaviour to experiments with animals, with reading and explaining observable behaviour change. Motivated - e.g. hungry - animals like cats, dogs, or chicken are confronted with a novel situation called a problem box. The animal engages in various 'tries' to attain satisfaction. Sooner or later, mostly by chance, the behaviour leads to a solution of the problem. The door opens and immediately after pressing the right bar some grains fall in a bowl. By eating the motive is being satisfied. Placing the animal in the box for a second time the 'right' behaviour is elicited sooner. Repeating such situation-behaviour combinations the 'false' behaviour progressively becomes weaker and finally disappears.

Situation-behaviour-combinations - like escaping from a problem box - are called complete acts (Unit 5/3). The correct responses are progressively strengthened being immediately followed by motive satisfaction (= food). Thorndike named this generalization law of effect.

A result of his controlled observation by performing experiments was that many previous accounts of animal thoughts were erroneous and that they attributed too much power to animal intelligence.

Learning by trial and error combined with the law of effect is not seldom realized in learning motor skills especially by children but to some degrees by adults as well.

Skinner's operant conditioning

B. F. Skinner referred to Thorndike's law of effect but focussed his experiments on the reinforcement following the emitted behaviour. To distinguish his concept from the stimulus-response prototype, he called the emitted behaviour operant, i.e. the stimulus preceding the behaviour was not in the centre of his considerations.
The model can be described as follows:

Operant conditioning

**Conditioned Response**

I. P. Pavlov (1927) found out that when a signal (e.g. a bell) was sounded at the same time food was shown to a hungry (= motivated) dog, and this set of events was repeated several times, the dog began to salivate at the sound of the bell alone.

In a similar way John B. Watson (1919) regarded learning as a matter of establishing individual associations with stimuli and responses (= conditioned response).

Twinkling on an air blast (= stimulus) is an unconditioned reaction or an unconditioned response. If the air blast is combined with a click, there is a great chance that after several repetitions of air blast and clicks, the twinkling may occur when only the click is realized. Twinkling associated with the click has become a conditioned reflex or response, illustrated with the following figure:

Signal learning
Motor chaining

Watson and others postulated that complex human behaviour is considered to be a chain of conditioned responses. The sequencing of a set of individual S → R is called motor chaining. Turning on the television, a dishwasher or riding a bicycle are examples for this prototype of learning.

Example: Starting a motor car consists of the following s-r sequences:

S: Let’s start the engine ... S (start the car) → R (look ahead and to the gearbox) ...
S (the road is free) → R (check the idle position) ... S (gearbox in idle position) →
R (turn the key in order to start the engine) ... S (engine starts) → R (unhand the key) ...
S (engine starts) → R (unhand the key) ... S (unhand the key) → R (accelerate) ... and so on.

Verbal associations

The simplest form of linguistic chains is the ability to name concrete objects i.e. the ability to use words in order to denominate concrete objects.

Example: Showing a hand to a child and saying the word 'hand', one can conclude that the child has learned the linguistic chain or association: object 'hand' → linguistic reaction 'hand':

\[
\text{S}_g \quad \text{object} \quad "\text{hand}" \quad \text{R}^{-} \quad \text{perception} \quad "\text{hand}" \quad \text{s} \quad \text{internal} \quad \text{image} \quad "\text{hand}" \quad \text{R} \quad \text{verbal} \quad \text{reaction} \quad "\text{hand}" \\
\]

Verbal association

As the chart shows, the acquired verbal chain consists of two impulse-reaction-links. The impulse-reaction-link object 'hand' → perception reaction (R) is the first link following to which the characteristics of the object 'hand' are registered internally. The impulse-reaction-link internal impulse: internal image of the object 'hand' (s) → verbal reaction 'hand' (R) marks the second link. These two links are, referring to the skill to name objects connected to a sequence with the illustrated specific progression.

Insight

Opposite to the associationist concept is the Gestalt theory represented by Max Wertheimer (1945); Wolfgang Köhler (1929), and Kurt Koffka (1929). Their focus is on insight indicated e.g. by "having a new idea", or "discovering a solution to a problem" as a result of suddenly occurring reorganization of the area of experience.
Köhler (1927) used different problem situations to study learning by insight of chimpanzees. In the famous experiment, a banana was suspended from the animal's cage, out of reach. Several wooden boxes were available within the cage, but the animal was not able to reach the banana by standing only on one of them. A lot of different and restless trial and error behaviours were emitted. In a sudden moment it was observed that the animal furrowed it's brow, then placed one box on the top of the other, climbed up this structure and reached the banana.

Similar experiments were run by Wertheimer (1945) with children solving insightfully geometric problems. Insight might also be involved in problems solutions on the shop floor described by Nonaka & Takeuchi (1995) by finding the beetle format for Ford Ka. But there are serious concerns to use insight for the explanations of these events. An essential one is that animals, children and adults solve these problems by transfer from prior learning because in these experiments the factor prior learning was not controlled.

**From the behavioural to the cognitive approach**

With the prototype 'verbal learning' and 'insight' after all there is a shift from purely behaviour orientation to personal features - e.g. prior learning - and internal non-visible actions. This aspect was reinforced by observations that persons being confronted with the same tasks or problems produced different behaviours and solutions. These observations were the turning point versus the cognitive paradigm in the field of learning. The general model for this research stream is the S-O-V-model:

\[ S \rightarrow O \rightarrow V \]

- **S**: Stimulus, situations, task
- **O**: Organism
- **V**: Behaviours

**S-O-V-model**

This model indicates that between perceiving the stimulus or the situation something happens in the organism what contributes to a variety of behaviours. The 'O' might be personal traits and/or internal actions. (Unit 2/11)

**Task 1**

a. Check whether you can identify trial-and-error-learning in your daily private or working life. Specify the situation, your behaviours, the process of situation-behaviour-stabilizing and the potential motivators.

b. Which of the following structures represents (a) operation conditioning and (b) conditioned response?

\[ S \rightarrow V \rightarrow S \]  \quad (a or b)  \quad \text{(a or b)}
Additional references

Learning theories: www.psychology.nottingham.ac.uk/staff/sea/c8clat/handout2.pdf

Unit 2: A general model of acting and learning

Internal and external conditions of behaviour and action

Since 1965 when Gagné revolutionized learning theoretical thinking with his "conditions of learning" bridging the behavioural approach and the cognitive approach, we differentiate between external and internal conditions of behaviour and action.

External conditions are the situations, tasks, events or stimuli outside an acting person. Under the conditions of instruction these are e.g. the teacher’s behaviour, the tasks, the media and the instructional arrangements. Under the conditions of the workplace the external conditions comprise the work tasks, the equipment, the organization and the behaviour of others like supervisors and colleagues (Unit 8).

Internal conditions comprise relative stable non-visible feature of a person, e.g. factual, conceptual knowledge, abilities, skills, attitudes, emotional dispositions (Unit 7).

The bridge interconnecting the internal and external conditions is the individual's behaviour. Such behaviour consists of observable non-observable parts. The non-observables part of behaviour or the actions comprises cognitive actions and reflections before, during and after the observable behaviour is executed (Unit 4, Unit 5, Unit 6). Features of observable behaviour are for example proficiency, speed, or accuracy.

Features of behaviour/action and internal conditions

Observable behaviour and non-observable actions are only current. They are bonded on the moment of executing and they are gone immediately after having been executed.

On the basis of these considerations the question has to be raised: Are behaviours and actions the aim of instruction and training?

The answer is: No.

Because of the momentariness of behaviour and action they never become the aim of instruction and training. The knowledge, ability, skill, or more general the internal conditions to realize these behaviours and actions during the work life in similar situations are the ultimate aims of instruction and training. Behaviour is an indicator for the person possessing the adequate internal conditions. Such a view has a fundamental impact on the definition of learning.

Example: The difference between internal conditions and the actual behaviour and actions can be compared with a machine to through out tennis balls used for exercising to acquire skills to play tennis. The machine or the mechanism to shot the tennis balls is comparable with an internal conditions. The flight of the tennis balls is the behaviour.
When the tennis ball is down to earth the flight is over, but the engine can produce other and new ball flights.

**The importance of internal conditions**

The behaviours and the actions depend on the internal conditions the person is possessing at the time of creating these behaviours and actions. These internal conditions determine what and how the external conditions are perceived and what and how the person is able to do.

Examples:

Visiting a museum of modern paintings an expert in this field will probably address different questions to the guide compared with a novice who may evaluate the paintings with nice and not nice or colourful and not colourful. In sum, the same external conditions or stimuli - the observed painting - initiate different impressions and questions based on the different bodies of knowledge or internal conditions of the expert and the novice.

The concepts of the conditioned response (Unit 1/5) and the operant conditioning (Unit 1/4) focus only on the observable behaviour. In contrast to them the concept of insight (Unit 1/8) and the cognitive approach (Unit 1/9) focus on the internal processes, but both of them need behaviour as an indicator to be interpreted related to internal events. As a consequence the internal conditions, like the concepts and attitudes are not in the focus of a behaviourist. They are exclusively focusing on the observable behaviours of a person, whereas representatives of the insight school go beyond the observable behaviour.
A general model of acting

On the basis of the considerations afore made considerations to the individual-environment-relationship may be structured with three levels. The levels of external and internal conditions and the bridging level of actual events like observable and non-observable behaviour or action.

A general model of acting
Learning

Observable and non-observable behaviour may have external and internal effects. External effects are results like a produced good, a service done, a machine programmed - or generally changes in the external conditions. Internal effects may be for example for the acting person new facts, an updated skill, an attitude change, or a restructuring the person's knowledge - or generally changes in the internal conditions.

Before the background of these considerations we are now able to defined learning. Learning has taken place only if a relative durable change of the person's internal conditions has taken place. The attribute "relative" stands for the fact that e.g. knowledge and skill may go lost if not used, or they may be changed via learning that takes place later on.

Self-evaluation

Drive in a car for some time and listen to a radio station which brings reports and news between music parts etc.

Check the next day how much you remember of that your have heard during your ride.

You may notice that this will be the smallest part of all the interesting information you’ve listened to, i.e. not all the news and reports are remembered and therefore have been learned.
Acting - learning

Notice: You act a lot during a day but you keep only small parts of these actions in your memory.

Note: Learning is not possible without acting but not every action has a learning result.

Information

Information is actual meaning created internally on the basis of the person's internal conditions.

What is the reason to introduce the concept of information?

One answer is that treating a piece of work consists not only of observable behaviour but also that this observable behaviour is accompanied by internal actions. More, the piece of work and the tools are not in your head. They are actually perceived by yourself, i.e. they are in the state of information in your head. It is not the iron peace and the hammer which are in your head, but information about such subjects, information about how to treat or use them and images of the target state to be created (= mental concepts).

Action and information

Up till now we have spoken about acting or actions. Examples for actions are e.g. analysing, evaluation, creating structuring, supervising one's actions. However these actions need a counterpart. This counterpart is information.

Example:
The operation of "adding" symbolized with "+" is not possible without at least two numbers. Adding itself is not possible. In this case if you have the numbers 4 and 5 the realisation of an adding action will be possible.

In reality, action and information are inseparably bonded together. However, from an analytical point of view, they can be separated. There are highly differentiated classifications of actions like the Taxonomy of Anderson (2001) or learning strategies (Unit 4/4 et seq.). For the information parts there are only rough classifications developed up till now, like fact, concept and process information represented enactive, iconic or symbolic, or structured complex, reversible.

Dimensions of actions

The concept of "action" has several dimension. The one is the behaviour with its motor and cognitive aspects. Even observable behaviour is mentally planned, controlled and evaluated (Unit 5/3) at least before it gets the status of a routine, where the motor chains (Unit 1/6) are carried out unconsiously.

Another dimension is the experience. It consists of cognitive considerations - from legitimating, analysing up to reflections on the acting (= meta cognition). But there is
also a need for stimulating, maintaining and evaluating such cognitive events. This aspect is covered with the concepts of "motivation" and "emotions".

Motivation will be differentiated into achievement motivation (Unit 6/4) or interest (Unit 6/2 et seq.).

The motor, cognitive, and motivational aspects of acting are accompanied by emotions. The concept of emotion covers the non-rational but sentimental experience which are accompanying the acting with more or less specificity (Unit 6/8 et seq.).

A more-dimensional model of learning

The inseparably information and action and its differentiations constitute the action episode. The action episode is the bridge between the external and internal conditions. An action episode becomes retroactive a learning episode when and only then, when some durable changes in the person's internal conditions have occurred. Even when an episode with the intention to learn does not lead to a change of internal conditions, retrospectively it still was an actions episode.

In the case of learning the persons start's with her/his learning prerequisites, i.e. the status of her/his internal conditions at point t1. The durable change of her/his internal conditions as a result of the interaction between information and action is denominated learning outcome (Unit 7).
In the course of an action and learning episode all these dimensions and elements are active at the same time. If one element becomes zero the action episode is terminated and another episode may take place. However, during an action episode each element may have a specific input, e.g. if you are very angry you might not be very effective in information processing, or your flow experience during solving a task will be so strong that you totally concentrate yourself on it and forget your surrounding colleagues.

**Task**

In site 5 you’ll find the following statement: Learning is not possible without acting but not every action has a learning result. Reflect or discuss this statement related to the vision of learning in the process of work and what can be done to make such learning more effective.

Fill in the appropriate terms in the figure. During doing this look inside yourself and specify the elements of your action episode you are just running through.
Unit 3: Types and quality of information

Advance organizer

The general model of learning (Unit 2/10) differentiated on the actual level between the components of information and action. In this unit information and types of information will be introduced.

Information and information processing

Interacting with one’s environment does not mean that the environment itself, i.e. the tools, the equipment or the materials are in our head. These elements of the environment are ‘only’ in the format of information in our head (Unit 2/8). Information are individually perceived and meaning-fully reconstructed external conditions by the individual on the basis of her/his internal conditions. Information is the reference point of our actions. The result of acting related to information is information which is the ‘new’ reference point for the following actions etc. This process of information processing has the following structure: ... information x action x information x action ...

Factual and conceptual information

Information may be classified according to facts, concepts differentiated in status and process:

✓ Factual information comprise all types of singular or situational information, like the actual temperature, the state of a beef steak, the speed a car is just running, or the name of a specific tire.

✓ Status conceptual information is actual meaning about what the world is like, how the world is structured, the actualized concept of a chair as a sitting utensil with four legs and a back, or the category of tubeless tyres represented by a Bridgestone tire.

✓ Process conceptual information is actual meaning about how the world may be changed, e.g. the way how to transform a raw beef steak (= status information) into a well done beef steak (= status information) with the process of grilling (= process information). (Unit 7/2 et seqq.)

Information about the world and oneself

The factual and conceptual information may be related to the environment or the person her-/herself. If we are asked how tall we are, we may answer with our individual measure of height (= factual person related information). If others ask us or we ask our self who we are, individual answers about our self-concept, or our values (= status conceptual information) may follow. If others ask us or we want to know how we actually feel, we know concrete ways how to look into ourselves (= process conceptual information).
Remembering, understanding and applying as quality features of information

Information is created by the individual itself, using activities like remembering, understanding and applying (Anderson et al. 2001):

✓ Remembering is retrieving relevant knowledge from the memory or out of our internal conditions.
✓ Understanding deals with construction meaning form messages, including oral, written, and graphic communication.
✓ Applying comprises the carrying out or the use of a concept in a given situation.

Remembering

Remembering may be differentiated into recognition and recalling.

✓ Recognition or identifying locates knowledge in the memory that is consistent with the present task or material, e.g. recognizing that tires should not exceed a specific air pressure.
✓ Recalling means the retrieving of relevant knowledge from the memory, e.g. reminding the procedure to grill a steak (Anderson et al. 2001).

Understanding

Understanding may be realized with interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

✓ Interpreting (clarifying, paraphrasing, representing, translating) means changing from one form of representation (e.g. numerical) to another (e.g. verbal) (e.g. paraphrase important speeches and documents)
✓ Exemplifying (illustrating, instantiating) is finding a specific example of illustrating of a concept or principle (e.g. give examples of various artistic painting styles).
✓ Classifying (categorizing, subsuming) determines that something belongs to a category (e.g. concept or principle) (e.g. classify observed or described cases of mental disorders).
✓ Summarizing (abstracting, generalizing) abstracts a general theme or major point(s) (e.g. write a short summary of the events portrayed on a videotape).
✓ Inferring (concluding, extrapolating, interpolating, predicting) draws a logical conclusion from presented information (e.g. in learning a foreign language, infer grammatical principles from examples).
✓ Comparing (contrasting, mapping, matching) detects correspondences between two ideas, objects, and so on (e.g. compares historical events to contemporary situations).
GDVT gez

✓ Explaining (constructing models) constructs a cause-and-effect model of a system (e.g. explain the causes of important 19th-century events in your country) (Anderson et al. 2001).

Applying (Skill)

Applying may be differentiated in executing and implementing.

✓ Executing or carrying out applies a procedure to a familiar task (e.g. divide one whole number by another whole number, both with multiple digits).
✓ Implementing or using applies a procedure to an unfamiliar task (e.g. use the rule of proportion in situations in which it is appropriate).

Task

Fill in the types of information and their relation to the world and oneself. Give an example for all of the six types in your actual situation.

<table>
<thead>
<tr>
<th>Types of information</th>
<th>world</th>
<th>oneself</th>
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Unit 4: The motor and cognitive dimension of acting

Advance organizer

The general model of learning (Unit 2/10) differentiates on the actual level the components of information and of action. In this unit the motor and cognitive dimension acting will be introduced.

The motor dimension of acting

An example for classifying the motor dimension of acting was developed by Bloom and others. They distinguish

✓ reflex movements, like segmental, intersegmental, and suprasegmental reflexes;
✓ basic-fundamental movements, like loco motor movements, non loco motor movements, manipulative movements;
✓ perceptual activities like kinaesthetic, visual, auditory and tactile discrimination and coordination;
✓ physical features of activities like endurance, strength, flexibility and agility;
✓ movement levels, like simple, compound and complex adaptive;
✓ non discursive communication, like expressive and interpretative movement.
✓ (http://www.humboldt.edu/~tha1/bloomtax.html

**The cognitive dimension of acting**

The cognitive dimension of acting may be differentiated into the following three levels:

✓ Level one comprises the acting itself like organizing and processing. These activities are answers to the question: What is to do?

✓ Level two includes activities of sequencing and supervising the activities of the first level, like meta-cognitive strategies and planning. These activities are answers to the question: How to do?

✓ Level three focuses on activities of legitimizing the activities of the other two levels. These activities are the answers to the questions: Why do I act? Or: Why do I act this way and not another one?

The levels are interrelated. Deciding to do something in a specific way may have consequences on the other two levels. Because level three is culturally bounded, we will focus on level two and three.

**Organizing**

Organizing encompasses activities to create an environment that supports work and learning, to obtain missing information and, if necessary, to cooperate with others in order to elaborate on or rather process missing information (of a task, case, or problem).
Organizing

**Processing**

Processing encompasses activities to break down pieces of information, to put them in an order, to relate them to things already learned and to integrate them into as well as consolidate them with these.

Being confronted with a task or a text, the person might decompose it into elements (= analyzing). When structuring, the task, the case or the problem details are with regard to the goal broken down into elements or rather units of sense between which the individual establishes relationships and separates the significant from the insignificant. Extensive information is reduced, selected and contained. Elaborating encompasses activities with which a person enlarges produced information, expresses information in own words, calls upon examples, mentally represents information, forms analogies, draws conclusions as well as elaborates on the differences and things in common with activated knowledge already acquired. When the information is actualized manually, motorically, mentally, orally either out loud or quietly, repetition takes place which may occur mechanic-receptively, literally through to actively.
**Planning**

Planning encompasses the mental anticipation of an intention (setting intention), whereby the desired result, which at the onset may still be imprecise, is determined as well as the way to achieving it, established as far as the sequencing of contents and the time are concerned. The task in hand is, as regards contents, subdivided into elements or rather steps which are then put into an order (sequencing contents). A time-scale for the intended task is laid down in advance as well as an estimation of when half-way steps ought to be achieved (sequencing time).

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**Processing**

**Meta-cognitive controlling**
Processing, organizing and planning are meta-cognitively controlled. Meta-cognitive control is when one's own action and learning is made the object of one's mental considerations, whereby one's action is observed and any half-way results established (monitoring). The observed action is in retrospect judged as to whether it contributes to achieving the goal (reflecting). Depending on the result, one's own action is organized more appropriately and purposefully, is in other words regulated.

Meta-cognitive controlling

When processing a task, I pay attention to the way I proceed. (monitoring)

When processing a task, I examine whether I have got any closer to its solution. (reflecting)

If I do not make any progress in the task, I pursue a different path. (regulating)

**Controlling the environment and oneself**

This type of controlling refers to the environment and to the action person itself.

Controlling ones environment encompasses taking precautions outside of one's own learning and action concerning either oneself or the physical environment in order to be able to act attentively and without being disturbed.

Controlling oneself refers to concentration on the task to be done, being persistent if the problems makes difficulties to be solved.
Controlling the environment and oneself

**Task**

In unit 4 the three level model of acting was introduced. Read again the passages and sort the types of acting in the following table:

<table>
<thead>
<tr>
<th>Level of acting</th>
<th>Types of acting</th>
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<tbody>
<tr>
<td>1. What is to do?</td>
<td></td>
</tr>
<tr>
<td>2. How to do?</td>
<td></td>
</tr>
<tr>
<td>3. Why I do?</td>
<td></td>
</tr>
</tbody>
</table>

Further reading:
Basis elements of instruction: [www.humboldt.edu/~tha1/bloomtax.html](http://www.humboldt.edu/~tha1/bloomtax.html)
Learning strategies: [www.msstate.edu/org/MAS/ejour2.html](http://www.msstate.edu/org/MAS/ejour2.html)

Empirical evidences for the effect of learning strategies:
Learning strategies: cp. Metzger in Gerald A. Straka (1997), European views of self-directed learning. [www-user.uni-bremen.de/~los/mitarbeiter/straka/reihe1.htm](http://www-user.uni-bremen.de/~los/mitarbeiter/straka/reihe1.htm)

**Unit 5: Motivation, interest, and emotion**

**A general concept of interest and motivation**

The concept of interest and motivation is modelled according to Atkinson's value-expectancy theory. This theory combines the value a persons is associating with an anticipated event, object, action, or goal and the expectancy of the person to understand or realize the event, object, action, or goal.
If the value and the expectance are high enough, an action will be initiated, maintained and after accomplishment evaluated.

In the context of education and training interest in the information (subject content) or in the process and achievement motivation are subject to elaborated considerations.

**Interest as regard to information**

The 'interest as regard to information' is defined as a combination of the value a person attaches to a piece of information and the expectation to be able to establish a meaningful relationship to the information (Straka 2000).

**Example:**
If a person considers the information of "a classification of different accounts" important and the person believes as well to be capable to "understand the classification of different accounts" she/he will start to deal with this topic.

Interest as regards to information

**Interest as regard to process**

In our action episode (Unit 2/11) we differentiated between information and action. Therefore interest may also be related to different types of action, expressed in preferences for actions. For example there are people who like structuring a text, or they prefer to act and learn self-directed. This preference can be modelled as a product of value and expectation for a specific action type.

Interest as regard to process

**Achievement motivation**
An interest on the actual level is always related to a specific information or a specific action or behaviour. In contrast to that achievement motivation is more general. Achievement motivation focuses on the performance in what ever context or situation. Achievement motivation is modeled with the value expectancy concept as well. Achievement motivation is the individual combination of the value of an anticipated result and the expectation to realize this result. Example: Producing goods in a factory has a high value for a persons and she/he expects to realize the production of goods according to standards.

```
Interest

"I like to produce goods whatever they are" (value)

I believe I am capable of "structuring text materials" (expectation)
```

Achievement motivation

**Intrinsic and extrinsic motivation**

Across the differentiation between interest and motivation the concepts of intrinsic and extrinsic motivation are discussed.

- Extrinsic motivation is that type of motivation which initiates action and behaviour because of the external rewards associated with the result achieved. External rewards may be for example money, social gratifications of others, feed back of the supervisor.
- Intrinsic motivation is that type of motivation which initiates action and behaviour because the action and behaviour and the result as itself have a high value and a high expectation of realizing it for the person. Typical examples are a hobby, swimming just for fun etc.

Comparing these types of motivation with the concepts of interest and achievement motivation the latter is closer to extrinsic motivation and the interest is closer to intrinsic motivation.

**Patterns of attribution**

The task is solved the work is done. In such state a person may allocate reasons to this result. According to theoretical work and empirical evidences (Weiner 1985) these reasons can be differentiated into stability (stable - unstable), locus of causality (internal - external), and controlability (controllable - uncontrollable).

- The attribution stability encompasses conditions under which a result was achieved, whereby we can differentiate whether actions carried out under the same conditions lead to identical results or not.
The attribution of the locus causality expresses whether results may be traced back to the knowledge, abilities and other internal conditions present during action or rather to external conditions.

The attribution controllability describes whether results may be influenced by the individual or not.

Patterns of attributions

**Relations between attribution and internal conditions**

These 'patterns of attribution' may have repercussions on the individual's or rather the learner's concept of himself. Attributing that she/he was the one who accomplished a certain task and not the others, and that she/he had the process under control may have an impact on her/his self-concept.

In a later phase when such a task is to be solved again the expectation component of her/his interest or motivation might be slightly higher. In such a case she/he will start working on that task which much more confidence to solve it. In addition to that such confidence may emit on the emotional dimension of an action episode as well.

**Emotions**

Pekrun (1998) did theoretical an empirical work in the field of emotions. Emotions are affect relations to things, persons, actions, and information. According to his model emotions are a neglected aspect in training and education. He found out that joy, anger and boredom are often to be found in school and companies and that they have different impacts of achievement.
The emotions can also be differentiated into activating and non-activating ones. Joy and anger are emotions activating behavior, or actions, whereas boredom has an deactivating effect.

The effect curve of emotion and motivation

The effect of emotion and motivation on performance can be described with an inverse U-curve (Yerkes-Dodson law 1908):
Yerkes-Dodson (1908) curve for performance and arousal

If boredom is occurring or no interest or motivation are activated nothing will be done and therefore performance is zero. If activating emotions occur, or there are some interest or motivation there will be some performance. However, if these emotions, interest or motivations reach a certain degree of arousal performance may slow down. Example: The joy or the anger are so strong that you are no able the think clearly and coordinate your actions.

**Task**

Site 10a: You have just finished a task: Check which attribution patterns may be suitable.
Site 10b: Check your emotional state during working on the task in site 10a.
Site 10c: Are you able to reconstruct an event in your biography in which you passed the peak of the Yerkes-Dodson-curve?

Additional information:

Emotion and learning: [www.cdl.org/resources/reading_room/connect_emotions.html](http://www.cdl.org/resources/reading_room/connect_emotions.html)
Interest and vocational learning: [http://www.b.shuttle.de/wifo/lll/lv.htm](http://www.b.shuttle.de/wifo/lll/lv.htm)

**Unit 6: Learning by acting and observing**

**Action orientation in vocational education**
In recent time there was a shift from subject orientation to action orientation in vocational education. The goal is no longer the structure of subjects but the independent planning, realizing and controlling of ones activities related to tasks in school and in the company. Such an action consists at least of the phases planning, executing, and controlling and is named a complete action.

**Origins of the concept of a 'complete action'**

The rational of the concept of a 'complete action' was to overcome the behaviourism with its "black box" widely spread in vocational education and training. The theoretical roots for the concept of a complete action are manifold:

- The concepts activity and action theory in the Soviet psychology. Rubinstein (1977) a representative of this school postulates that human activities are the basis for mental human development. Humans act and learn intentionally and consciously to reach goals and to use tools and not with trial and error.
- The model for the regulation of human action with the TOTE-unit of Miller, Galanter & Pribram (1973). Starting with an image of what exists and what should be reached a person approaches towards the aim by controlling her/his own actions according to the loop of Test-Operate-Test-Exit (= TOTE-unit).
- Hacker transformed the closed TOTE-unit into an open feed-back loop in which the aim is changing during running through a TOTE-unit. He postulates that this concept is closer to reality and named it "comparison, change-feedback-unit".

**The concept of the 'complete action'**

The concept of a 'complete action' widely discussed in the German vocational education and training is further differentiated in six sub actions:

- Informing: Analysing the task and the potential solution state, additional information might be reactivated or searched in manuals available at the workplace, in the resource centre of the company or school or in the internet.
- Planning comprises structuring and sequencing the task solution process to realize the anticipated final state. The more complex the task is the more ways or plans will be designed.
- Deciding has the aim to choose one plan out of the different plans designed in the phase before. Pros and cons are to be considered, time, economic and technical aspects as well.
- Executing is realizing the actions according to the chosen plan.
- Controlling comprises recording of the intermediate and final results and checking the task solution.
- Evaluation consists of comparing the realized result with the anticipated results and with the standards of the occupational domain of work.
Structure of a "complete action"

The six sub actions are structured in the following way:

Learning by observing

We acquire behaviours without being reinforced ourselves. We store complex behavioural models and recall them later in an appropriate situation. Other people or scenes in movies serve us as behavioural models. We learn many things in the company by observing others. This ability makes the constitutional difference between humans and animals. The latter are not able to learn complex things by observing. They follow born instincts which may be very complex. They even learn complex motor chains.

Behavioural models are part of the social context. What the principles are to learn such complex model's behaviours was the theme of Bandura and his group with their social learning theory which was expanded to a social-cognitive learning theory (Bandura 1977). Social learning theory has been applied extensively to the understanding of aggression (Bandura 1973) and psychological disorders, particularly in the context of behaviour modification (Bandura 1969). It is also the theoretical foundation for the technique of behaviour modelling which is widely used in training programs. In recent years, Bandura has focused his work on the concept of self-efficacy in a variety of contexts (e.g., Bandura 1997) like aggression, altruism, sex-typed behaviours, attachment behaviours, and social independence.

Vicarious experiences
In learning by observing, people learn through vicarious experiences. Vicarious experiences take place when people see others experiencing reinforcement or punishment and from expectations about the reinforcements or punishments, the acting person might receive for her/his own behaviour.

Of the hundreds of studies Bandura was responsible for, the most famous experiments are the bobo doll studies. He made a film in which a young woman was essentially beating up a bobo doll. The woman punched the bobo doll, shouting "sockeroo"! She kicked it, sat on it, hit with a little hammer and so on, shouting various aggressive phrases.

This film was shown to groups of kindergartners who, as you might predict, liked it a lot. They then were let out to play. In the play room, of course, were several observers with pens and clipboards in hand, a brand new bobo doll, and a few little hammers.

A lot of little kids were beating the bobo doll. They punched it and shouted "sockeroo," kicked it, sat on it, hit it with the little hammers, and so on. In other words, they imitated the young lady in the film, and quite precisely at that.

These children changed their behaviour without first being rewarded for approximations to that behaviour, i.e. they had vicarious experiences.

**Internal processes mediating learning by observing**

According to Bandura's concept (1986) four processes are involved in learning by observing: attention, retention, motor reproduction, and motivational processes:

Attention processes: If you are acting and learning, you have to be paying attention. Likewise, anything that puts a damper on attention is going to decrease learning, including observational learning. If, for example, you are sleepy, groggy, drugged, sick, nervous, or "hyper", you will learn less. Likewise, if you are being distracted by competing stimuli. Some of the things that influence attention involve characteristics of the model. If the model is colourful and dramatic, for example, we pay more attention. If the model is attractive, or prestigious, or appears to be particularly competent, you will pay more attention. And if the model seems more like yourself, you pay more attention as well.

Retention processes: Once a person attends to a behaviour, it must be remembered if it is to affect future behaviours. Thus processes, such as imagery and rehearsal, that enhance memory are mediators of observational learning. The same factors like for attention might have an impact on retention.

Motor reproduction processes: At this point, you are just sitting and daydreaming. You have to translate the images or descriptions into actual behaviour. So you must have the skills to reproduce the behaviour in the first place. In other cases, the observer can carry out the components but not the entire sequence. Sometimes the individual components have to be acquired before the entire sequence can be executed. Example: To play a piece on the piano some sequences have to be practiced before the whole piece will be presented.
Motivational processes: In the process of learning by observing, several motivations may be involved. Past reinforcement may play a role and promised reinforcement as well - the traditional motivators from behavioural learning theory. But Bandura discovered and added another powerful motivator into his theory. It is the vicarious reinforcement, i.e. the vicarious reinforcement the observed model gets.

**Self-regulation (Bandura)**

In order to control our own behaviour (= self-regulation), Bandura recommends three steps:

- Self-observation by looking at ourselves, our behaviour, and to keep tabs on it.
- Judgment by comparing what we see with a standard. For example, we can compare our performance with traditional standards, such as "rules of etiquette". Or we can create arbitrary ones, like "I will read one book a week". Or we can compete with others, or with ourselves.
- Self-response takes place when we did well in comparison with our standard, we give our-self rewarding self-responses. If we did poorly, we give our-self non rewarding self-responses.

**Self-regulation (Zimmerman)**

In recent time self-regulation became a major issue in the social learning theory of the Bandura school. Barry Zimmerman (2000), an outstanding scholar of Bandura, actually distinguishes three cyclical phases of self regulation: forethought, performance or volitional control, and self-reflection.

- The forethought phase includes the task analysis (goal setting, strategic planning) and the self-motivation beliefs (self-efficacy, outcome expectations, intrinsic interest/value, and goal orientation).
- The performance or volitional control phase is differentiated into self-control (self-instruction, imagery, attention focusing, task strategies), and self-observation (self-recording, self-experimentation).
- The self-reflection phase consists if self-judgment (self-evaluation, causal attribution), and self-reflection (self-satisfaction/affect, and adaptive defence).

**Learning under formal, non-formal and informal conditions**

In recent time there has been an increasing attention on informal and non-formal learning. Such learning occurs on the shop floor (= informal learning) or in meetings in the context of a "learning organization" where not only the solving of problems is addressed but aspects of human resource development at the same time (= non-formal learning). Formal learning takes place in educational institutions where generally accepted certificates are issued. However one should consider that learning itself takes place in the head or the cognitive system of a person. Even if learning research found out and validated some regularities, this research result does not mean that learning is
characterised by formality. As a result learning is always informal and the terms informal, non-formal and formal learning are metaphors. Informality, non-formality and formality are features of the environment and not of the learning itself. Even the European Commission uses in the communication with the title "Making a European area of lifelong learning a reality" (2001, p. 15, italics by the author) "learning in formal, non-formal and informal settings".

For more detailed information on these concepts: www.elearning-reviews.org; A review of this paper can be found: www.elearning-reviews.org/topics/

Problem solving

Problem solving takes place only, if specific conditions exist: the acting person is confronted with a barrier she/he has not available the information and/or the actions needed. In addition to that she/he must be interested or motivated to overcome this barrier and Her/his emotions should be before the turning point. During the process of solving the problem all the actions specified in Unit 4 and all the considerations introduced in Unit 5 might occur. The topic of barrier has a certain importance for the person and her/his expectancy to overcome this barrier is over zero. Both experiences are to continue during the whole process otherwise the solutions process will be interrupted. The person is processing (Unit 5/5) the situation, organizing additional information (Unit 5/4), planning her/his actions episodes towards the solution (Unit 5/6, Unit 2/11), and she/he is controlling these episodes cognitively and meta-cognitively (Unit 5/7 & Unit 5/8). The episodes themselves are functions of the internal conditions and the features of the barriers or the problem situation. In sum problem solving is a complex episode in which all different types information, actions, and experiences are combined, and after all new information and actions are created by the person and because of the attribute of the barrier the person's actual capacity.

Task

Write the appropriate terms in the blanc circles of complete action.
Unit 7: Learning outcomes

Outcomes of an learning episode

In Unit 2/11 we introduced a more dimensional learning episode. It is composed of the dynamic interplay between information and action. The action part is differentiated into motor, cognitive, motivational, and emotional dimensions.

Referring to Anderson et al. (2001), knowledge can be differentiated into facts, concepts and processes.

Considering an action episode being fluid, there must be something non-fluid or relative stable over time. This aspect was addressed with the internal conditions. Related to the dimensions of the learning episode the durable counterparts are:

<table>
<thead>
<tr>
<th>Actual</th>
<th>Durable</th>
</tr>
</thead>
<tbody>
<tr>
<td>information</td>
<td>knowledge</td>
</tr>
<tr>
<td>factual</td>
<td>fact</td>
</tr>
<tr>
<td>conceptual</td>
<td>concept</td>
</tr>
<tr>
<td>procedural</td>
<td>process</td>
</tr>
<tr>
<td>action</td>
<td>skill</td>
</tr>
<tr>
<td>motor</td>
<td>motor</td>
</tr>
<tr>
<td>cognitive</td>
<td>cognitive skills</td>
</tr>
<tr>
<td>motivation</td>
<td>motive</td>
</tr>
<tr>
<td>emotions</td>
<td>emotive</td>
</tr>
</tbody>
</table>
Factual knowledge

Factual knowledge comprises basic elements a person must know to be acquainted with a discipline, a domain, an occupation. Such elements comprise the possessing of terminology like technical vocabulary, musical symbols or abbreviations like the UNO or the EU (Anderson et al. 2001).

Conceptual knowledge

Conceptual knowledge covers interrelationships among basic elements within a larger structure like in a domain, an occupation, or a discipline. The conceptual knowledge is differentiated into:

✓ knowledge of classification and categories, e.g. periods of geological time, forms of business ownership;
✓ knowledge of principles and generalizations, e.g. Pythagorean theorem, law of supply and demand;
✓ knowledge of theories, models and structures, e.g. theory of evolution, structure of the executive in democratic societies (Anderson et al. 2001).

Procedural knowledge

Procedural knowledge comprises how to do something, methods of inquiry, algorithms, techniques, and methods. Subsets of this type of knowledge are:

✓ Knowledge of subject-, domain or occupation specific kills and algorithms, i.e. skills used in painting with watercolours, preparing more course meals, whole number division algorithm.
✓ Knowledge of subject-specific techniques and methods, i.e. interviewing techniques for hiring personal, marketing methods, or thermal methods of preparing food.
✓ Knowledge of criteria for determining when to use appropriate procedures, i.e. criteria used to determine when to apply a specific thermal method of preparing food, criteria used to judge the feasibility of using a particular method to estimate business costs.
✓ Strategic knowledge, i.e. outlining as a means of capturing the structure of a unit of subject matter in a textbook, or criteria of the use of heuristics.
✓ Knowledge about domain or occupation specific tasks, including appropriate contextual and conditional criteria, i.e. knowledge of the cognitive demands of different tasks (Anderson et al. 2001).

Knowledge about the world and oneself

In Unit 3/3 up to Unit 3/5 the types of knowledge introduced were by tendency related to the world surrounding the individual. However, in addition to the knowledge about the
world outer to the individual or her/his external conditions knowledge has to be considered which is related to the individual her/himself. This knowledge about one-self or the self-knowledge consists of factual knowledge (i.e. height), conceptual knowledge (i.e. personal strengths and weaknesses), and procedural knowledge (i.e. knowing successful ways to decrease one's smoking, drinking or eating behaviour).

In important type of knowledge about oneself is the awareness of one’s self in general and in specific domains. Part of the domain specific self-knowledge is the identity related to one’s occupation which may be developed in the course of one’s working life. Such knowledge of one’s occupations related identity has serious impact like on the quality of the work, or the occupational competence development. (Unit 6/7)

**Skill**

The durable counterparts of behaviour and action are the skills. A skill is the person’s feature or disposition to use her/his knowledge effectively and readily in situations of the private and work life or to solve tasks, or problems. Depending from the type of demand and the type of action motor, cognitive or intellectual skills are to be differentiated.

The question may be raised: What is the difference between conceptual and procedural knowledge?

The answer is: Remembering and after all understanding are the features of conceptual and procedural knowledge. But understanding does not necessarily means that a person is able to apply these types of knowledge. There has to be added something to these knowledge types like the conditions or the situations under which it can be used. These characteristics are part of a skill and therefore skill and knowledge have to be differentiated.

**Skill and routine**

A cognitive, intellectual, or motor skill is more than conceptual and procedural knowledge. Such skills enable the person to use her/his conceptual and procedural and motor knowledge (mental models) in situations. In order to use it, additional features are added like the conditions, the features of the situations under which the procedural knowledge may be used as an instrument, e.g. transcending the status of understanding.

However, such a description might be valid for a novice when the skill was acquired. Using skill for a long time the person might become customized to its use. In such a case skill might be realized unconsciously or tacitly and will become the status of a routine, somehow characterizing an expert.

**Types motive and interest**

Motivation and actual interest contribute that action is initiated, continued and evaluated. The internal conditions of motivation and actual interest are the motive and the interest as a relatively stable feature of a person.

Motivation and actual interest are conceptualized in this context as combinations of values and expectancies. On the level of internal conditions these are relative stable
values a person has to certain settings of e.g. tasks, requirements, subjects, or procedures. The expectancies are a stable and characteristic personal believes in mastering e.g. sets of occupational tasks, requirements, or very day problems.

Motives and interests are regarded to differ in their domain coverage. Motives are more general than interests. Examples for motives are power, achievement. Examples for motives are interest in playing the piano, in the development of the company. According to the Munich interest concept (Krapp et al.), interest is a specific person subject relation, accompanied with personal values, and associated with some emotional tinge.

More at: www.unibw-muenchen.de).

**Emotive**

The durable counterpart of actual emotions and the emotive or the emotional dispositions characterising a person’s behaviour and actions. The emotional disposition may contribute to activation or deactivation. Examples for activation emotional dispositions are person, characterized as angry, joyous or boring. More: www.zepf.uni-landau.de

**Learning outcomes (Gagné)**

A similar and widely used classification of learning outcomes was introduced by Robert H. Gagné (1965, 1985). He states that there are as many learning types or learning outcomes as we can differentiate internal and external conditions. Reviewing results of empirical learning research up to this time he specifies five classes of learning outcomes:

1. Intellectual skills are the capabilities that make a person competent. They enable the person to interact with perceived conceptualizations of her/his environment. They range from elementary conditioned responses (Unit 1/5), conditioned operants (Unit 1/4), elementary language skill like composing a sentence or verbal associations (Unit 1/7), advanced technical skills of engineering and in other domains (Gagné & Briggs 1974).

2. Cognitive strategies are skills by means of which learners regulated their own internal process of attending, learning, remembering, and thinking.

3. Verbal information, enable the person to state ideas, like a fact, or a set of events using oral speech, writing, typewriting, or even drawing a picture or design. The person must ordinarily know how to construct at least a simple sentence. However, the purpose is to tell information and not to display the intellectual skill of sentence construction.

4. Motor skills enable the person to execute movements in a organized manner, as in threading a needle or throwing a ball.

5. Attitudes are mental states which influence the person’s choices of behaviour, information, or actions.

**Task**
Compare Gagné's five categories of learning outcomes with the learning types described in M1-1 and the learning outcomes in this unit.

<table>
<thead>
<tr>
<th>Gagné’s learning outcomes</th>
<th>State the suitable learning types of M1-1 and this unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intellectual skills</td>
<td></td>
</tr>
<tr>
<td>2. Cognitive strategies</td>
<td></td>
</tr>
<tr>
<td>3. Attitudes</td>
<td></td>
</tr>
<tr>
<td>4. Motor skills</td>
<td></td>
</tr>
<tr>
<td>5. Verbal information</td>
<td></td>
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</tbody>
</table>

**Unit 8 External conditions**

**External conditions in the context of school and work**

In the context of school and instruction the external conditions are the teacher's behaviour, the tasks, the media and the arrangement coordinating these elements according to the educational goals. The external conditions in the context of a company comprise the work tasks, the equipment, the behaviour of others like supervisors and colleagues and the organization related to the company goal.
External conditions in school and company

There is an analogy between the context of school and company. The difference is to be found in the aims of school and company. The main aim of school is to initiate, support and evaluate learning and its results. The main aim of a company is to produce goods and services for a market, whereas learning is a subordinated goal. Therefore the focus of this unit is on external conditions in support of learning in the context of school or, more specific, of instruction (for companies external conditions, see Module 7).

**Task**

The external element 'task' is an important tool in the process of instruction. Roughly speaking education is not more than exposing students to a large number of tasks sequenced according to the curriculum. The goal associated with the exposition of tasks is that by solving such tasks the student learns what is laid down with the learning objectives (Modul 4, Unit 4).

The powerful external condition 'task' has a general structure specified in the following figure:

![General structure of a task](image-url)
Every task has an initial state, comprising a situation, or a demand to do something. In reality the person working on a task has to analyse the situation in order to find out what has to be done and what is the target state. The target state comprises a solution, the preparation of a product or a service realized. The transition from the initial state to the target state occurs with anticipated episodes created by the person working on the task. The episodes are sequenced combinations of the type: information - action - information - action associated with potential experienced motivations and emotion etc. of the person.

**Problem**

There is a difference between a task and a problem. However, the difference is not an objective feature. By principle tasks and problems have the same structure introduced in M1, Unit 8. But if such a structure has the status of a task or a problem, it depends of the internal conditions of the persons exposed to the task.

*The task gets the state of a task if and only if the person is familiar with the mental and motor requests, i.e. the person knows and is able to realize the necessary sequence of episodes. The task gets the state of a problem, if there is a barrier for the person which inhibits her/him the transformation from the initial state to the target state (Dörner 1976).*

**Types of problems**

When the internal conditions of the problem solver are known, different types of problems are to be distinguished. The criteria are:

- ✓ The person’s familiarity with the events necessary to transform the initial state in the target or solution state of the problem.
- ✓ The clearness of the target or solutions state.

Combining these two criteria you'll get four types of barriers or problems (Dörner 1976):

<table>
<thead>
<tr>
<th>Familiarity with events</th>
<th>Clearness of target</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>high</td>
<td>interpolation barrier</td>
</tr>
<tr>
<td>low</td>
<td>synthesis barrier</td>
</tr>
<tr>
<td>low</td>
<td>dialectical and synthesis barrier</td>
</tr>
</tbody>
</table>

*Ill defined tasks* and problems are if the clearness of the targets is low. The anti poles are *well defined tasks* and problems in which the target is clear. Is the familiarity with the events necessary to transform the target state in a solution state, you have "only" to
make interpolations. In the case of low familiarity and high clearness you have to composite the events or the combinations of action and information. In this case we have a synthesis barrier or problem. More demanding might be tasks or problems with unclear targets. In this situation the target might change and the action episodes to be realized in order the reach the changed target. In relation to the familiarity with the necessary action episodes to be realized one can differentiate between dialectical and dialectical and synthesis barriers or problems.

**Teacher’s behaviour**

In the general model of acting we preliminarily differentiated between observable and non-observable behaviour. Non-observable behaviour are all the cognitive actions, considerations, motivations, and emotions an instructor is bringing in the process of interaction and communicating with students. However, the student can only perceive the observable part of the teacher’s actions. Which non-visible considerations and acts the teacher is associating with the observable behaviour is subject to interpretations of the student - and these interpretations might be wrong or right.

On the basis of these considerations every observable behaviour of the teacher in an educational situation or institution is teacher behaviour. However, only a subset of the teacher’s behaviour gets didactical or instructional significance i.e. if it is functionally related to assume learning episodes in the student.

Five molar instructional functions are to be considered (Klauer 1985) and related to

- motivate and emotionalising
- creating information
- acting and behaving
- storing and retrieving
- transferring
- monitoring and directing

**Instructional functions and teaching methods**

Instructional functions may support the selection of instructional methods. For lecture and guided discussion the result is the following:

<table>
<thead>
<tr>
<th>Instructional functions</th>
<th>Teaching methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lecture</td>
</tr>
<tr>
<td>Motivation</td>
<td>+</td>
</tr>
<tr>
<td>Information</td>
<td>++</td>
</tr>
<tr>
<td>Information processing</td>
<td></td>
</tr>
</tbody>
</table>
Selection of teaching methods (Klauer 1985)

Media

Media are needed to enable communication and interaction between the teacher and the learner. The 'ancient' media like book or painting made rapid advances with the development and dissemination of information technology. Nowadays we speak no more of media but of multimedia, like computer programmed instruction (CPU), audio and video etc.

There is great hope that multimedia will enhance learning. However, research results speak a different language. Clark (1983) argued that media do not influence learning in any significant way. Reviewing several of his own studies after years of research in this field, Mayer (1997) found no evidence of media effects either. The reason is that people do not learn form technology. Rather, they learn form thinking about that what they perceive and experience (Unit 2/2). Their thoughts are mediated by activity which is mediated by the attributes of the medium, not the medium itself (Jonassen 2001).

Therefore a classification on presentations modes and the sensory modalities is introduced next.

Presentation modes (attributes) of multimedia

<table>
<thead>
<tr>
<th>Text</th>
<th>Image Manipulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>numbers/formulae</td>
<td>cropping</td>
</tr>
<tr>
<td></td>
<td>posterization</td>
</tr>
<tr>
<td>Still Images</td>
<td>reposition</td>
</tr>
<tr>
<td>photographs, slides</td>
<td>resize</td>
</tr>
<tr>
<td>charts, diagrams</td>
<td></td>
</tr>
<tr>
<td>textures</td>
<td></td>
</tr>
<tr>
<td>backgrounds</td>
<td></td>
</tr>
<tr>
<td>3-D still graphics</td>
<td>Sounds</td>
</tr>
<tr>
<td>line art (clip art)</td>
<td>music</td>
</tr>
<tr>
<td>icons/dynamicons</td>
<td>sound effects</td>
</tr>
<tr>
<td></td>
<td>narratation</td>
</tr>
<tr>
<td>Spatial Positioning</td>
<td>Data Structures</td>
</tr>
<tr>
<td>proximity</td>
<td></td>
</tr>
<tr>
<td>attribute grouping</td>
<td>hypertext</td>
</tr>
<tr>
<td><strong>juxtaposition</strong></td>
<td>database</td>
</tr>
<tr>
<td>------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>procedural</td>
</tr>
<tr>
<td>dialog boxes</td>
<td>hierarchical</td>
</tr>
<tr>
<td>windows</td>
<td></td>
</tr>
<tr>
<td>checkboxes</td>
<td>Transitions</td>
</tr>
<tr>
<td>drag and drop</td>
<td>cuts</td>
</tr>
<tr>
<td>drop (pull down) menus</td>
<td>fades</td>
</tr>
<tr>
<td>bookmarks</td>
<td>dissolve</td>
</tr>
<tr>
<td>branching</td>
<td>zooms</td>
</tr>
<tr>
<td>buttons</td>
<td>special effects</td>
</tr>
<tr>
<td>embedded hot Links</td>
<td></td>
</tr>
<tr>
<td>scroll bars</td>
<td>Container Metaphors</td>
</tr>
<tr>
<td></td>
<td>book pages</td>
</tr>
<tr>
<td><strong>Video</strong></td>
<td>cards</td>
</tr>
<tr>
<td>full motion video</td>
<td>stage with characters</td>
</tr>
<tr>
<td>time lapse</td>
<td>flowchart</td>
</tr>
<tr>
<td>montage</td>
<td>windows</td>
</tr>
<tr>
<td>diorama</td>
<td>rooms</td>
</tr>
<tr>
<td>2-D animated graphics</td>
<td></td>
</tr>
<tr>
<td>3-D animated graphics</td>
<td></td>
</tr>
<tr>
<td>virtual reality</td>
<td></td>
</tr>
</tbody>
</table>

Presentation modes (attributes) of multimedia (Jonassen 2001)

**Instructional arrangement**

The instructional arrangement brings the tasks, teacher behaviours and media attributes together in relation to the educational objectives and assumptions on learning episodes needed to realize the intended learning outcomes (= educational objective). The traditional teaching methods have some commonness with that understanding of instructional arrangement. For example the *Instructional functions and teaching methods* (Klauer, above) have been related to teaching methods. Let's take the teaching method "guide discussion" related to different teaching functions which may proximate specific teacher behaviours. Such an approach might be adequate for authentic or real work life tasks with unclear targets (= task). The attribute 'authentic' recommends in an educational institution a full motion video of a work process (= media). The educational goals might be the enhancement of problem solving skills. Such interrelations between educational goals, types of tasks, instructional functions, and media attributes are structured by the instructional arrangement.
Task

Take table "Presentation modes (attributes) of multimedia" and check which media are available at your place of work.

Unit 9: Instructional conclusions

Learning and instruction

Grounded on the general structural model of learning (Unit 2/5) and the more-dimensional model of learning (Unit 2/11) we are able to formulate three general core questions for planning and analysing instruction:

Which durable internal conditions have been realized or should be realized?

Which learning episodes have contributed or should contribute to realize the internal conditions?

Which instructional conditions (teacher behaviour, media, tasks and arrangements) are appropriate or contributed to elicit the learning events?

Core questions for planning and analysing instruction

Focusing the core questions

Under the aspect of planning, the core question 'durable internal conditions' comprises the specification of the educational or instructional objectives (Module 4). Investigating which educational objectives have been realized and to what extent is a matter of diagnosis and evaluation (Module 9).

Focusing on the core question 'learning events' answers for are to be found in Unit 3 up to Unit 6. The aspect which episode has just been realized or has contributed to the realizations of internal conditions is a matter for formative and summative evaluation. Planning potential learning events is a matter of learning theoretical considerations and of the arrangement of external or instructional conditions (Unit 8/5). These instructional
conditions are the potential learning tasks, the media, the teacher's behaviour and the arrangement on which we will focus in the following sections.

**Functions of instruction**

Similar to the five 'molar instructional functions' of Klauer (Unit 8/5) the instructional design concept of the Gagné school differentiates into the following 'instructional events' related to group instruction or tutorial instruction, and individual learning:

<table>
<thead>
<tr>
<th>Instructional Event</th>
<th>Group Instruction</th>
<th>Tutorial Instruction</th>
<th>Individual Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activating motivation;</td>
<td>Instructor establishes common motivation among learners</td>
<td>Tutor discovers individual motivation</td>
<td>Learner supplies own motivation</td>
</tr>
<tr>
<td>Informing the learner of the objective</td>
<td>Instructor communicates objectives to learners</td>
<td>Tutor communicates objective to learner</td>
<td>Learner confirms or selects objective</td>
</tr>
<tr>
<td>Directing attention</td>
<td>Instructor stimulates attention of learners</td>
<td>Tutor adapts stimulation to learner attention</td>
<td>Learner adopts attentional set</td>
</tr>
<tr>
<td>Stimulating recall</td>
<td>Instructor asks for recall by learners</td>
<td>Tutor checks recall of essential terms</td>
<td>Learner retrieves essential items</td>
</tr>
<tr>
<td>Providing learning guidance</td>
<td>Instructor elaborates or provides hints or prompts learners</td>
<td>Tutor provides guidance only when needed</td>
<td>Learner supplies own strategies</td>
</tr>
<tr>
<td>Enhancing retention</td>
<td>Instructor provides retrieval cues to learners</td>
<td>Tutor encourages learner to use his own cues for retrieval</td>
<td>Learner supplies own retrieval cues</td>
</tr>
<tr>
<td>Promoting transfer</td>
<td>Instructor sets transfer tasks for all learners</td>
<td>Tutor sets transfer tasks adapted to learner’s capabilities</td>
<td>Learner thinks out generalizations</td>
</tr>
<tr>
<td>Eliciting Performance</td>
<td>Instructor uses a test to assess performance of learners</td>
<td>Tutor asks for performance when learner is ready</td>
<td>Learner verifies his own performance</td>
</tr>
<tr>
<td>Providing Feedback</td>
<td>Instructor provides feedback to learners, varying in immediacy and precision</td>
<td>Tutor provides accurate and immediate feedback</td>
<td>Learner provides own feedback</td>
</tr>
</tbody>
</table>

Resource: [www2.gsu.edu/~mstswlh/courses/it7000/papers/robert.htm](http://www2.gsu.edu/~mstswlh/courses/it7000/papers/robert.htm)

**Potential learning tasks and authenticity**

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The attribute 'potential' in conjunction to 'learning task' was chosen intentionally. The reason is that a task gets the function of learning task only retrospectively, i.e. if a learning outcome has occurred (Unit 2/5). The same task might also get the function of diagnosis, the function of a problem, if the person is not able to solve the task (Unit 8/4) if the task is used to figure out the type and degree of realization of educational objectives. As a consequence the same task may become different functions, i.e. a task is not a learning, diagnostic, or problem (Unit 8/5) task per se.

The aim of education is to prepare for private social and work life. The best way to do this would be on the shop floor or act in real private social contexts. Therefore the demand for schooling is the introduce authentic tasks - but what are the criteria for authenticity? School are always dealing with tasks of reduced authenticity - the criteria to differentiate authentic form non-authentic tasks are not very sharp. The dual vocational education and training is a rough approach to go the tightrope between authenticity and non - authenticity or discipline or action orientation.

**Task's attributes**

In Unit 8/2 the general structure of a task was introduced. We'll now try to specific some attributes for the elements of this structure:

- Complexity of the task, i.e. the number of potential information elements to be processed up the aspect of exceeding the human information processing capacity of seven plus/minus two information units.

- Non-transparency of the task, i.e. not all of the information necessary are to be found in the initial state of the task. They have to be found elsewhere (Unit 4/3 et sequ., Unit 8/4).

- Dependence of the task parameters, i.e. choosing a solution may have an non-intended impact on further steps or the realization of the task's targets.

- Self-dynamic of the task, i.e. the initial state changes itself without assistance of the acting person.

- Diversity of targets, i.e. several competing targets are to be pursuit by the action person (Kluge 2004).

**Instructional function of media**

In Unit 8/8 the presentation modes of multimedia have been introduced. According to Jonasson (2001) they may be used for three instructional purposes:

- Learning from media takes place, when media are used as a carrier or delivery vehicle to carry and present information in the form of multimedia information databases, presentations, and most forms of interactive instruction. However, most research shows small or no positive effects of multimedia systems on learning.

- Learning in media comprises using multimedia simulations and learning environments, like pilot training, or case-based clinical simulations. Even if this approach supports constructivist assumptions about the situated nature of learning not enough research results are available up till now.
Learning with media is the approach utilizing multimedia resources not to think of multimedia as a form of instruction to learn from or in, but rather to look at a multimedia as a tool for constructing knowledge.

**Instructional arrangement**

In the proceedings paragraphs potential learning functions or characteristics of selected instructional conditions have been introduced. The instructional arrangements structures all these items in relation to the educational objectives (Unit 8/1).

It is the assumption of the introduced concept of learning and instruction that the external conditions are functionally related to the educational objectives.

**Examples:**
If the educational objective is to contribute to the development of a problem, solving skills, ill-structured tasks, and not lecturing teaching behaviour and multimedia might to be chosen by tendency (Bruner 1963). Is the educational objective to build up a well organized cognitive structure of concepts (Ausubel 1968) well structured tasks, lecture and flow charts may be used by tendency (Module 5).

**The process of instruction**

Instruction may be considered structurally - like in the proceeding paragraphs of this unit - and as a procedure. A process is characterized by the starting point, followed by events and the final state.

Since instruction takes place the question is where do you pick up your students. As a consequence a diagnosis of the pre requisites of learning is recommended. In the basis of these results the instructional events - i.e. the teacher’s behaviours etc. - are planned according the envisaged educational objectives. The process might be accompanied with formative diagnoses and closed with summative diagnosis (Module 9).

For sequencing the instruction-learning process reference can be made to Gagné’s concept of learning hierarchies (Module 4), starting with the final objective and asking for the requisites of this objective until one reaches the diagnosed learning pre requisites at the beginning of the instructional sequence.

The process itself is maintained by interaction and communication between the teacher and the students. Considering that teacher behaviour is decoded by the students according to their internal conditions, there is no guarantee that the students associate the same meaning as the teacher does. To avoid that, clear concepts have to be built up on both sides.

**Effects of experienced instructional conditions**

Even if the features of instructional conditions are perceived by the student, empirical research findings on teaching and learning show some effects that are to be considered (PISA 2000, Deci & Ryan 1985, Prenzel et al. 1993, Straka 2000). These types of perceptions are:
**Experiencing autonomy** is when a person has the impression s/he has scope, that is to say s/he is able to carry out her/his work tasks according to her/his own schedule. **Experiencing competence** is when a person has the impression s/he experiences her/himself as being effective and s/he has the impression s/he carries out her/his work tasks competently and successfully.

**Social integration** is experienced by a person when her/his work is acknowledged by instructors, supervisors and colleagues and s/he feels integrated in the group. These forms of experience are expanded by the **teaching quality** as evaluated by the learners and encompasses aspects of teaching which appear relevant beyond the various instruction models.

### Instructional conditions

These types of experiences enhance motivation and emotion contributing to more intensive information processing and as a consequence to higher learning outcomes of the student.

### Task

Take the **Task’s attributes** of Unit 9: Instructional conclusions, and check if you can find some work tasks having one or more of these attributes.

a. In **Unit 5/4** the structure of a complete action was introduced. Think about your instructional behaviour you ought to realize in order to support the actions of your students. Write your considerations in the blank rectangles.
Note:
If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
MODULE 02:
Forms of student centred learning

The nine methods (units) display the great variety of teaching actions referring to the methodical competence of the trainer/instructor or teacher. You will see the great variety in teaching and you will realise the advantages of each method after a short while. Remember, a good teacher has a high level in methodical competence, what means - he/she knows for the right situation the right method! The overview on the following pages/units will also give you a picture of advantages and disadvantages of each method.

<table>
<thead>
<tr>
<th>Nº</th>
<th>Name of Unit</th>
<th>Tests</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General information</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Unit 1</td>
<td>Lecture</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Presentation</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Teaching conversation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 4</td>
<td>Round table conversation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 5</td>
<td>Guided problem discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 6</td>
<td>Presentation of results by students</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 7</td>
<td>Brainstorming and moderation</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 8</td>
<td>Guided team work</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 9</td>
<td>Guided self learning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specific objectives of module:

It is intended that, after studying the handouts or participating in a seminar about the topic, you would be able to:

✓ Explain the common methods to conduct lessons or instructions
✓ Distinguish the following methods of imparting theoretical knowledge: brainstorming and moderation, lecture, teaching conversation, illustrated talk, round table conversation, presentation of results by students, guided problem discussion, guided teamwork, guided self-learning
✓ Apply the rules to conduct a discussion
✓ Apply the rules of asking questions
✓ Conduct a lesson or instruction using an example
**Purpose of module:**

- Developing individual competences to prepare and conduct lessons and instructions with common methods of student/trainee centred learning
- Learning the principles, advantages, disadvantages of common methods of student/trainee centred learning
- Working out one example of written preparation plus performance standard

**Graphical structure of the module**

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**Forms of student centred learning**

- Lecture
- Guided self learning
- Guided teamwork
- Guided problem discussion
- Presentation of results by students
- Brainstorming moderation
- Round table conversation
- Teaching conversation
- Presentation

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**Units 1-9**

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General information on conducting lessons (1/9)

Note:

All following 9 pages should be read carefully, then access will be given to the units.

The general sequence in conducting a lesson is as following:

1. warming up and motivation
2. information
3. knowledge transfer
4. tasks to settle comprehension
5. analyses, syntheses
6. evaluation measures

The time frame for this sequence is usually 45 or 60 minutes, during adult training up to 90 or 120 minutes. All the 6 steps have to be completed within one session.

General information on conducting lessons (2/9)

Lessons should always be planned, and in order to hold a lesson the following cross-check should be carried out:

Cross-check the outcome of the planning phase

<table>
<thead>
<tr>
<th>assessment of prerequisites &amp; preconditions</th>
<th>Are the results of analyses still valid?</th>
</tr>
</thead>
<tbody>
<tr>
<td>time</td>
<td>Is the time sufficient to impart knowledge?</td>
</tr>
<tr>
<td>room requirements</td>
<td>Is the classroom not occupied by others? Are chairs and tables arranged in an U-shape?</td>
</tr>
<tr>
<td>media</td>
<td>Are blackboard, chalk, duster, overhead projector etc. existing and in working condition?</td>
</tr>
</tbody>
</table>
General information on conducting lessons (3/9)

The six phases of a lesson

1st phase: warming up and motivation

First and foremost hold a warming up session: Welcome the trainees and have a chat about certain interesting topics, if possible with a hidden link to the subject matter. You can also choose an interesting quote or new short story, all this will help to get attention and to avoid the possible tension of participants. (Have a warming up file for this purpose…) Conducting the very first lesson, introduce yourself with short words and allow to introduce the trainees themselves. Apply the flip chart for short notes.

According to the defined and selected units and modules the direct motivation and introduction of the trainees should follow by presenting the objectives and give an appropriate reason to clarify the purpose of the lesson. Try to find reasons and arguments which are suitable for intrinsic or extrinsic motivation. Ensure, that you have done in any case an action of motivation!

General information on conducting lessons (4/9)

The six phases of a lesson

2nd phase - information

Start with a short repetition of the essential outcome of the previous lesson. Then go into the new matters. Apply lectures, discussions, teaching conversations, role plays, problem-solving-conversations, group work and individual assignments - whatever seems to be appropriate for the topic.

Feed the students with the necessary information regarding the topic of the lesson.
General information on conducting lessons (5/9)

The six phases of a lesson

3rd phase - knowledge transfer

Distribute handouts and assignments topic-wise, this will ease your teaching and gives the guideline through your lesson. Do not just distribute the handouts without referring to them - it will be even better to distribute the pages one after another regarding to the topic and giving a few minutes time to read or let somebody read loud in order to grasp the information's. Then discuss the topic.

General information on conducting lessons (6/9)

The six phases of a lesson

4th phase - tasks to settle comprehension

Keeping the importance of activities in mind, conduct individual or group work in solving of assignments to allow the consideration of a certain topic and let the participants present their results. It gives the possibility, after having a relatively passive phase of gaining information and knowledge to get active. Develop checklists together. Do give home assignments. Even practical demonstrations in workshops, when possible and facilities are available, should be considered.

General information on conducting lessons (7/9)

The six phases of a lesson

5th phase - analyses and syntheses

Through analyses of a topic individual knowledge components can be elaborated. Especially features, principles and procedures can be discussed in detail. Syntheses are necessary to bring all the individual discussed details together again and enable the
summarising and the drawing of conclusions. Also the links to other knowledge can be drawn.

**General information on conducting lessons (8/9)**

The six phases of a lesson

**6th phase - evaluating measures**

After each assignment you should conduct a self-evaluation by participants. Another way is to discuss the results frankly in group discussions.

At the end of a session take your time for a final conversation. This will give you feedback of the performance of participants, their fulfilled expectations and last but not least feedback of your own performance. Answer the question: "Are the objectives achieved? If not, why?" Here you can also apply a seminar evaluation form.

**General information on conducting lessons (9/9)**

**Summary:**

Guide the participants in transferring the acquired knowledge into the working practice. Whenever possible, monitor the work of the participants on the shop floor and give advise for future improvements.

Moreover, take the initiative to exchange the experiences of the participants during the next sessions.

Guide activities to learn from each other.

**Unit 1: Lecture**

**Definition of the concept:**

*Lecture:* is an address or discourse on a particular subject, a formal discourse delivered to students etc. by a teacher (source: Oxford Dictionary)

**Situation:**

The teacher stands in front of the student/students/trainees and speaks almost without interruptions about facts, concepts, principles and procedures. He/she presents knowledge well-prepared. Questions by the students are not expected. This method is
very useful for first information and introductions to comprehensive topics.

Advantages for the trainer:

- imparting of a big amount of knowledge in a short time
- methodical preparation and organisation is not difficult
- logical sequence is easy to maintain

Disadvantages from the side of student/students/trainees:

- takes very big effort to grasp all the presented knowledge, makes retaining difficult
- hard to be attentive more than 20 minutes, tiresome (psychological barrier)
- different previous knowledge can not be respected appropriately
- questioning is not involved
- big danger to expect too much comprehension from student/students/trainees
- passive way of learning

Task 1

Prerequisites:

- teaching experience
- developing lesson preparations

if you do not meet the requirements above, please study further. You can also refer to the following Reader: M5-1, Learning objectives

Task:
Choose an appropriate topic (from your subject) and prepare it for a lecture of about 20 minutes and explain why you would teach it applying this method. Send the preparation to your tutor via email! Please also indicate the numbers of module, unit and task!

State reasons why this teaching method fits best this particular topic.

Hold a lecture, preferably with your tutor. If this is not possible, let other teachers sit in classes.

**Note:**

Already existing teaching and learning materials for the lecture can be used, but if not available, should be prepared as well.

### Unit 2: Presentation

**Definition of the concept:**

- the action of presenting a thing for acceptance, the action of presenting something to sight or view; theatrical, pictorial, or symbolic representation; a display, an exhibition. (source: Oxford Dictionary)

**Situation:**

The trainer stands in front of the student/students /trainees and presents e.g. real objects and models, patterns, as well as photographs, wall-posters and audiovisuals, like movies, videos, slides, etc. This method is very useful to give a lively and vivid impression about a matter to ease the perception.

**Advantages:**

- optical support enables better comprehension
- methodical preparation and organisation is not difficult
- logical sequence is easy to maintain
- student/students/trainees get impressions about the reality, if the reality can not be transferred into the learning situation

**Disadvantages:**

- acquiring knowledge goes only in one direction, if questions are avoided
- danger of imparting unbalanced knowledge
different previous knowledge can not be respected
danger of technical breakdowns, if the trainer is not skilled
passive way to learn
movies should be presented not longer than 20 minutes, longer movies have to
be split up

Task 1

Prerequisites:

- teaching experience
- experience in using media

Task:

Prepare a presentation of about 15 minutes fitting your subject. (or better something
which will be common for all participants, yet to be found)

State reasons why this teaching method fits best this particular topic.

Note:
Already existing aids for the presentation can be used, but if not available, should be
prepared as well.

Unit 3: Teaching conversation

Situation:

The trainer imparts knowledge in terms of facts, concepts, principles and procedures and
uses questions to support the direction of thinking, he/she expects answers to be
discussed. All didactic principles (M5-2) can be respected.

This method is the most common teaching method, it is very useful to develop
comprehension and thinking in relations.

Advantages:

- the process to develop intellectual skills is directly supported by the trainer
- comprehensive matters can be analysed in small steps
- very active way of learning
- good way to use prior knowledge and experience of students/trainees
Disadvantages:

there is a danger to use improper methods of asking questions
trainers tend to overrate a certain opinion and do not respect answers, which are not completely correct

Additional information on communication, Reader: M2-4

Unit 4: Round table conversation

Situation:

The trainer arranges the tables of the room in the order of a circle, what enables face-to-face talking. He/she distributes a draft of discussion paper about a topic and he/she calls for opinions and decisions.

This method is very useful to develop communication skills and decision making skills.

Advantages:

the process of developing communication skills is directly monitored and supported by the trainer
decision making skill will be developed - method of preparation of an action plan can be introduced
very active way of learning
everybody can learn to feel responsible to participate
good way to use experience of students/trainees
good way to discover social skills and positions within the group

Disadvantages:

overrating of students/trainees is possible
there is a danger to stick to a certain problem
time consuming

Additional information, Reader: M1-4
Unit 5: Guided problem discussion

Situation:

The trainer prepares a statement about a certain problem. He/she gives the assignment to search for causes and solutions.

This method is very useful to develop problem-solving skills and communication skills.

Advantages:

- a very intensive way to discuss a matter
- students/trainees learn to analyse and assess causes and effects
- they learn to think
- good way to assess knowledge and experience of students/trainees

Disadvantages:

- requires well-prepared topic and good motivation
- choosing of the problem has to be appropriate to the level of students/trainees
- time-consuming

Unit 6: Presentation of results by students

Situation:

One student of a discussion group presents the found solution of a problem discussion.

He/she explains the problem to be solved and the solution that was found.

This method is very useful to develop problem-solving skills and communication skills.

Advantages:

- a very intensive way to develop the explanation skills of students/trainees
- students/trainees learn to discuss and to find common solution
- they learn to think
- good way to assess knowledge and experience of students/trainees
Disadvantages:

- requires well-prepared topic and good motivation
- choosing of the problem has to be appropriate to the level of students/trainees
- time-consuming

Unit 7: Brainstorming and moderation

Situation:

The trainer stands in front of students/trainees and introduces a problem. He/she asks questions to be answered frankly. The trainer does not commend the answers, also the answers could be given in written form on cards which will be pasted onto pin boards. This method is appropriate to develop creative thinking.

Advantages:

- discussion can be visualised
- ideas will be promoted
- all students/trainees are involved
- experience can be used

Disadvantages:

- time-consuming
- moderation equipment is necessary
- room conditions must be appropriate
- problem must be appropriate to the level of knowledge of students/trainees

Additional information on brainstorming and moderation: Reader M1-7
Task 1

Choose an appropriate topic of your subject for a brainstorming session. Prepare a classroom arranging the tables and chairs according to the number of the participants. To visualise results of brainstorming, provide sufficient pinboards, cards, pens and pins.

Bear in mind the background to students and the motivation in participating in the process. The results can be captured by a digital camera afterwards. The pictures as well as a report (comments) on the brainstorming session shall be send to your tutor via email.

Unit 8: Guided team work

Situation:

The trainer prepares a working/learning task for a group of students/trainees. He/she gives the assignment to solve the duty. This method is very useful to develop problem-solving skills within a group and communication skills.

Task:
read and study the files "learning in teams" and "motivation" carefully before applying this method. Also try to find more information about teamwork looking at resources in the library.

Unit 9: Guided self-learning

Situation:

The trainer provides sources for information and learning aids/materials and distributes assignments for self-learning.

This method is useful to develop the ability of self-learning and gives the basis for home-assignments.

Advantages:

- knowledge can be learned by the learner’s own pace
- knowledge can be digested
- if motivated, the learner learns very effective
- very active way of learning
- methods of written communication can be learned
Disadvantages:

- overrating of students/trainees is possible
- questionnaires and learning aids have to be well-prepared
- problems arise in case of insufficient time and a lack of motivation

Note:

If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
Module 03:
Foster self-reliant forms of learning

This module consists of 6 Units, according to the structure of the module.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Unit</th>
<th>Tests</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General information</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Unit 1</td>
<td>The importance of self-reliant learning</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Unit 2</td>
<td>The relation between self-reliant learning and student-centred teaching</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 3</td>
<td>The essentials of the new teaching role within a self-reliant learning process</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Design assignments for self-reliant learning</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 5</td>
<td>Design assessment- sheets for self-reliant learning</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Foster self-reliant teamwork</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Specific objectives of the module
Upon completion of the module, you should be able to apply self-reliant forms of learning in your own teaching and instruction. Especially you can:

- explain the importance and benefits of self-reliant forms of learning
- distinguish the differences between teacher-centred and student-centred teaching
- compare the different roles of a teacher/instructor when conducting teacher-centred and student-centred teaching
- explain the process of self-reliant learning by describing the 5 steps of the complete action model
- explain and apply the guidelines for the new teacher’s role as an adviser and a coach on your own teaching
- explain and apply the characteristics of student centred-learning on your own teaching
- distinguish the characteristics of a closed and an open assignment for self-reliant learning
- design closed and open assignments for self-reliant learning corresponding with different performance levels of students
- explain the connection between learning and working processes
- design assessment sheets for self-reliant learning on different levels of performance
Module 3/IST

✓ apply the guidelines and hints of the module for fostering self-reliant form of learning when you are planning and conducting own teaching

Purposes of the module

✓ To provide knowledge on the characteristics and impacts of self-reliant forms of learning
✓ To explain and to give evidence how to implement student-/trainee-centred teaching and learning by planning and delivering suitable examples of own teaching

Graphical structure of the module

Foster self-reliant forms of learning

- Foster self-reliant teamwork
- The importance of self-reliant learning
- Design assessment sheets for self-reliant learning
- Units 1-6
- The relation between self-reliant learning and student-centred teaching
- Design assignments for self-reliant learning
- The essentials of the new teaching role

General information on the characteristics of self-reliant learning

Generally spoken self-reliant learning has the following distinguishing marks:

1. Self-reliant-learning is a modern way of lifelong and comprehensive learning which is corresponding with the needs of modern computerised production
2. The process of self-reliant learning follows the steps of the complete action model
3. Self-reliant learning requires and provides that teachers appropriate a new role of teaching
4. The didactical core of self-reliant learning is to define, to carry out and to assess an assignment for self-reliant learning
5. To define, to carry out and to assess an assignments for self-reliant learning is a comprehensive process that contains all steps of the complete action model

6. Learning in self-organised groups and self-moderated teamwork are a significant mark of self-reliant learning

**Self-reliant learning demands provision of the requirements listed up on the following checklist:**

<table>
<thead>
<tr>
<th>Requirements/preconditions of self-reliant learning</th>
<th>Cross-check questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involvement of students</td>
<td>Have the students been involved already in the preliminary planning of the learning and work assignment?</td>
</tr>
<tr>
<td>New role of the teacher</td>
<td>Is the teacher a coach and advisor to the individual learning processes, or is he the director in front of the classroom?</td>
</tr>
<tr>
<td>Teamwork</td>
<td>Is the classroom/lab ready for learning in groups? Are the assignments clearly defined for every group?</td>
</tr>
<tr>
<td>Learning and work assignments</td>
<td>Has the learning and work assignment been defined precisely and is it meeting the student's level of performance?</td>
</tr>
</tbody>
</table>

**Six distinguishing marks of self-reliant learning**

**1st mark: Self-reliant learning is corresponding with the demands of modern forms of work-organisation and production**

Not only for developed, but also for developing countries the workforce must cope with the challenges coming from globalisation and the world-wide spread of new technologies and forms of work-organisation. Modern production can offer a huge variety of goods according to the changing demands of customers very quickly and with high quality. Planning of new and marketable products in a short range of time requires short ways of information and decision, flat hierarchies, highly qualified personnel even on the shop-floor level and the participation of all workers. Workers who are only able to carry out orders from their supervisors feel not responsible for participation in the planning processes and for the quality of products. Since not every detail how to proceed when working with a task cannot be predetermined, different ways are possible.

Modern knowledge-workers have the willingness for independent, life-long learning. They work in teams and can solve problems when working on comprehensive work-assignments that include comprehensive and complete actions.

**2nd mark: The process of self-reliant learning follows the steps of the complete action model**

The complete action model can be described as a cycle running through the following successive steps:
✓ Setting goals: to define and to agree on the intentions and results, neither as goals given with the work assignment, or coming up with own goals
✓ Planning: to anticipate and define the steps of work and the pathways of actions in a team or individually
✓ Decision making: to regard the utilisation of the plan and resources
✓ Executing the action process and monitoring: to follow the work-plan and monitor the activities and results
✓ Evaluation: to observe and assess the entire approach, the processes and results for completing the assignment by the students themselves and/or by the teacher

3rd mark: Self-reliant learning requires from teachers to appropriate a new role of teaching

The new role of a teacher/instructor as a coach and an advisor is
✓ To stay more in the background than in the centre of action
✓ Not to answer every question of students but to help them to find the answer themselves
✓ To offer tips for starting independent activities and finding own solutions
✓ To accept student’s own ways of doing things
✓ To stimulate independent thinking of the students and trainees and to encourage them to go unusual ways

4th mark: A learning and working assignment is the didactical core of self-reliant learning

Trainee-centred teaching is the basis for self-reliant learning. Efficient self-reliant earning is only possible if the teaching-process is trainee-centred. The core-element of this teaching is given with the learning and work assignment.

These assignments must refer to the specific level of performance of the students who have to work and learn with the assignment. They may be formulated as "closed" or as "open" assignments, corresponding with the student’s preconditions of learning. "Closed" assignments are not so demanding since they require from the learner only to carry out the complete action for given goals (set by the instructor).

"Open" goals require that the learners carry out the complete action including the finding and formulation of the goals in a given framework.

5th mark: Self-reliant learning includes the assessment of all planning and work actions performed when carrying out an learning and work assignment

Assessment sheets for learning and work actions performed when carrying out an assignment give evidence of the following performance of students:
✅ Planning of work (gathering, selecting and preparing information)
✅ Execution of work (decision making and carrying out)
✅ Quality of work (Monitoring and evaluation)

6th mark: Learning in groups and self-moderated teamwork

Communication in teams requires from the teacher/instructor to

✅ listen actively and curious about the student's ideas
✅ take the floor in turns: only one person can speak at the same time
✅ be careful with judgements during speech of a group member
✅ give priority to the factor that create disturbances
✅ discuss in writing by fixing the results of discussions
✅ moderate group work processes
✅ assess the teamwork experience and results

Test

What are distinguishing marks of self-reliant learning? Some of the following 8 answers are right, the others are wrong. Please click neither "right" or "wrong" for every answer.

Self-reliant learning …

<table>
<thead>
<tr>
<th></th>
<th>right</th>
<th>wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) ...prepares trainees for carrying out given tasks exactly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) ...is useful for trainees not to make any deviation from the plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) ...has clear and typical structure of phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) ...requires from teachers to give a precise answer for every question</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) ...encourages students to assess their own process of learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) ...is another way of teacher-centred teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) ...requires an &quot;open assignment&quot; for learning in any case</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) ...is usually depending on teamwork</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unit 1: The importance of self-reliant learning

A short definition of "self-reliant learning":

Self-reliant learning means that a learners themselves are responsible for their own way of learning and the results. No teacher can take off this task from the students. But this does not mean that the teachers will become unnecessary; however they now have the role to foster and to coach the student's achievements by supporting his individual mode of learning independent.

Why is self-reliant learning important for technical/vocational education?

Briefly summarised there are four argument to give self-reliant learning more space in technical/vocational education:

- In modern computerised production the knowledge required is outdating and changing rapidly. Traditional teacher-centred training concepts (link mit Unit 3) cannot cope with this new situation at the workplaces.
- In today's industrial world must be willing and able to learn continuously.
- The demands on the level of the worker's qualification in modern production are increasing continuously since they have to share responsibility for innovation, efficiency and quality of production and service.
- The hierarchy in many enterprises is becoming flatter as a precondition for higher flexibility and cost-effectiveness. As a consequence of this, qualified workers have to take part in planning, monitoring and assessment of their own work-processes.

The best way to learn more about the importance of self-reliant learning is to deal with this issue in an active mode by carrying out one of the assignments you will find when you go forward to the next file.

Unit 1 - Task 1

Please prepare and carry out a 15-minutes lecture to your students. More information on the issue "Justification for self-reliant learning" M3-1.

Send this preparations to your tutor via E-mail and indicate the number of module, unit and assignment.

You will find detailed information on the issue "Justification of self-reliant learning" for working out the assignments if you click the link below.

Unit 1 - Task 2

Prepare and hold a presentation to your colleagues at school or service centre on the issue "Justification of self-reliant learning” Enormous change in industry, trade .... ( M3-1)

Send this preparations to your tutor via E-mail and indicate the number of module, unit and assignment.
Unit 1 - Task 3
Conduct a final round-table conversation on the issue "Justification of self-reliant learning with your students or colleagues, and if possible with your tutor at service-centre.

Send this preparations to your tutor via E-mail and indicate the number of module, unit and assignment.

Unit 2: The relation between self-reliant learning and student-centred teaching

A short summary
If students are learning in a self-reliant way, or in other words, if they are learning independent by using their own intellect and experiences, then we can say that teaching is student-centred. So, self-reliant learning and student-centred teaching are the both sides of the same medal.

What is the relation of student-centred teaching and self-reliant learning?
By self-reliant learning process students will learn how to set goals, how to plan their work, how to make decisions, how to execute, monitor and evaluate their work. All these activities are shaping a coherent cycle that we call the complete action model. If teachers let the students learn on an assignment that comprehends all steps of the complete action model he will teach in a student-centred mode because students have an active role.

The most effective way to learn the contents of this unit is to deal with it in an active mode by carrying out the assignment you will find when you go forward to the next site

Unit 2 - Task 1

1. Please prepare and conduct a 10-minutes presentation on the process of self-reliant learning to your colleagues to be hold at your school or at the service-centre.

2. Prepare and conduct a 30-minutes guided-problem-discussion your colleagues on differences and advantages/disadvantages of self-reliant learning and student-centred teaching. This discussion may be hold at your school or at service-centre.

Send both preparations to your tutor at service-centre via E-mail and indicate the number of module, unit and assignment.
Unit 3: The essentials of the new teaching role within a self-reliant learning process

A short summary

The new role of teachers/instructors in student centred teaching is characterised as the role of a coach and advisor in common. This role of teachers/instructors in teacher-centred teaching may be comparable with the role of a supervisor and conductor who helps the learners to learn how to learn themselves and to become independent from the teacher.

The two Action Forms of Teaching: Teacher centred teaching (TCT) and student centred teaching (SCT)

As you have already learnt from Unit 1 of this Module, self-reliant learning and student centred teaching is corresponding with the new demands coming from modern technologies and ways of production. But this does nor mean that teacher dominated teaching becomes obsolete at all, as well in developed as in developing countries. If the goal of vocational training for example is to train defined skills (e.g. welding) in a short time effectively, those traditional methods (like the 4-steps-method) are becoming indispensable.

More information on TCT and SCT you will find in Reader M3-3.

What are the differences of teacher-centred teaching (TCT) and student centred teaching (SCT)

Briefly spoken students (and teachers) are doing and learning very different things when they are learning and teaching in the TCT- or SCT- mode. Student-centred teaching requires active learners; the teachers have a more reserved and reticent role and let the students go first. Teacher-centred teaching can be characterised like feeding the learners with a given pile of knowledge. In this case the learners have a passive role: they are fed by the teachers.

Unit 3 - Task 1

The best way to a deeper understanding of the contents of this unit is to deal with it in an active mode by carrying out the following assignment:

Prepare and carry out a 10-minutes lecture to your colleagues on the differences of teacher-centred and student-centred teaching. Explain the guidelines for the teacher/instructor as a coach and adviser.

Carry out a 30-minutes discussion with your colleagues on the question: "What kind of action form (TCT or STC) is the suitable way my teaching?"
Observe your teaching lessons mutually with three colleagues and discuss with them whether they teach in the mode of TCT or STC.

Send a brief report on the results of the discussion and observations to your tutor at service-centre and indicate the number of module, unit and assignment.

**Test**

If you think that the items in column (1) describe the characteristics of Teacher-centred teaching (TCT), please press the corresponding ICON in column (2). If you think the item characterises Student-centred teaching (STC), please press the corresponding ICON in column (3).

<table>
<thead>
<tr>
<th>(1) Items</th>
<th>(2) Teacher-centred teaching (TCT)</th>
<th>(3) Student-centred teaching (SCT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The students have to train a given set of technical/occupational skills under rigid control of the teacher</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. The students have learn the ability of independent problem solving and lifelong learning</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. The students are learning and working in a team assisting themselves</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. The teacher is writing at the blackboard in front of the complete learning group, no facilities and equipment for working in groups available</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Textbooks, information-sheets, tools, and equipment necessary for working in group are available</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. The students are learning on basis of the &quot;Complete action model&quot;</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. The teacher holds a lecture in front of the class</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. The teacher helps the students to find information for solving a task</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Unit 4: Design assignments for self-reliant learning**

**A short definition of "assignments"**

We discern assignments on three levels of learning and working
Trainee-centred teaching is the basis for self-reliant learning. Efficient self-reliant learning is only possible if the teaching process is trainee-centred. A core element of this teaching process is given with the learning and work assignments. These assignments require different levels of performance. We distinguish two levels. Learners have to climb these two levels in order to become self-reliant in their learning process with reference to assignments. In addition to this, teachers/instructors have to teach increasingly as moderator, coach and adviser.

In this unit you will learn how to design an open and a closed assignment for self-reliant learning, according to different performance levels of your students. You will do this by choosing examples which are based on specific contents of your vocational subject area/teaching subjects.

First you will learn the differences between a "closed" and an "open" assignment. Please, go ahead.

**Open and closed assignments**

"Closed" assignments

These assignments require that the learner carries out the complete action for a given goal (set by the teacher/instructor). Students learn particularly how to plan steps for accomplishing given goals acting entirely on their own or in teams, how to decide on an appropriate approach/method, how to monitor their activities and how to evaluate the course of action and its result. To accomplish this they learn how to look for and get appropriate information independently, and how to gain information in a finely tuned co-operative process. In addition to this they can acquire the required knowledge, skills and attitudes for working in a specific field.

The teacher or instructor can foster the acquisition of specific knowledge, skills, and guidelines for communication and co-operation with well-formulated aids for self-reliant learning, such as guiding questions, orders, advice and assessment sheets. An example for a "closed" assignment combined with guiding questions, orders, hints and assessment sheets is given below. How to develop assignments and related aids for self-reliant learning is going to be explained in the next chapter.

"Open" assignments

These tasks require that the learners carry out a complete action including the finding and formulation of a goal in a given framework. The framework determines the scope for designing the goal (e. g. a number of alternatives, size of a product, timetable for manufacturing, available material). By means of this the learners will be more motivated and they act with more commitment and responsibility for THEIR product. Students also learn how to plan the steps for accomplishing goals acting entirely on their own or in teams, how to monitor their activities and how to evaluate the course of action and its result. They learn how to look for and get appropriate information independently, and how to gain information in a finely tuned co-operative process. In addition they may acquire knowledge, skills and attitudes for working in a specific field.
The teacher or instructor fosters acquisition of specific knowledge, skills and guidelines for communication and co-operation in this stage of self-reliant learning with more general and fewer formulated aids. The latter depends on the performance level of the students and their progress in self-reliant learning.

Examples for closed and open assignments in Reader M3-8.

**How to design learning and work assignments**

An example for a learning and work assignment that will foster self-reliant learning is: "Manufacture an engraving tool according to a drawing attached. Use the appropriate raw material available. The time to complete this assignment is 3 days."

When the teacher/instructor is going to plan teaching on this assignment in detail he/she first has to make decisions on the following questions:

- What activities the students have to carry out when doing the assignment?
- What can the students learn when the carry out the assignment?
- From what sources can they get the information they need for carrying out the assignment?
- What guiding questions and hints may help the student to overcome problems when they carry out the assignment in order to come to the result required.

So, when a teacher/instructor is preparing an assignment he/she has to fill in the following table:

<table>
<thead>
<tr>
<th>Activities to carry out to complete the assignment</th>
<th>Learning objectives/out-comes</th>
<th>Information sources</th>
<th>Guiding questions and hints</th>
</tr>
</thead>
</table>

Guidelines in Reader M3-4

**Unit 4 - Task 1**

The best way not only to learn but also to apply the contents of this unit is to deal with it in an active mode by carrying out the following assignment: Work in a team of colleagues on the following assignment: Draft a "closed" assignment with guide questions and hints for self-reliant learning of your trainees/students. The assignment and guiding questions, orders and advice should combine practical work activities with learning. Theoretical studies have to be a part of the learning process.

- Formulate the wording of the assignment/task and the guide questions and hints carefully.
- It must be possible to apply the assignment and guiding questions, orders and advice in your lesson/training program.
Unit 5: Design assessment sheets for self-reliant learning

A brief definition of assessment sheets

The most important function of sheets is to provide the opportunity for the trainees to judge and assess their activities (individually or in a team) and the results of their learning and work processes.

A variety of assessment sheets currently exist and are in use in training practice. One can distinguish two main groups: One group refers to the concrete work activities and its results and the other to the characteristics of the learning and work process. Representative examples are given below.

Assessment sheets for self-reliant learning and work processes are given primarily for the trainees to foster their competencies. They are also given for an assessment by the teacher/instructor, but this is the lowest priority for their usage. The latter have the task of double-checking what the trainees have assessed, to give them feedback on their ability to assess themselves. Assessment sheets for self-reliant learning and working have to be designed for the trainees and NOT for the assessment by the teachers/instructors. Teachers/instructors assess the progress of their trainees’ self-reliant learning, which also includes their progress in self-reliant assessing.

When you go ahead to the following two charts you will find two examples of assessment sheets

(1) One assessment sheet for learning and work actions performed when carrying out the assignment

(2) One assessment sheet for the quality of the results

Assessment sheet for learning and work actions performed

Please assess the learning and work process in your team. Use the comments "it is accurate" (+), "it is partially accurate" (0) and "it isn't accurate" (-) . You are to assess first and then your instructor/teacher assesses.
## Unit 5 - Task 1

Draft for the assignment you have designed in Unit 4 of this module the belonging assessment sheets.

Apply the assignments and assessment sheets in your lessons/training program Prepare a presentation for the learning phase at service centre. The presentation should not be longer than 15 minutes.
Unit 6: Foster self-reliant teamwork

A brief summary of teamwork

Teamwork is an indispensable part of learning and work activities in any technical/vocational education. Team learning and working follow the steps of the complete action model. In general, learning in a team or in a group is running as follows:

- First the learning and work assignment must be clarified in the complete learning group (class)
- Based on the elaborated assignment sheet and the activities listed up on it the learners decide to shape a number of teams that are responsible for these activities and the results
- Preferably the students decide who will join which team for working and learning on the defined activities and results
- Preferably the students elect team-leaders who are responsible for co-ordination of work in their teams, corresponding with the working plan to be elaborated for every team
- The teacher has to be ready for assisting and advising the teamwork
- The process of teamwork and -learning and its results will be evaluated and assessed.

Communication in teams as well as moderation of the group work process follows defined guidelines that should be agreed by learners and teacher/instructor.

Unit 6: Foster self-reliant teamwork

Advantages of teamwork for the trainees

- Trainees with different preconditions of learning, knowledge and experience can be fostered individually. This is not possible in teacher-centred forms of operation, like lectures Module 1
- Trainees may acquire soft-skills required in modern production, like the abilities of life-long and independent learning, to plan, organise and evaluate their own work, to learn how to co-operate and to work systematically with colleagues on comprehensive problem.
- They learn how to structure and to analyse an assignment and how to co-ordinate and to present the results of work.
- Learners with individual problems and sketchy knowledge will not be left alone as members of a team.
Possible disadvantages of teamwork

✓ May be in some cases (especially for giving information on defined topic) less effective than teacher-centred teaching (e.g. like holding a lecture)

✓ More advanced trainees take the main load of work and the others may be dragged along with them if the teacher does not observe what is going on in the working-groups

✓ Requires experience with it from trainees and teachers/instructors as well as suitable and sufficient equipment for working in groups.

Advantages of teamwork for the trainees

✓ Trainees with different preconditions of learning, knowledge and experience can be fostered individually. This is not possible in teacher-centred forms of co-operation, like lectures.

✓ Trainees may acquire soft-skills required in modern production, like the abilities of life-long and independent learning, to plan, organise and evaluate their own work, to learn how to co-operate and to work systematically with colleagues on comprehensive problem.

✓ They learn how to structure and to analyse an assignment and how to co-ordinate and to present the results of work.

✓ Learners with individual problems and sketchy knowledge will not be left alone as members of a team.

Possible disadvantages of teamwork

✓ May be in some cases (especially for giving information on defined topic) less effective than teacher-centred teaching (e.g. like holding a lecture)

✓ More advanced trainees take the main load of work and the others may be dragged along with them if the teacher does not observe what is going on in the working-groups

✓ Requires experience with it from trainees and teachers/instructors as well as suitable and sufficient equipment for working in groups.

Unit 6 - Task 1

Prerequisites

✓ Some teaching experience

✓ Experience and knowledge on developing learning and work assignments (if not yet acquired, you may return to unit 4)

Assignment
Plan, apply and evaluate teamwork when you carry-out the learning and work assignment you have designed in unit 4 of this module.

State reasons why teamwork is suitable for your specific assignment

Send the preparation and arguments to tutor via E-mail. Indicate the numbers of module, unit and assignment

If you need assistance for carrying out the assignment above you can refer to the following links:

1. Planning teamwork (M3-5)
2. Hints for conducting teamwork (M3-6)
3. Assessing teamwork (M3-7)

**Summary A**

**Principles of teamwork for the student centred teaching approach**

1. The composition of the team depends on the intention of the teacher.
2. Teamwork has to follow the cycle of self-reliant learning as well.
3. Trainees have to follow the guidelines for appropriate communication within the teamwork process.
4. The results of the teamwork have to be presented by all of the team members.

**Summary B**

**Planning a special form of self-reliant learning in a team**

The interdependent relation of learning and work assignment, shaping teams and the size of groups when planning self-reliant learning
Note:

If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
GDVT  gíz
Module 4:
Plan a program / a course of study

Advance organizer

The module's concept

The planning of a program for vocational education and training has to bear in mind an abundance of aspects. They are outlined in the eight units of this module. The idea behind this units is linear, starting with unit 3-1 focusing on some general considerations (link 3-1). This unit is followed by others becoming more and more specific. Unit 3-8 is integration and summarising the introduced important aspects of program planning (link 3-8). Program planning a complex and multi facet procedure. A consequence is that also links to other modules of the program are necessary and reasonable.

<table>
<thead>
<tr>
<th>№</th>
<th>Name of Unit</th>
<th>Tests</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Principles of program planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Occupation description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Prepare a list of relevant occupational tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Program objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Structuring occupational tasks/modules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sequencing and scheduling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Resources and references</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Assemble the program into a suitable format</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specific objectives of the module

It is intended that, after having studied the handouts or participating in a seminar about the topic, you will develop a well structured knowledge on planning a program (= mental model) and be able to develop a program or course according to your mental map. This complex and professional skill comprises

- To know, understand and apply the principles of program planning
- To be able to define and describe an occupation
- To be able to specify the occupational tasks
- To be able to define instructional and educational objectives
- To be able to structure the modules, and tasks according to the 'logic' of the occupation considered
- To be able to sequence and schedule the occupational tasks and modules
- To be able to consider the necessary resources and references for the program
To be able to integrate the aspects mentioned before in a suitable format to give the students and colleagues an overview of the program and its structure.

Purpose of the module

- To develop knowledge, understanding and skills to apply the principles of program planning
- To be able to optimise and integrate the elements of program planning starting with an occupations’ description and finalizing with a structured and formatted program description
- To be able the apply the principles of program planning in different occupational settings

Graphical structure of the module

**Plan a program / a course of study**

- Formatted program
- Program planning principles
- Resources and references
- Sequencing and scheduling
- Structuring
- Program objectives
- UNITs 1-8
- Occupation description
- Specify relevant occupational tasks

General Information
The general sequence in planning a VET program is the following:

1. Introducing into the principles of program planning
2. Describing of the occupation
3. Specifying the relevant occupational tasks
4. Defining the program objectives
5. Structuring the program objectives
6. Sequencing and scheduling the program objectives
7. Specifying resources & references
8. Formatting the program

Notice: There are relations between the units, i.e. in the process of program planning along the eight units the definitions of the program objectives might have some impact on the job description and vice versa.

Unit 1: Principles of program planning

Expert's performance

How would you go about setting up a business to manufacture a particular product or service? Would you begin by ordering equipment, renting space, hiring personnel? Or would you first develop a business plan? What is usually meant with the expression 'someone performs her/his occupation like an expert'? Does it mean that such a person picks tools at random from the tool box, tries the first thing that comes in her/his mind, or does s/he use the same tool and procedure for every task on the shop floor? Or does performing one's occupation like an expert means that the task is analysed systematically first, objectives are accurately defined, suitable tools and procedures are selected for creating the desired result, and finally the result is checked whether the objectives fixed are realized?

Professional educational program planning

Planning an instructional program goes along a similar process as described above. It involves accurately defining the desired program goals, instructional objectives, developing an instrument by which the success can be checked, recommending teaching approaches and intended learning activities, specifying teaching aids to initiate and support the process of learning, and arranging measures for continual improvement of the program's effectiveness.

Three questions of educational program planning

The examples illustrate that systematic educational program planning is not different from systematic design and construction of a building, the realisation of a three course menu by a cook or to construct a roof on a house. The difference is in the tools but the procedure is the same. The three tasks for any procedure are:

1. Determine and describe what you want to achieve.
2. Do what is necessary to achieve the desired result.
3. Check to see that you have realized what you wanted to achieve.

In the specific case of developing instructional programs, the translations of the tasks are:

1. Derive and describe the instructional objective in a meaningful form.
2. Develop packages, modules, components, units and lessons as well as material to support achieving these objectives.
3. Realize the program and investigate how well the objectives were achieved and improve the program in order to improve the results (Mager & Beach 1967).

**General goal of VET**

Regardless of the domain the general aim of technical vocational education and training is to send the trainee or student away:

- Being capable of performing the occupation according to quality standards (Unit 2).
- Being capable to reflect about the occupation related to aspects like society, environment protection, and participation.
- Being capable to improve one's expertise and the self through continuing practice in the course of the working life.

**Meaning of being able to perform an occupation**

To achieve the goal 'being capable of performing the occupation' it is necessary to know

- How the occupation looks like,
- What the occupation bearer needs to do to perform each of the tasks,
- How frequently each task is performed.

In this case the strategy for developing effective instruction is competence orientated. The competence should be built up in authentic situations as much as possible. However, there is also a need for subject matter orientation in order to reflect and understand what the expert is practicing and for effective development of the person's own expertise.

**Phases of program planning**

Program planning includes three phases: the preparation phase, the development phase, and the improvement phase. The phases are connected with feedback loops.
Steps program preparation

The preparation phase comprises several steps. The purpose of these steps is to insure that all the knowledge and skills necessary to perform the occupation are included in the program. If the aim is being capable to perform an occupation, it is reasonable to start with the occupation description. The occupation description specifies in general terms what someone does when performing the occupation. With step two the tasks characterizing the occupation are described more in detail. This is done by specifying the steps to be mastered with a task analysis. The third step specifies the target population of the students or trainees. This enables you to describe the program prerequisites. The program objectives are derived from comparing the results of the task analysis and the program prerequisites. With the final steps tests for program requisites and program objectives are developed.

Program development phase

Prerequisites define where to start; objectives define where to end. The difference between the starting and the end point specifies the tasks of the program development phase. The development phase begins with an outline of the program, followed by outlines for modules, units, components, or lessons (Unit 5). The program outline describes the tasks the student will be able to perform at the end of the program. The tasks are structured and sequenced for the instructional process. Time is allocated for tasks, lessons, units, modules and the program. Teaching resources are selected or recommend with accurate references. The results of these steps enter into the program
description which includes the lessons plans the program comprises. The plans for the program broken down to lessons are the ground work for the program tryout.

The steps in program development

### Steps in course improvement

Competence orientation defined with tasks the student has to achieve has an impact on educational education and training. Rapid and structural changes in organisation and work requirement - e.g. the penetration of IT-techniques in every occupation - force to change permanently the program - at least in parts. Therefore a permanent improvement of the program should be on the agenda in order to minimize the gap between training and changed occupation requirements. Two comparisons produce information for implementation:

1. Comparing the performance of the students with the objectives of the program.
2. Comparing the objectives of the program with the occupation requirements.

The results of these comparisons are the basis for the revision of the program followed by tryout. Considering the changes in the world of work such processes of comparing and revision will never end.
The steps in course improvement

Function of examples

Final comment, analogue to the statement made before: The difference is in the tools but the procedure is the same. We have to consider that the contents of the occupations are more or less different - but the principles of program planning are the same. Nevertheless examples will be introduced here and there for the sake of better understanding. These examples do not have to correspond with the occupation the user has an eye for.

Tasks

1. Specify the three specific tasks of developing instructional programs:
   1. ------------------------------------------
   2. ------------------------------------------
   3. ------------------------------------------

2. Program planning includes three phases - please specify them and their interrelations

3. Fill in the boxes with the steps in program preparation

4. Specify and describe steps in process of program development and their relations

Unit 2: Occupation description

Occupation description
In vocational education and training the primary goal is that students attending the program will master the requirements on the shop floor which are characterizing the occupation. Therefore an occupation description is the first step of the preparation phase for the program. An occupation description is a general statement about what a person does on the workplace and tells something about the conditions under which he does them. It is the performance which is specified but not the knowledge behind the performance.

**Resources (personal)**

If you are familiar with the job, list the various tasks which take place. To assure yourself in doing this ask people actually practicing the job. If different companies are accessible visit them and talk with experts like persons in charge of human resource development (HRD). If possible, conduct yourself some field surveys, like participant observation. List also special or unusual conditions under which the tasks are carried out. For example, a roofer is working without safeguards on tops of houses - he should therefore be free from giddiness, a plumber is working at different places and in customers' houses which have an impact on individual flexibility and communication style, or a cook should bear heat.

**Resources (general available)**

Another or additional way is to search for job descriptions in institutions of your country responsible for occupation standards like ministries, chambers of commerce and industry, professional associations, or programs goals of comparable schools and training institutions of the country or abroad.

A modern resource is the internet where you can find job descriptions. However, you should check whether they are up to date, and the reputation and importance of the institution defining the standards.

**Resources for describing occupations**

- Own experience
- Job holders
- HRD - experts/supervisors
- Field studies
- Institutions/associations
- Internet

**Examples of occupation's descriptions**

If you enter [www.bibb.de/en/ausbildungsprofil_1803.htm](http://www.bibb.de/en/ausbildungsprofil_1803.htm) you will find some information for state recognized occupation profiles in Germany which could be used to work out your job description.
In the following you'll get some specimen.

**Cook**

Cooks develop menu plans, produces meals, and present them to the customer, what comprises the following tasks:

- Use master work processes and culinary techniques and apply hygiene regulations,
- Make soups and sauces/gravies,
- Prepare fish and crustaceans,
- Prepare meat and offal, game and poultry,
- Prepare vegetables and side dishes,
- Prepare desserts, egg dished and dishes made form dairy products,
- Prepare hors d'oeuvres and cold and hot dishes,
- Master basic calculation principles,
- Develop menu proposals,
- Advise guests,
- Consider nutritional, economic and ecological requirements.

Special or unusual conditions: Heat - allergies related to types of food, using sharp knives.

**Bicycle mechanics**

- Service bicycles and other products commonly used in the field,
- Assemble and dismantle structural parts, subassemblies and systems,
- Fit accessories and additional devices to bicycles,
- Recommend services, goods and products,
- Advise customers with regard to maintenance and servicing work,
- Produce bicycles from individual components.

**Carpenter**

- Build timber constructions, for example for ceilings, roofs, half-timbered structures and timber-frame constructions, using various techniques,
- Carry out trimming and joining work taking account of structural timber protection considerations,
- Build and fit doors, gates and straight and spiral stair flights,
Build claddings for external walls, taking account in particular of ventilation requirements,
Use fixed wood processing machines,
Build constructions structures using dry construction techniques,
Build furrings and claddings,
Process and treat wooden surfaces,
Apply materials to insulate against heat, cold, noise and fire,
Carry out preservation and repair work on timber constructions.
Additionally, carpenters carry out related tasks in the field of construction finishing

Landscape gardener
A landscape gardener has knowledge of lawns, shrubs, annual and perennial flowers, pest and disease control, soil structure, fertility, and other information that enables him to plant and maintain beautiful landscapes. He provides a service in the area of design, selection, and maintenance of most plant life. He possesses fundamental knowledge of the methods of propagation by seeding, grafting, layering, and cutting. He is an expert in taxonomy. He is acquainted with the various plant diseases and physiology. He is able to provide sketches of landscaping design to various clients to meet their specifications. He is often required to supervise non skilled helpers. The job requires that he be able to drive a truck, meet customers, and be acquainted with and operate manual equipment. During the off-season, he may be required to participate in tree surgery or other forms of work related to his job. He is often required to keep systematic charts showing planting areas and maintain customer records pertaining to plant maintenance or rotation (Mager & Beach 1967, p. 9).

Providing financial services (banks and building societies) UK
The functional area of ‘sales and marketing’ is characterized by the following activities:

1. Identify sales leads for follow-up calls (S.Q.B.),
2. Sell products and services over the telephone (S.Q.B.),
3. Sell financial products and services,
4. Contribute to financial services sales action plans,
5. Promote the organisation's products and services,
6. Provide feedback on financial products and services,
7. Contribute to the development and marketing of products and services,
8. Develop and implement a local financial services sales plan,
9. Make a sales presentation (S.Q.B.),
10. Develop and maintain business relationships with introducers.
National criteria for occupation descriptions

There are different approaches and traditions to structure the occupation in national contexts. In some countries this job is done by associations, companies and public-private partnerships, to be found in the Anglo-Saxon culture. The other pole are countries in which the occupations are regulated by the state like in Germany where actually (March 2005). However there is a strong participation with the representatives of the labour and the capital. Actually 349 state-recognised training occupations (Ausbildungsberufe) exist in Germany. According to a law (Berufsbildungsgesetz), a state-recognized training occupation comprises:

- Designation
- Duration of training ship
- Occupational characteristics and profile
- Training specifications
- Assessment requirements

For the function of preparing menus in a restaurant or hotel the designation of such an occupation is 'cook'. The duration of traineeship is three years - in some countries like Denmark it is four years, in others shorter. The venues for training are the training company and the vocational school, which characterizes the dual vocational education and training system in Germany. The occupational characteristics and profile were introduced above where training specifications are laid down sophisticated syllabuses for companies and school ([www.bibb.de/en/ausbildungsprofil_2164.htm](http://www.bibb.de/en/ausbildungsprofil_2164.htm)) and for the assessment as well as Module 9 and Module 10.

National qualification framework

There are countries with national qualifications frameworks. They allow classifying the specified jobs, occupations or functions. One example is the five levels of the English qualification framework ([www.dfes.gov.uk/nvg/what.html](http://www.dfes.gov.uk/nvg/what.html)):

**Level 1**

Competence which involves the application of knowledge in the performance of a range of varied work activities, most of which may be routine and predictable.

**Level 2**

Competence which involves the application of knowledge in a significant range of varied work activities performed in a variety of contexts. Some of the activities are complex or non-routine, and there is some individual responsibility and autonomy. Collaboration with others, perhaps through membership of a work group or team, may often be a requirement.

**Level 3**

Competence which involves the application of knowledge in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-
routine. There is considerable responsibility and autonomy, and supervisory competence in some capacity is required often.

**Level 4**

Competence which involves the application of knowledge in a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.

**Level 5**

Competence which involves the application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for allocation of substantial resources are a strong feature, as well as personal accountability for analysis and diagnosis, design, planning, execution and evaluation.

Example: Depending on the type and number of certified qualifications, an employee providing financial services in banks and building societies (Module 5, Unit 2) range between level two up to level four.

**International aspects for job descriptions**

Each country, nation, state or culture has its own traditions in specifying occupations and jobs. England has its qualification framework with five levels. In Germany, there is no official framework.

Becoming a global village, considering globalization of good and human capital as well, the ISO 9000 ([International Standardisation Organization](https://www.iso.org/iso-home.html)), the rise of economic zones like the European Union, or the International Labour Organization (ILO) VET program designers should have a watchful eye on the international development. There are standards which should be considered like the Standard of Education and Occupation (SEDOC), the SEDOC (European system for the distribution of international job offers and demands), or the International Standard Classification of Education of 1997 ([ISCED-97](https://www.uis.unesco.org/naacp/en/ISCED-97)).

According to the ISCED the graduates of the German Dual VET fulfill the criteria of level three out of eight levels. This level begins around the age of 14 to 15 and refers to either general, technical or vocational education. It may lead to the standard required for admission of higher education or it may be 'terminal' as is sometimes the case in vocational education and training. An orientation on international standards contributes to comparability and mobility of the national workforce and the human capital. To increase the transparency of certified qualification and the mobility of the labour force in the European Union there is a trend to make the job profiles understandable across Europe. Therefore not only Germany developed occupation profiles in English, French and German but also Denmark and Austria for example are developing such descriptions.

**Tasks**
✓ Take the occupation's description of the cook in Module 5, Unit 2 and compare it with the requirements.
✓ Take the occupation's description of the cook in and compare it with the requirements in your country.
✓ Follow the numbers of the steps - take only one occupation's description according the importance in your country.

Unit 3: Prepare a list of relevant occupational tasks

Task

Occupations are described with a set of tasks the occupation holder is able to master. Tasks are complete occupation functions. A service station mechanic-attendant repairs tube or tubeless tires. A cook prepares a three-course-meal composed of T-bone steak, fries and salad on side. A travel agent is booking a package tour for the client. In the context of program planning for vocational education and training the first step is to identify all the tasks assigned to the occupation. You can use the same resources for describing the occupation (Unit 2/2). However, in this phase the tasks are described more in detail. Describing the occupation tasks is a tightrope walk between specific and general. The task description should not be valid for a specific company or organization only. The reason is that the trained person may not dispose the flexibility to do the job in another company or occupational setting. A severe consequence is low mobility in the labour market are a consequence. The opposite is being too general. In this case the trainee has the burden to translate the idea of the task to the specific situations. The trained has the knowledge but is not able to use it on the shop floor (Module 5, Module 8).

Example

Vocation: Service station mechatronic-attendant

1. Cleans or replaces spark plugs.
2. Adjusts and bleeds brakes.
3. Replaces wheel cylinders.
4. Inspects and flushes radiators.
5. Tests antifreeze.
6. Repairs tube or tubeless drive.
7. Rotates tires.
8. Lubricates vehicles.
10. Checks engine.
11. Cleans or replaces gas filters.
12. Washes and waxes autos.
13. Sells auto accessories.
15. Checks oil, brake fluid, power steering, etc.
16. Washes windshields, replaces blades.
17. Fills gas tanks, radiators.
18. Keeps daily records of sales, inventory changes.
19. Orders supplies.
10. Replaces air cleaners.

Task listing form

The tasks assigned to the occupation are put down in a written form. To get an easy overview a form for list the tasks is recommended. Such a form consists of several columns in which the following information is put down: the name of the occupation, the sequential number for retrieval, the denomination of the task, the frequency of performance, the importance for the job, or the difficulty to learn.

Occupation: -------------------------

<table>
<thead>
<tr>
<th>No.</th>
<th>Task</th>
<th>Frequency of performance</th>
<th>Importance</th>
<th>Learning difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Denomination</td>
<td>e.g. x-times a day, every day, once a week or month, rarely</td>
<td>e.g. very, important, unimportant</td>
<td>e.g. difficult, moderate, easy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other criteria</td>
<td>Other criteria</td>
<td>Other gradations</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are job specific relations between tasks, there frequency of performance and their importance. For a service station mechanic tests of antifreeze might not be important in the tropic parts of a country. But if the country has also populated areas with winter seasons, this task has to be part of curriculum. Selling auto accessories is also a function of the counter. If there are time limits this task may be omitted in the training program.

Task listing form filled out

Occupation: Service Station Mechanic-attendant

<table>
<thead>
<tr>
<th>No.</th>
<th>Tasks</th>
<th>Frequency of performance</th>
<th>Importance</th>
<th>Learning difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cleans or replaces spark plugs</td>
<td>every day</td>
<td>very, important, unimportant</td>
<td>easy</td>
</tr>
<tr>
<td>2.</td>
<td>Adjusts and bleeds brakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Replaces wheel cylinders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Inspects and flushes radiators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Tests antifreeze</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To be continued</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The rational estimating frequency, importance and difficulty to learn gives some advice for selecting the tasks in the training program and estimating the time for training and education.

**Task index card**

The next step is to create index cards based on the denomination of the tasks which characterize the occupation. Index cards can be easily fixed on a board. This will give you an overview of the tasks assigned to the occupation. The index cards are easy to restructure. This is important when designing the sequences of the program (Unit 6). Comparing task index cards for different jobs reveals intersections of tasks in other jobs. In this case program elements could be used to train different occupations. The task index card contains the name of the occupations, the denomination of the task, the number of the occupation’s task, and the learning difficulty assigned to each sub-performance for the task. Recording the frequency and the importance of the task is optional and located on the head of the index card.

Task index card

<table>
<thead>
<tr>
<th>X</th>
<th>occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX</td>
<td>name of the task</td>
</tr>
<tr>
<td></td>
<td>frequency &amp; importance (optional)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of the task</th>
<th>Performance type</th>
<th>Learning difficulty</th>
</tr>
</thead>
</table>

Task index card

**Task index card (service station mechanic-attendant)**

1 service station mechanic-attendant

1-1 clear and replace spark plugs

1-2 etc.

<table>
<thead>
<tr>
<th>Steps in performing the task</th>
<th>Performance type</th>
<th>Learning difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note the plug location relative to the cylinder.</td>
<td>recall</td>
<td>easy</td>
</tr>
<tr>
<td>Remove all spark plugs.</td>
<td>manipulation</td>
<td>easy</td>
</tr>
</tbody>
</table>
Identify the type of plugs. | discrimination | ✓
---|---|---
Decide whether to adjust or replace plugs. | problem-solving | moderately difficult
Clean plugs, if necessary. | manipulation | ✓
Adjust plugs, if appropriate. | manipulation | moderately difficult
Replace spark plugs in engine. | manipulation | ✓
Connect ignition wires to appropriate plugs. | recall, manipulation | moderately difficult
Check for performance. | discrimination | very difficult
Clean tools and equipment. | manipulation | ✓

Note that some of these steps cannot be seen directly, but that they are nonetheless important in completing the task (Mager & Beach 1967).

**Task index card (cook)**

1 cook

1-1 three-course-menu: T-bone steak, fries & salad on side

<table>
<thead>
<tr>
<th>Steps in performing the task</th>
<th>Performance type</th>
<th>Learning difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-bone-meat tenderizing</td>
<td>manipulating</td>
<td>easy</td>
</tr>
<tr>
<td>Heating the grill</td>
<td>manipulating</td>
<td>easy</td>
</tr>
<tr>
<td>T-bone-steak greasing and seasoning</td>
<td>recalling</td>
<td>easy</td>
</tr>
<tr>
<td>T-bone-steak broiling - well done</td>
<td>manipulating</td>
<td>difficult</td>
</tr>
<tr>
<td>Taking raw potato stripes</td>
<td>manipulation</td>
<td>easy</td>
</tr>
<tr>
<td>Preparing fries</td>
<td>manipulation</td>
<td>moderate</td>
</tr>
<tr>
<td>Selecting salad components</td>
<td>manipulation</td>
<td>easy</td>
</tr>
<tr>
<td>Selecting dressing</td>
<td>recalling</td>
<td>easy</td>
</tr>
<tr>
<td>Stirring salad &amp; dressing</td>
<td>manipulation</td>
<td>easy</td>
</tr>
<tr>
<td>Putting salad on side</td>
<td>manipulation</td>
<td>moderate</td>
</tr>
<tr>
<td>Broiling of the T-bone steak has to be finished at the same time as the fries are done.</td>
<td>structuring</td>
<td>difficult</td>
</tr>
</tbody>
</table>

**Target population**

At present youngsters enter the vocational education and training with a certain level of schooling. The educational prerequisites may vary from country to country. In Germany for example people can only enter the dual vocational education and training system after having completed successfully compulsory general education of nine years of schooling. For certain jobs specific physical characteristics are to be met. For a roofer this means being free from giddiness. A cook must be able to bear heat. Motivation and
interests types of performance are important for successful training too. It should be
checked and evaluated (Module 9, & M10). The type of performance it is assumed or
tested has to be considered. The difference between the real pre requisites of the task
performances identified determines the training program.

Tasks

Choose a job you are familiar with, develop the form of the task index card and try to
specify the tasks to be performed, the performance type and your assumed learning
difficulty. Ask a colleague to check your results and discuss the divergences.

Additional references

www.ccohs.ca/oshanswers/hspart.htm
www.mapnp.org/library/staffing/specify/job_desc/job_desc.htm
www.acinet.org/acinet/jobwrite_select.asp
www.toolkit.cch.com/tools/jobdesc_m.asp

Follow 3-3-1 to 3-3-9; chose job examples of your country or culture.

Unit 4: Program objectives

Instructional behavioural objectives

Occupational tasks analysis and instructional objectives differ in some way. Occupational
tasks analysis describes the task as it is performed by a skilled person. Instructional or
educational objectives specify the kind of performance at the end of training program.
Occupational task analysis describes all the steps carried out. Instructional objectives do
not include those things the trainee already knows. Instructional behavioural objectives
are written statements of the intent of a program, a course or a lesson. According to
Mager (1962) instructional behavioural objectives should consist of three components.
They should be stated and written down:

1. Behaviour: The specific and observable behaviour of the trainee
2. Conditions: The conditions under which the behaviour is to be realized, including
tools or assistance to be provided.
3. Standard: The level of performance that is intended, including an acceptable
range of answers that are allowable as correct.

Examples instruction objectives (operating phone &
communication)

Example: “In this course you will learn how to operate the phone and properly
communicate with callers.”
This statement is not an objective but a description of a task.
Example: "At the end of the course you will be able to:

- Operate your phone
- How to greet callers
- Understand the procedures for transferring a call."

These statements do not describe observable behaviour. An assessment of the mastery is impossible. Understanding cannot be directly observed. What is meant with "operating a phone"?

After completing this course you will be able to:

- Place a caller on hold
- Activate the speaker phone
- Play new message on the voice mail system
- List the three elements of a proper phone greeting
- Transfer a call to a requested extension."

These statements express discrete behaviour. Instead of the vague statement "operate the phone" (cp. 3-4-2-2), it is exactly described what is expected for successful operation - namely, using the hold feature, speakerphone, and voice mail system. More important, these behaviours are observable. A proper assessment, objective realized or not is possible. Link: Formulate learning objectives - list of action verbs (Module 2 at the end of unit 1)

Observable behaviour - an instructional objective?

'Transferring a call to a requested extension' is indeed a specific observable behaviour. This behaviour is immediately gone when done. However, in a later situation such a behaviour is not repeated but it is created again by the acting person. Consequently there must be something disposed in the person's memory which enables her/him to create the behaviour again and again. This invisible mechanic of these observable acts of behaviour is the skill. A skill is an invisible attribute of the person. According to Gagné (1977) these attributes are invisible components of the internal conditions of a person.

The internals conditions comprise all the features of a persons, like her/his knowledge, attitudes, motives, values (Module 1)

Consequently: The objectives of instruction are skills or internal conditions which enable the person to numerous observable behavioural acts and not to the behaviour itself. Observable behaviour is an indicator for a learning outcome but not the learning outcome itself.

Behaviour the tip of the iceberg
The individual behaviour may have two consequences. One consequence may be located or related to the external conditions, e.g. if the "transfer a call to a requested extension" is done fast and without mistakes, or the T-bone steak grilled up to the state 'well done'. The other consequence may be related to the internal conditions.

If the internal conditions are durably changed, then and only then learning has taken place, e.g. the person acquired the skill is able to transfer a call to a requested extension fast and accurate, or the person has advanced her/his skill to grill beef steaks well done.

'Transferring a call to a requested extension' comprises more than observable behaviour. The person reacts to her/his mental map guiding this observable behaviour. She/he remembers that first she/he has to press a certain button, and then put in the numbers of the requested extension, waiting till the person on the other end of the line takes over, etc.

In sum: There are also some mental considerations behind the observable behaviour - or as modern learning theory calls these considerations 'cognitive operations'. (cp. Statement: Note that some of these steps cannot be seen directly, but that they are nonetheless important in completing the task) Unit 3/6).

Does a person's observable behaviour is always guided by cognitions?

The answer is: Not always. At the beginning, when the process of learning a skill takes place the person may talk internalized with her/him-self what is to be done to transfer a call to a requested extension. In the course of practice such cognitive considerations - internalize talking - will fade away. The observable behaviour has become a routine. In this case the behaviour will be activated without conscious cognitive considerations. The basis or the mechanism for that is the learned skill as a component of the individual's internal conditions.

Sometimes such cognitive considerations get lost trough routine. In this case the person has to reactivate or relearn the cognitive considerations, which is an important part of teacher training.

The importance of observable behaviour

To summarize:

- Observable behaviour is only the peak of the ice-berg.
- Observable behaviour is controlled by conscious or unconscious cognition. In the actual discussion you will find for these issue terms like 'explicit', 'implicit' or 'tacit'.
- Learning has taken place only and only then, when the internal conditions are durably changed.
- Observable behaviour and its results are the only indicators we have to 'look' into the person and to evaluate learning results (Module M9 and M10)
Module 4/IST

Behaviour and skill, information and knowledge

Since 1956 there is one taxonomy for classifying behaviour and skills widely used all over the world. It is the taxonomy of educational objectives by Bloom and others (link - cognitive domain – Module2, unit 1).

This taxonomy has some inconsistencies. The most serious one is the element 'knowledge'. Knowledge is not a skill or process. Knowledge is the result of a learning process or a learning outcome.

This inconsistency has been cured in the revision of Bloom's taxonomy by Anderson et al. (2001). They distinguish between the cognitive processes or the skills of remembering, understanding, applying, analysing, evaluating, and creating.

The former element 'knowledge' became an own dimension within Anderson et al (2001) new taxonomy (M1, unit 4)

Knowledge is a part of internal conditions. It is relatively enduring. For using it the knowledge has to be remembered at least. This activated knowledge controls the visible and non-visible behaviour of the person. The transforming of a raw T-bone steak in the 'well done' state takes place on the basis of a conscious or unconscious mental model of a cook. Such mental models are parts of the knowledge structure of the cook which have to be reactivated for achieving the task.

On the other side, the grill and the T-bone steak to be transformed from the raw state to the well done state is not in the head of the acting cook. But the actual status of the grill and the beef stake in form of actual information are in the 'head' of the cook.

Consequently a differentiation between that the person possess durably as part of her/his internal conditions - e.g. knowledge - and that what is activated or just perceived is to be made. Therefore knowledge is a category of the internal conditions and the activated knowledge or the perceived external conditions are information. (Module 1)

The revised taxonomy of Bloom's educational objectives

The revised taxonomy of Bloom's educational objectives distinguishes two dimensions. The cognitive process dimension which corresponds to a large degree with the original taxonomy of Bloom from 1956 (Module 2, unit 1). The second dimension is the knowledge dimension consisting of the categories of factual knowledge, conceptual knowledge, procedural knowledge and meta-cognitive knowledge. The result of the combinations of both dimensions is listed in:

<table>
<thead>
<tr>
<th>The knowledge dimension</th>
<th>The cognitive process dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.</td>
<td></td>
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</tbody>
</table>
Revised taxonomy of educational objectives (Anderson et al 2001)

Example: The procedural knowledge "grilling a T-bone steak well done" may be remembered and produced (= created). This procedural knowledge may also be understood in comparing 'well done' from 'medium done'. This understanding may be used in different situations. Regarding the different meats in the fridge there is a need to analyse them and to check beef meat and evaluation which beef meat is appropriate for the task "grilling a beef steak well done". Such a checking is done on the basis of created information by the cook when watching in the fridge and reasoning.

**Program and instructional unit**

A program and an instructional unit have communalties and differences. A communality is that both have objectives the trainees have to achieve. They are formulated in the way introduced in order to be the outline for instruction (Module 5) and evaluation (Module 10)

The instructional unit is a part of the program. It is contributing to the achievement of the program goals and objectives.

The difference is that the program objectives are more or less general goals. The objectives of an instructional unit are more specific specifying the objectives to be reached during and at the end of a lesson.

A program description is not only concerned with what the trainees will do in the learning situation, but with what they will be able to do.

A program is concerned with what results, and not what happens.

The concept of the program as objectives to be achieved has had a profound impact on education and training. It provides the rational for outcome orientation or competency-based education, which has historically served as the model for vocational education and training (Saylor, Alexander & Lewis 1981, p. 6).

**Tasks**

Specify the knowledge dimension and the cognitive process dimension and write concrete examples in the cells for a occupations of your choice:
### The cognitive process dimension

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>A.</td>
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<tr>
<td>B.</td>
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<tr>
<td>C.</td>
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<tr>
<td>D.</td>
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</tbody>
</table>

### Unit 5: Structuring occupational tasks/modules

#### Structuring - what does it mean?

Having specified the tasks of an occupation, the tasks have to be structured for the sake of educational programming. Structuring for educational and training purposes means, bringing the tasks which characterizes an occupation into an order. Basis for orientation is the work process (Unit 5/2).

In an educational and training program the tasks are put together in modules (Unit 5/7). Modules can be obligatory, restricted, or free chosen by the trainee. For each module the learning outcomes a assessed and certified. of an occupation (Unit 5/11).

Let's consider the subtask 'preparing a salad' of a cook's occupational task 'preparing starters'.

To 'prepare a salad' you need some cut salad pieces and a salad sauce as a composed mixture of oil, vinegar and spices according to a recipe. These parts are put together in a salad bowl just before serving.

The structure 'prepared salad' looks like this:

```
  salad (prepared)
   
  cut salad
   
  salad sauce
   
  different cuts
   
  oil - vinegar - spices - recipe
```

Structure 'prepared salad'
Tasks of a cook

The core function of a cook is to transform raw foods in dishes or menus for the guest. To achieve this, the cook uses equipment, services of others, energy, space, etc. These goods and services are procured. To pay for the goods and services financial resources are needed.

When the menu is prepared the cook may either serve the menu to the guest or this function is done by the person in charge of the restaurant service. Up till now the cook has expenditures and costs for the procured goods and services and the use of the equipment. After the guest has paid the bill, cash is earned by the cook (or company) and can be e.g. used to pay the salary and new goods to be ordered.

All the actions starting with procurement, production and sales are laid down with the perspective of finances, and costs are subject of book-keeping, calculating, analysing and budgeting.

To assure that all these tasks and functions work coordinated according to the company goals management becomes necessary. Management plans, decides, delegates and controls these processes.

A structure of a cook’s tasks

![Diagram of tasks structure]

Cook’s tasks - general structure

In a one person restaurant all these functions have to be achieved by the cook. However, the development of occupations and culturally shaped divisions of labour took place and still takes place. In some programs the cook functions are focussing on the production of meals and services. Within the kitchen there are further differentiations of functions. There are persons in charge of salads, cold entries or desserts only. Within the group of cooks assistant cooks, cooks and chef-cooks may work together.
Sales of the produced meals and services may be done by the restaurant service being also responsible for the beverages.

The procurement may be done by the clerk but payment regulations and book-keeping by occupations for accounting.

**Structuring a training program (modularization)**

In Unit 2 the core tasks a cook should be able to master according to the standards of the company, consumer laws etc. are listed. An approach to develop the knowledge and skills to master such occupational tasks is the modularization.

The terms "module" or "modularization" originally derive from the fields of technology and engineering. For example in construction technology a module may be a standardised element of a building like a roof truss or a pillar. Elements like this can be combined in various ways when constructing a building.

In the field of technical/vocational training and education there are many terms used, sometimes with identical meaning. Examples for that are "module", "element", "unit", or components.

**National Vocational Qualification framework**

In 1986 the National Vocational Qualification (NVQ) framework was established in England and Wales. It is receiving increasing attention on the European level. The NVQ framework is characterized by modules. According to the NVQ framework "a module is a self-contained partial qualification which can be separately assessed and certified and promotes in itself, or in combination with others, employment".

The Scottish Qualification Authority (SQA) uses the term "unit" instead of "module". A unit is the smallest package of outcomes, which form the basis of judgment on a candidate's level of performance (Dennis 1999).

Institutions engaged in vocational education and training can group modules together into programs to meet the needs of employers. The learning outcomes of each module are assessed and certified.

**Other systems of modularization**

In 1996, the German federal vocational vocation and training policy shifted from subject orientation to "action competence" (Handlungskompetenz) and "learning areas" (Lernfelder). Action competence means the readiness and ability of a person to behave in vocational, societal and private situations in a professional, considered and responsible way. Action competence has a strong performance orientation. Learning areas are not subjects but complete occupational tasks related to the work processes the trainee should be able to master after the learning area is accomplished. This view has an overlap with the module definition introduced before.
Each apprentice receives a separate attendance certificate for each learning area. It specifies her/his level of competence to manage a part of an occupation. However, her/his occupational competence is assessed in a final theoretical and practical test.

**Example module - component - lesson (cook)**

In this guide "modules" as the packages of a learning program consist of "components". The components themselves are differentiated into "hours" for education and/or training.

**Module A:**

Being able to prepare desserts, egg dishes and dishes made from dairy products.

The module is broken down in the two components

A1: Prepare desserts  
A2: Prepare dishes of eggs and dairy products

The components are differentiated into the following lessons:

A11: Prepare puddings (e.g. caramel)  
A12: Prepare creamy desserts (e.g. strawberry cream)  
A13: Prepare fruit salads (fresh fruit salad, fruit pulp)  
A14: Prepare semi-frozen products and ice cream (e.g. coup Melba’), etc.

**Features of modules**

- Modules are not input and process but output oriented. What equipment is used, the trainers and the students are doing are not of interest. It is the achievement of the objectives that counts.
- Output orientation requires a clear definition of the training objectives (Unit 4/8).  
- The achievement of the training objectives is assessed and certified (Module 10)  
- The procedure of assessment is described.  
- The instructional and work arrangements are specified.  
- Reference to the occupation and/or the national qualification network.  
- Amount of instruction and training time.

**Module and subject area**

The module concept is affiliated with occupational competence, skill or performance orientation. The subject area concept is knowledge and understanding oriented.

The Swiss module concept expresses this difference with the following statement: After a module you can do something, after a subject area you know something.
However there are seldom actions on the shop floor realized in a knowledge free manner. Therefore also occupation specific knowledge and not only skills are part of a training module. However an occupation module does not end on the level of knowing and understanding.

Types of modules

The types of modules are distinguishable by structure and function: Fragmented modules, differentiated modules, combined modules, obligatory, and selectable modules.

Fragmented modules are standardised training offers, aiming for acquiring specific and partial vocational competencies/skills. Their distinguishing mark is their demarcation and independence faced with other modules. They are standing alone. Example: Preparing vegetarian dishes.

Differentiated modules are single phases or elements of a coherent vocational training programme with a final examination. They can be combined like bricks in various ways, shaping a total and more complex qualification, like a vocation or profession. But they have no value as separate modules and partial qualifications. Example: Module (1) "Prepare desserts, egg dishes and dishes made from dairy products", (2) "Prepare fish and crustaceans", and (3) "prepare soups" are compulsory for the occupations "cook".

Combined modules are a combination of fragmented and differentiated modules. They are aiming for enlarging and combining the advantages of both systems. Existing or new complex training programmes will be made more flexible by establishing combined modules. Example: Modules (2) and (3) are combined and shortened but added with changing up-to-date dishes. For more details and history see Ertl (2001).

Obligatory modules specify which module every bearer of the occupation has to achieve. Selectable modules open the trainee choices. The occupation profile element "use master cooking work processes and culinary techniques and apply hygiene regulations" the module on "apply hygiene regulations" and "master cooking work processes" are obligatory. Preparing "fish and crustaceans", "meat and offal", "game" and "poultry" two of the four are to be chosen by the trainee.

Structuring the modules

In Module 1, unit 5 the tasks of the occupation 'cook' are outlined. There are the cook's core tasks of transforming raw materials or food and services into meals by using the equipment of the kitchen.

There are supporting and framing tasks like hygiene, safety, maintenance of the equipment, environment protection laws, labour law, the procurement of the raw materials and equipment, the sales starting with service and ending with marketing, the management function at least related to the kitchen staff, business accountancy, etc.

For each of these tasks one or more modules might be easily developed. However the question is how to characterize the occupation of a cook.

The following questions are to be answered, like:
Which modules are obligatory?

Which modules are obligatory with choices, e.g. according to the traditions of the region?

Which modules are facultative?

Which modules give a condensed overview focussing on knowing and understanding to be continued in continuous education and training after apprenticeship?

Which module has the development of skills as an objective?

Should modules for general education like mother language, arithmetic, history, geography, religion etc. be introduced?

**Structured modularized for the occupation "cook"**

On the basis of such considerations *(Unit 5/11)* the result for the occupation cook might be:

**Obligatory:**

Set one (domain specific general tasks): Each of the five modules has to be accomplished: safety, hygiene, environment protection, and labour law. (5)

Set two (generic tasks): communication in a foreign language, domain specific arithmetic, mother tongue, local history, IT-application. (3)

Restricted choices of occupational tasks: Out of 16 core occupational modules on the transforming of raw foods into menus, eight modules are to be successfully completed. Of these eight modules two should comprise starters, two desserts and six meat and non meat main dishes. (8)

Particular occupational tasks: Free choices of two modules out of spicing, baking, drinks, guest communication. (2)

The certificate of a cook will be acquired if eighteen modules are passed with success.

<table>
<thead>
<tr>
<th>General tasks (obligatory)</th>
<th>Occupational tasks (restricted choice)</th>
<th>Particular tasks (free choice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain specific 5 modules</td>
<td>Core occupational modules</td>
<td>2 particular modules</td>
</tr>
<tr>
<td></td>
<td>2 modules (starters)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 modules (meat and non meat main dishes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 modules (dessert)</td>
<td></td>
</tr>
<tr>
<td>Generic 3 modules</td>
<td></td>
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</tr>
</tbody>
</table>
Task 1

General structure of an occupation's tasks

Choose an occupations of your country. Specify the tasks of this occupations and put the tasks in the functions specified in boxes of the figure below.

Task 2

Modularization of an occupation's tasks. Structure the modules according to step 3-5-11:

<table>
<thead>
<tr>
<th>General tasks (obligatory)</th>
<th>Occupational tasks (restricted choice)</th>
<th>Particular tasks (free choice)</th>
</tr>
</thead>
<tbody>
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</table>

Unit 6: Sequencing and scheduling

Sequencing
Sequencing brings tasks, elements, components, or modules in a continuous and connected series. Sequencing gives an answer to what follows next; sequencing is focussing the process. Structuring (Unit 5/1) describes the state, how the situation is at a glance.

The structure "salad prepared" in (Unit 5/1) gives an overview of the elements in order to prepare the salad. Preparing or teaching the preparation of salad may be done in several ways. First you cut the different ingredients of the salad with different equipment - lettuce leaves are cut, carrots are abraded etc. Second you prepare the salad sauce. Third you bring these two parts together when needed, stir ingredients and sauce.

Sequence "preparing salad"

In sequence you are quite free in choosing the starting point. You can start with preparing the salad sauce or with cutting the different salads. However this choices are related to time. If the salad sauce maintainable over some days you should start with that. The cut of the salad should be done at the day of serving. With these considerations we touch the designing of a program.

**Sequencing for reasons of law regulations**

The structure of a cook's tasks (Unit 5/3) is mainly characterized by the production of meals. At a first glance it seems reasonable to start with these tasks. However there are regulations or even laws that oblige to start with topics which may not be of primary interest of the apprentice or the common view of the cook's tasks. In step (Unit 5/11) there are obligatory modules specified, like safety, hygiene. Therefore the training might start with these modules first and if possible with practical applications. On the other side the module environment protection gives the program certain degrees of freedom when to put on the agenda.

Such responsibilities by law fix the starting point and not the motives and interests of the novice unit 5.

**Sequencing for reasons of getting an overview of the occupation**

The structure of a cook's tasks may be used as well to give the novice an overview of the occupation to be trained for. In that case one could start with the "production cell" driven by the assumption that these are the reasons for the choice for this occupation by the novice. However another approach might also be possible. Starting either with "sales or marketing" because without a guest there is no need for the production of meals or with "procurement" because without available goods and services there will be no production of meals.

Considering that the occupation of a cook is highly related with entrepreneurship actually on the agenda in the European VET discussion and policy, "management" and "business administration" as the core of all economic operations could be a starting
point, too. At the end of such a module, a general structure of the potential tasks of a cook should be developed as a mental map by the apprentice.

Each module introduced later on will be located in this general structure of the cook’s tasks. Such a type of sequencing contributes to a holistic way of “doing the job” instead of focussing only on the production of meals and not having the needs of the guests or the cash flow in mind.

General remarks. The answer to the question what is the best starting point or programs is a matter of systematic empirical investigations and not so much of considerations, even of experts.

**Sequencing for reason of learning prerequisites**

Gagné (1977) introduced the concept of cumulative learning. It expresses that everyone starts learning with some knowledge, skills etc. This starting state of the person’s internal conditions expands in the life span to higher orders skills and wider knowledge (link module 12).

This idea was transformed into a tool to develop learning paths. This tool consists of the development of learning hierarchies which is widely used in vocational education and training all over the world (cp. Mager 1997).

To develop a learning hierarchy you start with the final objective of a lesson, a program, or a module and ask for the prerequisite skills needed to achieve the goal. The questioning will be continued till the point where you identify those skills the target group is assumed to possess.

Example: The cook apprentice should become able to bake a cake. To do this he must be able to use the oven, to measure the ingredients and to read the recipe. The prerequisites for these skills are that the apprentice is able to read the recipe in the language familiar for her/him (e.g. mother language), to read numbers, and to use the kitchen utensils. The last three skills are assumed to be mastered by the target group.
Sequencing may start with reading the recipe then weighing the ingredients, heating the oven etc.

**Learning hierarchy "adding/subtracting mixed numbers"**

Learning hierarchies are not restricted to concrete behaviour and action but are used in more abstract areas like "adding/subtracting mixed numbers" like $1 \frac{3}{8} + 1 \frac{1}{4} = 1 \frac{7}{8}$ or $1 \frac{3}{8} - 1 \frac{1}{4} = :$

---

Eigler & Straka (1976) Mastery learning, p. 40

Learning hierarchy adding and subtracting mixed numbers

**Types of hierarchies**
There are several types of hierarchies often found in different domains:

1. Integrative hierarchy
   - An integrative hierarchy is to be found when you combine spices, water and oil to get a salad sauce which will be poured in a salad bowl to be mixed with hackled salad pieces.

2. Additive hierarchy
   - An additive hierarchy expresses that three elements have to be brought together, e.g. the skills of being able to read the recipe, to weight the ingredients, to heat the oven (site 4).

3. Process hierarchy
   - A process hierarchy shows how the skills are combined. The arrow expresses that some steps are non-reversible, e.g. a baked cake cannot be reconstituted in its original components, hackled salads cannot be reconstituted in the original lettuce leaves etc. In such cases the expression 'let’s simply try it' might be very costly in case of failure.

Program designs

There are different criteria for sequencing. They depend from the intents of the program planner, which have an impact on the program design:

<table>
<thead>
<tr>
<th>Selecting Program Designs</th>
<th>Consider using this program design:</th>
<th>Consider organizing instruction:</th>
</tr>
</thead>
<tbody>
<tr>
<td>If program planners intend to:</td>
<td>Provide organized knowledge, for example, knowledge in the cooking domain</td>
<td>Subject matter/disciplines</td>
</tr>
<tr>
<td></td>
<td>Around disciplines of knowledge</td>
<td>Through an instructional system design</td>
</tr>
</tbody>
</table>
### Scheduling

Scheduling is raising the questions when a module should be selected and how much time should be admitted a module.

In Unit 5/11 the occupation of a cook was defined with obligatory modules, modules of restricted choice and modules free of choice. In this case it is legitimately to start with the two obligatory modules 'safety' and 'hygiene'. After that, some modules of the set of restricted choices are foreseen. In relation to the school resources the free choice modules may be offered.

Another criteria is the time admitted to the training program. Further questions are the practice where and when, cooperation between company and school.

The time budget for a module has to be taken in consideration. Predominantly you will find modules with a time budget around 40 school hours or multiples of 40 hours.

Further aspects are the organisation of time spent in school and in the company.

A dual VET system may foresee one up to two days per week in school and three days per week in the company - like in the German VET. However, nowadays a lot of apprenticeship training is organized in a blocked manner, like one or two weeks schooling and four and more weeks in the company.

In sum there are quite a lot of factors to be considered when planning a vocational education and training program.
A modularised program for cooks

Frame
School: 40 weeks a year with 8 school hours a day, i.e. 40 hours a week schooling
Company: 48 working weeks a year (four weeks for holidays, season holidays etc. taken into account);

To receive the certificate of a cook (Unit 5/11) the requirement to be spent in educational vocational institutions are 720 hours or 18 weeks of schooling.

In addition to schooling there are approximately seven weeks of training in the company on the topics of the modules integrated. Approximately, because there are some topics which cannot be trained over six weeks as a whole but which have to be considered during the whole training in the company. For example: Safety has to be practiced to a certain portion during the training in the company.

On the basis of these considerations the training time will take seven times the 18 weeks at school or 126 weeks.

Three working years comprise a working time budget of three times 48 weeks = 144 weeks. The difference between 126 to be trained in the company is 18 weeks what corresponds approximately with the time to be spent in school.

There is an assessment at the end of the school module, during the practical work in the company and after the module related training in the company. The result of both is validated with credits.

Task
Chose a training objective of an occupation, specify the learning prerequisites, and develop a learning hierarchy according to step site 4. Additional resources

www.dfes.gov.uk/nvg/what.html
www.qca.org.uk/610.html
www2.sjsu.edu/depts/it/edit226/sequence/22606seq.pdf
www2.sjsu.edu/depts/it/edit226/sequence/sequence.html
www.b.shuttle.de/wifo/key/mod-t.htm

Unit 7: Resources and references

Levels of resource planning

There are three levels of program planning:

- On the micro-level the learning-teaching process is programmed. At that stage the occupational tasks the trainee will be able to master are specified, the objectives defined and classified, the program curriculum structured and sequenced, the teaching methods, the media, and the assessment procedures are recommended.
✓ On the meso-level the focus is on the school resources enabling and supporting the learning and teaching processes, e.g. the qualification of the teachers, the facilities of the school, the organization of the school, and the prerequisites the target group is entering the program. In the case of dual vocational education and training the quality of the companies, their equipment, organization of the training phases are subject to considerations as well.

✓ On the macro level the perspectives are the socio, cultural, technical, political, environmental conditions in which the schools and the companies as a whole are embedded. In the context of program planning aspects are considered, like the political system, the educational administration, the associations of the companies, the chambers of commerce, industry and craft, the trade unions, teacher association.

In the following three steps some questions are formulated related to the three levels introduced above. The questions are not exhaustive. The rational for that is, that it depends form the specific conditions and traditions in VET what questions are to be addressed. However the questions shall give the program planner a general idea about the agenda to be worked down.

**Micro level aspects**

On the micro level questions have to be answered, like:

✓ Are the education and training program worked out?
✓ How differentiated are the education and training programs?
✓ Are the lessons structured and sequenced?
✓ Are the duties of the company defined and sequenced?
✓ Who is controlling that the objectives of the school and training program are achieved?
✓ Are the teaching materials and media available?
✓ Is there an access to the internet for teachers and all students?
✓ Who is responsible for the assessment of the school modules?
✓ Who is responsible for the assessment of training progress in the company?

**Meso level aspects**

On the meso level questions have to be answered, like:

✓ Is there an accreditation of prior learning?
✓ What are the conditions to admit the students?
✓ What are the conditions to admit the apprentice in the company?
✓ Is the education program blocked or not?
✓ Does the transportation allow a daily return home of the students?
✓ Are dormitories or housing available?
✓ Who pays for using the dormitories or housing?
✓ Are there enough class rooms?
✓ Quality and quantity of the equipment (laboratories, machines, school kitchen, IT-rooms or access)?
✓ Who pays for the consumer goods (chemicals, learning materials etc.)
✓ Qualification of the teachers and trainers?
✓ Is there a cooperation between the teachers, like team teaching?
✓ Exchange of teachers and trainers in school and companies?
✓ Organization of continuous training for teachers and company trainers?
✓ Functions and responsibilities of teachers and the school manager?

**Macro-level aspects**

On the macro level questions have to be answered, like

✓ What are the relations of the school to the community?
✓ How is the cooperation between school and companies organized (e.g. school and local companies, ministry, company associations, and trade unions)?
✓ Is there public private partnership?
✓ Who defines the training and education programs?
✓ Who contributes to the costs of building education and training facilities?
✓ Who has the right to certificate the learning outcomes of an occupation?
✓ Are there fees for schooling?
✓ Who is responsible for the organization of teacher education and trainer training?
✓ What is the relation of the occupation certificate to the national qualification level?
✓ What entrance conditions for further formal are met with the occupation certificate?

**Task**

✓ Choose references you are interested in and search them in the media lab of your institutions, amazone.com.
✓ Give some key words in google, analyse and evaluate the results.

Additional resources
Unit 8: Assemble the program into a suitable format

Preliminary

The following descriptions, statements etc. have exclusively the function of exemplifying.

General remarks

The general remarks point out the importance of the designed program for the development of the country - if possible some statements of important stake holders, e.g. minister of education, representatives of the industry, trade unions. Consensus between the public and private sectors in the spirit of public-private partnership (PPP).

Arranging the program into the TVET system and the whole school system as well

Example:
The TVET system is a part of the secondary II school system. The minimum entry requirements for the trainees are:

- They must have completed the 10th grade or accumulated equivalent modules,
- They have to find a training company and make a contract. For people having not finished but staying in the formal and the informal sector of the country accreditation of prior learning - done by the committee for TVET special admissions - may open them the opportunity to enter the secondary II level. Persons finishing successfully the secondary II system are eligible for e.g. vocational higher education.

Features of the TVET-system

The TVET system follows the principles of duality in vocational education and training, i.e.

- Each trainee is hired by an accredited company or training unit where s/he works and
- S/he visits a defined amount of time vocational schools for education (see later).
- Features of the dual vocational education and training (VET) are the following two poles:
  - Theory in school - practice in the training company, i.e. simulating practice in the school is regularly not necessary (compared with a full time vocational training).
  - Theory and practice should ideally take place simultaneously.
- The focus of theory instruction is not to build up inert knowledge but active knowledge, i.e. the apprentice should become able to use the knowledge at the workplace and to expand it regarding to generality and speciality of the conditions in the company.
✓ Job descriptions and corresponding curricula (common standards).
✓ The adoption of these common standards by all the institutions in charge of education and training of human resources for the TVET.

Ultimate goal of occupational education and training is occupational competence: The apprentice should become able to master core tasks/requirements of her/his occupation on the level of a skilled worker.

Name and profile of the occupation

Unit 2/5
Designation: Cook
Duration of training ship: 3 years
Occupational characteristics and profile: Unit 2/4
Education and training specifications by specifying the philosophy of the school and naming the modules: Unit 6/9
Assessment: Specified for each module

Specifying the module's tasks

A module comprises a complete occupational function specified with complete tasks.

Unit 2/4
Unit 3/1
Unit 3/7

Specifying the module's requirements

For each module the prerequisites of the learners are to be specified, i.e. modules to be successfully passed in advance, competences, knowledge and skills to be acquired, if necessary.

For developing the skill 'baking a cake' the indispensable prerequisites are: being able to use specified kitchen utensils, to read etc. (Unit 6/4).

Educational and training objectives

Unit 3/4

The trainee will be able to bake the following cakes - to be determined (= skill). S/he will be able to explain the process of preparing and the features of the ingredients - to be specified.

Materials and equipment for learning

Raw materials & equipment in the company and school, etc.

**Assessment**

**Unit 6/1**
**Unit 7/1**

At the end of the module the work specimen 'desserts-fruit salad (fresh fruits)' (Unit 5/7) the trainee gets a basket of ingredients, spices etc.: She/he is asked to prepare the dessert to be served to six persons. To master this task 45 minutes are scheduled. The basket of ingredients has more ingredients than necessary. The produced dessert will be checked by two persons independently according to defined criteria.

**Subsequent modules**

A consequence of sequencing, scheduling, (Unit 6/1) and of the school and company resources (Unit 7/1) might be that there are restrictions in choosing the next modules. For example the modules 'hygiene' and 'safety' have to be completed directly at the beginning of the traineeship (Unit 6/8).

A result of sequencing might be

**Module cover sheet**

All from 3-x-x up to 3-x-x could be put down in the following form:

Designation:
Duration of training ship:
Occupational characteristics and profile:
Education and training philosophy of the school and modules named:

Name of module:
Author: optional

<table>
<thead>
<tr>
<th>Specification of the module's tasks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification of the module's requirements:</td>
</tr>
<tr>
<td>Educational objectives:</td>
</tr>
<tr>
<td>Learning materials and equipment:</td>
</tr>
</tbody>
</table>
Breaking the module down into components

Each module has to be broken down into components (Unit 5/7). The number of components per module is a function of the number and the extent of complete occupational tasks.

In module 3 Unit 5 Site 7, the module 'Being able to prepare desserts, egg dishes and dishes made from dairy products' was broken down into the following two components as an example:

A1: Prepare desserts  
A2: Prepare dishes of eggs and dairy products

The components are differentiated into the following sub components:

A11: Prepare puddings (e.g. caramel)  
A12: Prepare creamy desserts (e.g. strawberry cream)  
A13: Prepare fruit salads (fresh fruit salad, fruit pulp)  
A14: Prepare semi-frozen products and ice cream (e.g. coup Melba)

Breaking down the components into lessons and weeks in the company

For each lesson (60 minutes at school, break included) the educational and training objectives (Unit 4/8) have to be specified. In dual VET the tasks related to the module and which have to be done at the workplace in the company weeks as time units are recommended.

Example:

<table>
<thead>
<tr>
<th>Lesson number</th>
<th>Educational objectives (content &amp; performance)</th>
<th>Training objectives (tasks &amp; weeks (w) spent in the company)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.4.1.1</td>
<td>Knowing and understanding the elements and the process of preparing national and international desserts. Preparing one international dessert as an example in the school's kitchen.</td>
<td>Preparing three national and two additional international desserts according to the menu of the company (2 w)</td>
</tr>
</tbody>
</table>
2.2.4.1.2 Knowing the history and nutritional features of the ingredients, understanding the general structure of preparing dishes of eggs and dairy products. Preparing one exemplary international dish of eggs and dairy products in the school's kitchen
(4 w)
Etc. To be continued

Breaking the lessons into instructional steps

In order to realize educational objectives of the lessons sub objectives or steps have to be specified. For each step a time budget in minutes is foreseen. Recommendations for the instructional approach (Module 5) are to be given, as well as the learning materials and conditions (Module 6) are to be specified. Considerations for formative and summative evaluation are to be specified as well.

Example:

<table>
<thead>
<tr>
<th>Lesson's number</th>
<th>Lesson's steps (educational objectives)</th>
<th>Time budget (minutes)</th>
<th>Instructional approach</th>
<th>Teaching materials (references, pages, videos, equipment, etc.)</th>
<th>Evaluation (formative - summative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.4.1.1</td>
<td>Desserts: national, international, nutritional and dietary features, procedures of preparation and its planning. (1) Knowing the history and importance of national and international desserts. (2) Knowing nutritional and dietary features of desert types (3) Understanding typical procedures to prepare desserts (4) Develop a written work plan</td>
<td>10</td>
<td>Lecture</td>
<td>Gerald W. Chesser (1992), pp. 553</td>
<td>Unit 7/1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>Lecture &amp; power point</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>Lecture &amp; process charts, self-reliant work (Module 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4.1.1 (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>--------------</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4.1.1</td>
<td>Lesson 1: Deserts: national, international, nutritional and dietary features, procedures of preparation and its planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4.1.1 (1)</td>
<td>Step one in lesson the lesson above: (1) Knowing the history and importance of national and international desserts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4.1</td>
<td>Component 1: Being able to prepare desserts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4</td>
<td>Module (4): Being able to prepare desserts, egg dishes and dishes made from dairy products' in the 2nd year of training of a cook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Year of training: 2nd year of training a cook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Type of occupation: cook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number in brackets:</td>
<td>Steps and educational objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forth number:</td>
<td>Component number within the module -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third number:</td>
<td>Module number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second number:</td>
<td>Year of Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First number:</td>
<td>Type of occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example:

Improvement

Program plans are not written to be retained unchanged for ever. Socio-economic changes in a culture, changes of the philosophy of the educational institutions, new educational goals by the ministry or the partners in charge of VET, new scientific insights, change in the target groups, etc. will make it necessary to check and evaluate the goal achievement and the whole concept of the program (Unit 1/9). This should be done with empirical investigations focussing on all the participants and users of the program. There are different methods to be used (Module 10) and it should be
considered to refer to The Program Evaluation Standards of the Joint Committee on Educational Evaluation (1994).

Task
Take the occupations you have chosen in unit 3-2 and break it down to the level of a lesson.

Note:
If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
MODULE 5:
Prepare a Teaching Unit

<table>
<thead>
<tr>
<th>Nº</th>
<th>Name of Unit</th>
<th>Tests</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General information</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Apply a theoretical framework on preparing teaching unit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Apply selected didactical principles</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Using of didactical principles in typical teaching situations</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Define objectives resp. goals and aims for teaching lessons</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Apply taxonomy of educational goals</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Analyse syllabi or curricula regarding the kinds of goals esp.</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>taxonomyed goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Apply the way from syllabus or the curricula to the plan of</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>distribution of content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Apply the coherence between planning elements</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Prepare a teaching unit</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

SPECIFIC OBJECTIVES OF MODULE

In module 5: "Prepare a Teaching Unit" you will learn to:

✓ Apply a theoretical framework on preparing teaching units
✓ Consider and apply selected didactical principles
✓ Use these didactical principles in typical teaching situations
✓ Define and apply objectives respectively goals and aims for teaching lessons
✓ Analyse and prepare a concrete plan of distribution from the syllabus or curricula

PURPOSE OF MODULE

Input:

✓ Didactic principles
✓ Standard sequences for job-directed teaching
✓ Preparation of planning a teaching unit
✓ Preparation of implementation documents

Expected outcome:

✓ At least one example of well prepared and detailed lesson
GENERAL INFORMATION 1/7

Hanno Hortsch: A didactic concept based on act theory

In vocational education, no matter if vocational or further education, it seems to make sense to put the usability of the occupational activity to be acquired into the foreground. This does not intend to polemizise against the trade (Berufsbegriff) as the vital category of German vocational education. To acquire a trade means more than gaining qualifications. Trade means a holistic acquisition of reality as regards activities in potential employment. The effects for vocational education are that topics are not only restricted to objective aspects but also include social, ecological or legal aspects that are to be borne in mind as regards the assessment of possible consequences. Nevertheless are vocational qualifications the rational core of the acquisition of a trade.
GENERAL INFORMATION 2/7

The term qualification in this sense is to denominate a disposition of personality traits aimed at certain vocational activities. Accomplishments, for example the accomplishments of a skilled worker, are made possible by qualifications when the competency of acquired qualification(s) are recognised and become functional in work-related situation. The ability to identify competency as regards vocational acts and to let qualifications become functional is called vocational decision-making responsibility or competency based education (CBE) (Handlungskompetenz). This makes it evident that the volitional disposition, besides the required knowledge and skills for vocational acts, is a precondition for vocational "competency". In this sense competency should not be divided into "sub-competences" as social competence, competence concerning learning, facts, values, etc. CBE is a holistic complex and needs to be applied to the performance of an act. The vocational act "ordering material" for example can not be divided into objective, social, learning or other acts. But the act "ordering material" has components that are social, objective, and so on. For this reason it is sensible to speak of components of vocational CBE (Handlungskompetenz). There certainly are numerous components. For vocational acts only the components to be cultivated are of importance, in this case social, factual and methodic components. The factual component constitutes the informative precondition for a vocational activity. The methodic component intends the subjective possibility for an activity. This also includes the necessary "provision" of the possibilities. The social component puts forth a subjective necessity for an activity. This includes, among other things, the evaluation of social relationships. If one sees the initially made theoretical disquisitions as a basis, the demand for instruction based on Act Theory becomes apparent. Figure 1 shows the positions of teacher and learner in such a process of acquisition. Applied to the process of instruction one can act on the assumption that there is a relationship between the teacher as subject and the object "learner"; this activity connected to this relationship is denominated "teaching". The intension of this relationship - on the basis of instruction based on act theory - is the creation of a relationship between the learner and the object of acquisition, once again a subject-object-relation. The activity connected to the second relationship is denominated "learning".
GENERAL INFORMATION 3/7

The basic didactic relationship clarifies the purpose of teaching and thus the role of the teacher. The task of the teacher when designing instruction is to create conditions that allow the development of the second subject-object-relationship. It is possible to construct a model of the functions of the teaching/learning process based on act theory on the basis of the basic didactic relationship.

This is to be illustrated didactically simplified below as an explicit description of the models would take too much time. As the intension of the activity of the teacher is to initiate learning in the sense explained above, the second relation of the basic didactic relationship should serve as the factual core of the model.

GENERAL INFORMATION 4/7

Simplified Model of Education

![Diagram](image-url)
GENERAL INFORMATION 5/7

Development of personality comes about through acting. Activity in this sense is to be seen as the conscious dealing of humans with their environment and with themselves in order to their needs. Activity is realised by acts. Thus it seems to be of use to depict acts of learners in a model of functions (Funktionsmodell). Seen from the teachers perspective these are the learning acts he initiates by creating the necessary conditions. Learning acts thereby receive orientation and, if needed, regulation and evaluation. In spite of this, anyone who has been teaching will acknowledge that every lesson is unique. Even with the help of the most elaborate structure of preconditions (Bedingungsgefuge) the teacher will not be able to avoid, and hopefully not want to avoid, a number of learners carrying out compensation acts. A compensation act in this sense is not estimated as entirely negative. It always is a reaction to the co-action of internal and external conditions including the effects as well as the conditions the teacher creates or forms.

For this reason it comprises compensation both as a reaction to a request by the teacher because of disinclination to learn and acts with the learner's own cognitive structures that do produce results, only taking a different way than that forethought by the teacher. This second type of compensation can be negative from the teacher's perspective regarding his perceptions of learning acts intended. This perception seems to be less relevant from a didactic point of view if one brings to mind the consequences of the basic didactic relationship. On the contrary, the teacher should create options open up to this type of act. Only thereby can the learners bring in their own "ego", can they act according to their ways of learning or their own cognitive styles. It is more than a matter of speculation if one concludes: Vocational lessons that provide a reasonable combination of learning acts planned by the teacher and scope for acts controlled by the learner are beneficial for both motivation and for the development of vocational competency (Handlungskompetenz).
GENERAL INFORMATION 6/7

Act as a process of feedback

Individual with Needs
(Motives for Acting)

Activity, Acts
(active dealing with the environment and with oneself for the purpose of need satisfaction)

Result of Activity
(New needs and new conditions for activities)

GENERAL INFORMATION 7/7

The list below gives you an overview and clarification of important terms so far mentioned.

Qualification: Disposition of personal features/attributes/qualities aligned at certain vocational activities.

Professional/vocational based competency (Handlungskompetenz): Ability of displaying responsibility in regard to professional/vocational activity and of making qualification functional.
Components of professional/vocational decision-making and responsibility

**Factual Component:** The informative precondition of professional/vocational activity.

**Methodical Component:** Subjective possibility for acting is aimed at this component. It also comprises the finding of the possibilities.

**Social Component:** It puts forth subjective necessity for the activity. This includes, among other things, the evaluation of social relationships.

**Conclusions:**

1. Learner acts actively, precise, future-oriented and creative on the lesson, is involved in its design and influences its structure.

2. The learner tries to reach his/her own goals or set goals by acting, either independent or together with others.

3. The acts of teacher and learners are complex as the external conditions affecting the process of vocational and further education. The stability of this process held up in equal measure by both order and chaos.

4. An important principle of organisation: Lessons are organised on the basis of acts of teachers and learners. The teacher initialises acts by orientating, regulating and evaluating.

5. Lessons based on act theory are to be characterised/distinguished among others by the following relations
   
   a. Relation of object/aim-means-content
   
   b. Relation of organisation of teaching and learning
   
   c. Relation of interactions

6. The impulse for the accomplishment of learning acts consists in the antagonism of continually increasing demands on the learner, initiated by the teacher, and the current state of the learner's knowledge, skills and will.

**TEST**

What are the main criteria of a didactic concept based on activity theory?

Please choose Answer A, B or C!

<table>
<thead>
<tr>
<th>Answer A</th>
<th>Answer B</th>
<th>Answer C</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher gives dominant instructions</td>
<td>The learner acts actively on the lesson</td>
<td>The learner is not in the centre of the lesson</td>
</tr>
<tr>
<td>The learner acts</td>
<td>The learner is involved</td>
<td>The learner acts</td>
</tr>
</tbody>
</table>

133
UNIT 1: Apply a theoretical framework on preparing teaching units
This module will give a short description of the different didactic concepts of the present in unit 1. These are:

"Normative Didaktik", "Informationstheoretische Didaktik", "Bildungstheoretische Didaktik" und "Lerntheoretische Didaktik". The "Lerntheoretische Didaktik" can be divided into the "Berliner Modell" and the "Hamburger Modell". In unit 5 the "Berliner Modell" developed by HEIMANN will be explained in detail.

The following list explains shortly the mentioned concepts.

Basic Didactic Concepts of the Present

Normative didactics (Normative Didaktik)

[Normative Didactics]
...a system based on the concept of up most pre-pedagogical sense-norms on, human life, the position of man in the world or the nature of man. All contents of the lessons as well as the curriculum are based on education norms which are derived from these sense-norms. It goes on differentiating methods and ways of education, creating a closed conclusion chain (Deduktionskette) which states how the reality of "Lessons" should be.

Didactic Model based on Information Theory/Communication (Informationstheoretische Didaktik)

Didactic Model based on Information Theory/ Theory of Communication (control cycle model)
Didactic Model based on Information Theory

**Didactic of pedagogical theories** (Bildungstheoretische Didaktik)

- Starting point for the formation of pedagogical theories is the reality of education/upbringing
- Concept formations occur in contact with practical side of education and its interactions
- "Education" (reality, not theory) is seen as the key category.

**Conclusions:**

1. Contents must be suitable for self-realisation and for the formation of maturity of the learners.
2. Vocational Education should be seen from the aspect of learning contents useful on the job.

Representatives: Spranger 1882-1963
As mentioned before the Didactic of learning theories (Lerntheoretische Didaktik) can be divided in the "Hamburg Model" by SCHULZ and the "Berlin Model" by HEIMANN.

**Didactic of learning theories** (Lerntheoretische Didaktik, HEIMANN, SCHULZ)

Plan according to the Hamburg Model (Schulz)

---

**Berlin Model (HEIMANN)**

In the Berlin Model HEIMANN describes six outlasting structures of teaching. He distinguishes between to fields; these are the fields of conditions and the fields of decisions. For planning his lesson the teacher has to determine the fields of conditions and these have to be consistent with the fields of decisions. The six elements have a relationship of dependence. Fields of conditions describe with anthropogenic pre-conditions factors which are determined by the teachers and students and with social and cultural pre-conditions factors which determine teaching from outside, for example financial resources. Lessons/teaching can be described via fields of conditions and fields of decision.
Lesson analysis goes from fields of decision to fields of conditions. Lesson planning emanates from the fields of conditions. Principles of lesson planning:

- Interdependency: consistent reciprocity of all planning elements, factors
- Variability: purposefully provisions of alternatives, permission of variations and adjustable objectives
- Controllability: of didactical drafts in terms of evaluation

**Tasks**

1. Discuss didactic considerations/reflections and intentions, that go with the term: "Development/ evolvement of personality/ identity of the learner" in the chat room!

2. Discuss the following statement: "The learner is both object and subject of the lessons at the same time." Discuss it in the chat room or with your experienced teaching consultant and your teacher fellows!

**UNIT 2: Apply selected didactical principles**

In this unit we will discuss the importance of didactic principles for the planning, implementation and evaluation of vocational education processes. Essential didactic principles will be characterised and the feasibility of putting them into practice will be discussed. The didactic principles of comprehensibility and of clearness will be focal point.

The first list describes didactic principles in comparison to didactic rules.

**Didactic principles**

- Principles for lesson design, based on laws or coherences almost like laws or systematised experiences
- Presents/opens up space for thoughts and action for the teacher
- Is valid for all forms/types of vocational lessons/learning/ instruction
- Depicts coherence of arguments in the design of vocational lessons/learning/ instruction (descriptive function)
- Have an effect on orientation, performing of tasks and evaluation of results/outcomes without determining them (regulative function)
Didactic rules

✓ Special regulative indications, which go into detail on the implementation and correct application of the didactic principles
✓ Refer to concrete situations

Selected Didactic Principles

✓ Principle of educational effectiveness of teaching
✓ Principle of activity and autonomy
✓ Principle of methodology and systematology
✓ Principle of the scientific approach
✓ Principle of illustration (clearness of mental images)
✓ Principle of comprehensibility (simplification)

The didactic principle of methodology and systematology

Methodology of teaching means to teach purposefully on the basis of curricula and other instructions as well as orders. Systematology of teaching means to arrange the particular academically proven considering methodology in an entirety.

The didactic principle of the scientific approach

Scientific approach to teaching means to teach objective truth in its systematology for the acquisition of a vocation. The scientific approach to teaching requires imparting to the learner methods and techniques of his vocational field and learning methods.

The didactic principle of illustration (clearness of mental images)

Clearness of mental images is a characteristic trait of subjective images.

⇒ appropriate design of apperception processes

PESTALOZZI: Outlook is the base of all cognition.
COMENIUS: Apperception is the base of cognition.

1. Matters of acquisition can be of
   o concrete,
   o non concrete or
   o conceptual abstract type.

2. A matter of acquisition leads to descriptive/demonstrative images if
   o the matter of acquisition has pictorial character.
   o the matter of acquisition allows connotations to matters already learned.
the spoken elements already known to the learner.

3. Clearness in this sense can be achieved if
   o the learner acts concretely with the matter of acquisition
   o the learner grasps matters of acquisition mentally by "observation".
   o the learner acts with the non concrete matters of acquisition (models, etc.).
   o the learner works with verbal (conceptual) matters of acquisition.

4. Clearness of mental images not simply achieved by the application of media in lessons that only trigger off perceptions and ideas/images/associations. The principle of clearness is only adequately taken into account if perceptions and images become starting point for thinking processes.

Rules:

✓ learners should use many senses in their learning acts
✓ use media for teaching and learning
✓ design the media according the learning objects an according the conditions of the learner
✓ use the language to accomplish clearness of mental images

The didactic principle of comprehensibility (simplification)

Teaching in a COMPREHENSIBLE way means that the terms/conditions of acquisition for the learner are designed in a way that he/she can acquire demanding matters of acquisition with reasonable effort.

• Cognition theory by PIAGET

⇒ Combination between assimilation and accommodation is a condition precedent for personality development
   assimilation: adaptation and subsumption of new experience in the own structure of knowledge
   accommodation: adaptation of the own structure of knowledge to integrate new experience without an antilogy conclusion:

✓ teacher has to organize, that new experience will connect with existing knowledge
✓ learning acts have to have a appropriate degree of difficulty to initiate mental work (development of the own structures of knowledge)
✓ cognitive motivation theory
✓ factors for motivation: * the chance of success * the demand of exercise (acceptation of success)
Teaching in a **COMPREHENSIBLE** way means that the terms/conditions of acquisition for the learner are designed in a way that he/she can acquire demanding matters of acquisition with reasonable effort.

Didactic rules for the easier application of the didactic principle of comprehensibility:

<table>
<thead>
<tr>
<th>Move from:</th>
<th>to</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWN</td>
<td>UNKNOWN</td>
</tr>
<tr>
<td>SIMPLE/BASIC</td>
<td>MORE COMPLICATED</td>
</tr>
<tr>
<td>NEAR</td>
<td>MORE REMOTE</td>
</tr>
<tr>
<td>EASY</td>
<td>MORE DIFFICULT</td>
</tr>
</tbody>
</table>

matters/contents

**Methods of didactic simplification:**

1.  
   - look for the universal/general contents in the parts of the term or statement
   - eliminate the parts (secondary statements)
   
   **example:**
   Electrical conductivity is possible through electrons, ions or p-holes.
   Electrical conductivity is possible through moving charge carriers.

2.  
   - you can’t find universal/general contents in the parts of the term or statement
   - select one or two of the most important parts oft the term
   - state this important parts and refer to other possibilities
   
   **example:**
   Electrical conductivity is possible through electrons, ions or p-holes.
   Electrical conductivity is caused by electrons in the most cases.
   There are other charge carriers.

3.  
   - transition on a general statement
   - state particular restrictive characteristics
   
   **example:**
   velocity (speed) is the first differential of quotient from way and time (the rise of the curve)
   Velocity is the quotient from way and time (steady motion without Acceleration)
   Velocity is the quotient from changing of way and time
Didactic simplification - Teacher as a transformer

Teacher as a transformer
Didactic simplification of a scientific statement is the transition of a differentiated term or statement (including special characteristics of the object) into a universal term or statement (including validity to the same extent about the same object seen from the same aspect).

Criterion for the legitimacy of didactic simplification:

<table>
<thead>
<tr>
<th>statement didactically simplified</th>
<th>(e.g. stage n in education)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transition must be possible without contradictions (no unlearning/relearning - recently learned matters must be compatible with matters learned a longer time ago)</td>
</tr>
<tr>
<td>differentiated statement</td>
<td>(e.g. stage n+1 in education)</td>
</tr>
</tbody>
</table>

UNIT 2: Apply selected didactical principles

Example for Redemption (elimination) of secondary statements:

Scientific statement:
Electrical conductivity is possible through electrons, ions, or p-holes. The universal content of the specific terms electron, ion, p-hole is "moving charge carriers" Replace the terms electron, ion, p-hole by "moving charge carriers."

Simplificated statement:
Electrical conductivity is possible through moving charge carriers

Theorems on the didactic simplification of scientific Statements according to HERING:

Theorem 1: Redemption (elimination) of secondary statements
This simplification can be achieved by transition from the statement expressing the differentiations of a subject matter, which presents in each aspect of the statement the general information, to a statement that contains this general information and encloses the differentiation of the subject matter.

**Theorem 2: Indicative redemption (elimination) of secondary aspects/partial statements**
This simplification can be achieved by the transition of a statement expressing the differentiations of the subject matter where the different aspects do not contain corresponding (general) components or where these components are not used for the simplification, into a statement consisting of an aspect (partial statement) that is especially important for the reflection of a particular context providing the information that additional aspects exist.

**Theorem 3: Indicative Generalisation**
This simplification can be achieved by the transition of a statement expressing the differentiation of a subject matter where aspects may or may not provide corresponding (general) information on a general statement. This statement is narrowed by the information of the existence of particular restrictive characteristics on the extent of the original statement.

**Tasks**

1. Explain the difference between a didactic rule and a didactic principle!
2. Discuss the importance/relevance of didactic principles for pedagogic acts of the teacher in the chat room!

**UNIT 3: Using of didactical principles in typical teaching situations**

In unit 2 the different didactic principles were explained. In this unit you should apply selected didactic principles.

**The Term: Teaching Method**

"System of rules, which defines classes of possible operational systems, which lead from certain starting conditions to a definite objective."

"Method, therefore, is a logical structured step or sequence of operations of actions to achieve a definite objective... Method is defined by the logic of the subject and the structure of the subject of its object and its contents respectively."

By teaching method we describe a system of action orientations by the teacher to initiate learning acts with the aim of shaping personality traits, which are aimed at achieving competence of action (in a defined area of action)
Tasks

1. Prepare and conduct a teacher talk and consider the didactic principles of comprehensibility, illustration, methodology and systematology and academic approach! You can tape your teacher talk on a video tape (see module 10). Discuss the result with your experienced teacher consultant!

2. Discuss selected teaching sequences under the aspect of the didactical principles and rules!

UNIT 4: Define objectives respectively goals and aims for teaching lessons

This unit will explain the different terms and functions of objectives, goals and aims. Starting from considerations for planning teaching lessons different didactic-methodical designs have to be considered. The first part gives an overview about the differentiation of goals, objectives and aims and explains what they contain. Möller distinguishes three different levels according to the preciseness of their formulation. The hierarchy should not imply that aims can be logically deduced from objectives and these from goals, to get from a goal to an objective to an aim requires every time new planning decisions. The formulation of goals is very abstract, objectives are more concrete but alternative interpretations are also possible and aims are to an extent precise that there is only one interpretation possible.

Types of Goals

Aspect: Extent of validity (according to Möller 1973)

Didactic intentions
The following list should explain the difference between didactic intentions and the didactic goal.

**The didactic intention**

Is the aim, the intention, with which the teacher initiates learning acts.

**The goal, general**

Is a situation or state desirable in the future, which is planned in the present.

**The didactic goal**

Is the planned change of a desirable situation or state of the learner as regards his/her development of personality with a learning act. Possible functions of a goal:

- orientation
- incentive
- evaluation

Example:
Goal: The apprentice should be able to think mercantile.
Objective: The apprentice should know monetary transactions.
Aim: The apprentice should be able to enumerate the constituents of bills of exchange by heart.

**Tasks**

1. Explain the difference between objectives, goals and aims!
2. Formulate objectives, goals and aims relevant for your subject! Discuss them in the chat room!

Solution:

1. The formulation of goals is very abstract, objectives are more concrete but alternative interpretations are also possible and aims are to an extent precise that there is only one interpretation possible.

**UNIT 5: Apply taxonomy of educational goals**

This unit describes a taxonomy of educational goals which determine the planning of a teaching lesson. At first the unit gives an overview on a taxonomy according to BLOOM and a taxonomy used at present.

**Taxonomy of educational goals**
A taxonomy is a type of classification, that correspond with the aspects of a scientific discipline. Here: educational goals (learning targets/objectives)

According to BLOOM four guiding principles exist:

- Differences in learner reactions should be reflected
- The taxonomy should be logic
- The taxonomy should coincide with psychic phenomena, it should only deal with such changes of behaviour that are indicated by education
- The taxonomy should be a descriptive system.
- Minimum behaviour/output aimed at requirements for the wording of objectives according to BLOOM:
  - The behaviour/output aimed at must be described in a way that makes it observable.
  - Conditions under which the behaviour/output is to be demonstrated is to be indicated.
  - The scale of evaluation (i.e. The quantity of the quality of the course of the learning act) is to be indicated.

Example:

The apprentice should be able to touch type 300 words with 160 characters per minute with 5 character mistakes maximum on a mechanical typewriter in a copying test. Behaviour/output aimed at: writing

Conditions:

- mechanical typewriter, touch typing
- copying test
- 300 words
- 160 characters per minute

Scale of control: 5 character mistakes maximum

Note:

A learning objective can be denominated operational if, referred to lessons/lectures, everybody in every situation and at any time understands the wording of the learning objective in the same way.

The following figure gives an overview on the present taxonomy used by the German Chamber of Commerce and Industry (Deutsche Industrie und Handelskammer DIHT)

Taxonomy of educational goals (according to the DIHT)
<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
</tr>
</thead>
</table>
| Describes the acquisition of dates, facts or terminology which are required for understanding complex issues | - Cognitive coping  
- Knowing  
- Overview |
| Comprehension | - analyse  
- justify  
- judging  
- prioritize  
- assessing  
- classify  
- appreciate  
- conceive  
- identify  
- structuring  
- distinguishing  
- comparing  
- comprehending  
- allocating |
| Application | - apply  
- act  
- select  
- consider  
- practical control  
- compute  
- consider  
- illustrate  
- define  
- conduct  
- initiating  
- plan  
- develop  
- determine  
- arrange  
- facilitate  
- control  
- guarantee  
- validate  
- assuring  
- manage  
- support  
- induce  
- negotiate  
- prepare  
- suggest  
- perform |

Relationship between taxonomy and the teaching duration: In planning a lesson it is important to determine the time needed and available for each educational goal. The
time needed for an educational goal on the knowledge level is of shorter duration than the time for an educational goal on the application level.

**Tasks**

1. Describe the three educational goals according to the DIHT taxonomy!
2. Compare the used taxonomy in your subject with the DIHT taxonomy and discuss the differences in the chat room!

**UNIT 6: Analyse syllabi or curricula regarding to the kinds of goals especially taxonomied goals**

This unit deals with different kinds of goals in syllabuses or curricula.

**Syllabus (in vocational education)**

According to BLANKERTZ, the syllabus is an ordered summary of contents, that are to be acquired or processed by the learners during a space of time in lessons, schooling or training.

These contents are normally derived from the requirements of the vocational field of acts of the future skilled workers.

In vocational education differentiation between the syllabus for vocational schools and the course outline for practical training (Ausbildungsordnung) and the framework plan is essential.

For the curricula for vocational schools there are recommendations by the Conference of Federal Ministers of Education in Germany (CFME) that had been fixed in framework curricula. Most federal states develop their own curricula on the base of the national frame curricula.

Concerning the set-up of the curricula, there are two fundamental current models in vocational education. One is a matrix like set-up, which has one of its foundations in taxonomy of educational goals according to BLOOM (1972). The other is a T-shaped set-up of the curriculum, where the cross of the "T" corresponds to the wording of learning objectives of a field of contents.

Concerning the work with the curriculum, one needs to remember that the curriculum constitutes an administrative regulation for the teacher. Consequently, there are legally binding parts, but also such that are not binding/without obligation. As a rule, the formulations on learning objectives and on contents are legally binding. Hints on didactic-methodical work are usually not binding.

The dependence of the curriculum for vocational schools on other training documents is to be depicted according to MILLER in the following illustration.

Planning and Analysis of Teaching
Syllabus

- reflection on syllabus
- obligations, scope of action
- distribution of subject
- matter/connections
- interrelation: objectives - contents

<table>
<thead>
<tr>
<th>Teaching preparation</th>
<th>Teaching performance</th>
</tr>
</thead>
</table>
| - analysis of conditions
- didactic analysis
- objectives and contents
- methods and media
- achievement tests
- step-by-step plan/process plan | - impulse, motivation
- conduct of learning processes
- student orientation and activity orientation
- teacher-student relationship
- flexibility and change
- goal achievement |

Teaching reflection

- measurement of success: is - target
- analysis: success - failure
- teacher-student relationship: conducive - not conducive
- explanations of changes
- evaluation of experiences
- elaboration of alternatives

Tasks

1. Bring your own syllabus and analyse the kinds of goals!
2. Analyse the ratio between the kinds of goals in syllabuses. Discuss conclusions on the analysis in the chat room or with your fellow teaching students!

UNIT 7: Apply the way from the syllabus or the curricula to the plan of distribution of content

Starting point for the planning and analysis of teaching is the syllabus for your subject. The conduct of teaching depends on the planning of a lesson and variations due to actual teacher - student interaction. For analysing a lesson the planning has to be compared to the actual conduct, reflected on and alternatives have to be worked out. This unit starts again with the figure of unit 6 on the planning and analysis of teaching.

Planning and analysis of teaching

Syllabus

- reflection on syllabus
- obligations, scope of action
The starting point for the development of a plan of distribution of content is the syllabus:

**Syllabus:**

- descriptive-normative function
- norms the main structure of the teaching task by objectives, content and time standard
- expression of social interests through educational goals
- structured according to
  - scientific disciplines ➔ subjects
  - vocational activities ➔ learning field

<table>
<thead>
<tr>
<th>Topic of syllabus unit</th>
<th>hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>goal</td>
<td></td>
</tr>
</tbody>
</table>
Plan of distribution of content:

Functions:

Planning function:
- structuring of content (orderliness and systematics, comprehensibility)
- enabling the connection to other subjects
- specific planning by long-term structuring
- long-term planning of student tasks
- planning and acquisition of media

Analysis function:
- fulfilment of syllabus
- content - time - relation

Structure of plans of distribution:
Elements:
- ✓ time plan
- ✓ topics / aims
- ✓ methodical recommendations / connections / long-term tasks
- ✓ media

Questions for working out a plan of distribution:

Time plan:
- ✓ How many teaching weeks / lessons are provided?
- ✓ How many and which lost days are expected?

Structure of content:
- ✓ What kind of theoretical and practical pre-conditions are there?
- ✓ What kind of subject structures have to be considered?
- ✓ What kinds of connections to other subjects or practical trainings are useful?
Are seasonally conditions for topics to consider?

Didactical-methodical aspects:

- Do didactical aspects require a certain subject structure? (e.g. project work)
- Are seasonally conditions for methods to consider? (field inquiry)
- Should free space be planned?

Task

1. Please obtain an actual syllabus (or the syllabus from unit 6) of your subject and develop for a small unit a plan of distribution of content for about 10 teaching lessons!
2. Discuss your examples and problems in the chat room!

UNIT 8: Apply the coherence between planning elements

In this unit you should apply the knowledge from the so far discussed units, especially the coherence between planning elements. HEIMANN developed in his "didactics of learning theories" approach a simplified model for planning and analysing teaching, which points out the coherence of the fields of conditions and the fields of decisions. The graphic in the additional information gives an overview about important aspects.

Teaching is influenced by:

**Fields of conditions**

- anthropogenic pre-conditions (all internal pre-conditions)
- social and cultural pre-conditions (class, group size, institutional conditions)

**Fields of decisions**

- Intensions
- Content
- Methodology
- Choice of Media
Tasks

1. Illustrate the coherence between the fields of conditions and goals, methods, media and content on a concrete example!
2. Discuss the interdependence between the fields of condition and the fields of decision on concrete examples!

UNIT 9: Prepare a teaching unit

In the former units you have got to know how to apply different didactical principles in typical teaching situations, how to prepare a plan of distribution of content and to apply the coherence between the different planning elements. This unit is a kind of guideline for preparing a teaching unit.

Now you can prepare a complex teaching unit

Planning of a teaching unit

Syllabus/curriculum:

✓ objectives
✓ mandatory content

Planning tasks of the teacher:

1. Assessment of situational pre-conditions
2. Decision on aims and content
3. Decision on teaching and learning procedures
4. Decision on social forms of learning
5. Decision on learning and teaching aids
6. Specific procedures for controll

1st Planning complex: Assessment of situational pre-conditions (condition analysis)

- What kind of development status do the students already have?
- What do they already know concerning the relevant objective/topic?
- What kind of general skills and attitudes do the students have? What kind of learning and working techniques are they acquainted with?
- What kind of effect will the concrete lesson have? When is it scheduled? How are the students strained before/after?
- Which effects may have situational influences (room situation? class size? School equipment? etc.)

2nd Planning complex: Decisions on aims and content (including didactical analysis)

What significance concerning subject matter and interdisciplinary matters has the aim? What significance has it for the vocational practice? How does it fit into long-term planning?

How is the aim legitimized for the students?

How can the aim be precisely adjusted to the teaching lesson? Can it be achieved in the given time? How has to be formulated meaningful?

How can the aim be achieved best? Has it to be subdivided? What kind of intermediate steps for subject/content are necessary? How should they be arranged?

How should the expected learning achievement be controlled? What kinds of tasks make an assessment possible?

3rd Planning complex: Decision on learning and teaching procedures

With what kind of learning acts should the learner deal with the content? What kind of acts are suited to

- develop new content
- consolidate and enhance knowledge
- assess learning achievements?

How are the learning acts to be arranged?

How have the learners to be prepared for the learning acts?
How do they have to be orientated towards the acts? How can motives for acts be formed?

What kind of information has the teacher to provide?

Should special methods be used (project work, case studies, etc.)?

4th Planning complex: Decision on social forms of learning

✓ In which way should the students work together with each other and with the teacher?
✓ Should some forms be preferred or excluded because of didactical considerations?
✓ What kinds of organisational preparations have to be done? (Preparation of the room, seating arrangements etc.)

5th Planning complex: Decision on learning and teaching aids

✓ What aids should be used? Are some aids more suitable because of methodical or subject matters?
✓ How are these aids provided? Are they available in school, or do they have to be obtained or produced?

6th Planning complex: Specific procedures for safeguarding

✓ Is information being handed over to the students? (Dates, material etc.)
✓ How should the blackboard information be designed?
✓ What kind of homework should be done? What kind of homework is reasonable?
How have the tasks be formulated, prepared and how can they be controlled?

Tasks

1. Plan (in written form) and conduct (at your university or institution) a teaching unit.
2. What do you need to prepare for the teaching unit?
3. Choose a topic of your field. Decide what you want to do: Teacher talk or maybe a demonstration?
4. Use the equipment proper!
5. Discuss the planning of the teaching unit in the chat room.
6. Discuss the conducting of the teaching unit with your teacher fellows and your experienced teaching consultant!

Note:
If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
MODULE 6:
Develop or adapt teaching aids

<table>
<thead>
<tr>
<th>Nº</th>
<th>Name of Unit</th>
<th>Tests</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Organise a personal teacher folder</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Develop black or white-board images</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Develop flipchart, wall chart and pin board images</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Design OHP-transparencies</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Develop handouts and assignment sheets for students</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Search for images in internet and download</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Plan the provision or preparation of models from the world of work</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Arrange a media store and state rules for application and use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Specific objectives of module:**

It is intended that, after studying the handouts or participating in a seminar about the topic, you would be able to:

- Explain the reasons of visualisation in the learning process
- Distinguish the different media applied in teaching and state advantages and disadvantages
- Select and apply the different kinds of media
- Prepare OHP transparencies and handouts
- Get images and information from the World Wide Web
- Organise media for specific subjects

**Purpose of module:**

- Developing media for teaching purposes
- Learning how to use and prepare media
- Exercising and work with media
- Improving skills in applying and developing media
Graphical structure of the module

General information about visualisation (1/8)

For more information see also Reader M6-1, “Visualization”

Human beings perceive the signals of environment mainly through 5 sensory channels: see, hear, smell, taste, feel. But the main sense organ to perceive information is the eye. It is easy to realise the problems somebody has, if this sense organ in not available.

Information and learning contents have to be presented as much as appropriate in a way that the eyes have something to catch!

The concept „visualisation“ means to form a mental image by visual aids.

Visualisation is both a method and a mean to make something visible. We also know the presentation of models, the demonstration of a procedure, the experiments with objects - these methods are also possibilities to visualise.

An old proverb means: „one picture explains more than 1000 words“. That message is still true.

A lot of didactic principles contain the demand to make contents visible.
General information about visualisation (2/8)

The advantages of appropriate visualisation:

✓ To shorten explanations
✓ To supplement lectures
✓ To give orientations
✓ To ease the perception of information
✓ To enhance the retention
✓ To guide the attention
✓ To strengthen the motivation
✓ To ease the conceptualisation

But, if visualisation is taken to extremes, than we can also get a negative effect.

Therefore, we have to consider:

✓ What is the purpose of visualisation? (objective)
✓ Who is the addressee of visualisation? (target group)
✓ What should be visualised? (contents)
✓ How should be visualised? (media, methods)
✓ Which conditions for visualisation are available? (availability and technical conditions of media)

General information about visualisation (3/8)

The availability of media is one of the presuppositions to apply visualisation. The former educationalist COMENIUS has already demanded 300 years ago the maintaining of the link between learning contents and learning media: “give the senses what they need, so
✓ give the eyes something to see,
✓ give the ears something to hear,
✓ give the nose something to smell,
✓ give the tongue something to taste,
✓ give the fingers something to feel …”
Module 6/ IST

Following that advise, we should try to involve all 5 senses during visualisation by combining of media.

Visualisation has a great influence on learning. Not only to ease the perception but also to enhance the retention can be done if seeing is linked with listening. That experience can be seen in the picture.

General information about visualisation (4/8)

Findings from several experiments display quite clear the advantages of a lecture with appropriate media:

Within a class in natural science about domestic animals four learning groups were formed.

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st group</td>
<td>received the contents trough a lecture (only by words)</td>
</tr>
<tr>
<td>2nd group</td>
<td>received the contents trough a lecture and presented pictures of the domestic animals (word + picture)</td>
</tr>
<tr>
<td>3rd group</td>
<td>got in addition to words a model</td>
</tr>
<tr>
<td>4th group</td>
<td>could see in addition to words, a living animal.</td>
</tr>
</tbody>
</table>

After 4 days a test had been made to find out the amount of retentive information. In comparison to the 1st group (only words) the following increasing could be monitored:

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of visualisation</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd group</td>
<td>word + picture</td>
<td>x + 9.5 %</td>
</tr>
<tr>
<td>3rd group</td>
<td>word + model</td>
<td>x + 20.0 %</td>
</tr>
<tr>
<td>4th group</td>
<td>word + living object</td>
<td>x + 40.7 %</td>
</tr>
</tbody>
</table>

General information about visualisation (5/8)

Also the approach of visualisation has a certain importance during the learning process. We distinguish:

- the inductive approach
- the deductive approach

The inductive approach leads from individual appearances via particularities to common or regular appearances.
For example the discussion of a measuring instrument (dial indicator) leads from the outer appearance (photograph) to the graphic principle to deal with functions and technical principles.

On the contrary the deductive approach leads from common or regular appearances via particularities to individual appearances, by logical conclusions.

Using the example, at first the technical principle of a dial indicator has to be discussed, than the engineering drawing has to be presented, followed by the photograph.

<table>
<thead>
<tr>
<th>photograph</th>
<th>drawing</th>
<th>graphic principle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inductive (from left to right)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>deductive (from right to left)</td>
</tr>
</tbody>
</table>

**General information about visualisation (6/8)**

Another logical approaches are:

- the analysis
- the synthesis

Through analysis the comprehensive learning object will be broken down into individual components by using a certain principle of structuring.

But through syntheses the individual components will be joined together to the whole. Both approaches are usually applied in joint action and can be visualised often differently.

**Designing selected visual media**

Here we consider photographs, pictures and sketches, schemes, plans, symbols, diagrams, graphics etc. in addition to texts. They have to be transferred to blackboard, flip chart, pin board or overhead-transparency. But we have always to consider the limited space on the media carriers.

**General information about visualisation (7/8)**

**The text design**

Visualise only those text, which are necessary to supplement the spoken word, like rules, definitions, summaries, conclusions or explanations of graphics. The text design should be simple, short and clear, and should have a logical structure.
Do not write longer text out of textbooks, as you have certain reasons for that.

**The graphic design**

Here we have to consider colours, shapes, as well as graphical elements and structures. Graphical structures can be diagrams. Quantitative matters can be visualised as:

- lines (to mark, to give reference, to connect ...)
- arrows (motions and sequences)
- stretches (length, height to compare lengths)
- areas (circles, squares, triangles to compare area)
- bodies (cubes, pyramids - to compare volumes)
- colours (to emphasize)

**General information about visualisation (8/8)**

**Common principles for the visualisation of contents**

- show unity by using similar colours and shapes as well as frames (borders)
- show motions and processes by drawing arrows
- use colours for emotional, ethic and signal effects
- use symbols for complex information

**Rules:**

- each picture needs a title,
- less information eases the perception
- show comparisons in one picture
- use equal colours and shapes for equal facts
- do not use more than 3 colours in one picture
- put the most important fact on top or in the centre
- maintain a good relation between text and graphics

**Selected techniques of visualisation**

Nowadays the visualisation of group-dynamic process, like the moderation of discussions, the solving of a problem as well as the planning of activities gets an increasing meaning. Such techniques are:

*mind mapping* (see M6-8)
visualised brainstorming (see M2-7)

optical feed-back-techniques, (see M6-9) different forms of visualisation

Unit 1: Organise a personal teaching folder

What is a personal teaching folder?

Generally, we would define a personal teaching folder as a folder containing all teaching preparations for a particular subject to be taught for a particular trade. If teaching more then one subject, personal teaching folders are for each of them are necessary. The content of a teaching subject is normally laid out and described in the curriculum. There, one finds the basis to even organise the particular lessons of the subject, because topics and time spend on them is given. Still, the lesson preparations derive indirectly from the curricula or syllabi. If syllabi or curricula are existent (and they should), they are used as a guideline to also organise your personal teaching folder. One takes the topic with the scheduled time and elaborates a lesson preparation. (you can also see reader "lesson preparation")

Well, to organise all those, it is recommended to separate each lesson into the following:

- Summary of previous lesson
- Objectives of the lesson
- Contents to teach
- Method to teach
- Media, equipment, tools (kind, number and location)
- Handouts, assignments, exercises, tasks, technical drawings, solutions

Interleaves or indices should be used according to the topics or better lessons, if possible. Indications towards the year of training, semester (trimester) or week of training and of course the trade area and subject should be made. The folder should also have a label clearly indicating the trade area, the subject and the year of training. It makes things easier, also and especially in case of somebody has to stand in for someone. Also very important is a "table of contents" to give clear indications towards the contents (topics) of the subject. Reason being is to get an overview.

Unit 2: Develop black or white-board Images

General information

The black or white board is still a common visual media in classrooms. It is commonly used to spontaneously elaborate on pupils questions. Black and white boards are suitable for the step by step development or explanation of facts or circumstances and also to collect data (e.g. topics, suggestions). They are not suitable for images used for a long term.
Images on black and white boards should be planned during the preparation of the lesson and the necessary space left. Things on black or white boards can easily be removed or changed. Sketches for blackboard or whiteboard images will be usually made out of textbooks and are further developed by the trainer or teacher. We use drawings, pictures and diagrams.

Without a big effort they should be drawn quickly on the board. For that reason we recommend to draw a grid first on a paper and copy the original. That grid has to be drawn on the board if the board has not any. All the sketches should be filed attached to the lesson plan.

**Advantages:**

- Practically existing in all classrooms
- Independent from power
- Suitable for small and big groups
- Slowing down the speed for complex learning matters
- Correcting and erasing possible at any time

**Disadvantages:**

- Writing is time consuming
- While writing no eye contact to audience
- Writing and speaking at the same time is difficult
- Images cannot be stored

**Additional information and tips**

- Use only clean whiteboards or blackboards
- Write and draw sufficiently big
- When drawing straight lines look at the target point (end of line)
- Use only bright chalk (or dark pens)
- Divide bigger blackboards
- Prepare complex images in advance

**Task 1**

Practise writing on a blackboard and draw images on blackboards. Check the readability of your writing from the students’ place which is far away from the blackboard. Correct the size of writing if necessary. Practise also making horizontal and vertical lines as well as circles.
Finally design a blackboard or whiteboard image (containing text and images) of your subject, take a picture of it and send it to your tutor.

Unit 3: Develop flipchart, wall chart and pin board images

Similar to the procedure described for the blackboard and whiteboard, we can prepare a collection of sketches or even draw the pictures already to that paper and store it.

The advantage is that the paper can always be used again and again.

An entire process of discussion can be preserved. Even after interruptions of weeks the flip chart paper can be replaced and the process can go on

Tips and hints

- Use broad markers and pens
- Write and draw sufficiently big
- Write in block letters
- Arrange and classify by using headings, colours and drawings
- Leave sufficient space in between the lines
Advantages:

✓ Exists in most of the classrooms and seminar rooms
✓ Easy to move
✓ Independent from power
✓ Can be prepared in advance
✓ Pages can easily be transported and stored
✓ Pages can be put onto the wall
✓ Ideal for brainstorming, group work and contents to be visual for a longer time

Disadvantages:

✓ Limited space for writing
✓ While writing no eye contact to the audience
✓ Not suitable for big rooms
✓ Erasing not possible

link to images with good examples

Unit 4: Design OHP transparencies

General information:

The presentation of overhead projector (OHP) transparencies shall underline and support the statements made during a lesson or lecture. Therefore consider the information you bring on the transparencies. Due to viewing habits the eye normally wanders from upper left to down right when looking on a transparency.

That is why the most important information should be on the top and the not so important information (e.g. page numbers, logos) in the footer.
Advantages:

- Can be used in almost every room
- Eye contact to the audience is possible
- Transparencies can be prepared in advance
- Transparencies can be stored and used again
- Sequence of transparencies can be changed
- Supplementation is possible
- Step by step development possible
- Reducing writing and speaking effort

Disadvantages:

It is mainly the wrong or bad application of the media, e.g. too much information is given on one transparency, the font size is too small, using the OHP for too long or changing the transparencies too quickly.

Nowadays transparencies are designed on a computer using various kinds of software. But in case of power cuts or if there is no access to a computer, OHPs can still be produced manually.

**Manual method to produce transparencies:**

- Make a sketch of the picture or diagram on a sheet of paper with a pencil.
- Place clear transparency over the sketch. Paper clips or small pieces of masking tape should be used to hold the transparency and the sketch firmly together.
- Use either water soluble or permanent colour markers designed for transparencies. Permanent markers usually give brighter colours.

Materials used to prepare transparencies include:

- a clear & transparent plastic sheet
- photocopy transparency sheets (if available)
- transparency marking pens - water soluble or permanent
- thinner (for removing the markings from the transparency and correcting mistakes)
- drawing instruments (templates, set squares, protractor, ruler, compass & dividers)
**Tips and hints:**

- If possible use the landscape format
- Develop a title transparency
- Follow the same structure
- Use the same fonts, font sizes, same symbols, frames and shadings for similar contents
- Recommended font size for headings at least 20pt, for normal text not smaller than 16pt
- Choose good readable fonts (e.g. Arial)

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**Task 1**

Follow the links which will lead you to four samples of overhead transparencies. Please have a close look at all samples and and judge them. Send your findings to your tutor via Email, stating also module and unit.

See OHP examples in Graphics M6-4

**Task 2**

Design a overhead transparency using PowerPoint software and forward it to your tutor via Email. State reasons why you did the way you did the transparency.

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**Unit 5: Develop handouts and assignment sheets**

**Handouts**

When developing and producing handouts for teaching purposes, consider how the handouts will help the learner either refer to a point or remember the content of your instruction/lesson. Often visual cues remind people of things they are still working on retaining. Handouts can serve this purpose as well as provide material for later reference. It is important when developing handout materials for a single event to have some design consistency from one handout to another. This allows the learners to identify the materials with the event and the content presented. In addition, handouts should be cleanly laid out so as to cause the least possible confusion. As a rule, long handouts are less effective than shorter one to two page handouts.

Some general guidelines to follow while developing handout materials are:
Consider how this handout relates to skills being taught and tasks to be performed
Title the handout and date it
Identify the purpose of the handout
Specify when and how the handout is to be used
Reference any additional materials that are needed in using it
Bold print, underline or capitalize to emphasize information
Space information so it is easy to read
Use short, active sentences
Avoid unnecessary information
Fully credit any source of information

See sample OHPs on M6-6

Assignment sheets

Generally speaking, when developing and producing assignment sheets, the same general guidelines as for developing and producing handouts can be followed. The difference is that there is no emphasis on information but instead on instructions or tasks given to be solved. Clear directions should be given what to do or what problem has to be solved.

See sample assignment sheet (about calculations), M6-7

Task:

Develop a handout and a assignment sheet and send it to your tutor via email.

Unit 6: Search for images in the internet and their download

First and foremost, basic knowledge in using the personal computer is required and assumed when using this "e-learning" programme. Still, crosscheck the following questions!

- Do I know how to get online/offline (connected/disconnected)?
- Am I aware of search engines (local/international) and which one do I use?
- What choices and options do I have using a particular search engine?
- Have I chosen the best or most appropriate entries/headwords?
- What alternatives do I have?
General information on search engines:

Most search engines offer options where and what to look for, e.g.:

- Look in the entire web,
- Language tools (selection, translations, country, others),
- Look for images, groups, news, etc.,
- Advanced search to find results (with all of the words, with exact phrase, file format, number of results, page specific search, topic specific search, etc.),
- Others

Learning by doing is a good choice...

Task:

Download an image, in this case the logo of the company "IBC GmbH". Write to your tutor, how many steps it took you to find and download the image, stating also what browser, what search engine and what preferences you have chosen.

Note:

It is generally recommended to open a new window to open a link (result) from the search engine by clicking the right button of the mouse, choosing "open link in new window".

This way the "hits" (found results) remain open. Once found an image, it is normally downloaded by clicking the right mouse button, choosing "save image or target as...". You have now to select the folder where you want to save the image. Having found/downloaded the desired image or images, be also aware of copyrights claimed.

If you have the impression, you will visit the site more often, where you have downloaded image or images from, you can also bookmark this website. Depending on the browser used, there is normally either a folder called "favourites" and or "links", which can be used. The so called cookies get you connected faster to the bookmarked website.
Unit 7: Plan the provision or preparation of models

Definition of a model:

A three-dimensional representation of an existing person or thing or projected structure, showing the proportions and arrangement of its component parts. (source: Oxford Dictionary)

First question to ask is: "Is there a storeroom, where models are stored?"

Second question to ask is: "If there is one, are you aware of all models stored in there?"

The ideal situation is to have a storeroom with shelves, where the models are, organized or arranged by subject. There should also be a registry (folder) about all models existing with a table of contents.

Check also the providers (companies) of learning and teaching materials, where you could order models from. Some providers do offer models suitable for your subject.

Task:

Go to the store or rooms, where there are models. Get an overview of all existing models. Identify and select models appropriate to the subject or subjects you are teaching.

To do so, we recommend to prepare a list of topics or lessons to be taught (of an entire subject), where you can mark with a cross where there are or are not models for the respective lesson or topic.
Unit 8: Arrange media store and state rules for application and use

There should be a room made available to store all media if there is none or specific media is not stored directly in a laboratory. Media in this case includes the following:

- OHP,
- Slide projectors and slides,
- Beamers,
- Flip charts,
- Pin boards and accessories,
- Models,
- Charts, maps,
- Others

Excluded are OHP transparencies and consumables such as chalk, white board markers etc.. Access to the media store should only be given to the staff of the respective school or vocational training centre. There should also be a registry indicating all media. The registry could reflect an inventory of media (stock list), where each item is named and has an inventory number.

Secondly, there should be a list where the teaching staff enters the name, the dates the media is taken and returned.

<table>
<thead>
<tr>
<th>Kind of media</th>
<th>Inventory number</th>
<th>Name/signature</th>
<th>Pick up date</th>
<th>Return date</th>
</tr>
</thead>
</table>

Sample: List for a media store

Preferably, the media is stored in shelves which are labelled (e.g. by subject or kind of media).

Note:

If you have completed all units of the module, you can go ahead to the next modules. If you have not completed all units of the module, you are recommended to complete those missing units first before going ahead.
Programme Reform of TVET in Viet Nam