Digitize and Virtualize our Teaching

Mission: Designing an efficient, digital course offering that minimizes the disadvantages for students due to the COVID-19 pandemic

Objective

Design and implementation of 'contactless' teaching concepts for our events

Sub-targets

- Finding solutions that make efficient use of existing products and can be used multiple times over the long term
- Teaching concepts with student-centered teaching-learning-activities that pursue the defined learning objectives, and exam forms that test them.

Premises

consider learning types consider freedom of choice address many senses

Use state-of-the-art

Challenges

General Challenges

- Activating students to learn/ overcoming the 'Binge mentality'
- Identify, detecting, (preventing) mis concepts

Specific Digital

- Access to compatible terminals for both sides
- Bandwidths
- Capacities

Approach

- General part (this document)
  - Identification of teaching-learning elements and their characteristics
  - Identification of digital possibilities/ media (incl. Short introduction and references)
  - Compilation of good combinations of elements and media (combination table)

- Course-specific part
  - Analysis of the course based on the learning objectives according to teaching-learning elements
  - Selection of media by combination table
  - Setting up an LV-concept from the selected media-element-combinations
  - Preparation of the necessary materials / contents
  - Delivery of the contents

Characteristics of Teaching-Learning-Activities

To improve creative work, existing teaching-learning formats are first analyzed, and elements defined. These are characterized above all by the action and interactions of the teachers or learners. By means of a classification, media and digital possibilities can be better selected.

Table 1 distinguishes five main categories of interactions: self-study, input, questions, discussion/ interaction, and feedback. Different subspecies are defined on these. The action of the lecturer and the students is described in each case. The interaction columns indicate whether an action takes place between the teacher and the student (Interaction T→S), an action from the student to the teacher (Interaction S→T) or an action between the students. The respective applicable actions are marked with an x. The communication marker (CM) summarizes the number of communication degrees and thus lies between zero and three. Examples and comments are given. The key marked with a lozenge is used in the later combination in Table 4.

Digital Media

Table 2 gives an overview of the digital media that can be used. A key indicates this for later use in Table 4. Four main categories are distinguished: records, tasks, interaction platforms and structures. Often several media are linked, e. g. dynamic images and sound to a video or tasks with a structure. As with the elements, the actions and interactions are shown and a communication marker (CM) is specified. The temporal flexibility of consumption is divided into three categories: high, medium, and fixed time. ‘High’ (h) means time-flexible offers. These can be used independently of time as soon as they are made available. The freedom of the students is maximum here. Media of the middle category (m) have a feedback with the teacher or with the student, so that there is a waiting time, but both actions do not have to run at the same time. Fixed times (f) have formats in which communication takes place in real time, so that all participants act at the same time. Again, examples and comments are given.

Existing Platforms

Table 3 provides an overview of a selection of existing platforms. It should be noted that in Stud. IP links to Moodle, BigBlueButton as video conferencing tool, the video server etc. can be set. These were not counted among the functionality of Stud.IP, otherwise the clarity would have been reduced. Only direct links such as the Wiki are considered. After a brief summary of what can be mapped on these platforms, the possible actions and media with their abbreviations are listed, which are suitable for this platform. Abbreviations, which are given in brackets, are conceivable but a little more elaborate in the implementation. In addition, the meaning and the weak points of the respective platform are briefly named. Table 4 visualizes the information in the third and fourth columns.

Possible Combinations and Creation Possibilities

Table 4 shows possible combinations of media in the columns and elements in the rows and platforms. Green and marked with ‘y’ are working combination. Combinations are marked with a ‘m’ and light blue, which are possible to a limited extent. Not possible combinations are marked by gray cells with an ‚n‘.

Table 5 presents some possibilities for the creation of digital, dynamic material. All ‘normal’ programs of the MS Office package, for example, are not mentioned, although they must of course be used for scripts, for example.

#	Category	Element	Action Teacher	Action Student	Inter-action T→S	Inter-action S→T	Inter-action S→S	CM	Example	Note
a	Self-study	with path	directs	learns/ executes	x			1	Solving the task with a sample solution	
b	Self-study	without a path		learns independently				0	Independent exam preparation	in advance a framework with learning objectives is given
c	Input	Lecture	presents	hears/ sees	x			1	Classical lecture	frequently supplemented by questions or small activations
d	Input	Presentation of results	hears / sees	presents		x		1	Results from group work will be presented	often supplemented by feedback and interaction of students beforehand
e	Input	mutual explanation		Student take on the role of the lecturer			x	1	Repetition in learning groups, letting students explain in VL, getting to a stand at the beginning of a group work, querying prior knowledge	
f	Questions	Demand	answers	Asks	x	x		2	Clarification of comprehension questions in lecture	
g	Questions	Questioning	asks	Answers	x	x		2	Asking for prior knowledge, survey to check learning outcomes, activation	
h	Discussion/ Interaction	Together	guides	discusses	x	x	x	3	Guided discussion on a given topic	
i	Discussion/ Interaction	Group work	initates	discusses			x	1	Group work with discussion of questions	frequently after input and before presentation
j	Feedback	to students	sends	receives	x			1	Feedback after presentation of a work result	
k	Feedback	by students	receives	sends		x		1	Evaluation	

#	Category	Element	Action Teacher	Action Student	Inter-action T→S	Inter-action S→T	Inter-action S→S	CM	Flex*	Example	Note
1	Recording	sound	speaks	hears	x	(x)		1	h	Audio track of video recording, podcast	all records are also conceivable in the direction of S-->T
2	Recording	static text	has written	reads, looks	x	(x)		1	h	Slides, Script	closely related to tasks and structures
3	Recording	dynamic text-image	prepared, presented	reads, looks	x	(x)		1	h	Recorded presentation with slides	mostly in combination with sound
4	Recording	dynamic sketch	prepared, presented, sketched	reads, looks	x	(x)		1	h	Recorded presentation with sketches	mostly in combination with sound
5	Recording	dynamic human	acts	reads, looks	x	(x)		1	h	Video track of lecture recording	mostly in combination with sound and if necessary. Slides
6	Tasks	with a clear solution	provides task, solution	processed and receives feedback	x		(x)	1,5	h	Question in Moodle with solution	all tasks can also be assigned to groups
7	Tasks	with type of solution	provides task, solution	edited and must verify correctness itself	x		(x)	1,5	h	Free text question in Moodle with type of solution	all tasks can also be assigned to groups
8	Tasks	free/without solution	presents task	edited and reflected	x		(x)	1,5	h	Question in lecture recording for reflection	all tasks can also be assigned to groups
9	Tasks	with correction	poses task, corrected solution	processed	x	x	(x)	2	m	corrected homework	all tasks can also be assigned to groups
10	Structure	sequence of elements	arranges elements	follows	x			1	h	Structure in the Wiki or Moodle	
11	Structure	Hierachia	arranges elements	performs after	x			1	h	Visualization of Hierachienen , Chart	
12	Structure	Relationship (causal)	presents context	according to	x			1	h	Big Pictures	
13	Interaction platform	directly, on both sides	(re) acts (directly)	(re) acts (directly)	x	x	x	3	f	Video conferencing with direct exchange	
14	Interaction platform	delayed, on both sides	(re) acts (later)	(re) acts (later)	x	x	x	3	m	Video conferencing with collecting questions, reaction and subsequent answers	
15	Interaction platform	directly, one direction T-->S	acts	responsive	x			1	f	Live video presentation of the teacher without questions	Benefits relatively unlikely
16	Interaction platform	directly, one direction S-->T	reacts	acts		x		1	f	Live video presentation of the students without questions	Benefits relatively unlikely
17	Interaction platform	delayed, one direction T-->S	acts	reacts later	x			1	m	Video recording of the teacher	
18	Interaction platform	delayed, one direction S-->T	reacts later	responsive		x		1	m	Video recording of the students	
19	Interaction platform	delayed, T--S--S	(re) acts (later)	(re) acts (later)	x	x	x	3	m	Wiki	

* Time flexibility of consumption (h: high, m: medium, f: fixed time)

Platform	What can be mapped	Actions by table	Media by table	Sense	Vulnerability
Moodle	Almost everything, incl. Structure, tasks with solution and tests	a, c, (d), (f), (g), (j) k	1-8, (9), 10-12, 17-19	Lead students with different media through the learning process, thereby also being able to check knowledge, processing times can be limited and content can be activated after successful processing of tasks, so that continuous processing (accompanying the semester) of tasks is possible	Real-time collaboration, difficult interaction
Stud.IP	Almost everything, incl. Wiki, less structure	a, b, (d), (e), (f), (g), (h), (i), (j), k	1-5, (6-8), 9, (10-12), 14, 19	Provide students with a platform for exchange (data and communication), connection of video server, BigBlueButton and Moodle with StudIP add-Inn (not shown in the table). Also possible integration of films in wikis	Less instructions possible than in Moodle
Recording of lectures	Everything that can be recorded	a,b, c	1-5, (6-8), (10-12)	Display content	no interaction
Video conferencing	Everything that can be recorded	a ,(b),c-k	"1-19"	Learning-teachung activity in real time, interaction	Bandwidth, fixed date
Scripts, literature, task lists.	Static recording	a,b, (c)	2, (6-8), (9), 10-12	Structured provision of information	Limited, no interaction

		1 Recording sound	2 Recording of static text	3 Recording dynamic text-image	4 Recording dynamic sketch	5 Recording dynamic human	6 tasks with a clear solution	7 tasks with a type of solution	8 tasks free/ without solution	9 tasks with correction	10 Structure sequence of elements	11 Structure Hierachia	12 Structure relationship (causal)	13 Interaction platform directly, on both sides	14 Interaction platform delayed, on both sides	15 Interaction platform directly, one direction T-->S	16 interaction platform directly, one direction S-->T	17 interaction platform delayed, one direction T-->S	18 interaction platform delayed, one direction S-->T	19 interaction platform delayed, T--S--S		Moodle	Stud.IP	Recording of lectures	Video conferencing	Scripts, literature, task lists
Self-study with path	a	y	y	y	y	y	y	y	y	y	y	y	y	n	m	n	n	m	m	m		y	y	y	y	y
Self-study without a path	b	y	y	y	y	y	y	y	y	m	y	y	y	n	n	n	n	n	n	n		n	y	y	m	y
Input lecture	c	y	y	y	y	y	y	y	y	y	y	y	y	m	m	m	n	m	n	n		y	n	y	y	m
Input presentation of results	d	m	m	m	m	m	n	n	n	n	n	n	n	m	m	n	y	n	y	m		m	m	n	y	n
Input mutual explanation	e	m	m	m	m	m	m	n	n	n	n	n	n	y	n	n	n	n	n	y		n	m	n	y	n
Questions of demand	f	n	n	n	n	n	n	n	n	n	n	n	n	y	y	n	m	n	m	y		m	m	n	y	n
Questions Questioning	g	m	m	m	m	m	y	y	y	y	n	n	n	y	y	n	n	n	n	y		m	m	n	y	n
Discussion/ Interaction Together	h	n	n	n	n	n	n	n	n	n	n	n	n	y	m	n	n	n	n	m		n	m	n	y	n
Discussion/ Interaction Group work	i	n	n	n	n	n	n	n	n	n	n	n	n	y	m	n	m	n	m	n		n	m	n	y	n
Feedback to students	j	n	n	n	n	n	y	y	y	y	n	n	n	y	y	m	n	m	n	m		m	m	n	y	n
Feedback from students	k	n	n	n	n	n	m	m	n	m	n	n	n	y	y	n	m	n	m	m		m	y	n	y	n
Moodle		y	y	y	y	y	y	y	y	m	y	y	y	n	n	n	n	y	y	y						
Stud.IP		y	y	y	y	y	m	m	m	y	m	m	m	n	y	n	n	n	n	y						
Recording of lectures		y	y	y	y	y	m	m	m	n	m	m	m	n	n	n	n	n	n	n						
Video conferencing		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y						
Scripts, literature, task lists		n	y	n	n	n	m	m	m	m	m	m	m	n	n	n	n	n	n	n						

Provider	Variant	Description	Output	Costs	Other	Help
Camtasia	Educational film production	Independent recording and processing of teaching sequences	Educational films with animations	License via data center		https://www.medienbildung-blog.tu-braunschweig.de/tools/screencasts-erstellen/
RZ-Produktion	Educational film production	Professional recording of teaching sequences	Educational films with animations	License via data center		
OBS Studio	Screen and sound recording	Recording of sound/screen without processing	Screen recording with sound track	Open Source	additional editing software required	
PowerPoint	Slides, sketches and sound recording	Independent recording and processing of foil presentation	Video of presentation with sketch and sound	License via data center		