Appendix: Exemplification of the 'Principles of good digital teaching'

The 'Principles of good digital teaching' are necessarily abstract in their wording. In the following, we present different proposals to exemplify and implement the principles. The goal is to inspire teachers to develop their own digital or hybrid teaching formats in line with the 'Principles of good digital teaching'. The first three scenarios have been developed by the Service Centre for Higher Education Didactics ('LehreLernen') of the University of Jena. The four best practice examples have been selected by the University's Academy of Teaching Development. The three scenarios are interdisciplinary in nature, whereas the four best practice examples are concrete courses in which model concepts for the respective specific content and learning objectives were implemented. In total, the three scenarios and four examples cover different online and blended learning formats, different course types and different subject areas, an overview of which you can find in the following table. The proposals presented will be updated in line with developments in the field of digital teaching.

	Lecture	Seminar	Practical course	Practical training
Interdisciplinary	*Scenario* *Online Teaching: Inter-active lecture* Alternating asynchronous self-study online and synchronous virtual exchange Principles 1, 2, 3		*Scenario* *Online Teaching The practical course* Alternating asynchronous self-study online and synchronous virtual exchange Principles 1, 2, 3	
	Scenario *Blended Learning* Alternating asynchronous self-study online and phases of on-site teaching Principles 1, 2, 3			
Humanities / Social sciences	*Best Practices:* *Example 'Public Law'* Online teaching with recorded inputs, synchronous exchange, and materials for follow-up Principles 1, 4	*Best Practices:* *Example German as a Foreign and Second Language—Teacher Training* Online teaching, alternating between asynchronous self-study online and asynchronous virtual exchange and clear allocation of tasks and roles (teams of moderators) Principles 1, 3, 4		
	Best Practices: *Example Educational Science* Online teaching with learning videos, tasks and synchronous virtual or on-site exchange Principles 1, 3			
Medicine				*Best Practices* *Example Internal Medicine* Synchronous online teaching with virtual patient cases Principles 1, 2

Model scenarios for online teaching and blended learning formats

Source: Service Centre of Higher Education Didactics (*LehreLernen*) of Friedrich Schiller University Jenahttps://www.lehrelernen.uni-jena.de/

Scenario Online Teaching: Interactive lecture

Phase 1: Recording inputs

- Record relevant sessions (max. 30 minutes), so that students can watch them afterwards no matter where or when.
- There are various technical options at your disposal: Direct audio recording in *PowerPoint, Open-Cast, Camstudio* etc. If possible (e.g. when using PowerPoint), activate the automatic subtitle feature to improve accessibility. In addition, the *Multimedia Centre* can record you in the lecture theatre.
- By using the plug-in *'Opencast'*, you can embed files in mp4 format in *Moodle*. With *Opencast*, you can also record videos directly from Moodle.
- The duration of your videos obviously does not have to correspond to the total duration of your course. Consider the workload (module catalogue) and allow time for assignments and exchange.

Phase 2: Assignments for students

- Give participants impulses to actively engage with the content presented. This enables them to internalize learning content and link it to their previous knowledge. In addition, questions often only arise when students actively reflect on the content presented.
- Students can complete these assignments at any time and from any location.
- Examples of assignments: Discussion of in-depth questions (via *Forum* in *Moodle* or via *tweedback*), quizzes (via *Quiz* in *Moodle*), compilation of research results on virtual bulletin boards (*Padlet* or *Board in Moodle*).

Phase 3 Exchange

- Provide opportunities to compare results and/or resolve questions. You can use exchanges to work on more in-depth topics with the students.
- This can be done synchronously by holding web conferences (e.g. with *Zoom, Webex*) or by meeting with students in a chat (*tweedback Chatwall*). Adjust the time frame of the web conference to the project. The exchange can also take place asynchronously, for example by using the Forum in *Moodle*.
- In any case, it is important that you as a teacher give impulses to initiate the exchange. Experience shows that the exchange rarely happens on its own. For example, formulate questions for the students to get the discussion started. Make sure that all students can actively participate, including those with limited auditory or visual capacity. In terms of the learning objectives to be achieved, set impulses in the course of the exchange to steer the plenary discussion.
- If necessary, start with a survey to get initial feedback from the students and get them in the mood for the exchange (*pingo, mentimeter*).
- Have them take the minutes to document the results of the exchange in the long term.

Scenario Online Teaching: Practical course

Phase 1 Task for students −individual phase (Think)

- These can be formulated as exercises or as part of reading a text.
- You should draft tasks that give students the necessary orientation with regard to the solution and the expected result. Tasks with clearly defined results motivate students. That means you should make tasks concrete to avoid them becoming never-ending.
- Example: Answer the three questions using the text ... Or: Summarize the key messages of the text on half a page in your own words.

Phase 2 Peer exchange among students (Pair)

- In larger seminars or tutorials in particular, you may not have the opportunity to review all of the students' exercises yourself. This is why you could give the students the opportunity to exchange the results they produced in the individual phase. They can then compare their results and solutions and analyse errors together. Experience shows that students already refine their work results or converge on correct solutions after the peer exchange.
- You can use the peer assessment feature in *Moodle (Workshop activity)* for this. Alternatively, you can ask students to collate the results of their individual work (using *etherpad, Padlet, Forum* in *Moodle, the tweedback Chatwall* or *Only Office* in the cloud).
- Tip: If necessary, also formulate a task for the peer exchange phase. Take into account how you want to continue working with the results in phase 3.

Phase 3 Live consultations (Share)

- Give the students the opportunity to compare approaches and solutions with you and the whole group and to clarify open questions and problems. You may also work out a sample solution together, if necessary.
- This exchange can take place orally via web conference (*Zoom, Webex*) or in writing via chat (*tweedback Chatwall, MS Teams*).
- Important: Avoid presenting a ready-made sample solution yourself. Work with the students' results and questions instead. This will motivate them to solve the tasks set for them in the future.
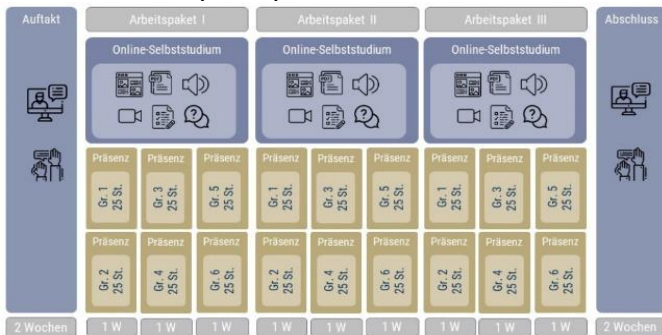
Blended Learning: Combining online self-learning phases with face-to-face consultations

Model with 75 participants:
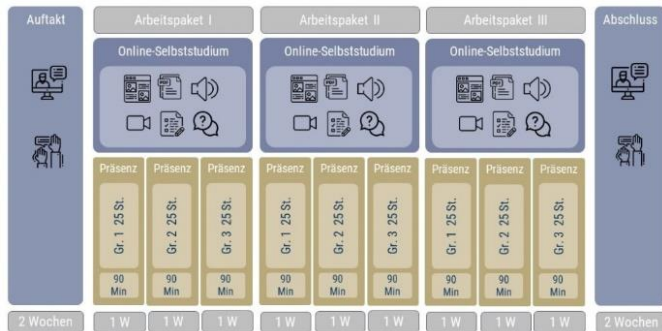
Model with 150 participants:

Illustrations by the Service Centre for Higher Education Didactics: Blended Learning Scenarios 1a and 1b

Overview

This example is based on the flipped classroom model and consistently combines phases of online self-study with on-site phases.

During online self-study, students work independently on work packages provided by the teacher. Depending on the objective of the course, these can be audio or screencasts, texts or scripts, or assignments to be completed by the students. Here, the core teaching content, which in the classic lecture is presented by the lecturer, is outsourced and worked out by the students themselves.

The on-site sessions, on the other hand, are devoted to consolidation, application and transfer exercises. They provide you as a teacher with insights into the students' progress, identify obstacles and work on them together with the students. For the students, the on-site sessions are opportunities to clarify questions that have arisen during the self-study. Important: The on-site sessions provide a space for exchange and interaction. They require students to have completed the tasks defined for the self-study and are much more than a repetition of the elements acquired in the self-study phase.

Kick-off session

▪ Takes place synchronously with all students on site **or** via web conference (e.g. with *Zoom*); approx. 90 min.
▪ **Assessing the students' level of knowledge and expertise**: e.g. assessment of previous knowledge using an audience response system (e.g. *Pingo*), collection of theories or ideas on the topic of the course (e.g. with *tricider*) or collection of knowledge on a virtual pinboard (e.g. *Padlet, Board in Moodle*).

- **Introduction to work formats** (concept and organization of the course); if necessary, preparation of group assignments for individual sessions
- **Making it clear** what is expected of students: What are the learning and assessment objectives of the course? How can/should students contribute? (When) should webcams/microphones be switched on in web conferences? How to deal with technical difficulties? What (additional) steps should be taken to ensure accessibility? What should be prepared for individual sessions? When, how and based on which criteria is performance evaluated?
- **Introduction to the topic**: timetable and common theme of the course; arouse interest in the topic (e.g. through the use of case studies, reference to subject-specific problems, life-world references, linking to previous knowledge, etc.).

Work packages I−III − alternating group sessions

- In our example, each work package consists of a three-week online self-study phase and three on-site sessions, each with different groups (max. 25 students each). All students participating in the course are divided into three groups of approximately the same size, and each of these groups has one on-site session per work package.
- **Online self-learning phase**: The students develop knowledge independently, organize it and/or solve tasks; this can be done based on: recorded inputs, screencasts or self-learning videos, scripts, texts, research and/or writing assignments to students (e.g. with *Moodle Wiki* or *Workshop activity*)
- **On-site group sessions**: Each group receives at least one consultation of 45 to 90 minutes per work package, depending on the total group size (see diagrams); these on-site sessions are used to clarify questions or to discuss selected topics in depth, to check the level of knowledge and competence achieved in the self-study by working together on (transfer) tasks or to collect approaches to solutions; in addition, it is recommended to discuss errors that prevent students from continuing their work.
- **Organizational challenge**: The individual groups participate in the on-site session at different stages, i.e. they may be at different points in the work process at the time of the respective session.

    o Solution 1: If applicable, you could send the first work package to the students before the kick-off session, so that the first group has a longer lead time.
    o Solution 2: You could offer weekly, but shorter, group consultations, so that each group has more frequent (but shorter) on-site meetings.

Closing session

- Takes place synchronously with all students on site or via web conference (e.g. with *Zoom*);
- **Concluding the course thematically**, e.g. by linking the knowledge gained in the individual work packages;
- **Addressing and answeri.ng questions** that have arisen across the work packages;
- **Taking stock of the knowledge gained**, for example with the help of digital knowledge maps (e.g. with *Padlet*),
- **Getting ready for the exam:** Information on the examination mode; tips on how to prepare well for the examination as well as information on the assessment criteria; if necessary, solving sample tasks and then clarifying questions that arise while working on them.

Best practices for the implementation of the 'Principles of good digital teaching'

Faculty	Faculty of Law
Subject	Public law
Type of course	Lecture (with a special focus on practical handling of cases)
Title of the course	Examination revision course '*Öffentliches Recht (Allgemeines Verwaltungsrecht)*'
Number of participants	approx. 80

In the lecture, case studies are discussed with the students in order to practically apply the theoretical knowledge acquired in past courses. The course consisted of alternating phases of self-study and the weekly interactive web conferences (Zoom).

Interactive preparation videos
In order to lighten the workload of the Zoom event, students were provided with 15-minute interactive videos via the new 'H5P' on Moodle in preparation for each teaching unit, providing a review of the necessary theoretical knowledge. The videos included quiz questions that the students had to answer one by one by clicking on them. The film only continued when the question was answered. Based on this knowledge, the students were supposed to prepare cases provided on Moodle for the Zoom session.

Interactive Zoom sessions
The Zoom session was used for interactive case work. With the help of the teacher, the students worked out the solution in plenary. In addition to the sample solution, which was outlined in a PowerPoint, alternative solutions were always discussed.

Extensive follow-up materials
To provide a good learning opportunity also for those students who could not participate in the web conferences—in addition to the recording of the Zoom session and the PowerPoint—formulated sample solutions were also made available in Moodle. There was also a Moodle forum for questions. Using the newly introduced H5P feature, further interactive exercises were made available via Moodle to deepen the topic covered in the respective teaching unit. During these exercises, students click their way through the solution and always have to answer small questions. In case they give a wrong answer, the students receive feedback messages to avoid the mistake in the future and are redirected back to the initial question. As there were various ways of solving the example cases, the interactive cases were programmed in such a way that—depending on the reasoning—different ways of solving were recognized as correct. Students evaluated this additional learning offer very positively.

Faculty	Faculty of Social and Behavioural Sciences
Subject	Educational Science
Type of course	Lecture
Title of the course	*Lernen, Entwicklung und Sozialisation: Eine Einführung*
Number of participants	100

The lecture provides students with a basic orientation concerning psychological processes that need to be considered in educational processes throughout life, such as learning and knowledge acquisition, motivation, and social interactions in different educational fields of action.

Students learn the concepts and hypotheses of basic psychological theories of learning, development and socialization (minimum standard), can apply these to examples (regular standard) and derive possibilities for action as well as reflect on their limits regarding the design of educational and upbringing contexts (maximum standard).

The lecture is based on the flipped classroom model and consists of weekly online live sessions and self-study phases on Moodle before and after the lecture.

Self-learning phase before the online live sessions

The learning units were developed with the *Moodle* plug-in *H5P* (*H5P Course Presentations*) using existing lecture slides to structure the process of knowledge transfer. The learning units contained self-made learning videos as well as freely available learning videos from other sources. The videos were either newly created or newly researched for online-only teaching. In addition, each *H5P* learning unit contained newly created recap questions that allowed students to test their understanding of the material. At the end of each learning unit, there was a link to the set of questions for the lecture. There, students could ask questions about the course content anonymously, but for everyone to see. Simple questions were answered by the tutor, complex questions were marked for the lecturer to answer in the online live session.

Weekly online live sessions

In the weekly live session via Zoom, the students worked on practical tasks in small groups (breakout sessions). Results were recorded in Padlet and other formats. In addition, the lecturer answered the students' complex questions from the set of questions and other ad hoc questions.

Self-learning phase after the online live sessions

In order to deepen and check their knowledge and to prepare for the exam, the students had the opportunity to consolidate the lecture content with further tasks in differentiation matrices and to check their acquired knowledge on *Moodle*. This provided them with a continuous opportunity to prepare for the exam. The tasks of the standard and maximum standard comprised transfers to simple examples up to complex pedagogical situations that pedagogues may be confronted with in their profession.

Faculty	Faculty of Arts
Subject	German as a Foreign and Second Language
Type of course	Seminar
Title of the course	Language assessments in German as a second language
Number of participants	10−12 (per semester)

In this course, students in teacher training go through six uniform cycles applying subject-related tools that are relevant to school practice, supplemented by an introductory and concluding part. For each cycle, they try out and critically reflect on a diagnostic tool in the field of German as a second language on the basis of authentic learner data. For students, a single trial cycle starts with acquiring theoretical background information on the tool and testing it on the basis of authentic learner data. The results of the exercise are compared and discussed in a Moodle Forum, and the tool is critically reflected with regard to advantages and disadvantages, suitability for school practice and (didactic and scientific) consequences. Afterwards, the results of this discussion are entered into a wiki table (in Moodle) in the form of a compact summary of one line per tool (prepared by the lecturer) and serves as a comparative overview of all six tested tools in the course of the seminar.

The introductory part of the seminar consists of a lecture on the basics of the subject and allows for the participants to get to know each other and the moderator teams to be assigned (see below). In the concluding live session, participants jointly evaluate the wiki table that has been created and apply it by means of comparative exercises−also as preparation for examinations. Depending on the previous knowledge and size of the group, a live session with an interim summary can be held at around 'half-time'.

Didactic-methodical implementation

The seminar consists mainly of **asynchronous units** (lecture and six trials) and is based on a *Moodle* course structured by topics (with the topics *getting to know each other*, *introduction*, *continuous securing of results*, *trials I to VI* as well as *conclusion and evaluation*). To compensate for this flexible but highly self-directed way of working, students are given a **clear time and role plan**. This means that each trial is accompanied by a **team of moderators** (two people) who structure the current **Moodle Forum**, encourage further discussion points and take on the task of transferring the most important results to the **wiki table**. They are also given **expert status** by being provided with further material on the tested tool by the lecturer at the beginning of their moderation week. Each test takes one week; the transfer of the results into the wiki table (prepared by the lecturer) for the moderators takes another 2−3 working days; the lecturer finally checks the wiki table from a scientific point of view in another 2−3 days, so that an application cycle takes a total of two weeks. For this reason, the seminar plan contains the exact distribution of tasks for the whole seminar group, the moderator team and the lecturer−marked in different colours−with deadlines and boxes to be ticked when tasks are completed.

The moderator teams are formed via the Moodle voting tool during the first 14 days of the seminar, while the theoretical basics are worked out via **asynchronous lecture (screen presentation with audio recording)**. For this purpose, all students record approx. 3-minute audio presentations, in which they can talk about other subjects they study, practical school experiences on the topic as well as private things they would like to share. The lecturer also introduces herself in the form of a short video. By providing links to the audio presentations in Moodle in the respective trial week, the people behind the abstract moderator teams become a little more visible.

Faculty	Faculty of Medicine
Subject	Internal medicine
Type of course	Qualified (virtual) bedside teaching
Title of the course	Practical training 'Rheumality—rheumatology education using virtual reality'
Number of participants	238 students of the 8th subject-related semester Human Medicine

Every year in the summer semester, the (compulsory) practical training Rheumatology is offered in the form of a qualified bedside teaching course. This course complements the lecture through a refresher course on the pathology of rheumatic diseases followed by a patient-based case demonstration on the most common rheumatic disease patterns (rheumatoid arthritis, spondyloarthritis and psoriatic arthritis).

Due to the pandemic, the course was converted into a virtual format with virtual patients in a virtual reality (rheumality).

Didactic-methodical implementation

In analogy to the classical practical training in rheumatology, the refresher course was conducted online and Rheumality was used for case presentation. Rheumality contains virtual patients with early rheumatoid arthritis, long-term rheumatoid arthritis and psoriatic arthritis. It introduces the virtual patients with their clinic and medical history. The inflammatory changes in the bone are imaged using X-ray diagnostics and high-resolution peripheral quantitative computed tomography (HR-pQCT). In the virtual space, the HR-pQCT images can be moved in three dimensions and also be enlarged as required, making it possible to even 'walk through' them (for details see Figure 1).

|	Teaching unit	Learning objectives	Method
Refresher course	1	Revision of the inflammatory rheumatic pathologies (rheumatoid arthritis, spondyloarthritis and psoriatic arthritis) with regard to clinic, diagnostics and therapy.	• Presentation with open questions
Patient demonstration	2	Patient demonstration by means of virtual patients in a virtual reality (Rheumality) with regard to the following disease patterns: • early rheumatoid arthritis • long-standing rheumatoid arthritis • psoriatic arthritis Presentation of the patient with regard to the medical history, clinic, presentation of the inflammatory joint destruction by means of X-ray diagnostics as well as high-resolution peripheral quantitative computer tomography (HR-pQCT) and therapy.	• Rheumality • Active involvement of the students through questions and answers in the virtual case demonstration
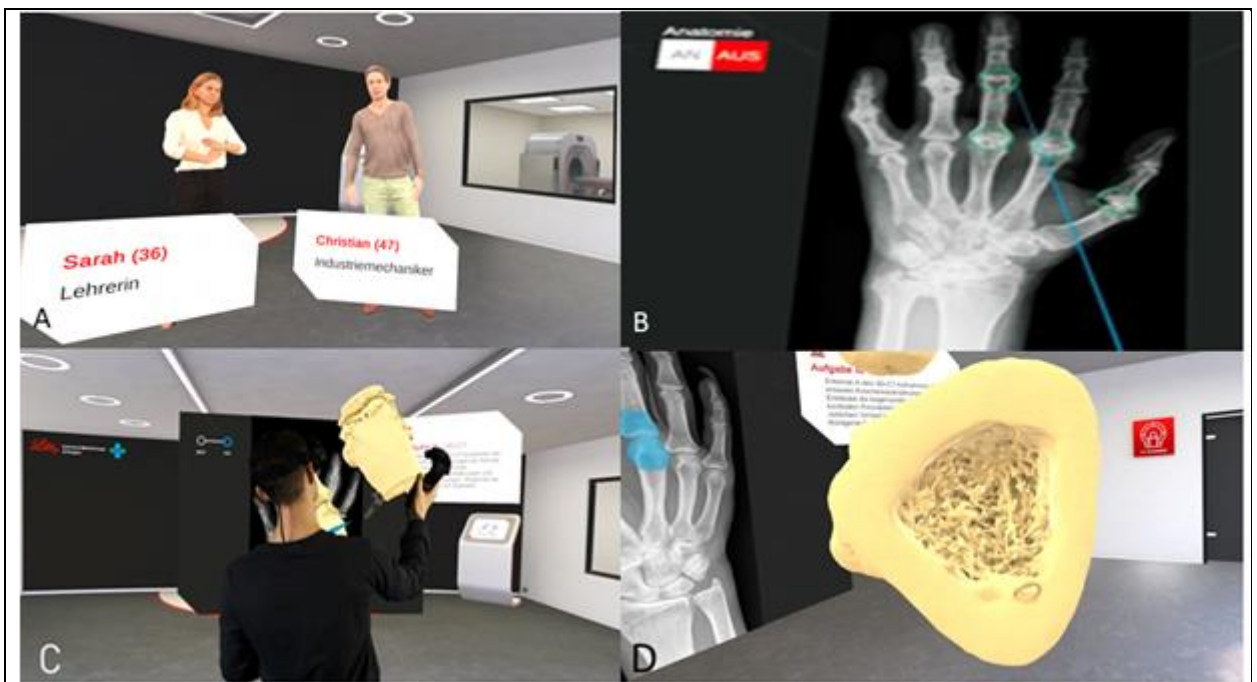
Figure 1: 'Insights into Rheumality' adapted to: Pfeil A, Franz M, Hoffmann T, Klemm P, Oelzner P, Müller-Ladner U, Hueber AJ, Lange U, Wolf G, Schett G, Simon D, Kleyer A. Virtual teaching for medical students during SARS-CoV-2 pandemic. Clin Exp Rheumatol, 2021

Figure 1 'Insights into Rheumality' shows *A* Welcome lobby with the option to select patients. *B* Hand X-ray showing the radiographic evidence of joint changes associated with rheumatoid arthritis. *C* Virtual image of the metacarpophalangeal joint II (index finger) by high-resolution peripheral quantitative computed tomography (HR-pQCT). *D* HR-pQCT shows the osseous changes in detail. Rheumality allows a magnification of the bone defects as well as a walk-through of the bone. This is an impressive way of teaching students about the bone pathologies in rheumatoid arthritis and psoriatic arthritis.