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AUTHOR PRESENTATION AND INTRODUCTION

Satu Lindén (KM) has worked as a researcher on the Department of Biotechnology and Chemical Technology of the Helsinki University of Technology.

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The various methods and course templates presented in this handbook have come up in the co-operation with teachers. This co-operation has shown that teachers use a limited amount of different teaching and evaluation methods, and rarely widen their method toolbox. The course structure is often based on only a few historical templates. Of these, the most familiar to the students is the passive lecture course with a traditional examination at the end. The course structure sets limits for the students' studying and their guidance. Besides contact teaching, the guidance of working methods related to studying has often gone unnoticed.

The co-operation with teacher's also revealed that improving contact teaching is usually seen as the most important aspect of course development. However, the courses cannot be developed to better support studying only by analysing current methods and improving presentation material. It also requires that teachers question the current structures and adopt new working methods arising from new learning outcomes. Therefore, the pursued know-how has to be taken as the premise for the planning of development. Building on this, the actions of the students during the course have to be planned to make attaining the set goals possible. The focus of the planning has to be placed on the actions of the student, not those of the teacher.

Even the more progressive teachers often operate only within the given framework, and the best teacher is often just a synonym for the best lecturer. We must remember that learning happens due to the time that the student (not the teacher) has spent studying. Due to the nature of learning and the resources available for teaching, a large part of the learning happens, and will happen, without the teacher's immediate presence. Thus, if teachers only utilise contact teaching methods during course, they leave the student unguided and unsupported for most of the time that is significant for learning. From the student's perspective, time spent studying without the teacher present is the most important for learning. A teacher can have a positive influence on the learning results of the study module by supporting this studying. It is the purpose of this manual to help teachers expand their activities that support studying to other working methods besides contact teaching, and guide the work of the students to reach new levels.

This handbook incorporates the articles by Olli Hyppönen on various teaching methods (Hyppönen 2006), assessment methods for learning (Hyppönen 2004) and assessment methods for teaching (Hyppönen 2005), previously published on the Internet.

The creation process of this handbook has included the help of several people that have read the work and have given valuable improvement suggestions. We wish to thank especially Katrina Nordström, Miia Erkkilä, the staff of the Teaching and Learning Development Unit of the Helsinki University of Techology and the teachers of the Helsinki University of Techology who attended teacher training.

ABSTRACT

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Title:
Opettajan käsikirja – opintojaksojen rakenteet, opetusmenetelmät ja arviointi (Handbook for teachers: course structures, teaching methods and assessment)

Key words:
Learning, teaching, studying, working methods, teaching methods, assessment of learning, assessment of teaching

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The handbook introduces a course planning model, where the structure of a course is made up of the various working methods used by students. In addition, the book gives a short introduction of different teaching methods as well as methods for assessing learning and teaching. Teachers can use these to modify, improve and diversify their teaching and to enhance the learning results of students by influencing their actions.

The book aims to highlight the importance of student working methods for the development of a deeper understanding of the studied topic. It also introduces some practical models to help teachers in course planning with the goal of offering some practical alternatives for teachers to apply to their teaching.

The book also includes a model for assessing the teacher workload associated with different student working methods. The model allows teachers to calculate and compare the workload of different working methods. Guided by the examples in the handbook, teachers can start calculating the course workloads themselves, which allows them to see course structures from a new viewpoint.

The book provides teachers with various examples of how the different working methods may be used creatively when planning new types of courses. These examples provide a good starting point for teachers planning and implementing new course structures. This handbook helps teachers to structure courses appropriately, taking into account the nature of the topic, the time available and other requirements.

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1 INTRODUCTION

It is the purpose of this handbook to help teachers develop course starting from making the development decision and ending in implementing the improvements. The need for the development of courses is based on the fact that even though traditional lecture, which is a passive learning method for the students, has been shown to lead to a superficial approach to learning, it still is a widely used teaching method. This manual is used discuss alternative teaching methods and to open up various working methods that you can use to organise teaching and learning during the course. Our goal is to lower the threshold for implementing teaching methods that deep approach learning methods and alternative working methods to contact teaching. In addition, we present templates for courses that use various working methods flexibly side-by-side. Because alternative teaching and learning methods are often regarded as more taxing than a traditional lecture-based teaching method, we also discuss the workloads of various working methods. We look at the workloads especially from the teacher's perspective. We also discuss some ways of estimating that workload in the study module planning phase.

In addition to the chosen teaching and working methods, the way that learning is assessed has a profound effect on how students study and the learning results they achieve. For this reason, assessment of learning is also discussed in this handbook.

The purpose of this handbook is to help teachers modify the structure of courses so that it supports studying that promotes a deep approach to learning[1]. A teacher can promote students' commitment to studying by creating meaningful learning experiences and possibilities (Smith, Sheppard, Johnson & Johnson 2005, 2). The choices made on the structure of a course have an essential effect on how the students study during the course. Thus, the structure of a study module places limits on the student's success potential and possibilities of achieving the set learning outcomes[2] during the study module. Structural choices are often based on the traditional and most widely used model (lectures + examination) instead on focusing on a model that would make the students commit to a way of studying that would better enable a deep approach to learning.

The need for the development of the course can be seen when teaching is assessed. At the same time, assessment produces information that can be used for the development of teaching. Feedback plays an important role in the development of teaching, and it should be collected on both the strengths and the weaknesses of a course. The course can be further improved to better support the achievement of learning outcomes based on the received feedback. (Kuittinen 1994, 10.) The assessment of teaching is discussed in this handbook through various assessment methods for teaching.

Often, fears that alternative teaching methods are very taxing form an obstacle for the development of teaching. In truth, teachers can affect their workloads by varying the used teaching methods. Variable course structures and teaching methods can be used even with large groups of students. The discussions in this handbook on how taxing various working methods are show that lecturing is not necessarily the most economical and least taxing method for the teacher.

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[1] Deep approach to learning here means learning that includes understanding, is significant to the student and is integrated to earlier knowledge. Often, a deep approach to learning is associated with the student's interest on the subject matter and a desire to learn. In comparison, a surface approach to learning indicates memorising things and repeating them mechanically. Due to a lack of understanding, the learned things remain separate pieces of information and adapting them later is very challenging. (Entwistle 1995.)

[2] The term ´learning outcomes´ describes the goals of the course. In this handbook, learning outcomes refers both to the things that the student is supposed to learn and the level at which the learning happens.

Fears related to changes often form another significant obstacle for the development of teaching. However, fear should not become a barrier preventing the development of courses. Development work and trying out various methods can be encouraged by superiors and the whole institution setting an example and giving support to teachers.

There are numerous scientific articles on various studies focusing on singular teaching methods, but more complete views on teaching methods and the various working methods of students are rare (Bonner 1999). This is why we feel that there is a need for this handbook, which discusses various working methods as well as evaluates and compares them. As we add the assessment of learning and teaching to the various working methods, the result is a handbook on the subjects that a teacher has to consider when planning and developing study modules.

2 SUCCESSFUL TEACHING

This chapter discusses teaching, studying and learning and introduces the essential phenomena for teaching development. At the same time it explains some factors that have a significant influence on the planning and development of courses.

Teaching in a teaching act is an interactive and goal-oriented action that aims to influence the learning and personal development of students (Kansanen 2004, 58; Uljens 1997, 35–36). The common goal for both parties of the teaching act is to evoke high-quality and deep approach to learning (Nevgi & Lindblom-Ylänne 2004, 236). The task of the teacher is to enable learning by supporting the prerequisites of studying (Uljens 1997, 35–36). The curriculum should always be noted in relation to teaching. The curriculum expresses the goals of learning and it guides the actions of both teachers and students as well as the whole educational process (Kansanen 1999, 82, 86).

Teaching in itself does not lead to learning, since the actions of the students themselves, studying, are essential to learning (Uljens 1997, 35–36). Studying is the interaction of students and the studied subject matters, whose goal is to achieve learning. Therefore, it is the conscious effort of the students to achieve the learning outcomes expressed in the curriculum. (Kansanen 2003, 230; Uljens 1997, 34–38.) Learning, on the other hand, can be defined as the change and development of knowledge, understanding, skills and opinions (Brown, Bull & Pendlebury 1997, 21). However, there exist several, even somewhat contradictory, definitions of learning.

So, the goal of the interaction between a teacher and students is the learning achieved by students. In reality, however, a teacher can only influence learning indirectly through the studying of students (Kansanen 1999, 85). This is because learning is the outcome of studying, not teaching, as explained above. Despite this lack of a direct link between teaching and the learning achieved by students, teaching methods aim to influence the study process to achieve the set learning outcome. (Uljens 1997, 39, 43.) The following chapters focus on the planning of courses and the different parts of teaching methods.

2.1 Successful planning of a course

When planning a course, a good starting point is the definition of the learning outcomes set for the students. These goals help to direct the direction and depth of learning and form the basis of assessment. As you set the learning outcomes, you should take into consideration the existing knowledge of the students and the relations of the course with other courses to promote cumulative and comprehensive learning. Outcomes may be formed co-operatively with students and they should be adjusted during the course. This way you can ensure that the course structure takes the students' premises and ability to challenge themselves into consideration.

The learning outcomes guide the planning of the course. Constructively aligned planning aims to create a course, where all factors of teaching are focused on high-quality learning. To enable this, the learning outcomes and used teaching and evaluation methods are planned to supplement one another. According to the principles of constructively aligned teaching, the planned outcomes are based on the level of understanding required from the students. The teaching and assessment methods are then chosen to support the achievement of the defined learning outcomes and to enable the students' commitment to studying in a way that is consistent with the outcomes. When selecting a suitable assessment method, you should also think about the fact that with it, you should be able to find out how well the outcomes have been achieved. If the different parts of teaching are not lined up towards the same goal, teaching becomes inconsistent and the probability of achieving the learning outcomes set for the course decreases,

which makes the importance of constructively aligned course planning evident. Teaching is often not constructively aligned, since the traditional view of teaching as the mechanical transfer of knowledge still persists. (see Biggs 2003, 1999.)

In addition to the planned outcomes, a further premise for course planning is the number of hours set for it in the curriculum. The used teaching and working methods, their emphasis and placement inside the course are decided according to this number of hours. The make a deep approach to learning possible, it is also important to reserve time for independent studying, because learning is achieved through the student's independent thought. In contact teaching, the students can be brought to the new knowledge and the subject to be learned, but in order to understand it, the students have to contemplate the matter from their own premises. Thus, learning depends on how the students utilise available time and tools for studying. (see Karjalainen, Alha & Jutila 2003, 10, 43–44, 46). If the course focuses intensively on contact teaching, it uses much of the teacher's resources, and, as the only working method, it often supports learning poorly, as expressed above. However, the mindset of the teachers is often contrary to the perspective presented here and is based on the assumption that the more time the teacher can spend with the students, the better learning is achieved.

2.2 Teaching style

Teaching comprises the used teaching methods and the teaching style. The teaching style has at least as strong an effect on the study motivation of the students and the quality and form of achieved learning as the used teaching method. (Jarvis 2002.)

Teaching methods refer to the techniques used by the teacher. The teaching style instead refers to the way that the teacher expresses himself/herself while teaching. It is essentially based on the teacher's identity, personality and character. Different teachers may use the same teaching methods to teach the same subject matters, but they may still teach very differently. Therefore, different teachers support various types of studying and guide their students to different learning processes. Examination of teaching methods without any consideration to teaching style easily leads to the standardization of teaching while ignoring the individuality of each teacher and teaching situation. A good teaching method does not equal good teaching, because it is also fundamentally affected by the identity of the teacher. (Jarvis 2002.)

University teaching has been broadly studied during the last decades. Even though the results of these studies differ from one another in details, the results support each other when viewed with a wider perspective. In the studies, the scope of teaching is defined as the aim to transfer knowledge to students and to develop the conceptual understanding of the students. In relation to the first aim, the actions of the teacher and the used teaching strategies are emphasised, whereas the second aim emphasises the students and their development. (Åkerlind 2003.) This scope is reflected in the approaches of teaching.

Teaching approaches refer to the teacher's teaching activity and teaching style. They have an effect on what and how the teacher teaches, and what he/she values as learning outcomes. (Samuelowicz & Bain 1992.) Teaching approaches are related to the achieved quality of learning through studying. This handbook uses the terms content-based approach and learning-based approach. The content-based teaching approach includes the conception of learning as the quantitative increase of knowledge, and teaching is understood as the mechanical transfer of information to students. In the centre of this teaching approach is the knowledge that is taught, which the teacher tries to transmit to the students. The teacher controls the knowledge that is taught and the way that the knowledge is presented to the students. The content-based teaching approach is often related to a surface approach to studying. The terms teacher-focused and content-focused approach are also used for this approach. (see Postareff & Lindblom-Ylänne 2008; Lindblom-Ylänne, Trigwell, Nevgi & Ashwin 2006; Killen 2001.)

The learning-based teaching approach refers to teaching, whose aim is to promote the learning process of the students. This approach includes the conception of learning as the change and development of the student's comprehensions. In this approach, the goal of teaching is defined as the promotion of the students' learning. The learning-based teaching approach supports a deep approach to studying and high-quality learning. The terms student-based and student-focused approach are also used for this approach. (Lindblom-Ylänne, Trigwell, Nevgi & Ashwin 2006; Killen 2001; Trigwell, Prosser & Waterhouse 1999.)

These teaching approaches are not complete opposites, since they also have similar features. Nevertheless, it has been said that the learning-based teaching approach is more extensive and developed than the content-based approach, and should, therefore, be supported in teachers' pedagogical training, for example. (Postareff & Lindblom-Ylänne 2008.) Table 1 presents the learning-based and the content-based teaching approaches.

Table 1 Teaching approach variations (Postareff & Lindblom-Ylänne 2008, 113–114).

LEARNING-BASED	CONTENT-BASED
1 Teaching process	
1.1 Planning teaching • Student needs, earlier knowledge and expectations form the premises of planning. • Students are asked to participated in planning, where possible. • Plans are not too detailed. 1.2 Teaching practices • Knowledge is built in co-operation with the students. • Teaching focuses on broad comprehensive subjects. • The teacher understands that students have various ways of learning. • Stimulating teaching methods are used to enable learning. 1.3 Assessment practices • The depth of the students' understanding is examined through assessment. • Versatile assessment methods are utilised for assessment.	1.1 Planning teaching • The teacher's own points of interest form the basis of planning. • The teacher creates a detailed schedule with no room for flexibility. The teacher also plans the course content independently. 1.2 Teaching practices • Teaching follows the plan strictly. • The teacher transmits the information to the students. • Teaching is largely focused on facts and details. • The teacher chooses a teaching method that he/she is the most comfortable with. 1.3 Assessment practices • Utilises traditional assessment methods that are familiar to the teacher.
2 Learning environment	
2.1 The role of the teacher • Students are encouraged to be critical and active. • The relationship between the teacher and the students is equal and informal. Both parties are expected to learn. • The teacher has a positive attitude towards teaching. 2.2 The role of the student • Students are seen as individuals and active participants, who are able to process information and solve problems independently. • Students bear the responsibility for their learning. 2.3 Interaction • Knowledge is built co-operatively. • The interaction between the teacher and the students and between various students is thought to improve the learning results. • Interactive elements are used to enable learning despite the group size. 2.4 Atmosphere • A pleasant and safe atmosphere supports learning. • The atmosphere is created together with the students.	2.1 The role of the teacher • The relationship between the teacher and the students is more distant. • Students learn from the teacher. The teacher is an expert, who points to the factual content that needs to be learned. • The teacher does not often feel that the teaching is meaningful. 2.2 The role of the student • Students are thought of as listeners and receivers of information. • The individuality of students is not taken into consideration. • The teacher is responsible for the students' learning. 2.3 Interaction • Interaction is not thought to promote learning. • The teacher lacks the tools or is afraid to use interactive teaching methods. • Interaction is not favoured in larger groups. 2.4 Atmosphere • The teacher tries to create a good atmosphere through good teaching or humour.
3 Conceptions about learning	
• Learning involves realising, applying, developing ideas, critical thinking and deep understanding. Learning is a process, during which the students construct their own notions about the phenomenon.	• Learning involves remembering or memorising correct answers and solutions. • The correct answers can be found by reading the course literature.
4 Pedagogical development	
4.1 Developing the teaching • The teacher is motivated to develop himself/herself as a teacher. • The development of the teaching improves the learning outcomes of the students. 4.2 Pedagogical understanding • The teacher understands his/her pedagogical skills and has processed his/her teaching	4.1 Developing the teaching • To a large extent, the teacher is not interested in developing his/her teaching. • The motivation comes in the form of a better status or pay. 4.2 Pedagogical understanding • The teacher does not assess his/her teaching practices and is not conscious of his/her skills as a teach

Teachers have various views on the stability of various approaches to teaching. As a rule, they are thought as dynamic and context-dependent so that the same teacher can utilise a different approach in various contexts. As such, approaches are equated to the teacher's actions in certain teaching situations. However, the use of a learning-based approach is limited by the teacher's lack of pedagogical skills. (Lindblom-Ylänne, Trigwell, Nevgi & Ashwin 2006; Prosser & Trigwell 1999.) Because of this, pedagogical training is seen as a way towards more learning-based approaches in teaching (Postareff & Lindblom-Ylänne 2008). Various researchers have noted that teaching approaches are somewhat connected to different disciplines. The studies on the connections of disciplines and teaching approaches have shown that teachers in "hard" disciplines (references to physics and chemistry, for example) are more prone to adapt content-based teaching approaches. On the other hand, the teaching approach of teachers in "soft" disciplines (references to the humanities and social sciences, for example) is often more learning-based (see e.g. Lindblom-Ylänne, Trigwell, Nevgi & Ashwin 2006; Lueddeke 2003; Neumann, Parry & Becker 2002.).

2.3 A course that supports high-quality learning

The quality of a course here refers to the quality factors conveyed through teaching, exercises, teaching material, assessment and methods that have an effect on the studying and learning of students.

Image 1 shows the connection between information processing methods and the student's commitment towards studying. In the image, the academic student refers to a student who is interested in studying and learning itself, and studies with a deep approach to achieve comprehensive understanding. The non-academic student refers to a student who takes an instrumental approach towards studying and believes that studying makes it possible for him/her to achieve a certain type of job, for example. A non-academic student studies with a surface approach to learning and aims at passing the course through memorising and repeating instead of understanding the subject. (Biggs 1999, 58.)

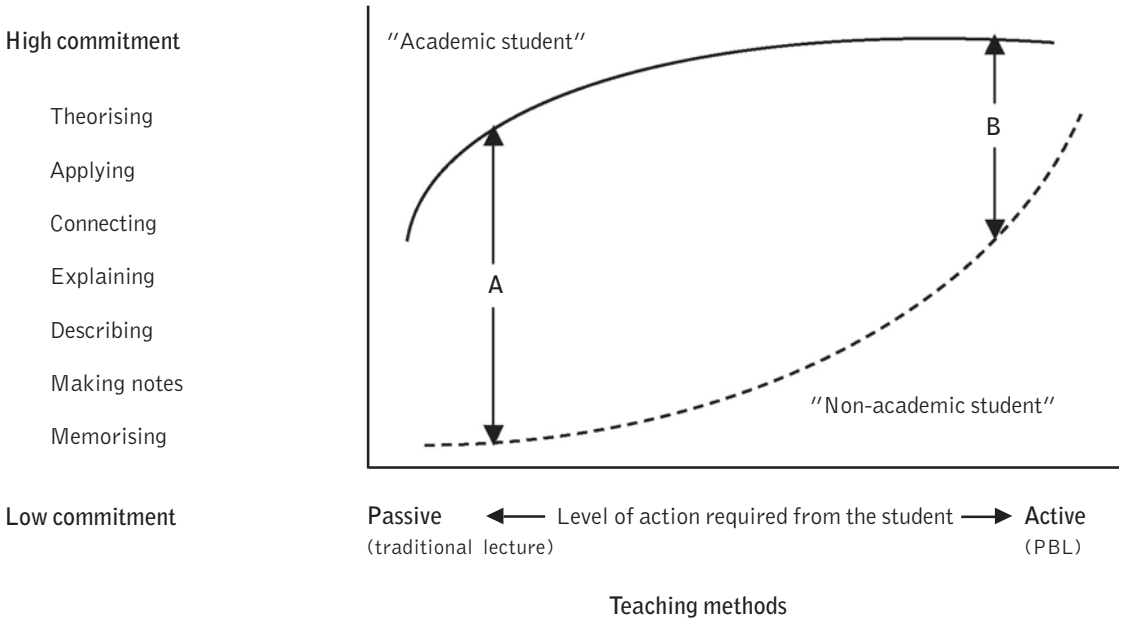


Image 1 The connection between teaching methods and student commitment (Biggs 1999, 59).

The deep approach to learning of a non-academic student can be supported by planning the teaching methods carefully. As we can see in image 1, a non-academic student is prone to study with a deep approach and use a higher level of cognitive functions only under the most favourable teaching conditions. In contrast, an academic student is ready to commit himself/herself to studying regardless of the used teaching method. (Biggs 1999.)

In image 1, the point A lies in the passive end of the teaching method scale. A traditional lecture is also in this end of the scale. At this point, the level of commitment and the cognitive functions used for studying differ greatly between an academic and a non-academic student, which corresponds to the quality of achieved learning between the students. The point B lies in the active and of the teaching method scale. At this point, the difference between the levels of commitment of an academic and a non-academic student has decreased, and students in both groups use studying functions on a higher level. Problem-based learning is an example of an active teaching method. (Biggs 1999, 58.) As we can see, high-quality teaching can shorten the distance between the learning outcomes of an academic and a non-academic student (Biggs & Tang 2007).

Thus, teaching methods influence students' studying and they should help the students commit themselves to active studying to induce a deep approach to learning. Therefore, it is important to focus in course planning on how the students are guided to utilise deep learning methods. Listening, reading and calculation are methods related to a surface approach to learning. When interaction, writing, drawing, coding, analysing and assessment are included in the course, information processing promotes a deep approach to learning better.

2.4 Workload

Courses tax teachers and students differently. It is important to assess and plan workloads for both parties. In this handbook, we will mainly focus on examining the workloads of the teacher. You can read about the workloads of students in the work ´Anna aikaa ajatella´ by Karjalainen, Alha & Jutila (2003), for example. It must be remembered, however, that only estimates can be given about workloads, since they vary from individual to individual for both students and teachers.

From the teacher's point of view, workload is affected by the extent of the course and the used teaching and assessing methods as well as teaching experience, experiences in teaching situations and familiarity with the used methods. The spread of the teacher's workload throughout the course varies according to the working methods used. For example, planning and preparing the teaching as well as carrying out the teaching is emphasised in contact teaching. For group work and independent studying, the work load is focused on guiding the students and reviewing the results. Regardless of the working methods used, teaching always takes up some of the teacher's time.

From the students' point of view, workload is formed by the time that they reserve for studying, or the time reserved for them in the curriculum plus the amount and level of the learning material. In addition, the skills, motivation and initial knowledge of the students as well as the quality of teaching all have an effect on how taxing the studying feels. (Karjalainen, Alha & Jutila 2003, 7.) The workload experienced by students has an essential effect on their readiness to commit themselves to studying, which makes the correct planning of the course workload a prerequisite for high-quality studying and learning (Chambers 1992). The spread of the students' course workload also depends on the working methods used. However, it is very important that the course workload spreads evenly throughout the course, since an unevenly spread workload easily creates a feeling of too much work.

Based on their research, Kember and Leung (1998) propose that the amount of contact teaching increases the workload experienced by the students more than independent studying. Therefore, Kember and Leung propose that courses placing a heavy emphasis on contact teaching guide students towards a superficial approach to studying, which stresses the repetition of knowledge made possible by memorising. Thus, higher-quality learning outcomes could be reached, in their opinion, by increasing independent studying and decreasing the amount of contact teaching.

Based on various studies, Karjalainen, Alha and Jutila (2003, 9) also note that the feeling of burden experienced by students is more dependent on the amount of contact teaching than on the amount of independent studying. Since students that feel overburdened are more prone to direct their efforts to a surface approach to learning, large amounts of contact teaching lead to students who emphasise superficial studying that is selective and utilises memorising.

Based on the aforementioned studies, independent studying can be thought to support a deep approach to studying and better learning outcomes better than contact teaching. This proves that contact teaching is not an indispensable teaching method, wherefore the need of contact teaching should be assessed when planning a course. Thus, it can be said that not only is contact teaching expensive but that it adds to the workload experienced by the students. This proposition is also presented during the later discussion of various working methods. In addition, using contact teaching rarely leads to learning outcomes equal to those of courses that utilise independent studying and processing of information.

3 WORKING METHODS

Working methods are the actions made to organise teaching in order to achieve a higher-quality of learning. Teachers have both a quantitative and qualitative effect on the way students study as they choose between various working methods and place varying emphasis on them during a course. Choosing a single working method does not rule out the use of other methods. In fact, it is often advisable to use various methods side-by-side during a single course. It ensures that students will process the subject matter in various ways and from varying perspectives to achieve a deep approach to learning.

The selection between working methods depends on the set learning outcomes, on what the students are meant to learn (Kuittinen 1994, 11). The outcomes should form the basis of the working method decision, since achieving various outcomes requires a different level of information processing. For example, achieving learning outcomes that include complex skills often requires that students process information actively, so teaching and studying should be organised to enable it. (Bonner 1999.) In addition to the learning outcomes, the extent of the course, the number of students in relation to the resources of the teacher and the initial level of the students should be considered when choosing the working methods used.

In this handbook, the icons used for various working methods are:

Independent studying

Contact teaching

Group work

Workplace studying

Personal guidance

Image 2 Working method icons.

Especially at the beginning of the student's studies, the emphasised role of contact teaching is often justified by explaining the basic information. According to this view, as the studies proceed, the subject matters become more complex and comprehensive. The working methods used should then also require a deeper intellectual performance and commitment from the students, as well. (see e.g. Kuittinen 1994, 11.) This view is misleading, however, since going through the information mechanically in lectures often leads only to a surface approach to learning. Because of this, the best working method for supporting a deep approach to learning is often not a traditional lecture-focused contact teaching. In addition, if traditional contact teaching is emphasised right from the beginning of the studies, the students get the idea that the recommended way of studying is listening on lectures and reading the material through before the examination. It can also be proposed, that because the students' study skills develop as their studying experience grows, the progression of the working methods should not be from going over the basic facts towards more intense working methods that require stronger commitment and deeper performances, but vice versa. The majority of students also require most guidance at the beginning of their studies, but large student groups do not enable a sufficient level of guidance. Peer support and self-direction replace the need for active teacher guidance at the later stages of studying. Therefore, students should be guided towards meaningful studying methods already from the first study year onwards.

In addition to the selection of working methods it is important to plan how the students learn with the various working methods, and how learning is best supported with each of them. The quality of studying and learning enabled by the working methods used is decided by the organisation of studying within the methods. Varying teaching technologies, information and communication technologies and sources of information can be used by teachers and students in a variety of working methods as needed.

As explained earlier, it is often useful to use various working methods side-by-side in one course. However, the following chapters discuss the working methods one at a time. With this approach, we try to make sure that the basic principles of various working methods are presented as clearly as possible. The summary at the end of the main chapter and the attached templates discuss combining the various working methods.

3.1 Independent studying

The goal of independent studying is to place the responsibility of learning on the students themselves, and to make them commit to a way of studying that aims at active learning. The teacher and the students are physically separate during independent studying, and their time use is flexible within the time limits related to the organisation and progress of the course. Independent studying may include, for example, doing preliminary work (e.g. preliminary assignments) for the contact teaching situations, deepening the understanding of a subject introduced during contact teaching, going through the course material, doing the exercises and assignments assigned during contact teaching, doing separately assessed exercises and/or preparing for an examination as well as other student-initiated studying aimed at understanding the subject matter (Karjalainen, Alha & Jutila 2003, 44–45).

While discussing students' independent studying, Kuittinen (1994, 55) proposes that students are themselves responsible for planning, scheduling, executing and, in some cases, also assessing their studies. However, this is not often the case, since courses mainly have clearly defined learning outcomes, working methods and schedule limits that the students need to adhere to.

Even independent studying should not be completely independent, since studying and learning should be sufficiently guided also while students are studying independently. Guidance is in fact one of the most important prerequisites for successful independent studying. Proper guidance ensures that the students know what is expected of them and what is the goal of their studying. With support, the students do not feel left alone with the subject matter and it is easier for them to turn to a teacher if they experience problems.

Independent studying often means only that the student has to go through the presented material alone. In that case, the teacher doesn't take advantage of the possibility to guide and support the student's independent studying. If the teacher gives advice on reading, for example, he/she can help the students actively analyse the information themselves through making questions about the text, experimenting, modelling, coding or searching for information. However, it is important to remember that the teacher only guides and supports the independent studying and the students remain responsible for their studying.

When guiding independent studying, teachers can, for example:

- Give advice on the use of resources (help the students use varied materials)
- Support the analysis of reading. The students can be instructed to:
  - Create mind maps
  - Write an essay
  - Solve given questions
  - Pick out the main points of the text
  - Create questions about the text
  - Write on collaborative platforms (e.g. optima, wikis, blogs)
- Motivate students
- Help students form peer reading or discussion groups.

Workload

Researchers have proposed that independent studying does not increase the workload experienced by students as much as contact teaching (Kember & Leung 1998). We believe that the flexibility of independent studying is a large factor in these findings. Through independent studying, the students can mainly define their own working hours and places, their progress rate and processing order.

When examining the teacher's workload related to independent studying, we should focus on the planning and execution of guidance. The teacher is also burdened by the assessment of the results. The preparation of guidance is a one-time task that does not depend on the amount of students, whereas the workload related to assessment depends on the amount of students and must be done separately for each course.

The following calculations represent the opposite ends of the teacher's workload for courses that are based solely on independent studying. The calculations are examples and the real workloads are affected by many factors. All teachers should create their own calculation models to assess their own workloads. These examples do not take administration work, course assessment and development or acquiring own know-how related to the course into consideration. In addition, the calculations do not take into account the timeframe of the course (1st study year/5th study year) nor the taught subject matter. They often affect the teacher's workload, as well, and everyone should add their effects in their own calculations for both the small and the large budget plans.

Small budget

The table 2 presents the teacher's workload on a course based on independent studying. During the course, students carry out exercises according to given, very general, instructions and based on material they have found themselves. The students put together a final output that can come in varying forms. The outputs are only graded, no feedback is provided for them.

Table 2 Course with a small budget based on independent studying.

A	Preparing exercises. The assignments are very general, for example "read the accompanying article and write an essay or a summary of it". The assignment is given on the course website as the students sign up for the course. There is no meeting.	2h
B	Selection of works. The works are not provided. The students are given information on how to search for suitable sources of information based on the given theme. Instructions are given on the suitable extent of the sources. As the course is repeated, the students can be given a list of the works used previously, or a single work from the list can be chosen to be used by everyone.	2h
C	The assignments are returned written on paper. Acquiring and placing a return box.	0.5h
D	Checking the results.	$N_{students}$ x 0.5h
	For example, a 3 credit course ($N_{students}$ = 100) (A) 2h + (B) 2h + (C) 0.5h + (D) 0.5h x 100 students = 54.5h	Total: 54.5h
	Variation – Executing a ready course. The preparation of exercises (2h) and the selection of works (2h) are carried out.	Total: 50.5h

Large budget

Table 3 presents the teacher's workload on a course based on independent studying. The students complete assignments based on provided instructions and given material. Detailed instructions for creating the final output are given, and varying material is provided. The teacher has prepared a list of themes and related sources that the students either must or can use in their work.

Table 3 Course with a large budget based on independent studying.

A	Preparing exercises. Students are given good and detailed instructions on how the output should be written and how the various works should be utilised, for example. The students are also given instructions on keeping a learning diary and they are provided with self assessment templates.	4d (1d = 1 day = 7.25 h)
B	Selection of works. Searching material for the literature list provided for the students.	10d
C	The assignments are returned written on paper. Acquiring and placing a return box.	0.5h
D	Checking the results.	$N_{students}$ x 1h
E	Verbal feedback on the assignments.	$N_{students}$ x 1h
	For example, a 3 credit course ($N_{students}$ = 100) (A) 4d + (B) 10d + (C) 0.5h + (D + E) (1h + 1h) x 100 students = 302h	Total: 302h (42d)
	Variation – Executing a ready course. The selection of works (10d) and the preparation of exercises (4d) are not carried out.	Total: 200.5h (28d)
	Variation – Executing a ready course. Giving feedback to groups of 3 instead of individuals.	Total: 134.5h (19d)

Strengths and challenges

The strength of independent studying for the students is that the students are able to adapt the speed of their progress to their own abilities. Through independent studying, the students learn to be responsible for their studying and their study skills improve. Independent studying is also not dependent on its time and place. It is flexible and accommodates for other work and enables studying outside of course schedules. As a working method, it supports a deep approach to learning well, as it requires that the students analyse the learned information.

While the fact that independent studying is not dependent on a certain time is one of its strengths, it is also one of its major challenges. Because the students are mainly responsible for their studying themselves, it is challenging to plan the independent studying and to spread the workload evenly throughout the course period. This can be supported with good instructions and various milestones. One of the weaknesses of independent studying is also the fact that if the student faces a problem, he/she might not receive required support and guidance immediately. The students should also get the feeling that they will be able to cope with the requirements of the assignments. If the students feel that the assignment is impossible or they do not see it as meaningful for their own learning, they may finish the assignment with a minimal amount of work or by plagiarising, which makes the achieved learning superficial. It is also a challenge to make the students understand the importance that independent studying has for their own learning.

3.2 Contact teaching

Many types of teaching can be called contact teaching, but the most used contact teaching form today is the lecture. However, contact teaching includes all learning situations, where a teacher is present and actively guides the studying and learning of the whole group. Therefore, in addition to lectures, contact teaching includes calculation exercises and guided laboratory assignments. Contact teaching introduces the new subjects to be learned to the students. The actual learning, however, depends on the readiness of the students to use their time and available tools to achieve learning. Thus, it is important to think about the amount of learning that can be achieved in contact teaching, and how much it has to be supported by other work done by students. You should add a proportion of independent studying to supplement contact teaching. (Karjalainen, Alha & Jutila 2003, 10, 44, 46.)

Biggs (1999, 67) proposes that if a course has a large number of attending students, teachers consider lecturing the only possible teaching method. However, lecturing is easy to modify into a situation actively participated by the students. This can be achieved, for example, by making the students analyse the presented new information independently, having the students carry out experiments and apply the new information and do various exercises with other students.

Workload

The students' workload consists of the actual contact teaching situation, preparation for them and going over the information presented in the contact teaching situations later. However, the students' independent preparation and revision is, according to the grouping of this handbook, a part of independent studying. Therefore, contact teaching as a traditional lecture is often not very taxing for the students, but instead is a rather easy and safe situation.

Planning the teaching taxes the teacher the most when utilising the contact teaching method. In addition to planning, preparation for each separate teaching situation, the teaching situation itself, and recovering after the teaching situation also add to the workload of the teacher. If the teacher has taught the same course earlier, he/she does not have to plan it again and just a small update of the material is often enough. This is one of the reasons why contact teaching

is not necessarily considered a taxing teaching method for the teacher and why it holds such a powerful status in teaching.

The following calculations represent the opposite ends of the teacher's workload for courses that are based solely on contact teaching. The calculations are examples and the real workloads are affected by many factors. All teachers should create their own calculation models to assess their own workloads. These examples do not take administration work, course assessment and development or acquiring own know-how related to the course into consideration. In addition, the calculations do not take into account the timeframe of the course (1st study year/5th study year) nor the taught subject matter. They often affect the teacher's workload, as well, and everyone should add their effects in their own calculations for both the small and the large budget plans.

Small budget

Table 4 presents the teacher's workload for a course, where all work happens under the teacher's guidance. Here, contact teaching is based on the utilisation of ready-made teaching materials. The teacher presents the teaching material to the students through discussions. The discussions are carried out in small groups formed by students. The groups ask the teacher questions about the material, which the teacher then discusses with all of the students. The students keep a lecture diary, which the teacher checks and grades with pass/fail.

Table 4 Course with a small budget based on contact teaching.

A	Planning and preparing contact teaching lessons (= N_{con}), including material selection (only a few works) and writing lecture diary instructions.	3d
B	Planning the discussions based on the material. Writing theme-specific questions.	N_{con} x 0.25h
C	Carrying out the contact teaching lessons, their preparation and analysis after the lesson.	N_{con} x 1.25h
D	Checking lecture diaries.	$N_{students}$ x 0.5h
	For example, a 3 credit course (N_{con} = 40h, $N_{students}$ = 100) (A) 3d + (B) 40 x 0.25h + (C) 40 x 1.25h + (D) 100 students x 0.5 h = 158h	Total: 158h (22d)
	Variation – Executing a ready course. The preparation for contact teaching and planning discussions are carried out.	Total: 126h (17d)

Large budget

Table 5 presents the teacher's workload for a course based solely on contact teaching. The teaching consists of well-prepared presentations given by the teacher. The time reserved for contact teaching is also used for independent and group study of the material. A large group is divided into weekly exercise groups of about 20 students, where the teacher is also present. The course has a final examination based on the contact teaching and weekly exercises. The questions of the examination change from one course to the next.

Table 5 Course with a large budget based on contact teaching.

A	Planning and preparing the contact teaching, including the search for support material, the creation of presentation material and the selection of subjects, for example. The teacher also selects the material that the students work on independently and in small groups during the time reserved for contact teaching.	N_{con} x 5h
B	Carrying out the contact teaching lessons, their preparation and analysis after the lesson.	N_{con} x 1.25h
C	Planning and preparing the weekly exercises (= $N_{exerc.}$)	$N_{exerc.}$ x 3h
D	Carrying out the weekly exercises, their preparation and analysis after the exercise (20 students/group).	$N_{students}$/20 x $N_{exerc.}$ * 1.25h
E	Planning the examination.	3d
F	Checking the examination.	$N_{students}$ x 1h
G	Giving individual examination feedback.	$N_{students}$ x 1h
	For example, a 3 credit course (N_{con} = 20, $N_{exerc.}$ = 20, $N_{students}$ = 100) (A) 20 x 5h + (B) 20 x 1.25h + (C) 20 x 3h + (D) 100 students / 20 x 20 x 1.25 + (E) 3d + (F) 100 students x 1h + (G) 100 students x 1h = 532h	Total: 532h (73d)
	Variation - the individual feedback is not carried out.	Total: 432h (60d)
	Variation – Executing a ready course. Planning of the contact teaching sessions and the weekly exercises is not carried out.	Total: 372h (51d)

Strengths and challenges

The strengths of contact teaching include the fact that students have reserved its scheduled time for studying, and their studying is, therefore, often more regular as it is during a course that is completed by passing a single book examination. In addition, it is presumed that all students pay attention to the subject at hand simultaneously during contact teaching. This can be further supported by using various activation methods. One of the strengths of contact teaching is also its ability to direct the students' attention to the most important issues of the course by emphasising them during the teaching situations. This way, studying can indeed be directed by teaching. The teacher's enthusiasm about the subject may also be carried over to and assumed by the students, which can also be a benefit of contact teaching.

A major challenge for contact teaching is that it may have to assume that the learning and performance levels of the students are similar. In reality, however, there may be significant differences in the level of students due to heterogeneous life and education experiences. If a single level is assumed for all students, the level of teaching and the progress rate of the course are only rarely suitable for the whole group. This frustrates both the students that know the subject beforehand and the students that have difficulties in understanding the subject. The teacher can use a pretest to find out the students' level before the course to focus the teaching level as well as possible to the students attending the course.

One of the main weaknesses of traditional contact teaching is the small amount of interaction, as listening is taught to be enough for learning. However, it should be remembered that all classroom discussion and other interaction on the studied subject keeps the students attentive and interested, which is always beneficial. Interaction can be supported by various questions designed to lead to discussion, and by analysing discussions in small groups or in pairs.

If the learning outcomes set for the course require the knowledge of a certain piece of information, it is often enough to present and analyse that information during a traditional lecture, with a video, or through reading material. In contrast, if a deep approach to learning is sought, the students should process, analyse, adapt and apply the information themselves. In order to achieve deep understanding, the students should, therefore, revise and analyse the points that they feel were left unclear during the lectures. However, the students often do not return to unclear subjects before the end of the course. By creating links between contact teaching and available material, the teacher can assist the students in clearing up problematic issues independently.

3.3 Group work

Here, group work refers to work done in student groups independently of teacher assistance to achieve the groups goals. Group work supports an active role for the students and it has been shown to be an efficient studying method (Kuittinen 1994, 103). If a teacher is present during the whole time in group work, it is classified as contact teaching in this handbook. The planning of group work includes their preparation (goals, schedules, working methods, source materials), creating and guiding the group work itself (reporting, guidance situations and methods, communication, operation in problem situations), ending the group work and the assessment of assigments.

Workload

In group work, students are often taxed by not only the actual work in the groups, but also independent work for the group (e.g. preparation for the meetings and possible individual contributions to the assignment). When compared with independent studying, the workload related to group work may seem lesser to students, because the responsibility for the work and the final result can be divided among the members of the group. In addition, the mutual support of the group members and the possibility to analyse the discussed subject together may lessen the experienced workload. Karjalainen, Alha and Jutila (2003) have proposed an opposite view. According to them, the students may feel that the work done in small groups is slower and more taxing than independent work. The writers claim that the group work is experienced as taxing due to the time spent creating a mutual understanding between the group members. However, group work is presented as a beneficial working method for learning, since it forces the students to think about the subject deeply and from various points of view.

The workload experienced by teachers by group work can be adjusted by modifying the size of the formed small groups. When compared with independent studying, group work decreases the amount of required guidance, as it mostly happens on the group level (Kuittinen 1994, 103).

The following calculations represent the opposite ends of the teacher's workload for courses that are based solely on group work. The calculations are examples and the real workloads are affected by many factors. All teachers should create their own calculation models to assess their own workloads. These examples do not take administration work, course assessment and development or acquiring own know-how related to the course into consideration. In addition, the calculations do not take into account the timeframe of the course (1st study year/5th study year) nor the taught subject matter. They often affect the teacher's workload, as well, and everyone should add their effects in their own calculations for both the small and the large budget plans.

Small budget

Table 6 presents the teacher's workload during a course based on group work. The students work in groups without the teacher's interference after being given instructions in a short introductory meeting. Group work is carried out as a reading circle. Grouping is done during a contact session. A web-based learning environment may also form a good alternative for grouping, if the attending number of students is large. The teacher assesses the finished assignments with a grade based on given criteria, and does not give feedback.

Table 6 Course with a small budget based on group work.

A	Preparing instructions on the reading circle actions.	1h
B	Selection of works. The teacher selects a familiar book as the reading material and divides it into suitable parts according to the schedule of the reading circle meetings.	1.5h
C	Writing the assessment instructions including the assignments that the students are supposed to produce based on the reading circles.	1h
D	Giving instructions and forming reading circles in the learning environment.	4h
E	Reading and assessing the finished assignments.	$N_{students}$ x 0.5h
	For example, a 3 credit course ($N_{students}$ = 100) (A) 1h + (B) 1.5h + (C) 1h + (D) 4h + (E) 100 students x 0.5h = 57.5h	Total: 57.5h (8d)
	Variation – Executing a ready course. The preparation of instructions, selection of works and creation of assessment instructions are not carried out.	Total: 54h (7d)

Large budget

Table 7 presents the teacher's workload during a course that is based on students working in independent reading circles. Good instructions are given for the group work and assignment. Students are also asked to evaluate their own work and the work of the group. Assessment is based on students' learning diaries and self-assessments. In addition to the individual grades, each group is given verbal feedback on the work that they have done in the reading circles and on their preparation for them.

Table 7 Course with a large budget based on group work.

A	Selecting the works (10d) and preparing good and supporting instructions on the operation of the reading circle, the learning diary, and the self-assessment (4d).	14d
B	Giving instructions and forming reading circles in the learning environment.	4h
C	Reading the learning diaries and self-assessments.	$N_{students}$ x 1h
D	Verbal feedback for the groups (5 students/group).	N_{group} x 2h
	For example, a 3 credit course (N_{group} = 20, $N_{students}$ = 100) (A) 14d + (B) 4h + (C) 100 students x 1h + (D) 20 x 2h = 246h	Total: 246h (34d)
	Variation – Verbal feedback is not given.	Total: 206h (28d)
	Variation – Executing a ready course. The selection of works and planning of instructions are not carried out.	Total: 145h (20d)

Strengths and challenges

The strengths of group work include the positive dependency of the group members on each other, which means that all group members are needed to perform the assignment (Smith, Sheppard, Johnson & Johnson 2005, 2). The mutual support and interaction between the group members enable the communication and sharing of ideas, experiences and information as well as learning in the group. The group's efficiency is indeed based on this interaction between the group members, which is focused on the sharing of information, thoughts and insights (Kuittinen 1994, 104). In addition to social and group work skills, working in a group promotes the students' ability to present, justify and defend their own views, to accept various views, to think critically and to share responsibility.

Positive synergy can also be seen as one of the strengths of group work. Synergy here means that the learning and performance of the individual group members may increase due to well-functioning group work when compared to independent studying. Groups often also promote learning that is not enabled by solitary studying.

From the teacher's point of view, one of the benefits of group work is the decreased workload created by the course. Groups often require less guidance than individually performed assignments, for example. (Kuittinen 1994, 103.)

One of the challenges of group work is the process related to the forming of the group. A group is not functional right from the start, as its operational preconditions start to form in stages as the members get to know each other, start to pick roles and form behavioural rules. (Kuittinen 1994, 107.) The group's formation into a functional unit, whose members trust each other and are ready to work for the group's common good, may take time. The problems are not always solved in the formation phase, and every now and then the group dynamics just do not work.

Free riding is a challenge that is often associated with group work. It means that some members of the group do not work actively to achieve the goals set for the group, which divides the responsibility for the group work unevenly between the members of the group. The unfair treatment experienced by group members due to free riding can be mitigated by utilising peer assessment in the course assessment, and by including individual assignments in the course. It seems that group work often requires independent studying to support it.

Group work shares a challenge with contact teaching in how the students are able to control their work outside of the group meetings and how they will prepare for those meetings. The groups should also be supported to control their own work.

3.4 Workplace studying

Here, workplace training serves as an example of workplace studying. Workplace training refers to a period of learning at the workplace that is related to the student's studies. During workplace training, the students have the opportunity to apply the know-how that they have learned during their studies as well as their other skills in a real work environment. They are simultaneously presented with the possibility to learn new things and develop their general skills related to the working life. (Karjalainen, Alha & Jutila 2003, 52.)

Workload

Workplace training may be the first experience that the student gets of work in his/her studied field. Because the work in a real workplace differs from the learning environment that the students are used to, it may feel more taxing. This feeling can be increased at the beginning of the work period, when the students have a lot to learn and everything around them is new.

However, workplace training is often meaningful for the students due to its practicality, and this meaningfulness may decrease the experienced workload.

Workplace studying taxes the teacher usually very little, which can be seen as one of its benefits.

The following calculations represent the opposite ends of the teacher's workload for courses that are based solely on workplace studying. The calculations are examples and the real workloads are affected by many factors. All teachers should create their own calculation models to assess their own workloads. These examples do not take administration work, course assessment and development or acquiring own know-how related to the course into consideration. In addition, the calculations do not take into account the timeframe of the course (1st study year/5th study year) nor the taught subject matter. They often affect the teacher's workload, as well, and everyone should add their effects in their own calculations for both the small and the large budget plans.

Small budget

Table 8 presents the teacher's workload for a workplace training period based on workplace studying. In this example, the students have acquired the workplace training positions themselves. The students document their actions during the training and analyse their learning during the period in a workplace training report. The workplace training will be assessed with a pass/fail based on the workplace training report. The students will not receive other feedback on the course.

Table 8 Course with a small budget based on workplace studying.

A	Writing the workplace training and workplace training report instructions.	14.5h
B	Accepting the workplace training positions and assignments.	$N_{students}$ x 1h
C	Solving problem situations, 10% of students.	$N_{students}$ /10 x 1h
D	Reading and assessing the finished workplace training reports.	$N_{students}$ x 1h
	For example, a 5 credit course ($N_{students}$ = 100) (A) 2h + (B) 2h + (C) 0.5h + (D) 0.5h x 100 students/10 x 1h + (D) 100 students x 1h = 225h	Total: 225h (31d)
	Variation – The projects are carried out in groups of five.	Total: 57h (8d)
	Variation – Executing a ready course. Writing the instructions is not carried out.	Total: 210h (29d)

Large budget

Table 9 presents the teacher's workload for a course, during which students carry out independent training projects based on workplace studying. The teacher seeks the training positions for the students and guides them at the beginning of the training as well as during the training. If no projects can be found outside of the university, the teacher creates projects at the university.

Table 9 Course with a large budget based on workplace studying.

A	Forming collaborative relationships and starting the projects in co-operation with companies.	$N_{students}$ x 5d
B	Guiding the projects (2d of guidance/student); preparation and meetings.	$N_{students}$ x 2d
C	Checking and assessing project assignments.	$N_{students}$ x 0.5d
D	Giving individual verbal feedback on the project assignments.	$N_{students}$ x 0.5d
	For example, a 10 credit course ($N_{students}$ = 20) (A) 20 students x 5d + (B) 20 students x 2d + (C + D) 20 students x 1d = 160d	Total: 1160h (160d)
	Variation – The projects are carried out in groups of five, and feedback is given to groups, not to individuals ($N_{students}$ = 20).	Total: 290h (40d)
	Variation – Executing a ready course ($N_{students}$ = 20). It is assumed that a part of the relationships are already formed, and do not take as much time. (2.5d/student instead of five days).	Total: 798h (110d)

Strengths and challenges

A major strength of workplace studying is that it makes it possible for the students to apply the theory learned on earlier courses to practice (the interaction between theory and practice). The authentic environment resembles those where the students will apply their know-how in the future as well, and, therefore, motivates the students and helps them commit themselves to studying. In addition, workplace studying supports the applicability of learned knowledge. Studying in a workplace familiarizes the students with their chosen field. It also supports the development of the students' working life and professional skills as well as the formation of their professional identity. Successful workplace studying may also create important contacts for the students' in preparation of their future work careers.

However, workplace studying may be a new and strange situation for the students. Even if the students have worked earlier, for example, during the summer of during evenings, this may be the first time that they will be able to apply the know-how that they have accumulated during their studies to real-life work situations. Thus, students may feel that workplace studying is suspenseful and stressful. The teacher can help the students adapt to the new situation with intensive guidance and support.

The students also have to be ready to take responsibility of their studying in the workplace, since they are responsible not only for their own learning, but also for their work to their workplace training employer. If the students are not able to perform according to expectations, and are not ready to commit themselves to workplace studying, the relationship between the company and the university may break down.

One of the challenges of workplace studying is the acquiring of employers. Companies receive numerous inquiries from various institutions about training practices, collaborative projects and interviews and cannot always assent to the requests. The employees of most companies are over-burdened with their own tasks and do not have the time to commit themselves to guiding students. On the other hand, workplace studying has its benefits for the company, because a suitable new employee may be found through workplace training, which then saves on time-consuming and expensive recruiting processes.

One of the challenges of workplace studying may come in the form of possible conflicts of goals set for the workplace studying by the university and the employer. For example, it may be

the aim of the employer to have work done by an inexpensive worker without supporting the learning and development of the students while they are working.

3.5 Personal guidance

Personal guidance refers to a private interaction situation between the student and the teacher, whose goal is to promote the student's learning and know-how. Thesis guidance is an example of personal guidance.

Workload

The workload of the students related to personal guidance comes in the form of preparation for the guidance situations, the guidance situations themselves and the follow-up activities. The teacher's workload related to personal guidance is also mostly formed by preparation for the guidance situations. The preparation may include checking the students' assignments and searching for possible support material. In addition, the guidance situations themselves and their follow-up activities form a part of the teacher's workload. If a course would entirely be based on personal guidance, the teacher's and the students' workload is totally formed by the guidance situations.

The following calculation presents the teacher's workload for a course that is totally based on personal guidance. The calculation is an example and the real workloads are affected by many factors. All teachers should create their own calculation models to assess their own workloads. The example does not take administration work, course assessment and development or acquiring own know-how related to the course into consideration. In addition, the calculations do not take into account the timeframe of the course (1st study year/5th study year) nor the taught subject matter. They often affect the teacher's workload, as well, and everyone should add their effects in their own calculations for both the small and the large budget plans.

Small budget and large budget

Table 10 presents the teacher's workload for a course based solely on personal guidance. During the course, the teacher does minimal preparation for the guidance situations. During the guidance situations, the discussion of the teacher and the student is based on themes selected by the teacher or questions asked by the student. The teacher's workload for a course based solely on personal guidance is mostly formed by the guidance situations themselves. Because this example only includes personal guidance, we propose that the teacher cannot use more time to prepare for the discussions. Otherwise, the workload would include independent or group studying by the students, whose results the teacher would then check before the guidance situations. This is why only one calculation of the teacher's workload for a course based on personal guidance is presented here.

Table 10 Course based on personal guidance.

A	Creating a web-based learning environment, where the available meeting times are announced. The students choose suitable times according to their schedules.	4h
B	Preparing for the meetings. Creating a general frame for all the meetings.	20h
C	Guidance during the meetings (20 two-hour meetings/student).	($N_{students}$ x 20 x 2h)
	For example, a 3 credit course ($N_{students}$ = 20) (A) 4h + (B) 20h + (C) 20 students x 40h = 824h	Total: 824h (114d)
	Variation – Guidance for groups of five ($N_{students}$ = 20).	Total: 224h (31d)

Strengths and challenges

Through personal guidance, the teacher can take into account the students' individual level of learning, areas of interest and development. This makes it possible to react to any shortcomings in the studying skills of individual students. Personal guidance also enables the giving of verbal feedback. The majority of students receive only little individual feedback on their performance during their studies. However, based on the feedback the student can fix any possible errors in their studying as well as direct their studying and learning to overcome their shortcomings and enable the achieving of the goals set for the studying. Thus, a close co-operation between the students and the teacher enables almost immediate intervention on problems. Personal guidance brings teachers and students closer together and enables the creation of confidential relationships. If successful, the support that a teacher gives the student during personal guidance acts as an essential motivator for the student. Another strength of personal guidance is that it helps the students to discuss in a way that is characteristic for the scientific community as they justify and analyse their views. In addition, both parties often learn something during the process.

One of the more significant challenges of personal guidance and possible obstacles to its success is that a close and continuous guidance takes up a lot of the teacher's resources. This is why personal guidance may be difficult to implement, if the courses are extensive and poorly resourced. The forming of trust is often a time-consuming process, and, therefore, is another one of the challenges of personal guidance. However, it is imperative for personal guidance that the students are able to trust their teacher and his/her professional skills. Possible clashes on the personal chemistry level make the building of trust challenging. Without functioning personal chemistry, personal guidance cannot achieve the goals set for it.

3.6 Summary of working methods

We have discussed various working methods: Independent studying, contact teaching, group work, workplace studying and personal guidance. By working method we mean various ways to organise teaching and studying, which aim at promoting the students' learning.

The selection of a working method should be based on the set goals, since some working methods are better suited to achieving certain learning outcomes than others. If the teacher sets clear goals for his/her courses and masters several working methods, he/she can flexibly choose the best working methods for each course. (Killen 2001.) With this in mind, setting clear goals and guiding the students' activities can be seen as a challenge for all the presented working methods. Clear and justifiable goals support the students' commitment. Guidance, on the other hand, enables the reaching of those goals, because it supports the students' regular and continuous studying.

Traditional lecturing, which is here associated with contact teaching, is often justified with the high cost of alternative teaching methods. However, as can be seen from the calculations presented with the individual working methods above, it is possible to organise studying through other working methods as economically as lecturing. Because the role of the students is more active in the other working methods, they often lead to higher-quality learning outcomes than contact teaching. The calculations also show that even though there is an effort to increase the amount of personal guidance, it cannot be utilised extensively due to its high cost.

The purpose of the calculations on the teacher's workload related to individual working methods is to bring the workloads of various working methods into proportion. The calculations are meant to show the differences in the teacher's workloads between various working methods. Table 11 summarises the teacher's workloads for various working methods (courses with a small and a large budget). However, we wish to emphasise that these calculations are only examples. For example, they do not take the differences in workload arising from the teacher's

teaching experience into consideration. These differences would, in reality, have an effect on the planning and execution of a course. The calculations are meant to serve as models on how the workload can be calculated.

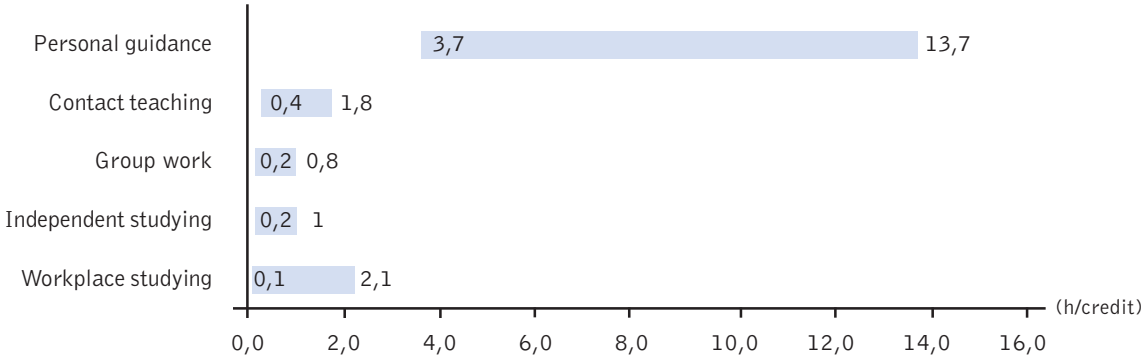


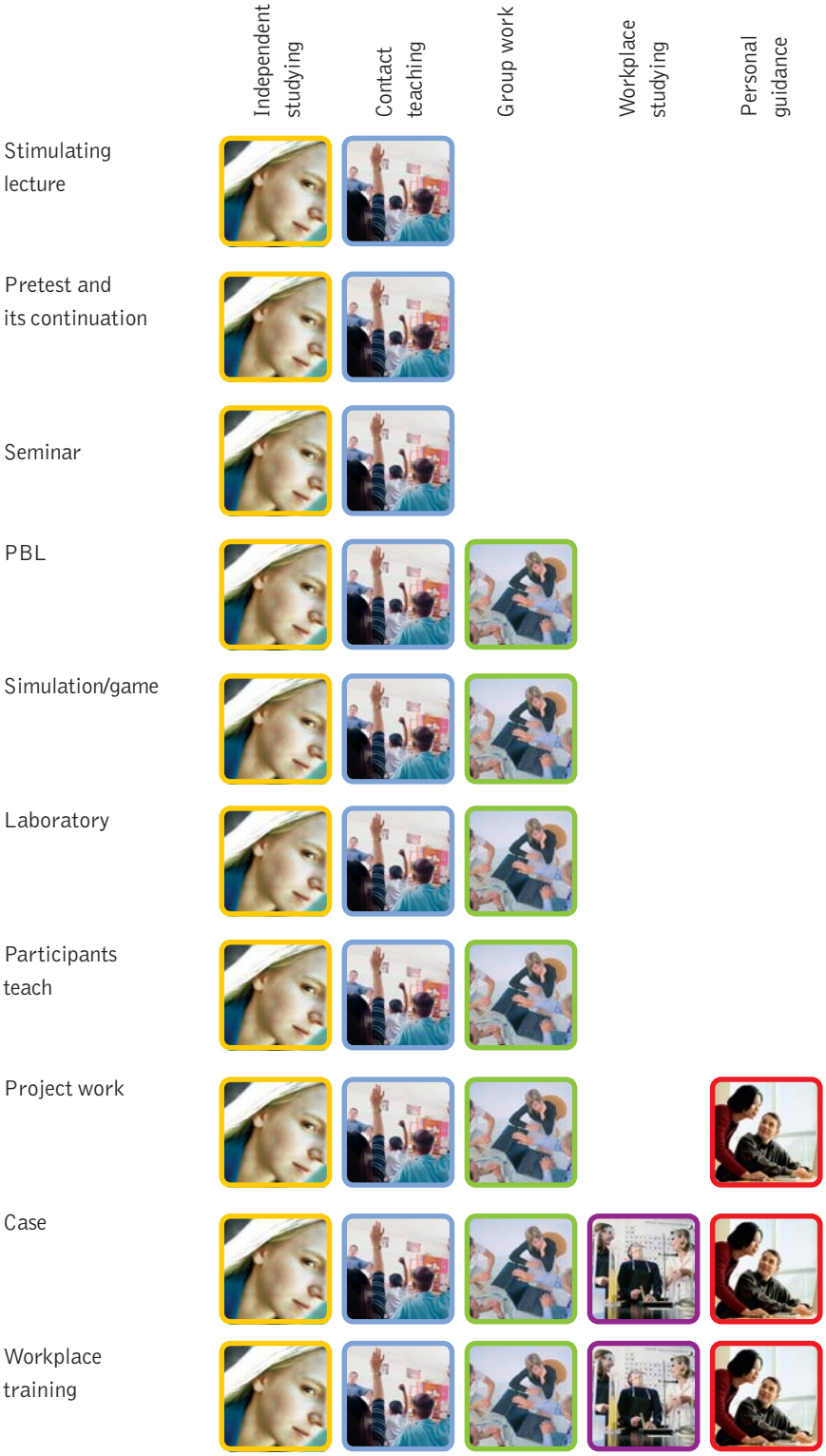
Table 11 Teachers' workloads for the various working methods (h/credit).

It is important for the teacher to calculate his/her own workloads for the courses to be able to control his/her work efficiently. The calculations help in planning workloads, for example. In addition, they make it easier for the teacher to plan the time required to assess and develop various courses.

To keep the presentation simple, we have assumed that the courses are based solely on a single working method presented in each chapter. In reality however, this happens only rarely, since it is often beneficial for learning to combine various working methods. The utilisation of several working methods supports the students in taking various viewpoints to the studied subjects. Models presenting partly imaginary courses combining various working methods are included as appendices to this handbook. They are meant to show the reader how the various working methods can be flexibly utilised during a course. There are countless ways to apply these working methods, of which this handbook presents only few.

The purpose of the templates is to support the planning of the course structures. The course structure creates a framework for the success of activities during the course. If this framework is already flawed at the start, it will be challenging to overcome its shortcomings even with a high-quality execution. It is easy for the teacher to assume the teaching method of an earlier teacher for a course, or adapt one of the methods that he/she is the most familiar with. However, this limits the course's development inside the single model of execution, even though the teacher would not be aware of the facts behind the previous teacher's decision, or of the functionality of the chosen method for the course in question. It is the purpose of this handbook to help teachers get out of this artificial habit, which limits the development of their teaching. Our purpose is also to make the teachers think about which structure supports learning the best. The templates show a way of building a rhythm for the courses that promotes learning. The rhythm alternates independent studying, group work, contact teaching, personal guidance and workplace studying.

The following courses are presented in the appended templates:



It is useful to start the development of a course by focusing mainly on developing the working method that the students will be using for most of the time. In addition to the used working method, the teacher's teaching style, materials, students, guidance and other quality factors have a significant effect on the learning achieved during the course. Successes and failures cannot be attributed to a certain structure, working method or teaching method without further analysis of the action. All success is a combination of good guidance, good learning goals and good working methods.

4 TEACHING METHODS

Teaching methods represent the ways of executing teaching (Vuorinen 2001, 63). They are forms of interaction that are meant to support the learning, stimulating and motivating of students (Peda.net school network). In this handbook, we shortly present various teaching methods[3] that can be used flexibly in teaching and chosen according to the set goals and the sizes of taught groups. Most of the methods can be applied to larger groups, as well. In certain circumstances, this may require dividing the large group into smaller groups of students. In addition, the teacher may not be able to control all that happens during a teaching session.

Preliminary plans for the learning outcomes should be made before the teaching methods are chosen. Then the teacher can think about the activities that enable the achievement of the chosen outcomes. Based on these plans, various teaching methods can then be applied and combined according to the planned outcomes to find appropriate operating methods. Individual methods can and should be combined and varied into reasonable entities. Creating a rhythm for the teaching session with various methods promotes the stimulation of students and keeps their interest high. However, the variation of teaching methods is not an end in itself, and the purpose of teaching methods is not the entertainment of the students.

Creating a study environment that promotes high-quality studying and the achievement of the set outcomes is often challenging regardless of the chosen teaching method. There are several good methods to achieve certain learning outcomes, but there are also outcomes and methods that do not fit well together. However, you should remember that no teaching method is good or bad in itself, and success or failure do not depend only on the selected method. The benefits of a chosen method depend on its suitability to the outcomes, but also the application of the method in the teaching situation, the teacher's familiarity with the selected method, the teacher's teaching style, given instructions and assignments, the activeness of the students, the teaching facilities, lighting, time of day and other environmental factors, for example.

Both the teacher's and the students' work effort has an effect on the success of the teaching method. Regardless of the chosen method, the teacher should think about how he/she is going to get the students commit themselves to studying. In many teaching methods, the actions of the students affect the outcomes more than the actions of the teacher. For example, the teacher has much less control on independent studying than on contact teaching. Indeed, traditional contact teaching is highly controlled by the teacher, since the students will not be working on their own assignments, but instead will be following the same teaching. When the participants share a common study space they are easier to instruct and guide. In contrast, the teacher is not able or have the time to control everything that happens during small group work, for example. Therefore, independent group or individual studying sets its own challenges for the guidance of teaching and on how the students will be made to control their own studying.

Teachers often do not choose teaching methods that are both new for them and are based on independent studying. They may fear that the teaching session will fail and that the group cannot, is not motivated to or able to take responsibility for their learning. However, if all learning situations are strictly controlled by the teacher, the students have no room for independent thinking and action, despite the fact that they can also produce feelings of achievement and may seem like good teaching situations from the outside. On the other hand,

[3] Teaching and assessing methods have been collected from teachers, from information sources and from the writers' own experiences. The literature references list some examples of the works that discuss the presented methods. There are numerous different methods and the sources discussing them are somewhat fragmented. The methods are also partly overlapping and teachers have personal variations on them. However, they have one thing in common: Their purpose is to guide, describe and simplify the operation of a group of people when learning.

students often like fluent, logical and effortless teaching that does not have incoherencies, discussions or open questions. If the teacher wishes to develop his/her teaching, however, he/she should be able to see teaching as something more than a pleasant experience produced by fluency. Teaching should challenge and develop the students' thinking and make it perceivable through the use of various teaching methods.

The following chapters present various teaching methods and their strengths and weaknesses shortly. The teaching methods have been divided into four groups according to their requirements for the teacher: Very easy, easy, average and demanding. However, you should remember that individuals will experience the teaching methods differently based on their teaching experience and the familiarity of various methods, for example. Some of the methods will become easier, as the teacher receives more experience on them. Because every teacher experiences the requirements of the methods differently, this classification is not definite, but is only meant as a rough tool for the selection of a suitable method.

4.1 Independent work

Easy

During independent work, the students work on an assignment independently. The assignment may include reading, planning, calculation or information retrieval, for example. The assignment may last for minutes or hours and it can be connected to other activities in a teaching situation.

Strengths and challenges
One of the strengths of independent work is that it creates breaks in the teaching sessions, during which the students have time to think and work on an assignment according to their own know-how and views. It also forces the students to be active as everyone else is also quiet and concentrates on their assignments. The method's major challenges include the creation of the individual assignments. The students also need support in starting their assignments and guidance with possible problem situations during their work. The duration of the independent work phase should be carefully considered so that the students will stay interested and motivated in their work. Independent work can also be divided into periods through peer support or milestones.

4.2 Stimulating writing assignments

Easy

Stimulating writing assignments are short periods of time (e.g. 15 minutes), during which the students will think about given factors of the discussed subject. The assignment may be to write about the student's own knowledge on the discussed theme, or to answer a certain question. Stimulating writing assignments can be used to start or end a certain subject matter, for example.

Strengths and challenges
The time provided for the students for independent work guides everyone to think about the subject from their own perspective, which is a strength. It gives the students some time to think on their own. This method also creates a rhythm for the contact teaching situations, brings about refreshing change and keeps the students' attention in the matter at hand.

It is a challenge to create good writing assignments. The assignments should motivate and inspire the students to think about their subject. The students may also need support and instructions at the beginning of their assignments or for solving possible problems. The duration of the independent work phase should be considered carefully so that the students will stay interested and motivated. Alternatively, the independent work phase may be divided into periods with peer support or milestones.

4.3 Exercises

Average

The students carry out exercises either independently or in groups.
The exercises can be connected with various information sources and practical tasks. One model to create a rhythm for the activities through exercises is called TARTAR (T = Theory, A = Action ja R = Reflection). In this model, the students utilise varying information sources, lectures or models (Theory) in order to carry out some thought exercises of experiments (Action). After the exercises have been carried out, the learned things can be analysed together (Reflection), and the learning experiences received from the exercise can be connected with a piece of information, or a totally new subject matter may be brought up (Theory). This model is strongly connected with learning through experience (see Kolb 1984).

The guidance of the exercises varies from a hands on approach to an independent research project (e.g. a thesis without guidance). It is important to give the students enough room and time during the action phase to make sure that the students really process the knowledge from their own perspectives instead of trying to figure out what the teacher wants them to do.

Strengths and challenges
The strength of exercises is their ability to connect theoretical information with action and further with learning and a deeper approach to learning. This helps the students make connections between the read information and practical thinking, research or doing. At its best, information becomes alive and affects the students' way of thinking and acting.

The challenges of exercises include creating the exercise instructions so that the work is properly challenging. The open nature of the exercises also requires that the students have good enough information retrieval skills and that the teacher chooses the correct teaching materials. If the exercises are too one-dimensional and have only one answer, the students will only carry out the exercise to come to the correct conclusion instead of trying to learn from the process.

4.4 Supplementary reading

Very easy

In this method, the teacher provides the students with extra material on the subjects discussed during the course. The purpose of supplementary reading is to deepen the knowledge on the subjects covered during the course, or it may form an alternative source of information for the subjects discussed during the course. The supplementary reading may be discussed individually or during teaching sessions.

Strengths and challenges
One of the benefits of supplementary reading is that it creates virtually no extra work for the teacher, since all that the teacher has to do is search for the supplementary material and hand it out. This method gives the students the possibility to get to know the subjects of the course from a wider perspective, and good material may get them excited about the matters at hand. In this way, a teacher may promote the students' learning significantly through the use of good material.

Finding material that would really promote learning is a challenge. If the reading material is not good, the method increases the students' workload without significant benefits. It is also a challenge to get the students to read the material, especially if it is not explicitly required. Therefore, supplementary material should be connected to problems, assignments or exercises of the course to make the students understand the benefit of reading them, and to connect them to the other activities of the course.

4.5 Summaries

Very easy

The students draft summaries in order to deepen their learning and understanding. The summaries may be writings, drawings, oral presentations or something else. They can be produced on paper, or they can be discussed generally or in small groups. The summaries may also be made by the teacher. In this case, the summaries repeat and condense the teacher's views and explains them to the students. But because the person doing the summary learns most from it, they should be made by the students.

Strengths and challenges
When the students draft summaries, they have to analyse the subjects discussed on the course. As they write the summaries, the students must think about the most essential facts of the discussed subjects and put them down coherently. This may help the students see gaps in their knowledge. The most important thing is to have the students make the summaries themselves instead of handing them over to them ready-made.

One of the challenges posed by summaries is that students can make them without really thinking about the discussed subjects. These kinds of summaries have little significance to learning. However, the students do not necessarily know how to make summaries, and what they should be like. Thus, it requires some skill from the students and good guidance from the teacher to achieve a good summary.

4.6 Mnemonics in teaching

Average

The students' memory can be supported in teaching situations variously.
The teacher may describe the general meaning of the taught subjects through keywords. The teacher can also create associations and mental pictures between connected subjects. It is also possible to support memory by linking matters to each other. This may happen imaginatively, and the links between the matters do not have to be real. The teacher can also support the students in making notes by presenting various note-taking techniques (such as mind maps). One form of mnemonic is also the use of advance organisers, which help the students to connect the new information to prior knowledge. Advance organisers may come in many forms: A question, a writing assignment, problem definition or articulating the student's learning through writing or discussion.

Strengths and challenges
Supporting memory promotes learning and is closely connected with utilising the students' earlier views and experiences in learning. Remembering is made easier, if the teacher is able to make the information meaningful for the students.

However, it should be remembered that remembering does not necessarily mean that the students have understood the subject. Merely developing memory during teaching may lead to the teacher trying to make the students remember the discussed subjects mechanically. In that case, the teaching inspires the students to a surface approach to learning, albeit an efficient form of it. To achieve a deep approach to learning, the students need to activate their thinking instead of just activating their memory.

4.7 Mind map

Average

In a mind map, the most essential subject is placed in the centre of the paper, to which subjects are connected in a tree-like form. The teacher can use mind maps to structure a presentation, to create a description during a discussion or to support the students' activities or group work.

Strengths and challenges
It has been shown that mind maps help people understand the contexts of subjects. The creation of mind maps helps the drawer analyse his/her thoughts and to see the connections between subjects and phenomena. Their creation requires the analysis of relationships between subjects that, in part, promotes learning. Mind maps can also be used as mnemonics.

One of the challenges of mind maps is that it takes time and some practice to make them efficiently. However, the time spent practicing will pay back later. Mind maps are tools specific for the thinking of their creator, and may not be self-evident to others. Therefore, they should not be used as material for others, at least not without some clarification.

4.8 Learning diary

Demanding

In this method, the students write a learning diary during the course.
A learning diary may include notes about significant learning experiences, events of the day, open questions and assessment of own actions, for example. It is possible to give instructions on the creation of the diary in various ways. A teacher can comment on the learning diaries, and he/she can change the direction of the course based on them. With the help of the diaries, the teacher may also find out things that the students have not understood or that require repeating. The students can either write the diary on their own time, or some time can be reserved for the writing during a teaching situation. The teacher can also use the learning diaries as a tool for assessment.

Strengths and challenges
One of the strengths of writing a learning diary is that the students have to think and write about the things that they have learned or have not learned. Analysing the discussed subjects in order to write them down in the diary may make things clear in a student's mind, and thus lead to a deep approach to learning. This happens, because articulating thoughts also organises them, and possibly leads to the filling of some of the gaps in the knowledge. Another strength of this method is that the teacher will get an idea about what the students really have learned and what they think through the diaries. This helps the teacher in the development of the course.

A part of the students thinks that learning diaries are taxing and unpleasant to keep. The purpose of the method is that the students produce text in their diaries throughout the course. However, if the students feel that writing is unpleasant, it is more likely that they will write the diary only at the end of the course. This makes the processing of learning harder for the student, and the learning diary does not achieve its goals. A part of the students also feel that writing their thoughts is pointless. Through writing, the students have to analyse their thoughts, which helps their learning, however. Another challenge for the use of learning diaries is giving good instructions for them. The learning diaries should be instructed similarly, and their practices should be common for everyone. In this way, the students would not have to learn new requirements during each course that utilises a learning diary. The learning diaries are taxing to read and comment, which poses a challenge for the teacher. This is even more emphasised, if the teacher checks the learning diaries regularly during teaching

4.9 Assembling a knowledge base

Very easy

In this method, the students will, at first, carry out an assignment and write down all the essential gaps in their knowledge related to the work. Thereafter, small groups are formed. The groups will assemble a common, more comprehensive result based on the views of its members. Then the students think about the essential facts that may be missing from the answer and add to it, if necessary.

Strengths and challenges

One of the benefits of this method is that the know-how of all students is used in the production of the final solution. The method enables using peer support during the assignments. The more advanced students help the beginners, and as the students help each other, they adapt a deep approach to learning. The students also learn to justify their views. The method can also be utilised in large groups.

The method's major challenges include the creation of the individual assignments. The groups also may not produce constructive and deepening discussion, and their work stays at the level of writing facts down mechanically. Thus, the creation of group activities that lead to a deep approach to learning may be difficult. The method requires much from the participants, but it can also be considered one of its strengths.

4.10 Group work

Easy

The teaching group is divided into small groups that are given an assignment and a schedule. The end result of the group work may be a report, a presentation, a teaching session or a discussion, for example. The members of the groups may be given various roles and areas of responsibility. As the teacher plans group work, he/she should focus on giving the assignments, the working methods, the activities of the groups, the reporting of the results and creating a summary or conclusion based on the end results of the groups. The duration of the group work may vary and it can be connected with other teaching methods. The success of the group work and learning as its result depend on the input of the group members and on the assignment, among other things.

Strengths and challenges

A strength of this method is that it develops the students' group work skills. Group work also enables learning from other students. In addition, the students learn to justify and present their views through group work. As the students solve problems in a group, the possibility of adopting a deep approach to learning and finding high-quality solutions increases. Often, a well-functioning group is more than the sum of its parts.

It is challenging to create group work that aims at a deep approach to learning, and it requires work both from the teacher and from the students. Another challenge of this method is that the groups may take more time starting that is reserved for it. The guidance of the group work and activities also poses a challenge. In order to promote the operation of the groups and to achieve learning, the course should include teacher support, instructions, materials and group peer support.

4.11 Collaborative learning

Average

Collaborative learning is a group work method, in which all group members have a similar responsibility for the work. The group is given an assignment or a problem that they start to work on. Co-operation and collaboration play a great part in the operation of the group. In this method, the group does not divide the work and then put the various parts together, but instead work together for the whole time. Collaborative learning can form a part of a group work or a project assignment.

Strengths and challenges

One of the strengths of collaborative learning is that it tries to utilise the efforts of each of the group members. Everyone gets to participate in the work and influence it. Close co-operation may reduce the feeling of isolation that some students may experience.

The challenges of this method come from the difficulties in forming groups that will strive for a common goal and in guiding the groups to enable their operation. If the students are used to dividing work, the method may also seem limiting and inefficient at first. This is because most students wish to produce the desired result as soon as possible, and collaborative learning is often not the fastest available method. Therefore, the guidance and assessment can focus on the operation and learning of the group instead of on the end result to support so-operation and collaborative learning. The teacher should especially focus on getting the dominating persons in the group to operate by the rules of collaborative learning. It is also challenging to create co-operation that would promote learning. This requires much both from the teacher and from the participants.

4.12 Cross-over groups

Easy

This method divides the teaching group into smaller groups that are all given separate tasks. For example, group A might design a car engine, group B might design a control system and group C might design the form of the car. The groups are given time and guidance for the tasks. At the end of the group work, the group members are redistributed. The new groups are formed by one member from each of the original groups. The new groups are given a new assignment that can, for example, develop the results of the previous groups further. This method works exceptionally well with the tasks, where a larger entity is built from the results of the smaller tasks, such as the car assembled from the engine, control system and form design of the discussed example. The method can last for a couple of hours, or it can last for the entire course.

Strengths and challenges

One of the strengths of this method is that it helps the students commit themselves to the tasks, because they have to be ready to share their results with the members of the new group. The method also develops the students' skills to produce and share knowledge and to work in a group. In addition, it support cumulative learning and the forming of general impressions.

Creating good assignments and guiding the students enough, while leaving plenty of room for their own thinking and creativity are among the challenges of this method. Succeeding in the assignments requires knowledge and skills to solve problems as well as group work skills from the participants.

4.13 Learning cafe

Very easy

In a learning café, the tables in the teaching room are placed as in a café, and small groups made from students are placed sitting around these tables. Each table will get a large paper or a table cloth to write on as well as a pile of coloured pencils. A secretary is chosen for each table. Each table is given its own discussion assignment, and the discussion is started with a stimulus or a question. The students discuss their subjects with their group members and all students sitting around the table can write and draw their views on the tablecloth or paper. After a chosen period of time, everyone except the secretaries change tables. Thus, the composition of the groups changes with one person, the secretary. A new discussion is started in the new table by going through a summary of the previous group's discussion, as paraphrased by the secretary. Then the group continues the discussion based on what they have heard from the previous group's discussion. The tables are changes so long as is needed for everyone to have been in each table. It is also possible to make a partial cycle. There is usually no need or benefit to summarise the discussions together, since every student (except for the secretaries) have heard and discussed each subject. Common discussions would not produce new opinions or views.

Strengths and challenges

One of the strengths of this method is that it utilises the outcomes of previous discussions, and, therefore, the groups do not have to start the discussions all over again. Moving also keeps the students lively and their thoughts active.

A challenge of the learning café is the unequal status of the students. In contrast to the other students, the secretary only gets to discuss a single subject, even though he/she participates in the discussions of several groups. Going through the discussions together would benefit the secretaries. However, the teacher should carefully consider any common discussion, since it would probably not yield any new knowledge to other students. The discussions can be analysed independently or in pairs, or the participants may summarise them themselves (see summaries). Finding good subjects for discussion and creating high-quality discussion also present challenges for the use of this method.

4.14 Cumulative group – snowball

Very easy

In this method, the students are divided into pairs, which are then given an assignment, a problem or a discussion topic. After the discussions, the pairs are combined into larger groups of four and, at the end of the exercise, the whole group will then discuss the subject together. The teacher determines the duration of the phases. The duration of a single group discussion can vary (e.g. 1 minute – 2 hours).

Strengths and challenges

One of the benefits of this method is that the students will be able to share their views with a larger audience than they would in a small group. At the same time they get a chance to learn from the other groups. The group discussions progress as their composition changes. This method can also include an independent phase, which would give the students some time for their own thinking.

One of the challenges of this method is that high-quality group activities are sometimes hard to produce. In addition, the method requires some moving about in the teaching premises.

4.15 Presentation walk

Easy

A presentation walk is a way to present the output of the group. The students are divided into groups and they are given the task to design and produce a poster, for example, and to present it to the rest of the group. Various groups may be given varying tasks. The groups should include as many students as there are groups (e.g. six groups of six or five groups of five). The finished output is hung on the wall. For the presentation, the students are regrouped so that each new group should have at least one member of each previous group. The new groups walk to the various presentations, and they start the presentation walk. The member of the new group that had a part in the creation of the examined presentation will present it to the rest of the group. After the presentation, the work is discussed in the group. When the teacher gives a sign, the groups move to the next work, which is then presented by the person who had a part in its production.

Strengths and challenges

One of the strengths of this method is that it helps the students commit themselves to the work, since everyone has to take part in the creation of the group output and be responsible for its presentation. Here, the students cannot study only a small part of the work that they will present, but instead have to learn to present the whole work. The implementation of a presentation walk does not take more time than the traditional model, which here refers to a group work presentation, where all groups present their work for the whole class one at a time. Since the group is here divided into smaller discussion groups, it is more likely that every student takes part in the discussions. Since the group composition stays the same during the walk, the group may start to combine the ideas that have come up during the various presentations and compare their similarities and differences, which may be counted as a strength of this method.

One of the challenges of this method is that the teacher can only follow one discussion at a time, which makes it impossible for him/her to control or guide the discussions carried out in the other groups. On the other hand, this may also be counted as a strength. Another challenge is the forming of the groups, which requires care and precision, to have the new groups include at least one member of each original group.

4.16 Teaching walk

Average

In a teaching walk, the student groups go out to walk and think about a given question. The question can either be analysed or not after the walk. The teacher may also participate in the walk and lead group discussions, or just direct the walking route of the group. The recommended size for a group is 2–4 persons so that everyone can actively take part in the discussion.

Strengths and challenges

One of the strengths of the teaching walk is that it refreshes the participants as it is a change to sitting inside in a lecture room. Walking gets the blood flowing and helps the students to think. During the walk, the participants also get to know each other. It is suitable for themes, which can be processed through group discussions and which do not need notes taken or written material read.

One of the challenges of this method is that its pleasantness is limited by the weather. The participants may also start to discuss other topics during the walk. The teacher can help the groups keep on topic by giving them a list of the questions that they should cover during the walk. Alternatively, the teacher may name persons in the groups that are responsible for turning the discussion back to the topic. It may be taxing to implement teaching walks for large groups.

4.17 Step-by-step discussion

Average

The idea of the step-by-step discussion is to go through a series of questions either with the whole teaching group or in smaller groups. For the implementation, the teacher prepares a set of questions that follow one another, to which the students then find answers. The answers can be found by reading or through discussion or thought.

Strengths and challenges
This method can easily be used with varying group sizes. Because the questions are prepared beforehand, the teacher may lead the students through a selected train of thoughts. Preparing the questions beforehand also makes it possible for the teacher to predict the situation.

The method's major challenges include the creation of good series of questions. The answers to the questions should be readily accessible for the students, but they should not be too easy. Another challenge is how to reach the ultimate goal of learning from searching for the answers instead of just answering the questions.

4.18 Inquiry teaching

Demanding

Inquiry teaching has plenty of ways of implementation. The questions may be posed by the teacher or the students. Inquiry teaching may also be carried out among the students. The questions can either be given to the students beforehand, giving them time for preparation, they can be formed together, or created spontaneously in the teaching situation. To get the most out of inquiry teaching, the teacher and the students should practice various question techniques and focus on:

- The quality of the questions (yes or no questions should be avoided); the questions should not be rhetorical (Does anyone have any questions?)
- The clarity of the questions
- Asking only one thing at a time
- The questions enabling the analysis of the subject. Avoiding questions that imitate or repeat knowledge
- Creating a safe atmosphere that allows for the shortcomings of answers and the discussion of thoughts in the answers
- The equal relationship of the asker and the answerer (even though there would be differences in their level of knowledge)
- Inspiring a true interest in the askers on the answers.

Strengths and challenges
One of the strengths of this method is that it brings the teaching closer to the students' own level of understanding. It also challenges the students to think for themselves and to build learning from their own premises.

A challenge for inquiry teaching is that it requires much from the teacher. The teacher has to be ready to face questions that he/she does not immediately know the answers to or does not understand. The method also requires good interaction skills to inspire the students to participate.

4.19 Teaching discussion

Demanding

Bothe the teacher and the student bear the responsibility for the success of teaching discussion. It can be applied in teaching situations, in which taking the other's opinions into consideration, forming own thoughts, learning from others, developing discussion skills and solving problems together are essential. The goal of a teaching discussion may be to produce an solution, to analyse a situation or to present various perspectives on the subject, for example. The teacher may start the teaching discussion by asking questions or using a stimulus (a story, a newspaper clip, a piece of news, a video, etc.) to inspire discussion. The selected topic should be somehow familiar to all participants to ensure that the discussion succeeds.

Strengths and challenges

One of the strengths of this method is that it enables sharing of thoughts, solving problems together and analysing subjects from various perspectives. In addition, the teacher is in close interaction with the students during the discussion. It is also possible to come closer to the thinking of the students with this method.

A challenge for this method is that it requires much from the teacher to succeed. Everything cannot be prepared for, because of which the guiding of the discussion calls for a sensitive understanding of the situation. The topic of discussion should be suitably challenging and easy to get hold of. It is also challenging to activate the more silent members of the group. The teacher should be careful not to dominate the discussion too much (monologue), but to give the students room to participate in the discussion and build it together with them (dialogue). Therefore, it is challenging to create high-quality discussion that promotes learning. It requires much from each participant.

4.20 Brainstorming

Very easy

In brainstorming, the teaching group is divided into smaller groups, which are then told to come up with solutions, questions or factors. The groups think up their ideas simultaneously so that each member can write down their ideas. It is important to emphasise to the students that even the craziest ideas can be presented during brainstorming and that all critique is forbidden during the brainstorming phase. The ideas are criticised after the brainstorming session. After the ideas are assembled, the best suggestions are then found by voting or otherwise filtering the ideas. The ideas can then be later utilised in another teaching situation or the planning of exercises, for example.

Strengths and challenges

One of the strengths of the method is that the simultaneous processing of ideas increases the amount of ideas. All participants also see each other's ideas, which can also inspire them to come up with new ones. During a brainstorming session, the various ways of approaching the same subject can be seen. The method works well as a stimulating exercise at the beginning of a teaching session, for example. Also the more silent students may be inspired by the method, since all critique of the ideas is forbidden.

Among the challenges of this method is that if the utilisation of the ideas is not decided beforehand, it may be hard to come up with. The creation of ideas also requires know-how that the method does not produce by itself. Because of that the ideas created are often already known and used.

4.21 Discussion group

Very easy

Small groups are given a short discussion assignment during the teaching session. Discussion groups work best, if the discussed topics are familiar enough for the students to have opinions on them. The duration of the discussion is often short, just some minutes, for example. The time should be short so that the students start the discussion quickly and utilise the given time effectively on the topic. Discussion groups create a rhythm for the teaching and stimulate the students.

Strengths and challenges
A strength of this method is that it activates the otherwise more passive students. If the small group discussions are then analysed together, it ensures that the students discuss the given topic. The analysis also brings forth several views on the subject during a short time. Another strength of the method is that it does not require much preparation from the teacher, since discussion groups can also be used spontaneously during teaching.

A major challenge of the discussion groups is to come up with good discussion topics. The students should know something about the topic, and it should stimulate and inspire discussion. If the topic is too hard or new for the group, it may confuse or frustrate the students, and the discussion will turn to other topics.

4.22 Reading circle

Easy

In a reading circle a group of students meets regularly to discuss something that they have read. The students prepare for the meetings by reading the chosen part of the book or other information source. The meetings can have a rotating secretary and chairperson. The secretary makes notes of the discussions and sends them to the participants. The notes may also be sent to the teacher, if this is agreed on.

Strengths and challenges
One of the strengths of this method is that it does not require much work from the teacher. The method helps the students analyse the read information and interact with their peers.

The selection of the works to be read poses a challenge to the teacher. The success of the reading circle depends both on the selected works and the effort of the students, since the discussion may easily turn away from the read subject. The teacher can activate and guide the reading circle by emphasising the work of the reading circle in the assessment. In addition, the members of the reading circle may be asked to report to the teacher.

4.23 Presentations (lecturing)

Easy

This is the most widely used teaching method. The teacher prepares a presentation or a monologue on the studied subject to the students. Traditional lecture teaching refers to a lecture, where the teacher is active and the students are assumed to passively absorb the taught information. However, if the teacher varies his/her style of lecturing, the lectures can activate the students and promote participation. In that case, the students will either process the information independently or in co-operation with others, which promotes independent knowledge creation.

Another thing that supports varying the lecturing is that if the students listen only passively, their attention will decrease rapidly. In order for the teacher to hold the students' interest and attention to the taught subject, he/she should not present information for more than 20 minutes at a time.

Lecture variations:

- Teacher presents information (traditional lecture)
- Interaction between the teacher and the students
- Interaction between the students
- Activities
- Independent analysis by the students
- Organisation or retrieval of information by the students
- Assessing the actions

Strengths and challenges
One of the strengths of lecturing is that the teacher is able to organise the information according to his/her wishes while taking the target group into consideration. However, this requires a good sense of the listeners' knowledge and skill levels. Another benefit of lecturing is that it can be planned accurately beforehand. It enables creating connections between various subjects and utilising various forms of interaction. In addition, lecturing can be an economic teaching method, because it is a quick and simple way to communicate information to large groups of students. For the students, it is also a safe and familiar method to receive information.

One of the challenges of lecturing is that it emphasises the teacher's role as the controller of knowledge. Communicating information is easy through presentations, but the challenge lies in getting the students to analyse the information themselves. There is often no room for independent knowledge creation during presentations, and the method can thus make the listeners passive and mechanical receivers of the information that the lecturer has already organised for them. However, this method does not guarantee that the students would absorb and learn the information in order to be able to utilise it later. (Perrenet, Bouhuijs & Smits 2000.) Because the students do not analyse the lectured information based on their earlier knowledge and views, lecturing often promotes a surface approach to learning, and the students will thus forget the learned knowledge quickly. In order to avoid this, the teacher can guide the students in using various note-taking techniques to analyse the information independently already during the presentation. In addition, lecturing pays no attention to the heterogeneity of the student group, but presents the information similarly to all students without consideration to their different knowledge and skill levels.

Due to the aforementioned challenges, teachers should utilise lecturing with care and should always link it to an independent analysis of the information. Instead of lecturing to passive students, the teacher should encourage the students to be active and interactive during the presentation.

4.24 Pretest

Very easy

A pretest is organised before the actual course starts, and it supports the orientation of students. A pretest can be used as a basis for the planning of the course as the teacher can use it to find out the initial level of the students and to gather background information, areas of interest, motives and understanding about the important issues of the course. When the learning base has been charted, the teacher can concentrate on the shortcomings and problems in the students' learning during the course. In addition, it enables the linking of new learning to existing knowledge, which supports the development of learning towards more comprehensive knowledge structures. The teacher can also assess how the learning of the students has developed during the course by organising a pretest.

Strengths and challenges
A pretest is good orientation for the course, because it forces the students to learn about the course subjects before the actual course has started. In addition, a pretest removes some of the workload from the actual course, since a part of the work has already been done before it starts. A pretest is also a good way of gathering information to find out the students' initial level. It is then possible to adjust the contents of the course to better correspond to the knowledge of the target group.

One of the challenges of pretesting is that it may prove difficult to utilise the gathered information in the planning of the course. This is because there often is only little time to change the contents of the course after a pretest. Another challenge is deciding the importance of the pretest for the overall course assessment. It should not be over-emphasised, because the students may then not commit themselves to studying during the actual course. On the other hand, if the pretest is not taken into consideration in the overall assessment, the students may not be ready to work for it, which would lead to diminished benefit from the pretest.

4.25 Symposium

Average

A symposium copies the form of scientific conferences, in which a group of experts (10–20 persons) of a certain field are brought together. Some experts are chosen to make introductions and a schedule is made for the symposium beforehand. After an introduction, its theme is then discussed together. A chairperson is chosen for the symposium, who will give the permissions to speak and takes care of the schedule.

Strengths and challenges
One of the strengths of symposium is that it obliges the participants to prepare introductions and analyse the subjects. The preparation of introductions promotes the students' learning, and giving them promotes the development of performing skills. The method also familiarises the students with the presentation and operation methods of scientific conferences.

One of the challenges of a symposium is that it much from all of the participants. On the other hand, this may also be counted as a strength. Waiting for their own introduction may also make the students nervous and prevent them from following the discussion. The discussions may also turn into competitions of knowledge, instead of truly aiming for learning. Therefore, the teacher should tell the students about the goals of this method.

4.26 Seminar

Average

The students create a seminar work, which is then presented to the students participating in the seminar. Other students are often asked to read the presented work beforehand to enable discussion and the actions of a possible opponent.

Strengths and challenges
One of the strengths of a seminar course is that the students get the possibility to present their own works. In this way, they will have to justify their solutions and, possibly, defend their views. Justifying their views in front of a possible opponent teaches the students to discuss in a way typical for the scientific community while developing the students' performance skills.

4.27 Panel discussion

Easy

A panel with representatives of various fields is assembled from the participants. A chairperson is chosen among the participants, who will then take care of the introductions, giving permissions to speak and the conclusion. The chairperson may also summarise the discussion and ask questions.

Strengths and challenges

One of the strengths of this method is its suitability for presenting various views. The only work required of the teacher is the selection of the participants of the panel and a theme. This method can easily be used with a rather large group. The presence of an audience may create an extra tension for the panelists' discussion. This can either present a strength or a challenge for the method, depending on whether it makes the participants try their best or paralyses them. Inspiring the participation of the audience can and should be a part of a panel discussion. Participating can come in the form of discussion groups or the gathering of the audience's questions on paper and giving them to the chairperson for discussion. Audience participation brings change to the discussion and adds new views. At the same time it helps the audience pay attention to the discussion.

One of the major challenges of this method is the preparation of the panelists. The panelists know the theme discussed in the panel beforehand, but do not know how the discussion will progress. Another challenge is that the panelists are often placed sitting towards the audience. They will not be face-to-face, which may make it harder for them to discuss. The activity of various panelists may also vary from dominating to retrieving. This requires a skilful chairperson, whose task it is to activate participants, keep up and direct the discussion and deal permissions to speak so that even the more silent panelists will be able to present their views. The chairperson should also pay attention to the audience so that it is not left out of the discussion, but can ask questions from the panel.

4.28 Debate with argumentation

Demanding

In a debate, two opposing groups or individuals are chosen, who then present their own views on the chosen theme and give counter-arguments to the opposing views. The students practice presenting justifications and arguments for their own opinions and evaluating other people's opinions. The goal is not to beat the opponent, but to further one's own understanding. A chairperson is chosen for the debate, who ensures that everyone has a chance to talk. The chairperson will also control that the arguments do not last too long. The chairperson lets the opposing teams give their arguments in turns. If the debate does not progress, the chairperson may also give the audience a chance to present a stimulating argument to further the debate. If it succeeds, the debate will force the participants to analyse their opinions.

Strengths and challenges

This method develops the argumentation skills of the students and supports the development of critical thinking. It also forces the students to justify their views. Hearing various perspectives and opinions may broaden and deepen the students' understanding on the themes of the debate.

One of the challenges of a debate is that the real goals of the method may be forgotten. The purpose of the debate is to deepen the students' understanding of the debated topics, not the debate in itself. The teacher should also instruct the students to only use fair arguments during the debate.

4.29 Fishbowl

Demanding

A part of the group is chosen as a discussion group or groups for this method. The other students in the teaching group form the audience for the discussion. After the topics are discussed in the small group or groups, it will be discussed together to allow the participation of the audience.

Strengths and challenges
One of the strengths of the fishbowl is that the discussions can often be started more easily in the smaller groups.

The challenge comes from the tensions and pressures that the audience creates for the groups. On the other hand, the audience may feel distanced from the discussion as it leaves them partly outside. In order to avoid this, the audience may be instructed to take notes as they follow the discussion. The importance of the notes may be emphasised by using them as the basis of the discussion of the whole group. Another challenge of this method is to get the students to participate both in the small group discussion and in the discussion of the whole group.

4.30 Problem-based learning (PBL)

Demanding

Problem-based learning emphasises the problems as the basis of learning and learning in groups. Its goal is to introduce the students to problems that they will probably face in the working life. The purpose of the problems is to start the learning process and to challenge the students to work together to achieve learning. The students will try to apply their earlier knowledge and discover new knowledge to solve the chosen problems. Thus, the method aims to develop the students' problem solving and interaction skills, among others. PBL teaching can also utilise other methods besides group work and problems solved in groups, such as contact teaching and independent studying (Perrenet, Bouhuijs & Smits 2000). However, independent studying and group work is often used more than contact teaching when this method is used. The assessment of a PBL course is based on how well the students are able to solve the problem presented to them. It is a teaching method, which has many variations and approaches. As a method, PBL has been developed further than most of the other methods presented here, and a lot of material related to it can be found on the Internet and in books.

Strengths and challenges
One of the strengths of PBL is that is emphasises the role of the students as retrievers and analysers of information. The students will have to search for information themselves and analyse problems that do not necessarily have a straight answer. The students will enter the world of open knowledge through PBL, where the teacher will not present ready-made questions and answers for them. As the students process the subjects to solve authentic problems, it becomes increasingly likely that they will be able to apply the learned knowledge in real-life problem solving situations. Another benefit of PBL is that the connection of the problems to real life will help the students motivate and commit themselves to studying. PBL will also provide the students with a model for analysing information in a group and will develop the students' group work and problem solving skills as well as their creativity.

One of the method's challenges is that it can easily be seen as a dogmatic example of how the learning path should progress. If the teacher follows the progress order and phases set for the method by the letter, he/she does not pay attention to the type of learning it encourages in the students. The existence of models does not mean that the teacher should follow them step-by-step, but he/she should instead always adapt the method to suit the chosen learning outcomes. As a group work method, PBL places some requirements on the studying techniques and group work skills of the students. In addition, it requires that the teacher is somewhat experienced.

The successful implementation of PBL will, therefore, require learning and a certain attitude both from the teacher and from the students. It is often also at least fairly taxing both for the teacher and for the students.

4.31 Case teaching

Demanding

In case teaching, the students are given a case that they will start to process either independently or in groups and make conclusions and generalisations based on it. The students will work on the case by utilising their earlier knowledge and by searching new information, when necessary. The cases can come in the form of stories, models, descriptions, solutions and applications. The students can also be given questions related to the cases, to which they must find answers. This method has been said to develop the skills related to understanding of larger wholes, application of knowledge, practical problem solving, evaluation of various solution options and the selection of optimal solutions. (Kuittinen 1994, 47–49.)

Strengths and challenges

The processed cases of case teaching make the learning process seem more real to the students. One of the strengths of this method is that it gives the students a point of reference, to which they can find additional information and based on which they can modify their earlier knowledge. The cases are a good test of the application of previously learned things and, as such, support the development of the students' application skills.

One of the challenges of case teaching is to get the students analyse the case critically so that they will reach the internal meanings of the case beyond its external characteristics. The method requires much from the students, which can also be considered one of its strengths. An additional challenge is presented by the creation of good cases. However, there are ready-made cases available for purchase, if required. The main requirements of case teaching are an experienced teacher and careful preparation.

4.32 Project work

Demanding

Project work is related to the linking of theoretical knowledge and practical actions. An individual or a group is given a project to work on, or the students can be allowed to define their projects themselves. The students will have to retrieve and edit information that is related to the project's theme. A project manager and possible other roles are chosen among the members of each group. During the project, the students can rotate the roles. Project work requires that the participants work actively and commit themselves to the project. The durations of the projects may differ, and they can be guided in various ways. The teacher's role is to support and guide the work. The teacher should not give the groups any straight answers, but instead should let the students come up with their own solutions.

Strengths and challenges

One of the strengths of project work is that its authentic nature may attract the students interest in the subject. In addition, information is processed in a new way as the students try to find a connection between information and real-life operation. Project work often helps the students see the target of the project as a comprehensive process all the way from the planning of the project to its execution and reporting. This way the students will form a clear picture of the process one phase at a time. Another benefit of this method is that the students will learn not only the processed subject, but also project work skills.

One of the challenges of project work is that it may require skills from the students that they do not possess. The starting of projects is especially challenging. Thus, successful project work requires that the teacher instructs, guides and monitors the groups well. Another challenge is that the teacher and students often see the goal of the project as creating good results, when learning from the process itself is at least as important. An additional challenge may be seen in keeping up the students' motivation and interest, especially during long projects worth several credits.

4.33 Learning by doing

Demanding

When learning by doing, a group or individuals directly start to practice on the taught subjects. The teacher can give instructions and stimuli to start the action either beforehand or on site. This type of teaching often includes laboratory assignments, field exercises, workplace training and workshops, for example. The purpose of laboratory assignments is to familiarise the students with experimental work, various measuring methods and devices and also to illustrate the subjects covered during the course (Kemian tekniikan tutkinto-ohjelman opinto-opas 2007–2008).

Strengths and challenges
The method is suitable for subjects, on which direct work can be done. Learning through practical activities and in the workplace is made possible with learning by doing. One of its strengths is also the creation of new experiences, a natural studying environment and direct action.

The method is challenging to implement in complex operating environments, since they can overwhelm the students' senses. To prevent this, the students can be first oriented to the phenomena in a simplified environment or the operation can be divided into parts. Another challenge of this method is that starting to act directly may fortify any incorrect operating methods that the students may have. In addition, the students may not concentrate on the things that are important for learning, while they are working. Depending on the work environment, a large part of the time reserved for learning may be used to prepare for and start the work. The method also requires appropriate facilities and equipment. The work is also often expensive to organise, since learning by doing will generally take up much of the teacher's resources.

4.34 Roleplaying

Demanding

When roleplaying is used for teaching, the participants may act out relationships between persons or situations related to professions or organisations. During roleplaying, attention may be paid to attitudes, values and problem solving skills, for example. Roleplaying enables the development of social and interaction skills, among others. When planning roleplaying, the teacher should pay attention to:

- The definition of goals (so that the acting itself does not direct the students' attention away from its purpose)
- The selection of theme
- The selection and guidance of participants
- The naming of observers and their guidance during roleplaying (what they should pay attention to)
- The acting in the situation
- The activation of the group
- The use of available space
- The discussion after the situation and the assessment of the situation
- The sharing of experiences and generalisation of the observations

Strengths and challenges
One of the strengths of roleplaying is that it enables experimentation on various situations and solutions. It simulates and models the interaction between people. Roleplaying is a good way to bring up challenges and problems that are related to the various roles of people or organisations, for example. It also activates students and helps them to link the subjects of the course to practical situations. Roleplaying can be connected to other teaching methods.

The use of roleplaying requires courage and creativity from the teacher. One of its challenges is to reach a deeper level beyond the acting, since roleplaying itself does not lead to learning. Funny acting may easily draw attention away from learning. The connections between the themes, their meanings and conclusions made from them should be discussed in addition to the roleplaying itself to enable learning.

4.35 Games

Demanding

Learning games are used to practice the studied skills in an environment that models reality, but is safe. However, playing is not an end in itself, but a tool to learn things. Analysing the things that have happened in the game is important to enable learning. One of the used game formats is simulation. Simulations use artificial reality to verify or illustrate the events and functions of the surrounding world (Virtanen & Valli, 1997). Games and simulations make experimenting with various approaches and learning from their effects possible. However, all participants should remember that games cannot replace a real-life situation. What they do is prepare the students to operate consistently and methodically in real-life situations. (Räsänen 2004; Virtanen & Valli, 1997.) Games can be used pedagogically to illustrate the studied topics, model operations, revise, apply the learned facts, manage routine work, demonstrate professional skills, organise tests and presentations and to assess the students (Räsänen 2004).

Strengths and challenges
The repeatability and variability of games enable the testing of various solutions and the analysis of their effects. Various approaches can usually be experimented more cheaply and easily through games than by organising them in real life. (Räsänen 2004). If peer assessment and feedback is included in playing the games, the students can also learn from following the playing of others. For example, the teacher can utilise pre-existing board games by modifying them to suit his/her teaching purposes. This way, the teacher does not need to create all the props himself/herself. Once the game has been created, it is easy to utilise for the following courses.

One of the challenges of this method is creating a good game and circumstances for playing. Building more advanced games (e.g. simulations) requires an expert team, since the creation of computer applications, for example, demands a lot of work (Räsänen 2004). On the other hand, there are existing simulations and games for various needs and operational fields, but they are usually very expensive. It is also challenging to guide the students during the game and help them analyse the playing afterwards. The games should not be an end in themselves, but instead be a tool for learning.

4.36 Creative work

Demanding

Creative work aims to utilise the students' ability to adopt new perspectives, to think of new possibilities and alternatives and to build new knowledge and analyses. A creative process can progress in the following way:

1. Searching for the problem (student, teacher, or both together)
2. Creating ideas (e.g. brainstorming)
3. Finding solutions among the ideas
4. Justifying the solution, accepting and assessing it

Strengths and challenges
One of the strengths of this method is that it gives room for the students to think for themselves, and requires them to seek new ways to approach the subject. This method challenges the students to overcome their limitations. One of the challenges of creative work is to get the students to create and learn something new. A part of the students may feel frustrated, as the teacher requires from them much of something that is not clearly defined. It is important to come up with a suitably challenging problem at the beginning. The problem should not have an obvious answer, but instead the students should be able to approach it from various perspectives.

4.37 Drama pedagogy

Demanding

Drama pedagogy challenges the students to commit themselves to independent learning and learning as a group member, to come up with ideas, to solve problems and to make value choices. Learning occurs through the active actions and studying of the students. The drama working methods can be divided into four main categories according to their purpose of use:

1. Methods that build the framework of the drama and motivate the group to participate in the activities and expression of the drama. The purpose of this method is to produce additional information for the work and to help the progress of the action.
2. Story telling methods develop the story and its plot. They are used to concentrate on important events, situations or conflicts, and they enable experimentation on and testing of thought models and approaches. In addition, the story telling methods help the group to move on in the story.
3. Interpretation methods bring forth new perspectives on the subject matter. Work is mainly done on the symbolic level.
4. Thought-provoking methods are used to evaluate and examine the events of the drama or to develop new solutions, for example. This method enables the development of the group's oral communication and discussion skills. (Draamatarinat.)

Strengths and challenges
One of the strengths of drama pedagogy is that is suits various fields of study. It enables work on and illustration of situations, experiences, attitudes and interactions through drama.

A challenge for this method is that it requires that the teacher is thoroughly familiar with the method to manage it. Acting may also easily become an end in itself, which makes the guidance of the students' attentions to achieve learning on the matters beyond the drama difficult. Another challenge is to help the students participate in the drama thoroughly.

4.38 Dialogue with oneself

Demanding

In this method, the teacher has a dialogue with himself/herself.
The discussion may be a debate, or it may bring up various viewpoints.

Strengths and challenges
One of the strengths of this method is that the students will be able to see negotiations and debates. The method enlivens presentations and gives an edge to it.

The challenge of the method is that it requires the teacher to be able to play at least two different roles and to have the courage to play those roles in front of the students.

4.39 Participants teach

Easy

In this method, the participants prepare a teaching session and teach each other something either individually or as groups. This way, the students are the experts on the subjects they are teaching. The teaching session may be prepared during contact teaching or independently. The teacher supports the students in their preparations for good teaching sessions.

Strengths and challenges
One of the strengths of this method is that the students are given an active role in the teaching session, and they have to analyse and process information themselves. This often makes the achieved learning and understanding reach a higher level of quality than if the students would only passively absorb the information presented by the teacher. At the same time the method frees the teacher from the presentation of basic facts, and lets him/her lead discussions and ask questions. The method also supports the development of the students' performance and teaching skills and helps them commit themselves to studying.

Because a single student or a group of students always has the active part of the teaching session in this method, it is a challenge to get the rest of the students to learn the topic. It is the purpose of this method to get the students to learn the subjects of the course more extensively than what they themselves teach. However, the person preparing the teaching session and presenting it also usually learns the most from it. Another challenge is to ensure the level of teaching, since the students' teaching skills vary. Therefore, the students have to be given support for the preparation of the teaching session and its presentation. The teacher should guide the students to teach their topic with more variable methods than a simple presentation monologue. An additional challenge is to have the students respect the student who is teaching as an expert in the matter.

4.40 Interview

Average

Student pairs are instructed to interview one another. The interviewer writes down the thoughts of the interviewee. An output (e.g. a report) is created from the ideas that have come up during the interviews. The topic of the interview may be anything that promotes learning.

Strengths and challenges
The interviewee has to articulate his/her thoughts during the interview. This may make them clearer as well as improve the understanding of the discussed subjects. In addition, some things may emerge during the interview that the students should focus on to gain better understanding. As the student's thoughts are written down by another student, it may also open up new perspectives on the subjects.

Interviewing is a skill that develops through practice, which may make it seem too difficult for the students at first. The students may also feel that presenting their views to a stranger is uncomfortable.

4.41 Web-based learning

Average

Web-based learning utilises information and communications technologies (e-learning) to place the learning material and various functions supporting studying and teaching on the Internet. The teaching process also occurs on the Internet. (Nevgi & Tirri, 2003.) Web-based learning environment may include instructions, assignments, learning material, chats and forums and links, for example.

Strengths and challenges

One of the main advantages of web-based learning is its flexibility, which means that studying and teaching are not fixed to a certain time or place. Web-based learning also enables learning from others through the sharing of thoughts and assignments.

One of the challenges of web-based learning is that the students require a certain level of computer literacy. Also the teacher has to have the technical skills required by web-based learning. For example, the teacher has to be able to create a web-based learning environment that is clear and supports the achieving of the learning outcomes. The lack of real-world contacts may also be seen as a challenge related to web-based learning. The lack of traditional human contacts may make the students feel alone with their studies. Therefore, the teacher also has to guide and support the students enough during web-based learning courses.

5 DIMENSIONS OF LEARNING ASSESSMENT

One of the most important aspects of the assessment of learning is its effect on the guiding of studying. Good assessment encourages the students towards studying that enables a deep approach to learning. As a contrast, bad assessment guides the students to doing things that are insignificant for their learning and development of skills.

5.1 Purposes of assessment

The goals of assessment can be divided in various ways. The emphasis on the various purposes of assessment depends on whether assessment is seen from the perspective of the individual, the community or the society (Räisänen 1994, 22), since various actors need assessment for varying purposes (Lappalainen 1997). This handbook examines assessment from the perspective of individuals, the students and the teacher. The students' understanding of assessment creates a framework that they base their studies on. There is a view related to a hidden curriculum, which proposes that studying often seems better when looked at from the perspective of assessment and grades than when examining it within the framework of a deep approach to learning (Biggs 1996a, 5). Learning as such includes not only the understanding of the taught information, but also knowledge about what pleases the lecturer and how to get good grades (Ramsden 1992, 6, 62). Students interpret the actions of the teacher and make assumptions on the requirements of the assessment based on their interpretations (Lindblom-Ylänne & Nevgi 2003, 56; Prosser & Trigwell 1999, 11).

The students focus their studying on the things that they think will be emphasised in the assessment. The situation, where the students' assumptions on the assessment situation, the used assessment methods and the assessment requirements as well as on what they should learn define their studying more than the learning outcomes set for the course, is called backwash. Backwash is often thought of as a negative phenomenon, but if the assessment is in line with the set outcomes, it has a positive effect. (Biggs 2003, 140–141.) If teaching, the set outcomes and the criteria and methods used for assessment are consistent, the student will be able to adjust their studying in a way that is beneficial for learning (Biggs 1996a, 4).

Trotter (2006, 507) divides the purposes of assessment into three main categories: Giving feedback, motivating and supporting the students' learning. The categories of Räisänen and Frisk (1996, 16) is more detailed, and they divide the purposes of assessment into guidance of learning, controlling, selection, prediction, motivating and development. In this handbook, we will concentrate on the purposes of assessment based on the categories of Räisänen and Frisk.

The control purpose of assessment describes the external control of assessment in connection with a behaviouristic perspective on the assessment of learning. Control is focused on the monitoring and examination of actions, it is external in relation to the action, it compares the action with the set outcomes and classifies it. Quantitative criteria are often used in connection with the control purpose of assessment, and it is implemented through tests, for example. **The selective and predictive purposes of assessment** refer to the assembling of knowledge, based on which the future study success of the students can be predicted, and assumptions made on their study progress, for example. (Karjalainen 2002, 209, 220–224; Räisänen & Frisk 1996, 16–17; Soininen 1994, 11–15.)

The motivating purpose of assessment means its role in creating activity and directing the actions of students. Motivation strongly directs the actions of people, and it is an important factor when the aim is to promote learning and make it more effective. Assessment influences the students' motivation, because assessment and its consequences have an effect on how students feel about studying. (Trotter 2006, 508; Kauppila 2003, 43.)

Feedback plays an important part in the **developing aspect of assessment**. Based on the feedback received through assessment, the students learn about the shortcomings of their learning, and understand the importance of developing their actions. Assessment aims at developing the students' skills, correcting erroneous impressions and challenging them to a deep approach to learning. Assessment is essential when the aim is to help the students achieve the set outcomes. (Räisänen & Frisk 1996, 16–17; Soininen 1994, 11–15.) Soininen (1994, 12) includes statement as one of the essential purposes of assessment, which he thinks is the premise and base for all assessment. The current status of the students' learning can be found out through stating assessment.

The guiding purpose of assessment refers to the direct effects that assessment has on the learning process. The students' assumptions and experiences of assessment and the methods used for assessment are linked to how they study and prepare for the assessment situations (Virta 1999, 5–6). Because assessment directs studying, it has an essential role in the quality of the achieved learning (Ramsden 1992, 78).

Studying can be directed towards choices that are appropriate for the set learning outcomes through the guiding purpose of assessment. The methods used for assessments and, later, its results tell the students how they should study in order for it to be beneficial for the achieving of the set outcomes. (Soininen 1994, 13.) Students adjust their studying to enable the achievement of the set outcomes, because the goal of studying directs it (Rauste-Von Wright, Von Wright & Soini 2003, 57). Therefore, a deep approach to learning and knowledge should be set as the outcome, and the assessment should be planned to guide studying towards the achieving of high-quality learning (Lindblom-Ylänne & Nevgi 2003, 254).

The various purposes of assessment can be achieved through differing assessment methods (De Graaff & Rompelman 2004, 171). Assessment methods are discussed in chapter 6.

5.2 Planning assessment

The planning of assessment is an essential part of the planning of a course. As said previously, the planning of a course is started by mapping the skills that should be developed. The learning outcomes and the structure of the course are defined based on those skills. The structure of the course is planned to include action that supports the achieving of the set outcomes. The purpose of assessment is to support the students' efforts to reach those goals. Another goal of assessment is also to find out the level of achievement.

The teacher should write down the specific outcomes during the planning of the course according to table 12, as well as the methods that those outcomes are supposed to be achieved with and how their achieving is assessed. Table 12 describes course planning that adheres to constructively aligned teaching.

Table 12 Examples of constructively aligned teaching

Learning outcome	Method + action	Assessment
Students know how to use references in scientific texts.	Writing references is explained and the students write some text of their own.	Students produce references during the exercise. Peer groups check the references and if there are any unclear situations, the teacher helps the students.
Students are able to search for information related to their own field of study.	Students search for information related to their own field of study in various places (e.g. libraries and databases).	Students hand in their output that includes the results found from various sources as well as the used search criteria in relation to the assignment at hand.

Table 13 describes a course, whose outcomes and teaching, learning and assessment methods are not consistent. Due to the lack of constructive aligning, the course in the example would only rarely produce studying that is beneficial for the set outcomes.

Table 13 Examples of teaching that is not constructively aligned

Learning outcome	Method + action	Assessment
Students know how to use references in scientific texts.	The teacher gives a presentation on how references are made. WHAT IS LACKING: Students creating their own references.	Students fill in a multiple choice test, where they choose the correct and incorrect references. WHAT IS LACKING: The textual context and placing the references as a part of a text.
Students are able to search for information related to their own field of study.	The teacher gives a lecture on where information on their field can be sought and searches for information in front of the class. WHAT IS LACKING: The students' own information seeking.	The students are asked for the most common information sources in a test. WHAT IS LACKING: Seeking for information for a specific use, selecting information, using search terms and the retrieval of sources.

The following presents some challenges that should be taken into account when planning assessment.

The work done by the students during the course should be taken into consideration in the assessment. If the teacher chooses a working method with a heavy work load for the students, and then disregards the work that the students have done, it does not support a deep approach to learning. Therefore, the students should be rewarded for the work they have done already during the course to support them in reaching their goals. Thus, if the teacher has the students complete assignments during the course, the assessment should be based on those assignments, or they should at least be taken into consideration in the assessment. This promotes active working during the course and the student's studying motivation.

It is always challenging for the teacher to try out new assessment methods. It may be difficult to understand the purpose of a new assessment method when it is first implemented, which makes experimenting with a new method challenging to do successfully. It is, therefore, recommended that the teacher gets acquainted with the characteristics of the various assessment methods before using them. Success also requires courage to try and learn from the experiments.

When the teacher chooses the assessment method for a course, he/she should know that despite the popularity of a traditional examination, it also has its own set of risks. If assessment is based on a traditional examination, the teacher may find it hard to change the actions of the students during the course by simply developing the teaching. This is because assessment has a strong effect on the actions of the students during the course. Based on this, it can be proposed that there are some essential problems in using a traditional examination as the basis of course assessment. The first problem is that an examination directs students to a surface approach to learning. If the assessment is based solely on an examination, the students are guided to study just before the examination. Another problem of an examination is that students do not know how learning is assessed in the examination. This promotes surface approaches to studying, such as memorising or searching for pointers. Students who utilise these sorts of studying strategies rarely reach a deep level of learning.

As the teacher plans assessment, he/she should also remember to define the assessment criteria clearly and inform the students of the criteria. The assessment criteria are connected with the guiding purpose of assessment, since they help the teacher direct the students' studying.

Measuring learning is difficult, which the teacher should remember when he/she plans assessment. Quantitative and distinct meters aid in the evaluation and comparing of the students, but they may not necessarily measure learning. Qualitative and individual meters enable the measurement of learning, but they might make assessment and comparing more difficult. Therefore, the teacher should think carefully about what he/she wishes to measure with assessment and how assessment will be implemented.

5.3 Measuring learned knowledge

The teacher will have to devise a meter to find out what the students have learned and to assess this learning. When creating a meter, the teacher has to be aware of what learning means in his/her case and how it is manifested. The planning of a meter should take into consideration the two factors that describe a meter's quality: reliability and validity. Reliability means the meter's ability to measure the desired quantity. If the meter has a high reliability, it does not in itself create a large margin of error. However, when measuring non-physical quantities, such as learning, the validity of a meter also comes into question. Validity indicates how well and reliably the meter measures the desired quantity.

The use of a traditional examination and a multiple-choice examination have been justified with their supposed objective results on the knowledge of the students. However, even though the reliability of these assessment methods is fairly high, they may have problems with validity. This has been shown in studies, which have proven that traditional and multiple-choice examinations promote a surface approach to learning and memorising. Therefore, an examination tests the students' memory and ability to memorise things, instead of their learning. All this makes the primary status of objective evaluation as an assessment criterion questionable, as this criterion promotes the use of high-reliability meters for assessment, even though those meters may have low validity. With this approach, the measurement results may be very reliable, but they do not necessarily tell the teacher anything about learning. This challenge is due to fact that learning is basically qualitative development, which makes quantifying it very difficult.

It is challenging to create a meter to measure the level of learning with high reliability and validity. If the teacher were to create a meter with high validity, it might be hard to use its measurement results to compare students. In this case, also the assessment performance and criticality of the teacher may fluctuate from one assessment situation to another. This is indeed the problem that teachers looking for an alternative assessment method to a traditional examination face. This situation can be seen in the assessment of theses (diploma theses and pro gradu theses), for example. The students write their theses on various subjects, and they are still assessed with the same criteria and tables.

To test the validity of a meter, the teacher can use the meter to measure his/her own or a colleague's knowledge. If an expert of the field cannot get a good result with the meter, he/she has to question its validity.

To make the assessment reliable and as equal to all students as possible, the teacher can create an assessment framework for each course or use ready-made general frameworks. An assessment framework includes the assessment criteria defined beforehand as well as the requirements of a performance of a defined level. The framework can be created to emphasise the same factors as the course and to take into consideration the achievements that the students should be rewarded of.

Solo taxonomy is an example of a general assessment framework. It is based on the research of Biggs and Collis (1982). The Solo taxonomy can be used to define quality criteria for various levels of learning and to classify answers based on their quality (Lake 1999). In the taxonomy, learning is divided into five levels. The levels are hierarchical and present the depth of the achieved learning: The first three levels present a surface approach to learning and the levels 4–5 present a deep approach to learning. The levels of learning are:

1. Pre-structural level: The answerer does not have factual information. The answer is incoherent and does not answer the question.
2. Unistructural level: The answerer examines the subject from a single point of view, or can name a single relevant fact in his/her answer.
3. Multistructural level: The answerer has produced a list of several unconnected, but relevant facts.
4. Relational level: The answer is coherent, and has a clear structure and meaning. The answerer also connects the facts to one another and makes generalisations.
5. Extended abstract level: The answer includes hypotheses and generalisations and the application of knowledge. (Biggs and Collis 1982, according to Scholten, Keeves & Lawson 2002.)

5.4 The place of assessment in teaching

This chapter discusses the temporal placement of assessment during the course. Assessment may be:

- **Diagnostic:** The assessment takes place before studying/teaching (mapping the students' knowledge level with a pretest, for example).
- **Formative:** The assessment takes place during studying (assessment is utilised for learning).
- **Summative:** The assessment takes place after studying (achieved learning is evaluated with a final examination, for example).

5.4.1 Assessment before studying

Diagnostic assessment takes place at the start of a course and refers to a mapping of the students' entry knowledge, skill and learning levels (Karjalainen 2002, 208). In addition, the students are presented with the most important issues of the course with assessment before the actual studying. Diagnostic assessment can be implemented with a pretest, for example. Based on the results of the test, the teacher can make adjustments to the contents, focus, and methods of the course that take the know-how of the target group into consideration.

Formative and summative assessment are discussed here through two quantitative and qualitative decision-making frameworks that are connected with education. Whether learning is seen as a qualitative or quantitative phenomenon affects the assessment, which then, based on the chosen perspective, emphasises either the quantity or quality of learning.

5.4.2 Quantitative approach and assessment after studying

From the quantitative perspective, the amount and details of learning are more important than its quality and comprehensive understanding. This approach sees assessment as a function separate from the learning process that concentrates on mapping the learning results (how much of the correct material the students have been able to learn). The students that know the most are considered to be the best students. This approach has no interest on the factors behind learning or not learning. A quantitative approach leads to a transmission of knowledge from the teacher to the students, after which the students return the knowledge to the teacher

in the assessment situation. The students' ability to reproduce the learned material quickly and accurately is thought to be a prerequisite for good learning. (Biggs 2003, 148–154; Biggs 1996a, 1–2.)

The quantitative tradition is connected with summative assessment, which emphasises the evaluative side of assessment. Summative assessment takes place after the teaching and concentrates on the knowledge accrued as a result of learning. In this way, assessment is a function separate from the actual learning process, and does not enable the development of the students' learning. Assessment makes sure that students have accumulated enough knowledge and skills to be able to advance in their studies. Thus, its aim is to map the students' current knowledge and skill level. Any changes occurred during the learning process as well as the way learning and knowledge have been achieved are not included in the scope of summative assessment. (Biggs 2003, 142; Lindblom-Ylänne & Nevgi 2003, 257; Poikela 2003, 77; Tynjälä 1997, 279; Brown et al. 1997, 12, 151.)

In summative assessment, students are often placed in order according to their grades. This arrangement helps the teacher find out how the students have succeeded in relation to one another. The students will not know, whether their grades are a result of achieving the learning outcomes, or of succeeding better than the other students, which is called comparative assessment. Students see comparative assessment as a competitive situation, because in order to get good grades they have to be better than the rest. (Biggs 2003, 59, 143; Karjalainen 2002, 207; Boud 2000, 156.)

Summative assessment encourages the students to a surface approach to learning, which often results in a poor quality of learning. Based on this, it can be proposed that summative assessment does not support achieving a deep approach to learning and understanding, which is considered a general aim in institutes of higher learning. (Biggs 1996a, 1, 3.)

5.4.3 Qualitative approach and assessment during studying

The qualitative tradition of learning supposes that students learn cumulatively and interpret and include new material based on their earlier knowledge. Earlier knowledge develops through new learning, as well. (Biggs 1996a, 3.) Qualitative assessment takes both the learning process and the learning outcomes into consideration. The teacher guides the development of his/her students through assessment. (Biggs 2003.) The qualitative tradition includes a formative assessment of learning, which focuses on the learning process and its development. It is characteristic for formative assessment for assessment to take place already during the course. Assessment is indeed an integral part of the learning process. Formative assessment measures the performance of the students and maps the shortcomings of their learning while defining the subjects that the students should concentrate on in the future. Assessment helps the students direct their studies to achieve the set outcomes. (Huddleston & Unwin 2003, 143.) In this way, formative assessment supports and guides the students in a way that is positive for the outcomes set for the studying and learning process. This makes feedback an essential part of assessment. (Boud 2000, 155–156.) Feedback is given both on the current knowledge of the students and on how they should direct their studies in the future (Black et al. 2003, 42). Formative assessment also promotes a deep approach to learning as it creates a steady rhythm for studying and prevents piling up all studying at the end of the course.

In formative assessment, the students are evaluated individually in relation to a fixed criterion, which is represented by the knowledge required by the assignment and the set goals. This makes the grade depend on achieving the outcomes. The success of other students does not affect the grade. Thus, getting good grades often requires knowing the set outcomes and the means to achieve them. (Biggs 2003, 59, 143; Karjalainen 2002, 207.)

Formative assessment promotes and guides learning, and it can also have a positive effect on study motivation. The means of formative assessment, including various assignments and lecture diaries completed during the course, often activate studying. (Biggs 2003, 142; Lindblom-Ylänne & Nevgi 2003, 257; Brown et al. 1997, 12, 151.)

The teacher should use a combination of the presented temporal placements of assessment in order to have the assessment support the students' studying in a versatile manner.

5.5 The person assessing

The following chapters discuss the person who does the assessing. Regardless of the person doing the assessing, assessment can take place before studying (diagnostic), during studying (formative) or after studying (summative).

5.5.1 Peer assessment

Peer assessment refers to an action, where students assess the outputs or actions of other students. Peer assessment can easily be connected to teacher assessment, and it can form a part of almost any assessment method (assessment methods are discussed in chapter 6). The success of peer assessment can be promoted with assessment instructions given to the students. The instructions should include the assessment criteria and the things that students should pay attention to in their assessment. The teacher can also create a template for the assessment with both quantitative and qualitative questions.

Strengths and challenges
Peer assessment eases the teacher's workload. The use of an examination is often justified for courses with large groups of students with the assumption that a large number of students makes formative assessment during the course impossible. However, formative assessment and feedback can be implemented through peer assessment without any significant extra workload for the teacher. Other strengths of peer assessment are that it develops the students' evaluation skills and makes it possible for the students to learn receiving and giving feedback as well as learn from the performance of others. In addition, assessing the performance of others has been seen to develop the students' ability to assess their own performance, because peer assessment guides the students to analyse and compare their own work in relation to the work of others. The knowledge that other students will read their work may also encourage the students to better performances. As students give feedback to one another, they may also bring up things that the teacher may not have paid attention to.

One of the challenges of peer assessment is that because individual students assess the output or actions of various people, the assessments may have a different quality level. If the students are aware of the set outcomes and the criteria of the assessment, the assessments may become more equal. This can also be promoted with clear assessment instructions or ready-made templates. The difficulty of assessment as well as giving and receiving feedback can also be seen as challenges for peer assessment. However, they can also be seen as skills that can be developed, and whose development can be supported. The development of assessment skills and giving and receiving feedback through peer assessment can also be set as one of the outcomes of the course.

5.5.2 Self assessment

In self assessment, an individual student or a student group assesses its own work or actions. The student is an expert on his/her own learning, so it is only right that he/she should assess it. Self assessment can also be utilised along with teacher assessment. self assessment can then be

focused on the student's actions during the study process or development during the course. As peer assessment, self assessment can also be supported by providing the students with assessment instructions. The instructions should include the assessment criteria and the things that students should pay special attention to in their assessment. The teacher can also create a template for the assessment.

Strengths and challenges
The major strength of self assessment is that it develops the students' ability to evaluate their actions. Self assessment also creates almost no extra workload for the teacher, and should, therefore, be utilised more widely as a part of course assessment.

The challenges for self assessment, as for peer assessment, come from the possible various levels of criticality of the students and the possible individual differences in the assessment criteria. This makes the comparison of the assessments problematic. However, the comparativeness of assessments can be promoted with guidance, as has been discussed before. On the other hand, assessing themselves may be strange for the students, which is another reason to provide instructions for the assessment.

5.5.3 Teacher assessment

Assessment has traditionally been carried out by the teacher. The teacher is seen as an expert in his/her field, and should, therefore, be competent to evaluate the level of the students' learning in relation to the set outcomes.

Strengths and challenges
Teacher assessment can be seen to increase the uniformity and equality of assessment. The teacher is responsible for assessing the students with regard to the set assessment criteria.

One of the weaknesses of teacher assessment is that it decreases the responsibility that the students have for their own learning process. Teacher assessment is based on a tradition, in which the teacher transmits information to the students and then checks if they have learned the taught subjects during assessment. This sort of assessment only rarely focuses on the development of learning. The development of learning during the course only comes up if the teacher stays the same for several courses or if the students' initial learning level is tested before the start of the course. Teacher assessment reflects his/her values and estimations and is not necessarily transparent or objective, despite the common belief.

5.5.4 Assessment carried out by a customer or other interest group

Assessment can be carried out by a customer or a representative of some other interest group in relation to workplace training or project work for an outside customer, for example. In this case, the assessment is done by a person independent from the institute providing the education.

Strengths and challenges
One of the strengths of an external assessment is that it often increases the students' motivation and commitment and, therefore, promotes learning and is beneficial for the set outcomes. For example, the customer may evaluate the students' know-how in relation to his/her views on the requirements of working life. In this way, the assessment of the students' know-how is not limited to the context of studying, but is related to a larger field of operation.

It is a challenge to connect the assessment carried out by a customer or some other outside operator to the goals of the institute providing the education. An outsider often carries out the assessment from his/her own perspective, which can also be in conflict with the outcomes of the course. If an outside operator carries out the assessment, it is important to explain the operator's perspective to the students.

5.6 Assessment by working method

Assessment should be planned in relation with the working method used during the course: independent studying, contact teaching, group work, workplace studying and personal guidance.

For **independent studying**, teacher assessment can be focused either on the process or its outcome. Especially when assessing the student's actions during the process, the teacher should utilise self assessment either to support teacher assessment or instead of it. If studying is not guided during the course, the teacher is not necessarily aware of the studying during the process, and has to focus the assessment on its outcome. In addition, assessing his/her own actions critically promotes the development of the student as a student.

In **contact teaching**, mere presence does not ensure that the students learn the things that they should. If the teacher wishes to assess learning, he/she cannot base the assessment solely on the recording of presence. Instead, assessment can be based on essays, writings, discussions or presentations produced by the students, for example.

For **group work**, the essential thing is to decide whether to assess the know-how of the group or the individuals that form the group. If the equal importance of each group member for the group's success is emphasised, the teacher should give a grade for the whole group. In this way, the group members that have worked less receive an equally good grade, even though they may not have earned it. This is not fair for the more diligent members of the group. If the active members of the group feel that the assessment criteria and the actions of the inactive members of the group are unfair, they may not be ready to give their best for the common good of the group. To overcome these challenges in group assessment, the teacher can take the views of the group members on both their own actions and the actions of the other group members into consideration in the assessment. This approach can be carried out through peer assessment and self assessment.

When assessing **workplace studying**, the teacher should rely on assessment carried out by the employer and on the student's self assessment. This is because the teacher often only gets to see the outcomes of workplace studying in the form of project reports or learning diaries, for example. This way, the teacher cannot know the reality about the actions and learning that has occurred at the workplace. The person guiding the students during their workplace studying instead follows the students and their development throughout the workplace studying, which makes him/her a good source for the assessment. For example, the assessment of workplace studying may focus on the student's initiative, independence and interaction skills, as well as their skills to apply learning, solve problems and present their output.

The assessment of **personal guidance** can concentrate on the end result and the actions during the process, but also on how the students prepare for guidance situations, make their own decisions, show initiative and ask for help in problem situations as well as on their ability to adjust their actions based on the guidance.

5.7 How to assess?

Students usually just receive a grade or a record of completion in their study registers as the result of an examination assessment, for example. This type of assessment tells the student nothing of the factors that affect their grade. For example, the grade does not tell the student which things have been correct or wrong, or how he/she should develop his/her studying to get better grades in the future. Therefore, grades represent the stating and evaluative purposes of assessment. When using grades, the teacher should inform the students about what their performances have to have to achieve a certain grade (cf. the levels of an assessment framework). As soon as possible after the assessed performance, the students should also be provided with model answers to compare their own performance with.

A written assessment is a one-way message from the person carrying out the assessment. It is better than a grade, since it gives the teacher a possibility to evaluate the weaknesses and strengths of the student and to specify the things that the student should concentrate on in the future. However, a written assessment does not ensure that the message is understood nor that any unclear matters are later discussed.

The assessment can also be given verbally. This method takes up a lot of time from the person carrying out the assessment, and it is, therefore, used relatively rarely, when compared to grades, for example. However, receiving verbal feedback would be important for the students' learning and development. Verbal feedback enables dialogue between the students and the teacher, asking questions about the assignments and justifying decisions. In addition, the teacher can make sure that the students understand his/her message while giving verbal feedback. Verbal assessment helps the students gain knowledge about their mistakes and adjust their studying based on the assessment to learn the things required to overcome their shortcomings. Instead of focusing solely on the students' mistakes, the teacher should also give positive feedback during the verbal assessment to encourage and motivate the students. For the teacher, one of the challenges of verbal assessment is to inform the students of the assessment criteria clearly and unambiguously during private discussion.

6 ASSESSMENT METHODS OF LEARNING

The methods used for the assessment of learning reflect the views on learning and the purposes of the assessment of learning behind the assessment (Räisänen & Frisk 1996, 18). Assessment methods are not only tools of assessment, but tools of learning as well. When choosing assessment methods, it is important that they are suitable for the target of the assessment and that they support the achieving of the course's outcomes (Brown et al. 1997, 44). The types of know-how and learning aimed at with the course should also be taken into consideration. What kind of performance should the assessment promote? In addition, the teacher should think about who decides the learning and know-how outcomes and assesses the level that should be reached. (Huddleston & Unwin 2003, 142; Biggs 1996b, 358.)

Various assessment methods guide the students towards different kinds of studying. Methods that are not directly linked to what students do easily lead to studying that emphasises memorising and a surface approach to learning. If assessment is an essential part of studying, it can be used to guide students towards a deep approach to studying and high-quality learning. In this case, assessment has been connected to studying with exercises, reports, diaries, assignments, projects or presentations, for example. The course grade is directly based on these outputs.

Brown, Bull and Pendlebury (1997) remind that if a teacher tries to change the students' learning, he/she should change the methods used for the assessment of learning. This is because the students' understanding of assessment and assessment methods has a strong effect on their studying and learning (Entwistle 1997, 20). Therefore, the chosen assessment method is a central factor behind study motivation, attitudes towards studying and the achieved learning outcomes (Scouller 1996, 3; Ramsden 1992, 67).

Table 14 presents the scope and methods of the assessment of learning discussed in this handbook. Teachers can mark the variations that they are going to use to assess the students' learning and know-how on the table, if they want. They can simultaneously think about how to develop assessment in the future.

Taulukko 14 Assessment method matrix.

	Who assesses				When			Target			Function					Type			Method				
	Self	Teacher	Peer	Customer	Diagnostic	Formative	Summative	Test performance	Real performance	Performance on one's own time	Control, statement	Motivation	Development	Guidance	Selection	Grade	Written	Verbal	Independent studying	Contact teaching	Group work	Workplace studying	Personal guidance
Participants teach																							
Assignment																							
Mind map																							
Demonstration event																							
Written assignments																							
Portfolio, development portfolio																							
Project work																							
Research projects																							
Learning diary																							
Discussions and interactive events																							
Pretest																							
Iterative examination																							
Traditional examination																							
Verbal examination																							
Home examination																							
Internet examination																							
Book dialogue examination																							
Lecture dialogue examination																							
Portfolio examination																							
Learning diary examination																							
Open book examination																							
Quick reports																							
Presentation examination																							
Drama examination																							
PBL examination																							
Multiple choice examination																							

The following chapters discuss the assessment methods of learning. In all of the methods, the assessment can be carried out by the students themselves, a teacher, a peer, a customer, or a representative of another interest group, as shown in table 14. The assessment can also be carried out by several of the aforementioned actors. Additionally, several assessment methods can be used for the assessment. Regardless of the used assessment method, the performance or output can either be assessed or left unassessed. Despite of the method of assessment, the target of the assessment should be the achieved learning and know-how. It is also essential to inform the students of the set learning outcomes and assessment criteria, because they direct the students' studying. Students should be aware of the things that the assessment focuses on and of the requirements of a good performance.

6.1 Participants teach

The students organise a situation where they teach each other. The action can be monitored or guided by the teacher or it can be totally independent. Teaching can be carried out by individuals, pairs or groups. The assessment can focus on the contents of the presentation and the students' level of know-how and on how well the students are able to explain and argue the taught subjects.

Strengths and challenges
This method promotes the development of the students' teaching and performing skills. To be able to teach the subject to other students, the teaching students have to first learn the subject profoundly. Therefore, learning is also focused on the substance. Dividing the teaching responsibility may also be used as a way to motivate the students and help them commit themselves to studying. When a part of the teaching responsibility has been given to the students, the teacher can withdraw to a monitoring or guiding capacity.

One of the challenges of this method is that the students may not know how to teach or they may consider teaching oppressive. Therefore, teaching may not always succeed as planned. The teacher's support is essential in those cases. The teacher may also find it hard to give up his/her role as a teacher, which may also be seen as a challenge.

6.2 Assignment

The students are given an assignment, which can include doing, reading, retrieval of information, laboratory assignments or planning, for example. The work can be done individually or in groups. The assignment may have different phases and guidance or it can be carried out totally independently. The assessment of an assignment can be focused on the quality and scope of the output, but also on the creation process. In this case, the assessment takes planning, time use and information retrieval into consideration, for example.

Strengths and challenges
Focusing the assessment on an assignment often supports studying already during the course. Usually, carrying out the assignment requires independent information retrieval and analysis from the students. Through independent information processing, the students can achieve a deep approach to learning.

One of the challenges of assignments is that students may not be ready to commit themselves to the independent and persistent studying required by them. Therefore, it is important to motivate the students. This can be done by giving the students the opportunity to influence the topics of the assignments and by emphasising the process in the assessment. If the assignment is challenging, the students should be supported and guided more, which increases the workload of the teachers.

6.3 Mind map

A mind map refers to a tree-like graphical presentation created by the student that has keywords and connections between subjects. Mind maps are like their creators, which makes it hard for outsiders to understand them. Mind maps aid memory and help seeing the connections between subjects.

When assessing mind maps, the students' ability to perceive and analyse a distinct set of subjects should be focused on. The assessment may concentrate on how diversely and richly the matter is laid out and what the mind map includes and lacks. Mind maps can be connected to different forms of examinations or to other assessment methods, for example.

Strengths and challenges
Mind maps can quickly give a picture on a subject field and they can be used variedly in teaching, assessment and memorising.

Using mind maps as an assessment method requires that the teacher is fully acquainted with their creation and masters the subjects of the mind maps. Another challenge of mind maps is that they are the results of information gathering carried out by their creators, and may not be easily interpreted by an outsider. The mind maps created by various persons might also be hard to compare. The students' explanations can be utilised in the assessment of mind maps.

6.4 Demonstration event

In a demonstration event, the students present a thing or a system that they have created during an assignment or a project. The form of the presentation may vary. For example, it can be a video, a slideshow, a drawing, a poster or a verbal presentation. The event may include discussion and questions. The peer group may prepare for the demonstration event by getting to know the pieces of work beforehand to promote discussion. Their views expressed during the discussion should also be noted in the assessment.

In addition to the quality of the output, the assessment of a demonstration event may be focused on the individual's or the group's ability to describe and present their work to others. Peer assessment may be utilised in a demonstration event through the use of opponents, for example. In this case, the opponents will critically acquaint themselves with the work and evaluate it beforehand and will discuss the contents and structure of the work and/or the presentation in the demonstration event itself. The demonstration event can be connected with another assessment method, for example, with the written assessment of a project or an assignment.

Strengths and challenges
A demonstration event may motivate the students and form the climax of a project. When planning demonstration events, it is important to remember that the goal is to learn from them. During demonstration events, the students' attention may be focused on secondary things instead of things important for learning. The teacher can influence the focus of the students by emphasising the importance of demonstration events as learning opportunities and by utilising peer assessment, for example. Through peer assessment, the students can be motivated to get better acquainted with the work of others.

6.5 Written assignments

For a written assignment, the students create an output by applying their know-how and learned theory to the assignment. Written assignment bring forth the students' own views and opinions about the studied subjects. Students are also able to gather extra information during the whole writing process. Written assignments include reports, essays, summaries, abstracts and synopses, for example.

Depending on the goals set for the written assignments, assessment can be focused on various things, which emphasises the importance of informing the students about the assessment criteria. The assessment criteria direct the students' writing and define the form and quality of the end result. For example, assessment can emphasise the concise presentation of the subject matter. Instead of the students' summarising skills, assessment can also focus on the students' ability to analyse the read text deeply. Alternatively, assessment can concentrate on the information created by the students themselves and on their ability to refine the information. Assessment can also focus on seminar work based on the written assignment or a presentation of the written assignment.

Strengths and challenges
Students can process the written assignment on their own time and progress at their own pace, considering the limits set by the course schedule, however. Therefore, using written assignments as an assessment method supports studying during the course and provides a rhythm for it. Written assignments based on reading material and assignments that students are aware of while reading often make reading for an examination, for example, more efficient. In this way, written assignments also support the forming of a deep approach to learning.

One of the challenges of written assignments is the creation of instructions and assessment criteria that are good enough for the assignment. Depending on the given instructions, written assignments may become too concise and detached from other learning, in which case they do not promote a comprehensive and deep approach to learning. To succeed, writing may also require support during the process from the teacher and other students. Depending on the nature of the written assignments, the possibility for plagiarism may form another challenge. In that case, the written assignment would not, in fact, assess the students' learning.

6.6 Portfolio, development portfolio

Students collect their achievements in a portfolio, which they can then use to present their know-how. A portfolio can include concrete outputs, writings or visual presentations. Additionally, it can include all of the student's output (work portfolio) or just a sample of them (sample portfolio). The structure of the portfolio may be strictly defined or chosen freely by the students.

The assessment of a portfolio usually focuses on the outputs included in it. The assessment can also include the student's verbal or written presentation and evaluation of the portfolio and his/her development during its creation. The students should be made aware of the assessment criteria for the portfolio, as well.

Strengths and challenges
One of the advantages of a portfolio is that the students can work on it on their own time and build its contents according to their interests. Thus, it can be a very motivating tool for those, who like independent work. When assessing portfolios, the development of the students' learning during the course (or another timeframe) can also be taken into consideration.

Working on a portfolio may be strange for the students, wherefore it requires good instructions and possible support during studying. Without adequate instructions, the students may feel that they are unable to create the portfolio independently. They may also not understand the goal and recommended contents of the porfolio. One of the challenges of a portfolio is to make the students think about their actions critically and evaluate and develop them instead of just describing them. This can be supported by choosing the analysis of one's actions as an essential assessment criterion.

6.7 Project work

The students work on a project either individually or in groups. The project may be imaginary or real, but it is important that it models real-life projects. The assessment of project work may focus on the end result, but also on the division of work, supervision of work, project plan and its execution, working methods, scheduling, budgeting and/or reporting.

Strengths and challenges
One of the strengths of project work is that it requires the students to retrieve and analyse information independently or in groups, which promotes a deep approach to learning. In addition to the learning outcomes related to the substance of the project, assessment can take the students' project work skills into consideration.

The challenges of project work partly depend on the size of the project. For a short-term project, it may be challenging to get the group to actually work together. The challenges of a longer project spring from scheduling and from the groups bogging down. Successful project work also requires a good project leader. The teacher can support project work by giving roles to the group members or by guiding and monitoring the project. However, all projects cannot succeed, but even failed projects enable learning if the reasons of failure and alternative operating methods are analysed.

6.8 Research projects

Students work on real problems by participating in starting or already running research projects. The assessment may focus on the research plan, actions during the research and/or the results of the research. It is important not to reward the students only for impressive results, but to take the nature and quality of their actions during the project more widely into consideration. Thus, assessment also pays attention to the work done during the research and its meaning for the success of the whole project and to the development of the students' actions. In that case, assessment should also reward the students for noticing wrong decisions and utilising group work. This type of assessment promotes both the success of the project and the development of the students.

Strengths and challenges
One of the strengths of research projects is that students will be able to work on real and challenging problems that have a direct link to real life. In research projects, students learn while working. Another of their advantages is that students have to search for and analyse information independently and apply their own know-how, which promotes a deep approach to learning.

The finding/creation of good projects and research problems, guiding the students' actions during the projects and the assessment of projects are some of the challenges related to research projects.

6.9 Learning diary

Learning diary is a document written by the student, which can include learned subjects, questions that have arisen, subjects of lectures, plans, problem points and other contemplation. The learning diary is not meant to be a summary of the things discussed during the course. The student's own analysis and profound contemplation of his/her own learning are essential for the diary. Its aim is to analyse and evaluate learning and its development.

Assessing a learning diary is made easier, if the teacher has provided good instructions for it. With good instructions, the students know what a good diary should include and how things should be discussed in it. This is important, because the instructions given for learning diaries often vary from teacher to teacher. In any case, a learning diary should be a tool for the description of the student's learning process, and the students should be encouraged to write in it already during the course. The assessment of a learning diary should pay attention to the student's analysis of his/her own development, and his/her ability to bring forth questions and seek answers to things that the student has not completely understood, among other things. A learning diary can also be provided as an alternative assessment method for an examination, for example. If a learning diary is written during the course, assessment should be based on it. There is no need for a separate examination in addition to a learning diary. If assessment does not reward the writing of a learning diary, students will not be ready to invest their time and energy on it.

Strengths and challenges
Students analyse and write down their own thoughts in a learning diary, and this process may clarify those thoughts and lead to a deep approach to learning. The use of a learning diary as the course's assessment method promotes long-term studying. This is especially true, if the teacher reads the diaries regularly. In this case, the teacher is also able to adjust teaching according to any difficult and challenging subjects brought up in the diaries. At the same time, the diaries bring the students views on the subjects of the course closer to the teacher.

All students are not familiar with writing down their thoughts. Therefore, students should be given instructions on and guided with the writing of a learning diary. Another challenge of learning diaries is that if the teacher checks the diaries regularly during the course, it creates additional workload for him/her.

6.10. Discussions and interactive events

These refer to meetings between the person carrying out the assessing and the students, where feedback is given and the subject matter of the course is discussed. Things that can be hard to clarify in written reports can be analysed during the discussions. During these events, justifications for decisions can be explained, the strengths of the students' work can be analysed together and possibilities for the development of the course can be discussed, for example. The discussions can be carried out privately or in small groups.

The discussions emphasise the development purpose of assessment, because interaction enables the development of the students' actions already during the course. The goal of assessment is to give feedback on the students' work and to encourage the students to direct their studies to enable the achievement of the learning outcomes. With interaction, the students can be made to think about things that they would not have thought otherwise. It can also be used to solve problems and difficult matters and discuss them in teaching and guidance. Interaction helps the teacher see the views of the students better. If you wish to assess the discussions themselves, see the chapter on verbal examinations.

Strengths and challenges
Interaction during the course can be used to promote the students' development. It also enables asking more specific questions and asking for justifications for decisions. In addition, discussion may bring the subconscious choices that direct the students' work or actions to surface.

Using discussions in assessment requires a trusting and developing atmosphere to succeed. The discussion should be developing and encouraging instead of defending and judgemental. Interactive assessment also requires good interaction skills from both parties and the ability to listen to one another. Discussions are usually most successful in small groups, which takes up much of the teacher's resources. Discussions with larger groups rarely succeed in developing the learning of the individual participating students.

6.11 Different types of examinations

A traditional examination is still one of the most widely used assessment methods. This is true despite the fact that students would better achieve a deep approach to learning, if learning was assessed more variedly. In the following chapters, we present the traditional examination, but also alternative forms of examinations.

When selecting the type of examination and its contents, the teacher should keep in mind that the examination should only include tasks and questions, which the students have already exercised during the course. Assessment, teaching, studying and the studied subjects should, indeed, be constructively aligned. For example, if the students have not applied the received information during the course, it is not consistent to arrange an examination, in which the students are supposed to apply information and assess them on it. Examination has traditionally only been seen as a tool for assessment, but examinations can also be good learning situations in themselves. However, if the examination is the final situation of the course, it cannot be fully utilised as a tool for learning. In that case, the student has no need or possibility to correct his/her incorrect understanding or fill in the gaps of his/her knowledge. Thus, the development purpose of assessment cannot be achieved. For example, pretest and iterative examination support learning well.

6.11.1 Pretest

Pretest means an examination arranged before studying. The teacher may require that students prepare for a pretest, or it can be used to map the existing knowledge of the students. The pretest can be used to screen out the students of the course and it can be assessed or left unassessed. A pretest can take the form of any of the examinations presented here.

Strengths and challenges
A pretest gets the students thinking already before the actual course has started. It helps the students form their own opinions on the subject matter of the course. The course can also be started more quickly with a pretest. It balances the workload of the course, since a part of the work has already been done as the students have prepared for the pretest. The teacher can adjust the teaching based on the results of the pretest to better suit the students' learning level, if required.

One of the challenges of a pretest is how to emphasise it in relation to the other forms of assessment of the course. If the pretest is not assessed, or if it has only a minor significance, it may make the students less motivated to work on it.

6.11.2 Iterative examination

An iterative examination is any type of examination that is returned to after it has been done and checked. Its purpose is to give the students feedback on the test questions and to get them to develop their learning and direct their studying based on the feedback. In the feedback, the teacher can also bring up things that the students should pay more attention to.

When assessing an iterative examination, the teacher should take into consideration both the quality of the questions and the students' ability to receive feedback and develop their learning based on the feedback. One of the assessment criteria could be the students' ability to develop and broaden their thinking.

Strengths and challenges
An iterative examination teaches the students to learn from their performances and develop their thinking and learning further. As an assessment method, it is a good tool for learning. An iterative examination can enable individual progress and support the development of the students who advance more slowly. Students may also feel that it is a fair assessment method, if they have gotten used to the fact that they cannot fix their mistakes or cannot learn from them. One of the advantages of an iterative examination is that assessment does not rely on one performance only.

The difficulty of creating good questions is one of the greatest challenges of iterative examinations. In addition, an iterative examination creates more workload for the teacher than a traditional examination. The teacher has to reserve time for giving feedback, making additional questions and checking the repeated examination. The teacher can utilise peer assessment to decrease his/her workload, for example. Another challenge is to compare the results of students who have progressed differently. Placing the results on a probability curve is also difficult for an iterative examination, because one of the purposes of the examination is to get better results from the students.

6.11.3 Traditional examination

A traditional examination supports the idea of the closed nature of knowledge, since it is done in a closed space and in limited time. The central idea of the examination is that there are certain things that the students should learn. The students answer the test questions based on their memory and know-how, because they cannot use any information sources during a traditional examination. Lindblom-Ylänne, Nevgi & Kaivola (2003, 277) discuss some factors that have maintained the status of traditional examination in the assessment of learning. The misconception that the traditional examination is the only correct and reliable way to measure learning is partly responsible for its steady status in assessment. Its favour is affected by the fact that the examination can be controlled, because it does not enable retrieving information from external sources or asking for help. The controlled nature of the situation reinforces the partly incorrect opinion that the students really have to know the subjects of the examination to be able to pass it. Thus, Lindblom-Ylänne, Nevgi and Kaivola propose that traditional examinations have such a strong status in institutes of higher learning because they are an easy and reliable way for the teacher to ensure that students have memorised the subject of the examination or have paid attention during the lectures.

The assessment of a traditional examination is based on the answers supplied by the students. The students are often not aware of the assessment criteria, but the course grade still depends on their performance in the examination. As examination feedback, the students usually only get a grade in their records. This does not promote the development of learning. Thus, the only assessment purpose of the traditional examination is evaluation, which is usually quantitative.

Strengths and challenges
The traditional examination has long traditions in the measuring of students' learning. It is based on the predominant practice in the university and is, therefore, easy to implement in the current administrative framework. Creating a traditional examination also does not take much of the teacher's time, and the comparison of the students' answers is often easy. Closed test questions with only one correct answer also enable the objective evaluation of answers.

A traditional examination encourages the students to a surface approach to learning and memorising, according to studies. Thus, a traditional examination does not give an objective picture of the students' knowledge, but their success can instead be based on memorising and ability to copy information from books. Regardless of their level of knowledge, the examination situation may also feel oppressive to many students, which may lead to failure. Students usually do not get any feedback on the contents of their answers, which may frustrate them, especially if they are not satisfied with their grades. Due to the lack of feedback, students cannot know which parts of their knowledge they should develop to succeed in a retake of the examination, for example.

A traditional examination takes place at the end of the course, and forms an event that is separate from the learning process. This makes the students think about the assessment as the end of learning, and do not return to the subject matter of the course after the examination. In this case, the guiding and developing purposes of assessment will not be achieved. In addition, the traditional examination and the working methods that are required to succeed in it often do not promote activities external to studying. Students produce the answers to test questions independently based on memory, but the ability to seek information, analyse it critically and adapt it to the current circumstances are more important skills for real life problem solving situations than memorising. (Tynjälä 2000, 173–174.) Thus, the traditional assessment methods are alone no match for all challenges set for modern teaching (Räisänen & Frisk 1996, 18).

6.11.4 Verbal examination

In this form of examination, the students answer the teacher's questions verbally. A verbal examination makes it possible for the teacher to ask more specific questions.

Strengths and challenges
One of the strengths of verbal examination is that finding out the students' actual understanding and knowledge is possible through asking more specified questions. Contrary to a traditional examination, the teacher is able to correct any misunderstandings that the students may have related to the questions and guide their answers with additional questions. The teacher can also interrupt the students, if they start answering the questions in a totally wrong direction or try to talk around the things that they do not know the answer to. A verbal examination can also be a good learning situation. It can be arranged in a group, which enables learning from other students. If the verbal examination is arranged in a group, the teacher can choose the answerer of each question separately.

Students may feel that a verbal examination is distressing, because the situation is new to many of them. This form of examination also favours students with good verbal skills, whereas some of the students may fail due to nervousness. Impartiality and comparing the students also form challenges for the verbal examination, because the students are asked different questions, contrary to other assessment methods. The situation is also challenging, because it changes constantly with the interaction and the teacher is not able to plan the situation and all of the questions beforehand.

6.11.5 Home examination

The students can take the examination at home, use various information sources and progress at their own pace. The time limit for completing a home examination can either be very short or it can be several days. The completion time of the examination can be limited by utilising a web-based learning environment, for example. As the teacher assesses a home examination, he/she should pay attention to both the quality of the answers and the use of various sources. A home examination has strong similarities to writing assignments and other assignments.

Strengths and challenges
One of the strengths of home examinations is that the students do not have to memorise things, but they can instead use books to support their memory and learning. The assessment is focused on the knowledge of the students instead of their memorising skills. The examination situation is also closer to real life problem solving situations.

Preparing for a home examination can be challenging, if the students do not know what they should focus on. Therefore, using a home examination requires that the teacher informs the students about the set outcomes well. If the students do not know the goals, they may not prepare for the examination and only strive to pass it once they have the examination. Another challenge of home examinations is that if the students are not familiar with this method, they may think that it is very easy. However, the purpose of the examination is not that the students copy their answers directly from the literature. The aim is to find information relevant to the questions, apply it in the answers and utilise various information sources flexibly and consistently. The planning of test questions that measure knowledge is another challenge of the home examinations.

6.11.6 Internet examination

This is an examination organised on the Internet (cf. home examination).

Strengths and challenges
The advantage of an Internet examination is that its independent of the place that its completed, which enables the students living in various cities completing the examination at the same time, for example.

If the answers to the questions of the Internet examination can be found, the examination is more about the students' information retrieval skills than his/her knowledge or information analysis skills. It is challenging to create an examination that truly measures the desired thing. Another central challenge is how to monitor that the students complete the examination themselves. Alternatively, the students may be allowed to use support persons. These challenges apply to all examinations and test arranged in a place that is not monitored.

6.11.7 Book dialogue examination

In a book dialogue examination, the students write an essay or a report based on books chosen either by the teacher or by themselves, depending on the assignment. The students' discussion of the sources and use of references in their answers show their use of the sources. The answers are given to the teacher, who will discuss them with the students. The discussions may concentrate on the shortcomings in the students' knowledge revealed by the answers, and their goal is then the development of the students' thinking. In their answers, the students can be encouraged to bring forth points that they have not fully understood and to search for more information on the topics. The teaching discussions may then focus on those topics and the teacher and student can think about them together.

The assessment of a book dialogue examination should be focused on the students' ability to discuss the topics and the problems that they have faced in addition to the quality and contents of their answers. The discussions may also deal with the views of both parties on the strengths and weaknesses of the students' work, and negotiations on the students' grade.

Strengths and challenges
A book dialogue examination gives students time to prepare for the examination and enables the independent analysis of information. A book dialogue examination may also encourage students to utilise information and information sources flexibly instead of the mechanical repetition of information. Because this method has both a written and a verbal part, the students that consider essay writing to be difficult may compensate these weaknesses during the verbal teaching discussion, for example.

The reading of essays as well as individual feedback discussions and preparation for them increase the teacher's workload for the course. Students may be nervous about the teaching discussion, which may be a challenge. Due to this nervousness, students may not necessarily be able to express themselves well and, therefore, are not able to show the true level of their learning.

6.11.8 Lecture dialogue examination

An individual student or a student group prepares for a lecture dialogue examination by creating an output that includes questioning, critique or discussing questions. In the examination, the output is given to the teacher, after which all of the students present their work and its problems or questions one after another. Then the student himself/herself, the teacher and the rest of the participating students comment on the topic, the questions, the problems, the presentation and the output.

The assessment of a lecture dialogue examination should concentrate on the questions and problems raised by the students as well as their output itself. If the teacher wishes to assess the examination, he/she can do it together with the students. The assessment can be either individual or it can cover the whole group. If the teacher assesses the whole group, he/she can influence the quality of the discussion in the assessment situation.

Strengths and challenges
The assessment situation of a lecture dialogue examination is also a learning situation. Learning is promoted by taking the students' own questions and critique as the basis of the discussion. Thus, this method is connected with the development purpose of assessment.

One of the challenges of a lecture dialogue examination is the time that it takes to arrange the assessment situations. However, the time can be taken away from other contact teaching. Then the assessment is not a separate function from other teaching, but an essential part of the course.

6.11.9 Portfolio examination

In a portfolio examination, the teacher asks the students questions or has them do exercises based on the portfolios that they have created. The teacher can also assess the portfolios already while they are being made (mid-course examination) or only after they are finished (end-of-course examination) The assessment purposes can include giving feedback, development or evaluation. Based on the assessment, the teacher can arrange a common teaching session or a personal feedback situation or he/she can give the feedback in writing.

Also read the description of the portfolio in this handbook.

6.11.10 Learning diary examination

In a learning diary examination, the teacher asks the students questions or has them do exercises based on the learning diaries that they have written. The teacher can also assess the learning diaries already while they are being made (mid-course examination) or only after they are finished (end-of-course examination) The assessment purposes can include giving feedback, development or evaluation. Based on the assessment, the teacher can arrange a common teaching session or a personal feedback situation or he/she can give the feedback in writing.

Also read the description of the learning diary in this handbook.

6.11.11 Open book examination

An open book examination refers to an examination, to which students can bring any materials they wish and use them in the examination. Alternatively, the allowed material may be limited to a certain list, or the material can be deal out in the examination situation. The assessment of an open book examination can focus on the quality and extent of the answers and the students' ability to utilise the material.

Strengths and challenges
One of the strengths of an open book examination is that it decreases the significance of memorising for the examination. Because students do not have to try to memorise the whole examination material, an open book examination is better suited for a deep approach to learning than a traditional examination, for example. With the help of the material, the students can also process their answers by applying their own know-how and knowledge to the contents and views of the material. Because of this, the students' answers may become more extensive and their quality may become higher.

An open book examination may decrease the amount of preparation that the students do for the examination. However, preparation is required for the students to be able to apply their know-how and the material they have to answer the questions in the examination within the set time limit. Another danger of an open book examination is that the teacher may require something from the students that has not been practiced during the course. The teacher should remember that the purpose of an examination is to test the learning and knowledge of the practiced subjects, and base the examination on those things.

6.11.12 Quick reports

In quick reports, the students describe what they have done and learned as well as any problems and questions that may have arisen during their studying. Quick reports can be used after a work phase has ended, at the end of a lecture or an assignment, for example. Based on the quick reports, the students can be given either verbal or written feedback.

Strengths and challenges
Quick reports force students to think about what they have done and analyse problems as well as write down the things that they have learned in a structured and concise way. Through quick reports, the teacher can monitor the students' learning actions and views already during the course. The reports can also be utilised to develop the ongoing course. The teacher can, for example, bring new content to the teaching sessions or revise difficult topics based on the reports. In addition, the teacher can develop the courses in the future with the help of quick reports.

Despite the strengths of quick reports, they are challenging to use for the development of the course, as it requires quick reactions from the teacher as well as an ability to adjust the teaching to the learning of the target group.

6.11.13 Presentation examination

Students produce a poster presentation about a topic, problem or a project. A seminar-like common event can be arranged to present all the poster presentations. The presentation can be created either in groups or alone, and they can also be made in a common room, which makes it possible for students to see the others' progress. At the same time, using a shared space enables giving feedback and guiding the students without everyone having to arrange a separate meeting with the teacher.

The assessment of a presentation can focus on the presentation as well as the contents and appearance of the poster. The assessment and evaluation of a poster presentation can become an exercise that supports the students' presentation skills. When presenting their posters, students can analyse their work verbally, which may promote the teacher's and other students' understanding of the poster and, thus, ease the evaluation of the work.

Strengths and challenges
One of the strengths of a presentation examination is its limited size, which teaches students to pick the most essential things of their work and present them in a compact and concise form. The presentation may also form a meaningful challenge for the students among the traditional literary studying. For the teacher, it is a quick way to get a picture of the completed assignments or projects. The topics covered by the students can also be dealt out to all other students in their concise poster formats.

6.11.14 Drama examination

Drama examinations are connected to drama pedagogy. In a drama examination, students will act out individually or as a group a phenomenon that is given to them beforehand or planned in the examination situation. The situation may also be open for all students of the course, in which case the other students form an audience for the drama. This enables the use of peer assessment. Some examples of drama situations: Solving crisis situations between a superior and a subordinate, communication problems between an expert and a customer and the relationship between a patient and a doctor.

The assessment of a drama examination is challenging and it is difficult to create common assessment criteria and to compare the performances. The assessment is easier if it is carried out verbally immediately after the performance without evaluation. In that case, the purpose of the assessment is the development of the students' understanding of the issues processed in the performance. Peer assessment should also be included in a drama examination, if other students are present during the performance.

Strengths and challenges
One of the strengths of a drama examination is that, through their performance, students teach the other students present at the examination.

The use of a drama examination requires courage and creativity both from the teacher and from the performers. In addition, it requires that students get to know the structures of the drama and practice it before the examination.

6.11.15 PBL examination

Students are given a problem that they begin to solve by discussing it together. Problem solving can be implemented completely as group work, or the examination may be combined with an independent phase, during which all students create their own answers. Problem solving can also be started by having the students solve the problem independently and then discussing it in a group.

The assessment of a PBL examination can be focused on the outputs or actions of individual students or of the group. It may be fruitful to evaluate the whole group, since the students may then be more willing to share their views and opinions. In addition, the group discussion is valuable for the students' learning.

Strengths and challenges
One of the strengths of a PBL examination is that it is an open situation that resembles problem solving in real life. In addition, group PBL examination develops the students' group work skills and promotes the development of their argumentation and justification skills.

Organising a PBL examination requires some creativity from the teacher, since it can be difficult to come up with a good starting problem. Assessment is also challenging for a PBL examination, because defining assessment criteria for the situation that does not have a single correct answer as well as the comparison of the answers may be difficult.

6.11.16 Multiple choice examination

The essential thing about this examination format is that its questions are multiple choice questions. Students select from the ready-made answer options the one that they feel best answers the question. The assessment of a multiple choice examination is easy and unambiguous, since there is only one correct answer for the questions. The form of the multiple choice examination may vary.

Strengths and challenges
The main strength of the multiple choice examination is the ease and unambiguousness of its checking. There is usually no confusion in the interpretation of the answers. However, the creation of a good multiple choice examination is difficult. A multiple choice examination should also require profound thinking and analysis from the students, and it should really measure the achieved learning instead of memorising. Also the evaluation of learning based on multiple choice questions is challenging, because the students may have made their choice by guessing or by eliminating impossible answer options. A multiple choice examination can be developed by requiring the students to justify their answers. When students are forced to justify the answers, they have to think about the options more deeply, which helps to avoid many of the problems of a traditional multiple choice examination.

7 TEACHING ASSESSMENT METHODS

With the help of the assessment of teaching, the teacher can learn the strengths and shortcomings of the teaching and evaluate the quality of teaching and/or learning. The assessment of teaching is carried out to support the development of teaching, and its aim is to increase the quality of learning. The results of the assessment can also be used to justify the teacher's own teaching decisions.

Before carrying out the assessment, creating the necessary meters and assessment criteria and gathering information, the goal of the assessment and the information that should be produced by it has to be decided. A generally used and uneconomic model is to gather some information about everything, while trying to figure out how things could be carried out better. We must remember that assessment does not in itself tell us how the things should be. As such, it also does not develop teaching, but only enables the development. The usefulness of the assessment of teaching is in its usability and the conclusions made from it.

The targets of teaching assessment may vary. If the purpose of the assessment is to increase the quality of learning, the main target of the assessment should be the things that best represent the learning outcomes, such as students' outputs and exercises and discussions between the teacher and students. Regrettably, the assessment of teaching often focuses on the teacher's work in the form of presentations, communication and the organisation of the course. This despite the fact that teaching only has a consequential and indirect relationship with learning. Assessment is also often carried out based on the student satisfaction gathered from feedback on the various parts of the course, which again only has an indirect connection with the learning outcome. In addition, assessing teaching is often thought of as synonymous to gathering feedback from students, even though feedback is only one way of gathering assessment information.

The following describes a possible way of assessing teaching:

1. Find out your own willingness and motivation to assess and develop teaching and learning to ensure your own commitment. It is not enough to gather assessment information, but you will also have to make the necessary changes based on the gathered information to enable development. That is why the assessment of teaching requires a long-term commitment.
2. Think about the parts or things in the course that need development in your opinion. Focus on the things that you think will have the largest effect on the success of the course, if developed.
3. Choose the targets of the development. You should only concentrate on few things to ensure that your resources are not over-taxed. You should select development targets that you can get information on through teaching assessment.
4. Define good and bad teaching and studying in relation to the set learning outcomes. Also define how success and failure can be seen in the development targets. These definitions direct the gathering of the assessment information and the development actions based on it.
5. Choose the methods that you are going to use for the assessment of teaching. The type of information that can be gathered and the targets, on which information can be gathered, is affected by the chosen methods. Think about which methods provide information on the things that you wish to develop.
6. Create assessment templates and gather the assessment information.
7. Analyse and interpret the assessment information and put it into context. Also compare the gathered information with the definitions of success and failure. Make conclusions on how to develop teaching and learning based on the comparisons.

8. Choose the real development targets based on the gathered and analysed assessment information and think about the reasons for the problems behind the development needs. The aim is to fix the reasons of the problems, not their consequences. For example, the students' poor examination results cannot be fixed by only developing the examination, since you should also pay attention to studying and teaching.
9. Implement the development actions based on the gathered assessment information and plans.

Development is a creative activity, in which you should try to get the students and possibly other teachers participate. This could help generate a wider range of views and a more extensive reception for the development results on the community level. It would be good, if the impulse to assess and develop teaching would come from the students or the teachers, since they are the ones, whose activities are affected by the assessment and development. If the impulse for assessment comes from the organisation management, the commitment of teachers and students is often weaker. In this case, assessment may be seen as an external threat or evaluation of actions. In addition, knowledge of the assessment may affect teaching and studying already during the course, before assessment is carried out. The teachers' own initiative to assess and develop teaching is also useful, because development ideas rarely emerge from external ready-made assessment templates or models.

Assessment includes many risks and unrealistic expectations. It is often carried out as a separate action, which weakens its connection with other planning and development. It is also useful to plan, allocate resources for and schedule the development activities that follow assessment beforehand, because they might not get done otherwise. If no practical actions are done immediately after the assessment, the gathered knowledge may be left unutilised. Therefore, it is important to combine assessment with development. If development fails, it can also set back the activities. For example, the teacher may try to fix things according to the gathered information in a way that causes problems in other areas, or he/she may concentrate on fixing the consequences of the problems instead of their causes. On the other hand, a part of the causes may be beyond the influence of the teacher. In order to find out the side effects of changes, the effects of development should also be evaluated with meters other than the ones that established the necessity of development.

Various teaching assessment methods are presented in the following chapters. You can utilise the different methods and combine them according to your development needs and possibilities.

7.1 External assessment

In this method, an external actor assesses individual courses, modules or the whole curriculum. For example, the Finnish Higher Education Evaluation Council (http://www.kka.fi) carries out external assessments. Assessment services can also be purchased.

Strengths and challenges
An external actor is not dependent on the target of assessment. Because of this, the assessment may be more objective than an internal assessment. Thus, an external actor may bring forth issues that the people in the community do not think of as problems. In addition, an external actor may have experience and comparative information gathered from various organisations, which may make the assessment more extensive than an internal assessment. An external assessment also does not take as much of the organisation's or unit's time as an internal assessment. However, it should be remembered that the planning of the assessment and the selection of the assessment targets require co-operation and, therefore, even an external assessment cannot succeed without the help and effort of the organisation's own workers.

The often high expense of an external assessment can be seen as a challenge. Despite its cost, the information received from an assessment may be non-essential for the orderer. This is because the assessing person may not know the target of assessment well enough and may focus the assessment on issues that are irrelevant for the orderer. To avoid this, the assessing person and the orderer should be in close enough co-operation. Another challenge is to make the assessment information a tool for the development of the everyday teaching of individual teachers. The development work carried out based on the assessment often has to be done by the orderer, so the organisation has to reserve resources to implement the development. In addition, if analysis is done on a general level, it may be challenging to make conclusions regarding individual courses or modules based on them. Another challenge of an external assessment is that teachers may feel threatened by the situation and take a defensive stance.

7.2 Peer teacher assessment

The person carrying out the assessment is another teacher, who monitors and assesses the course either in total or for certain areas. The assessment of a peer teacher is significantly influenced by the teacher's pedagogic know-how, knowledge of the taught field and ability to assess.

Strengths and challenges
The strengths of a peer teacher assessment are partly connected with the strengths of an external assessment described above. A peer teacher may notice some things about the course that the teacher himself/herself cannot see. For example, the teacher may not be able to question some traditional practices. A peer teacher can also bring forth some views on development needs based on his/her own courses.

One of the challenges of peer teacher assessment is that the teacher's ability to assess is crucial to the information that can be received from the assessment. Assessment is a skill that develops through practice. A peer teacher is also usually a member of the same work community, and cannot necessarily question the existing practices. In that case, the peer teacher may not notice areas that are important for development and that could better be seen by an outsider. Another challenge of peer assessment is getting to a deeper level of analysis beyond feelings and opinions to create development actions out of the causes of the problems. Also the implementation of the conclusions based on the assessment is a challenge.

7.3 Own perceptions

A teacher may also gather assessment information by observing his/her own teaching and the actions of the students during the course. He/she can and should write down the observations in order to create development actions. The teacher can also combine his/her own observations with another assessment method.

Strengths and challenges
A teacher makes observations in any case while he/she guides and monitors the students, so this method creates no significant extra workload for the teacher. If the teacher writes down his/her perceptions, their articulation may help the teacher understand the observations and the causes behind them. Writing the observations down enables the teacher to return to them, and so he/she can distance himself/herself from them for a while. The perceptions may open up in a different way later.

One challenge of perceptions is that making them on one's own actions is difficult, because the observation of one's own actions is always limited and influenced by one's own values and know-how. In addition, the use of observations as a tool of development requires that the

teacher is aware of them and analyses the causes behind the observations. Interpreting perceptions and creating development actions may also be challenging. If the teacher observes the students instead of his/her own actions, it must be remembered that the perceptions often concern individual students, and generalisations on the whole group may be difficult to make based on them.

7.4 Self assessment

In this method, the students and/or the teacher assess their actions, learning or teaching independently. Self assessment can be combined with other forms of assessment.

Strengths and challenges
One of the strengths of self assessment is that the person carrying out the assessment knows the target of assessment. Self assessment may make assessment a natural part of operations, which is good for the development of actions.

The assessment of one's own actions or performances is difficult, and self assessment can, therefore, create distorted results. Everyone can develop and practice their skills to assess their actions. The students may also not be accustomed to assessing their actions and have to be guided in it, which may also be challenging. Especially the results of students' self assessment may be skewed. The distortions may be emphasised, if self assessment is used as a basis for the students' grade. It may also be difficult to make conclusions about the development of the course from the students' self assessments.

7.5 Discussions with students

In this method, the teacher has discussions with the students during the course to gather assessment information. In this way, the teacher can receive information on the students' motivation, thinking and operating methods as well as on the problems of the course, for example. The discussions can be carried out during lectures, lecture breaks, exercises or via e-mail, for example.

Strengths and challenges
The teacher can get closer to the thoughts of individual students through the discussions. Based on the gathered information, the teacher can evaluate how the outcomes set for the course relate to the actions in reality. Discussions can be used to find out possible problem areas at the beginning of the assessment, but they cannot reveal the extent of the phenomenon, if the teacher interviews individual students. However, the issues brought up during the discussions may give the teacher new ideas and can, thus, act as a basis for the course development.

The discussions with students are usually about the views of individual students, which limits their usefulness for the assessment of teaching. Conclusions based on individual discussions may not necessarily cover all views. To avoid this, the teacher should interview all students participating in the course, but that will take up much of the teacher's time. Because of this, the teacher usually interviews only a part of the students. The discussions can also be carried out in small groups, but everyone may not be willing to share their thoughts in that case. On the other hand, anonymous feedback always also has a risk of the students not telling their real opinions. Another challenge of discussions is that if their participants are chosen among voluntaries, the results of the discussions may again be distorted, because voluntary students are often more active in their studies, as well.

7.6 Questions for students

In this teaching assessment method, the teacher asks the students questions about the course. The teacher thinks about the things that he/she would like to have the students' opinion on beforehand. The questions can be asked in person or via e-mail, for example.

Strengths and challenges
If the teacher asks questions in person, he/she can make sure that students understand the questions the way they were meant to. In that case, the teacher can also clarify the questions or ask more specific additional questions.

It is challenging to come up with the questions, because the teacher has to know the type of information he/she wishes to gather beforehand. Thus, the teacher has already decided the issues that he/she thinks are the most essential for the assessment while asking the questions. Because of this, the teacher can either strengthen or unsettle his/her opinions with the questions, but they rarely bring up new development targets. Therefore, if the questions are planned beforehand, the true problem areas and essential development targets of the course may not be found. Asking questions from large groups personally takes time, whereas the answers of individual students may not reveal the extent of their views.

7.7 Questionnaires

The teacher creates a questionnaire that concentrates on questions related to the development of the course. The questionnaire may include questions that require verbal or numerical answers. Open questions should be used to find out the causes of things. Quantitative questions can be used to evaluate the level of the whole group in something, because numerical data enables the calculation of averages.

Strengths and challenges
It is possible to gather information from large groups of people with questionnaires without taking up much of the assessing person's resources (related to discussions with students, for example). Because a questionnaire enables getting answers from all students, the extent of a phenomenon and views can be found out with it. In addition, if the same questionnaire is used for different classes, the answers of various groups can be compared.

The teacher should think about the problem areas of the course to form the basis of the questionnaire and to be able to focus the questions on these areas. If he/she does not know the central development targets, they should be found out with another method. Creating questionnaires takes time, and it is challenging to ask the right questions to improve the development actions. The form of the questions should also be paid attention to. For example, essential things about quantitative questions is their unambiguousness and not to include several questions in one question. Another challenge of questionnaires is that they often do not reveal the causes of phenomena. Because of this, and also to get development proposals, the students can also be asked to give reasons for their answers. Otherwise, it may be difficult for the teacher to make development conclusions based on the information gathered with a questionnaire.

7.8 Interviews

The teacher gathers assessment information by interviewing a sample (random or selected) of the group. The interview can be planned beforehand, and it can focus on the decided development targets. The interviews should be recorded and collected in some way.

Strengths and challenges
With interviews, the teacher can get to know the students experiences closely. They can also

bring up issues regarding the development of the course that the teacher has not been aware of before. It is possible to change the progress of the interview and adjust it according to the situation. There is no need to follow the predefined interview structure (cf. questionnaires, for example). Interviews show the students that the teacher is interested in their views and is prepared to spend his/her time to find them out.

The students may feel that the interviews are contrived or distressing situations, but this often depends much on the teacher's personality and the interview situation itself. If the interview situation is unpleasant for the students, it does not necessarily reveal essential issues for the development of the course. Organising a good interview is a skill that can be developed through practice. It also should be remembered that the teacher cannot make conclusions regarding the whole group based on individual interviews.

7.9 Work group

The teacher organises a group from the students participating in the course. Their task is to produce information related to the development of the course and give feedback on its strengths and weaknesses. The teacher can also compensate the group for its work with points towards the course grade or by serving them coffee and cake. The group can meet weekly or monthly in connection with lectures, for example.

Strengths and challenges
One of the strengths of this method is that the students have an essential part in the development of the course. The students may be more committed to the development, if the group stays the same throughout the course.

It can be challenging to form the work group. If its members are selected poorly, they may not represent the views of the whole group. The method may also be unfamiliar for the students, and will thus require close guidance. Guiding the work group requires good guidance skills from the teacher. The group will be the more useful the better the students are committed to its work and the better guidance skills the teacher has.

7.10 Student outputs

Students' outputs, such as examinations, project works, reports, essays, lecture diaries or demonstrations, can be used as basis for teaching assessment. Assessing the outputs does not mean evaluating them for grades here, but an analysis of their content. The teacher can use the outputs to deduce what has been learned, what are the shortcomings, and what has been understood only partially.

Strengths and challenges
Using student outputs as the basis for teaching assessment does not require gathering separate assessment material or a separate analysis of assessment information, because the teacher will analyse the outputs in any case to evaluate achieved learning and know-how. Learning assessment can create a meaningful premise for the development of the course. However, it should be remembered that you cannot deduce the causes for the shortcomings of learning directly from the outputs, but other assessment methods have to be used to find out these causes.

It is challenging to find out the things that students have not understood fully from their outputs only, because students are often skilful in hiding their shortcomings. Based on the outputs, the teacher can find out what the students have failed with, but outputs do not directly reveal the causes of those failures. Finding these causes may require interaction with the students, and using only outputs to develop the course may, therefore, be challenging.

8 SUMMARY

Studying often leads to the best results when it is active, regular and persistent. The traditional lecture and examination model directs the students too much to a to a surface approach to learning, and their studying is concentrated on the days just before the examination. To enable a more deep approach to learning, the teacher often needs to adjust the used teaching and assessment methods. However, the variation of methods does not, in itself, guarantee that the achieved learning would be of a higher level. The development of learning requires work and commitment both from the teacher and the students. If we want the students to commit themselves to a deep approach to learning, it should be enabled on the curriculum and course level so that the degree programme and its individual courses are not too taxing (Chambers 1992). It is also important for the students' commitment to get them motivated to learn and to guide them towards correct studying in relation to the outcomes set for learning and the desired know-how. In addition, it is important for the course assessment to encourage the students to study persistently and to learn from their failures and to reward them for it.

Several different sources bring forth the need for teaching development strongly. Traditional contact teaching, which is passive for the students, is often not the best alternative for a deep approach to learning and studying that is the aim in university level studies. The same learning outcomes can be achieved even with a smaller workload for the teachers by modifying the lectures to be more activating or by utilising group work, for example. In this handbook, we have shown with calculations that contact teaching is not necessarily the most economic teaching method, despite the general belief. In addition to its poor learning outcomes, the expensiveness of contact teaching and its rather high teacher workload speak in favour of the development of other working methods.

The universities' scarce resources and the resulting lack of time among the teaching staff are considered to be a significant obstacle for the development of teaching. The workload calculations for different types of courses presented in this handbook show that the traditional contact-oriented teaching takes time and is expensive. At the same time, the calculations show that the predominant assumptions of the expensiveness of alternative teaching methods are partly ungrounded. Therefore, better teaching that takes less contact time from the teacher requires the development of good independent and group assignments as well as guiding the students better in their independent studies. Traditional university teaching has usually been limited to contact teaching and independent studying, but support and guidance for independent studying is often non-existent. In this case, the teacher utilises and guides only 1/5 of the available working methods. We hope that the four other working methods become essential activities for students and targets of teachers' conscious guidance through the use of this handbook, and they no longer depend on the students' own activeness.

The setting of learning outcomes and their relationship to the teaching methods have not been discussed profoundly in this handbook. However, the outcomes direct the planning of course structures, teaching methods and learning assessment methods. A part of the outcomes are, indeed, formed during course planning, but a part of them may also be formed by the students' actions. Especially for the courses based on workplace studying and project work, a part of the learning outcomes are related to the choices made by students. It is important for the teacher to take the formation of outcomes during the course into consideration, because it enables the creation of unforeseeable learning paths and it helps the students take responsibility for their studying. Various methods guide the teacher in defining the outcomes and affect how much the students are forced to strive for certain outcomes as well as how much room is given for the formation of outcomes during the course.

Good teaching includes the selection of methods, but also the implementation of teaching. If a course fails for some reason or another, the used methods are often thought of as the reason for the failure. If the teacher assumes that correct teaching methods automatically lead to the desired learning outcomes, he/she does not take the taught subject, the actors involved in the learning process, the individual nature of learning and cultural differences into consideration.

Various learning assessment methods provide the teacher with a possibility to support the development of the students. Assessment directs the students' actions significantly, because they are used to adjust the received credits and course grades. Therefore, assessment can be used to reward the students, and the teacher should think about how different forms of assessment encourage or discourage the students. There are innumerable learning assessment methods and their variations. The selection of a good assessment method requires that the teacher is aware of the set outcomes and of how the method affects the students' motivation, commitment and time use. It is important to remember that assessment has a different effect of different students, because assessment is subjective and context-related. A good teacher understands that students are individual and human actors and adjusts assessment based on this knowledge.

The teacher can develop his/her teaching through the assessment of teaching. The most commonly used assessment method is feedback gathered from the students with templates. This handbook presents several ways to assess teaching, some of which are in parts more advanced than the use of feedback forms. Before the teacher chooses an assessment method, he/she should know the desired development targets and select the method that suits them best. However, the assessment often proceeds in a reverse order: The assessment information is gathered first, and the central development targets of the course are sought for in the information. In this case, it is assumed that the teacher has been able to include all the fundamental development targets in the feedback form and that students are best suited to assess them.

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APPENDICES – TEMPLATES

Table icons:

Independent studying

Contact teaching

Group work

Workplace studying

Personal guidance

Course planning model Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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14								
15								
16								

Stimulating lecture, 3 credits (100 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. The student is guided to start studying the material related to the learning diary and the writing of the diary already before the course starts. This enables a more flexible scheduling during the course. The student can choose his/her amount of work before the start of the course according to his/her own situation.	20					PREPARATION. Selection of teaching material (5d). Giving instructions for the learning diary (2d).	74.8
1	CONTACT WEEK. Lecture (2h). About half of the lecture is reserved for exercises done in small groups. INDEPENDENT STUDYING. The student writes a learning diary on the themes of the lecture.	4	2				CONTACT WEEK. Giving the lecture and quiding the work done. Work of the small groups.	2
2	INDEPENDENT WEEK. The student studies the given material and writes a learning diary based on them.	10						
3	CONTACT WEEK (described above)	4	2				CONTACT WEEK (described above)	2
4	INDEPENDENT WEEK (described above)	10						
5	CONTACT WEEK	4	2				CONTACT WEEK (described above)	2
6	INDEPENDENT WEEK	10						
7	CONTACT WEEK	4	2				CONTACT WEEK (described above)	2
8	INDEPENDENT WEEK and learning day	10						
9							Checking the assignments (100 x 1 h)	100
	Total by working method (h)	76	8	0	0	0	TOTAL (h)	183
	TOTAL (h)	84					TOTAL (d)	25
	TOTAL (credits)	3						

Pretest and continuation, 3 credits (100 students) Week	Student's work	Indep. 	Contact 	Group 	Workp. 	Guid. 	Teacher's work	Time (h)
N	PREPARATION. The student is directed to start his/her orientation for the course by preparing for the pretest. The pretest is implemented as a home examination and the students are guided to read a certain set of materials for it. The student can decide how much time he/she wishes to use for studying and how much of the material he/she wishes to study for the pretest before the start of the actual course. The pretest balances the workload of the actual course.	30					PREPARATION. Selection of course material (5d). Creating the pretest (2d). Planning the course. The course plans are later adjusted based on the pretest results. Creating the essay topics (2d). Checking the pretest (100 x 1h).	165
1	CONTACT. Starting the course with a lecture based on the pretest. Giving instructions for the essay and giving out the topics. INDEPENDENT STUDYING. Starting the essay writing.	2	2				CONTACT. Preparing for the lecture (6h) and giving the lecture (2h).	8
2–6	INDEPENDENT STUDYING. The assignment is partly based on the literature used for the preparation for the pretest, but also includes independent information gathering and essay writing.	50						
7							Checking the assignments (100 x 1 h)	100
	Total by working method (h)	82	2	0	0	0	TOTAL (h)	273
	TOTAL (h)	84					TOTAL (d)	38
	TOTAL (credists)	3						

Seminar (e.g. candidate seminar), 10 credits (~15–20 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. Thinking about the research topic.	10						
1	CONTACT. Organisation. Going through the students' research topics, deciding their applicability and modifying them, if required. The course practices are presented, the schedules are settled and the presentation schedule and opponents are settled. INDEPENDENT STUDYING. Preparation and analysis (2h)	2	2				ORGANISATION. Going through the course practices. Writing the course schedule down based on the agreements made during the lecture. Helping students without a topic select a topic for the research.	5
2	INDEPENDENT STUDYING. The student starts to familiarise himself/herself with the selected topic by gathering information and writing a couple of pages for the next contact session. CONTACT. Each student tells the others about the topic of their research in turn.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
3	INDEPENDENT STUDYING. The student continues gathering source material and getting to know his/her topic by reading and writing. In addition, he/she defines preliminary research problems. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting meeting hours, as required.	5
4	INDEPENDENT STUDYING. The student gets acquainted with the method that he/she will probably use for gathering material based on familiarisation with his/her topic and the preliminary research problems, and abot the method. The student also familiarises himself/herself with the factors affecting the quality of his/her research and takes them into consideration while carrying out the research. He/she writes a couple of pages on the reliability of his/her research. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting writes hours, as required.	5
5	INDEPENDENT STUDYING. The student thinks about the processing of the research material by getting to know the method he/she will probably use for processing material and writes a couple of pages on the method. CONTACT. Discussing the topic of each student and their progress shortly. Accepting the students' preliminary plans, after which they can start gathering research material.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
6	INDEPENDENT STUDYING. Gathering material and starting the analysis. and possible problems are discussed shortly.	20	2				SEMINAR. Organising the seminar and eading the discussion. Guiding the students during meeting hours, as required.	5

Seminar (e.g. candidate seminar), 10 credits (~15–20 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
7	INDEPENDENT STUDYING. Material analysis. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20	4				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
8	INDEPENDENT STUDYING. Material analysis. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.		20	2			SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
9	INDEPENDENT STUDYING. Material analysis and research results. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20					SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
10	INDEPENDENT STUDYING. Research results. Writing more extensively on the reliability of the research. Description of material gathering and analysis and the justification of decisions. CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during. meeting hours, as required.	5
11	INDEPENDENT STUDYING. Research results and conclusions. Writing more extensively on the reliability of the research. Description of material gathering and analysis and the justification of decisions CONTACT. Each student's topic, their progress and possible problems are discussed shortly.	20	2				SEMINAR. Organising the seminar and leading the discussion. Guiding the students during meeting hours, as required.	5
12	INDEPENDENT STUDYING. Presentations and opponents' preparation. CONTACT. Presentations with opponents.	20	4				SEMINAR. Reading the students' output beforehand. Running the seminar.	40
13	INDEPENDENT STUDYING. Finishing and giving in the written report.	10						
	Total by working method (h)	242	26	0	0	0	TOTAL (h)	95
	TOTAL (h)	268					TOTAL (d)	13
	TOTAL (credits)		10					

PBL, 3 credits (100 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. Getting to know the given literature independently. Each student can decide how much work they will do before the start of the course, according to their situation.	10					PREPARATION. Creating topics and pbl stimuli (4d). Searching for topic-related sources (5d). Preparing the first lecture (6h). Planning the learning diary and giving instructions for it (2d).	85.75
1	CONTACT. First lecture (3h), during which the practices of the course and the working methods are explained and the students orientate themselves in the themes of the course. The orientation is based on independent studying. INDEPENDENT STUDYING. Preparation for the lecture and its analysis (2h).	2	3				LECTURE and GUIDANCE	7
2	CONTACT. Lecture (3h). The students are divided into pbl small groups. The pbl work on theme 1 is started with a stimulus and some materials. The teacher supports all groups. INDEPENDENT STUDYING. Students gather information and write their learning diaries related to their group's problem for the next meeting of the pbl group (10h). Preparation for the lecture and its analysis (2h).	12	3				LECTURE and GUIDANCE	7
3	GROUP. Students' pbl meeting on the first theme INDEPENDENT STUDYING. Work on the first theme and writing the learning diary (10h).	10		3			GUIDANCE	4
4	CONTACT. Lecture (3h). Creating a new pbl problem related to the second theme and starting work together. INDEPENDENT STUDYING. Preparation for the lecture and its analysis (2h). Work on second theme and writing the learning diary (10h).	12	3				LECTURE and GUIDANCE	7
5	GROUP. Theme 2. INDEPENDENT STUDYING. Work on the second theme and writing the learning diary (10h).	10		3			GUIDANCE	4
6	CONTACT. Lecture (3h). Creating a new pbl problem related to the third theme and starting work together. INDEPENDENT STUDYING. Preparation for the lecture and its analysis (2h). The third theme is finished alone, no pbl group meeting. Finishing the learning diary (10h).	12	3				LECTURE and GUIDANCE	7
7–	GIVING IN THE LEARNING DIARY						Checking the learning diary. (100 x 1 h)	100
	Total by working method (h)	68	12	6	0	0	TOTAL (h)	221.75
	TOTAL (h)	86					TOTAL (d)	31
	TOTAL (credits)		3					

Simulation and game, 4 credits (100 students)

Simulation and game, 4 credits (100 students) Week	Student's work	Indep. 	Contact 	Group 	Workp. 	Guid. 	Teacher's work	Time (h)
-N	PREPARATION. Getting to know the topics of the course through a reading assignment.	4					PREPARATION. Planning and executing the game (on separate time). Planningn the lectures (3 x 12h). Planning the instructions for the learning diary (2d). Selection of teaching material (2d).	65
1–6	READING THE MATERIAL. Reading the teaching material, which is directly connected with the writing of the learning diary and the analysis of the game experiences.	40						
1	CONTACT. The course practices and working methods are presented during the first lecture and the students are divided into groups.	2	2				LECTURE	4
2	CONTACT. The lectures (2 + 2h) discuss the theme of the course. After short introductions, the students discuss the given questions in pairs. Later during the course, the students will apply learned things through the game that is central for the course. INDEPENDENT STUDYING. Independent studying related to the lectures (4h). The student processes his/her learning with the help of a learning diary (6h).	10	4				LECTURE	6
3	CONTACT. The lectures (2 + 2h) discuss the theme of the course. After short introductions, the students discuss the given questions in pairs. INDEPENDENT STUDYING. Independent studying related to the lectures (4h). The student processes his/her learning with the help of a learning diary (6h).	10	4				LECTURE	6
4	CONTACT AND INDEPENDENT STUDYING. The students apply learned things through a game. The functioning of the game is presented commonly in a contact session (2h). Independent studying related to the game (2h). After the introduction, the groups play the game independently. The students play in groups, because several persons can participate in the game simultaneously	2	2				GAME START. Showing the principles of the game to the students.	4

Simulation and game, 4 credits (100 students) Week	Student's work	Indep. 	Contact 	Group 	Workp. 	Guid. 	Teacher's work	Time (h)
4–6	GROUP. Several game sessions are played (3 turns, á 4h). The students make various functional decisions during each session. The game's purpose is to get the students understand how the changes in their actions and various solutions affect the result of the game. For this reason, the players assume various roles from one game session to another. The decisions that affect the result of the game are discussed in groups. INDEPENDENT STUDYING. In the learning diary, the student discusses his/her learning during the course and analyses the events of the game with the help of provided literature. The discussion of game orders and the effects of various functions on the result of the game are also an essential part of the learning diary (3 x 6h).	18		12				
7–							Checking the learning diary. (100 x 1 h).	100
	Total by working method (h)	86	12	12	0	0	TOTAL (h)	185
	TOTAL (h)	110					TOTAL (d)	26
	TOTAL (credits)	4.1						

Laboratory, 5 op (24 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. Creating pairs and groups.			2			PREPARATION. Preparing lectures (5 x 6h) and laboratory assignment introductions (6 x 2h), creating calculation exercise materials (2d), creating the course schedule according to the number of participants (2d), ordering required tools and materials (2d), creating the examination (2d).	100
1	FIRST LECTURE (2h). Going through the course practices and schedule. Giving exercise instructions.		2				LECTURE (2h). Dividing students without pairs into groups (2h).	4
2	INDEPENDENT STUDYING. Independent studying starts, when the students are provided with home calculation exercises. Preparing for contact sessions and independent processing of information (2h). CONTACT. Lecture (2h). Exercise 1, including start-up session and laboratory work (4h).	2	6				EXERCISE 1 (groups 1, 2 and 3) á 4h	12
3	CONTACT. Lecture (2h). Exercise 2, including start-up session and laboratory work (4h). Exercise 1–2, including start-up session and laboratory work (3h). INDEPENDENT STUDYING. Preparing for contact sessions and independent processing of information (2h).	2	9				LECTURE (2h). EXERCISE 2 (groups 1, 2 and 3) á 4h. EXERCISE 1–2 (groups 1, 2 and 3) á 3h	23
4	CONTACT. Lecture (2h). Exercise 3, including start-up session and laboratory work (4 + 2h). INDEPENDENT STUDYING. Preparing for contact sessions and independent processing of information (2h).	2	8				LECTURE (2h). EXERCISE 3 (groups 1, 2 and 3) á 4 + 2h	20
5	INDEPENDENT STUDYING.Producing the student's own part of the group's exercise report (3h). Preparing for contact sessions and independent processing of information (2h). CONTACT. Exercise 4, including start-up session and laboratory work (5h). GROUP WORK. Producing the exercise report based on the results of exercise 3.	5	5	2			EXERCISE 4 (groups 1, 2 and 3) á 5h	15
6	INDEPENDENT STUDYING.Producing the student's own part of the group's exercise report (3h). GROUP WORK. Producing the exercise report based on the results of exercise 3.	3		2				
7	INDEPENDENT STUDYING.Producing the student's own part of the group's exercise report (3h). Making the home calculation exercises (6h). Preparing for contact sessions and independent processing of information (2h). CONTACT. Exercise 5, including start-up session and laboratory work (8 + 6h). GROUP WORK. Finishing the exercise report based on the results of exercise 3. Giving in the exercise report.	11	14	2			EXERCISE 5 (groups 1, 2 and 3) á 8 + 6h. Checking the exercise reports (0.5h/pair).	48

Laboratory, 5 op (24 students) Week	Student's work	Indep. 	Contact 	Group 	Workp. 	Guid. 	Teacher's work	Time (h)
8	CONTACT. Calculation exercise session (2h). Assistants help the students with problems related to the home calculation exercises. CONTACT. Calculation exercise session (2h). INDEPENDENT STUDYING. Finishing the home calculation exercises and giving them in (4h).	4	2				Calculation exercise session (2h). Checking the home calculation exercises (0.5h/student).	14
9	CONTACT. Lecture (2h). Exercise 6, including start-up session and laboratory work (5h). INDEPENDENT STUDYING. Preparing for contact sessions and independent processing of information (2h).	2	7				LECTURE (2h). EXERCISE 6 (groups 1, 2 and 3) all groups at the same time 5h.	7
10	CONTACT. Exercise 6, including start-up session and laboratory work (2h + 8h). INDEPENDENT STUDYING. Producing the student's own part of the group's exercise report (3h). Preparing for contact sessions and independent processing of information (2h). GROUP WORK. Producing the exercise report based on the results of exercise 5 (2h).	5	10	2			EXERCISE 6 (groups 1, 2, 3, 4, 5 and 6) á 2h. (Groups 1, 2, 3 and 4) á 8h	44
11	CONTACT. Exercise 6, including start-up session and laboratory work (4h + 4h). INDEPENDENT STUDYING. Producing the student's own part of the group's exercise report (3h). Preparing for contact sessions and independent processing of information (2h). GROUP WORK. Producing the exercise report based on the results of exercise 5 (2h).	5	8	2			EXERCISE 6 (groups 1, 2, 3, 4, 5 and 6) á 4 + 4h.	48
12	CONTACT. Exercise 6, including start-up session and laboratory work (2h). INDEPENDENT STUDYING. Producing the student's own part of the group's exercise report (3h). Preparing for contact sessions and independent processing of information (2h). Preparing for the examination (5h). GROUP WORK. Finishing the exercise report based on the results of exercise 5 (2h). Giving in the exercise report.	10	2	2			EXERCISE 6 (groups 1, 2, 3, 4, 5 and 6) á 2h. Checking the exercise reports (0.5h/group).	18
13	INDEPENDENT STUDYING. Preparing for the examination and the examination.	15						
14							Checking the examination (1h/ student). Preparing a summary session (2h x 3)	30
15	Summary session		2				Preparing the summary session based on the examination and the course (6h). Summary session (2h).	8
	Total by working method (h)	66	75	14	0	0	TOTAL (h)	391
	TOTAL (h)	155					TOTAL (d)	54
	TOTAL (credits)	5.8						

Participants teach, 5 credits (100 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-1	Dividing groups and selecting topics. The topics are related to the theme of the course and each other.	8					PREPARATION. Group work topics (2d). Processing and preparing material for the lectures (4 x 6h). Creating the group examination (2d).	53
1–3	CONTACT. Lectures (2h/week). GROUP. Work on the given assignment (2h/week). INDEPENDENT STUDYING. Learning diary (6h/week). Preparation for the lecture and its analysis (2h/week).	24	6	6			LECTURE. Giving the lecture (3 weeks x 2h). Solving possible problem situations (7h). Students contact the teacher, if their group is unable to operate well. It is important to ensure the operation of the group, because the students complete a group examination at the end of the course, which is included in the evaluation.	13
4–5	GROUP. Processing the topic (2h/week). INDEPENDENT STUDYING. Learning diary (6h/week).	12		4				
6	CONTACT AND GROUP. The students are re-divided into groups so that each new group includes a single member of each previous group (2h). Each member of the new group teaches the phenomenon that he/she has learned during the course to the other members of the new group (2h). INDEPENDENT STUDYING. Preparing for the group teaching session (2h). Finishing the learning diary (6h).	8	2	2			CREATING GROUPS. Dividing the students into new groups.	2
1–6	PREPARATION FOR EXAMINATION. Studying the literature independently (40h) and in groups (10h).	40		10				
7	EXAMINATION. Students complete a group examination (2h) with their original groups based on the things they have learned during the course. Giving in the learning diaries.			2			CHECKING. Checking the learning diaries (100 x 0.5h) and the group examination (25 x 1h).	75
	Yhteensä työskentelymuodottain (h)	92	8	24	0	0	YHTEENSÄ (h)	143
	YHTEENSÄ (h)	124					YHTEENSÄ (pv)	20
	YHTEENSÄ (op)	4.6						

Project work, 6 credits (100 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. Students independently familiarise themselves with the given literature and earlier projects. A general picture of the course. Each student can decide how much work they will do before the start of the course, according to their situation.	10					PREPARATION. Thinking about the project topics (same topic for all groups/different topics) (5d). Planning the instructions for the project and the learning day (2d).	50.75
1–12	READING THE MATERIAL INDEPENDENTLY AND INFORMATION GATHERING.	40						
1	CONTACT. Lecture (2h), which discusses the course practices, goals and purpose. Dividing groups and selecting topics. INDEPENDENT STUDYING. Preparation for the lecture and its analysis (2h).	2	2				LECTURE. Giving the lecture and its analysis (2h). Dividing students without groups into groups (2h).	4
2	INDEPENDENT AND GROUP. Starting the project and creating the project plan. The students work both independently (4h) and in groups (2h) related to the project work. The student also writes a learning diary about his studying and learning continuously (2h).	6		2			GUIDANCE. Guiding the groups as required (2h/week). The groups contact the teacher.	2
3–4	INDEPENDENT AND GROUP. Project plans. The students work both independently (2 x 4h) and in groups (2 x 2h) related to the project work. The student also writes a learning diary about his studying and learning continuously (2 x 2h).	12		4			GUIDANCE. Guiding the groups as required (2h/week). The groups contact the teacher.	4
5	INDEPENDENT AND GROUP. Finishing the project plans and giving them in. The students work both independently (12h) and in groups (8h). Group guidance session with the teacher (1h).	12		8		1	GUIDANCE. Reading the project plans of the groups (1h/group) and giving feedback on them for each group (1h/group) (20 groups).	40
6–11	INDEPENDENT AND GROUP. Carrying out the project according to the plan. The students work both independently (6 x 4h) and in groups (6 x 2h) related to the project work. The student also writes a learning diary about his studying and learning continuously (6 x 2h).	36		12			GUIDANCE. Guiding the groups as required (2h/week). he groups contact the teacher.	12
12	FINAL SEMINAR, GIVING IN THE PROJECT FINAL REPORTS.	4	4				SEMINAR. Running the seminar and analysis of feedback.	4
13							CHECKING. Checking the project works of the groups (20 x 1h) and the students' learning diaries (100 x 1h).	120
	Total by working method (h)	122	6	26	0	1	TOTAL (h)	237
	TOTAL (h)	155					TOTAL (d)	33
	TOTAL (credits)	5.8						

Case, 6 credits (100 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
-N	PREPARATION. Students independently familiarise themselves with the given literature and earlier cases. Each student can decide how much work they will do before the start of the course, according to their situation.	10					PREPARATION. Creating a co-operation network/contact list for the cases (5d). Cases from the co-operation partners (0d). General cases for students without co-operation partners (10d). Creating instructions for the cases (1d).	116
1	CONTACT. Explaining the idea of the course and dividing the students into groups. Instructions on the nature of the case and communication. During the lecture, small groups think about where they are going to search for cases (2h). INDEPENDENT STUDYING. Preparation for the lecture and its analysis (1h).	1	2				LECTURE. Giving the lecture and its analysis.	3
2	INDEPENDENT STUDYING, GROUP, WORKPLACE STUDYING. Searching for a co-operation partner mainly independently. Progress is discussed in groups	15		5	5			
3	CONTACT. Starting group work. Groups that have not found a co-operation partner are provided with a general case (2h). INDEPENDENT STUDYING. Preparation for the lecture and its analysis (1h).	1	2				LECTURE. Giving the lecture and and its analysis.	3
4	INDEPENDENT STUDYING, GROUP, WORKPLACE STUDYING. Agreement with the co-operation partner, preliminary project plan, meeting with the co-operation partner.	5		15	5		PROBLEMS. Solving problem situations.	14
5–14	INDEPENDENT STUDYING, GROUP, WORKPLACE STUDYING. Solving the case in groups (30h). Independent information gathering, work and writing the report (40h). Workplace studying (20h). PERSONAL GUIDANCE. Checking the group's work and guiding the group (1h).	40		30	20	1	GUIDANCE. Guiding the student groups (1h/group, 20 groups), preparation and scheduling meetings (1h/group, 20 groups).	40
15	INDEPENDENT STUDYING, CONTACT, GROUP. Final seminar, where the groups tell others what they have learned during their projects. Feedback on work. WORKPLACE STUDYING. Presenting the end result for the co-operation partner.	5	5		5		ANALYSIS. Running the seminar and analysis of feedback.	5
16							CHECKING. Checking the end results (20 x 2h).	40
	Total by working method (h)	77	9	50	35	1	TOTAL (h)	221
	TOTAL (h)	172					TOTAL (d)	30
	TOTAL (credits)	6,5						

Workplace training, 10 credits (20 students) Week	Student's work	Indep.	Contact	Group	Workp.	Guid.	Teacher's work	Time (h)
1	Contacts to possible employers and agreement on workplace studying. Introducing the workplace to the teacher for approval. Getting to know the employer and tasks beforehand after the agreement has been signed.	15					PREPARATION. Writing the instructions on workplace studying and the learning diary written during the course (2d). Approving the workplaces presented by the participants of the course (1d).	21,75
1–2	CONTACT. Common start-up session. The students present their workplaces and tasks (2h). WORKPLACE STUDYING. Orientation period guided by a mentor from the workplace (37.5h/week). INDEPENDENT STUDYING. Writing a workplace studying diary (3h/week).	6	2		75		Running the start-up session (2h). Helping the students with possible to workplace studying (2h/week).	6
3–5	WORKPLACE STUDYING. Work at the workplace, with the purpose of getting to know the tasks of one's own field, the application of know-how gathered during studying and developing this know-how (37.5h/week). INDEPENDENT STUDYING. Writing the workplace studying diary (3h/week) and giving it in to the teacher before personal guidance. PERSONAL GUIDANCE. The teacher and the student discuss the workplace studying, the development of the student's actions and possible development targets (1h).	9			113	1	Helping the students with possible problem situations related to workplace studying (2h/week). Preparation for personal guidance by reading the students' workplace studying diaries (1h/student) and running the personal guidance meeting (1h/student).	46
6–11	WORKPLACE STUDYING. Work at the workplace, with the purpose of getting to know the tasks of one's own field, the application of know-how gathered during studying and developing this know-how (37.5h/week). INDEPENDENT STUDYING. Writing the workplace studying diary (3h/week) and giving it in to the teacher before personal guidance.	18			225		Helping the students with possible problem situations related to workplace studying (2h/week).	12
12	INDEPENDENT STUDYING. Preparation for the personal guidance meeting (2h) and presentation (4h). PERSONAL GUIDANCE. Discussion of the student's learning and development during workplace studying (1h). CONTACT. The students shortly present their workplaces, tasks and learning during workplace studying in turn. The aim is to provide the students with information about various work possibilities in their field (2h).	6	2			1	PERSONAL GUIDANCE. Preparation for personal guidance by reading the students' workplace studying diaries (1h/student) and running the personal guidance meeting (1h/student). Running the contact session.	40
	Total by working method (h)	54	4	0	413	2	TOTAL (h)	125.75
	TOTAL (h)	473					TOTAL(d)	17
	TOTAL (credits)	17.7						

TEKNILLISEN KORKEAKOULUN OPETUKSEN JA OPISKELUN TUEN JULKAISUSARJA

1/2000 Ahonen Anna-Maija
Perustutkintoa tekevien opiskelijoiden ohjaus Teknillisessä korkeakoulussa – Nykytilanne ja kehittämissuuntia

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Teknillisen korkeakoulun opetusvälineistön tila ja tieto- ja viestintätekniikan käytön tukeminen

3/2000 Hein Irene & Lauhia Riikka (toim.)
Ope^2. Dokumentoitua opetuksen kehittämistä Teknillisessä korkeakoulussa 1999–2000

1/2001 Knuuttila Mari & Virtanen Annukka
Opettajan opas onnistuneeseen opettamiseen

1/2002 Ahonen Anna-Maija & Yanar Anu (toim.)
Yopas yotakin! Opettajien oivalluksia opetuksesta. YOOP 2000 -kurssin opetuksen kehittämishankeraportit

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Opetuksen pintaa syvemmällä – TKK:n opettajien käsityksiä tiedosta, oppimisesta ja opetuksesta

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Opettajatuutor tienviittana – Tavoitteena koko opintopolun kattava ohjausjärjestelmä

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Matkalla itsenäiseksi tutkijaksi – Tieteenfilosofisten taitojen rooli jatko-opintojen haasteiden voittamisessa

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Teknillisen korkeakoulun konetekniikan osaston opettajien ja opiskelijoiden kokemukset oppimisen arvioinnista ja palautteesta

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Fuksien fiilikset. Teknillistieteellisen alan ensimmäisen vuoden opiskelijoiden opiskelukokemuksia 2005–2007

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Strategisesti suorittaen? Teknillistieteellisen alan opiskelijoiden kandidaattivaiheen opintojen eteneminen, opiskeluorientaatiot ja opiskelukokemukset uudesta kaksiportaisesta tutkintorakenteesta

3/2009 Rantanen Elisa & Liski Eero
Valmiiksi tavoiteajassa. Teknillistieteellisen alan opiskelijoiden opintojen eteneminen ja opiskelukokemukset tekniikan kandidaatin tutkinnossa

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