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Manual Construction and Setup for Hybrid Classroom Sessions

by Team IDEN [1]

1. In General

The hardware system for hybrid teaching is based on two notebooks (see following graphic). Each notebook participates independently in the online teaching (for example via Webex). It is important to take enough time to set up and test the hardware before the face-to-face session begins (three hours should be planned for the installation at the beginning). Or better a day before the day on which the classroom event is planned to run.

Graphic: Hardware system for hybrid teaching.
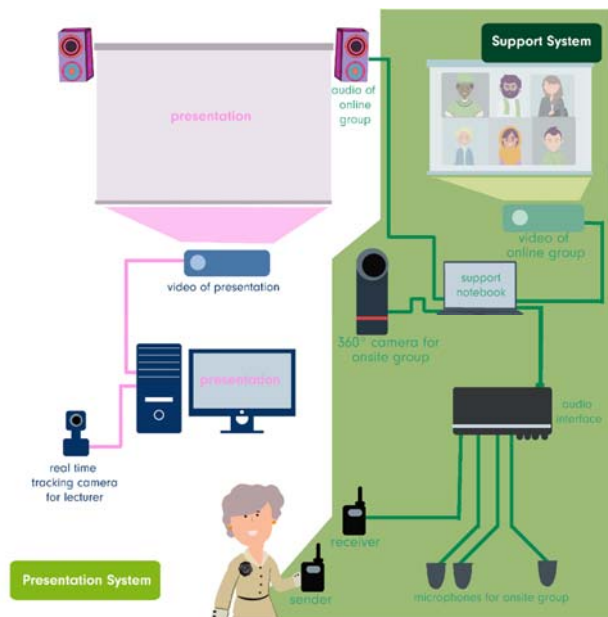
2. Required Hardware

The following is a list of the hardware you will need. The technical brands mentioned have been used in this setting and are used by example only.

(1) Presentation notebook (here computer)
Notebook / Computer of the lecture (including hardware marked in the graphic in blue / pink.

(2) Support notebook
(including hardware marked in the graphic green / black). Actually, it is (in this setting here) important for this notebook that the OS version Windows 10 is installed. Since a driver for the USB-Audio/MIDI interface Beringer UMC404 must be downloaded and installed on the support notebook. This driver does not run on Windows 11.
Driver under: https://www.behringer.com/downloads.html

(3) camera for the presentation notebook, 1 x (here OBSBOT)

(4) USB-Audio / MIDI Interface, 1 x (here Beringer UMC404)

(5) Microphone system with microphone and receiver, 1 x (here Sennheiser)

(6) Room microphones, 3 x, including extension cable (if necessary), 3x (here Shure)

(7) 360 ° degree camera including a USB cable and a cable for the electricity, 1 x, (here Kandeo Meeting Pro)

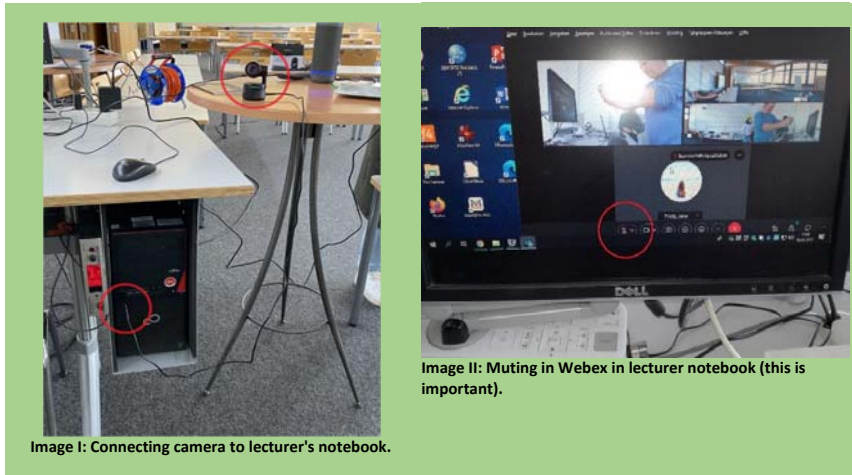(8) Speakers, 1 x (here Anker)

(9) Two beamer.

3. Setup

3.1 Lecturer's presentation notebook

The first (1) notebook is that of the lecturer. The lecturer can give with this notebook his presentation as before and present it via beamer, for example, in the classroom at the university for the class on site and for the online class, for example, via Webex.
The only thing that is necessary for the hybrid classroom is to connect the (3) camera to this notebook via USB connection, which shows the lecturer online. Here we use an OBSBOT camera. This camera reacts to movements and follows the lecturer, for example, when she walks a few steps (see also Image I).

Important: To avoid unnecessary acoustic feedback in hybrid classes, the microphone of the lecturer's notebook must be muted in Webex (see also Image II). All audio transmission is done via the support notebook.

Image II: Muting in Webex in lecturer notebook (this is important).

Image I: Connecting camera to lecturer's notebook.

3.2 Support notebook for hybrid teaching

Note: All connections between the notebook and other hardware should be made and then the devices should be turned on.

3.2.1.

First connect the (4) USB-Audio / MIDI Interface to the (2) support notebook and to the network via the USB port. Here we use a here Beringer UMC404.

3.2.2.

Connect the receiver of the (5) microphone system (here Sennheiser) at the back of the interface with an XLR male - 3.5mm 3-Pole Jack cable at the XLR connection. The corresponding microphone is fixed to the body of the lecturer. In this way, the lecturer's words are transmitted from the wireless microphone to the receiver on the audio interface. When the devices are switched on later, they should connect automatically.

Now connect the three (6) room microphones shown in the graphic, or the extension cables of the room microphones, to the other ports on the back of the interface by using the XLR connections (Image III). Distribute the room microphones in the room.

The interface should only be set in *mono* (front side) in our setting, and the 'phantom power' on the back side should be set in *on* (so normally nothing has to be changed here, see also Image III and IV). Also, no other switches need to be pressed.

Image III: Behringer front side, microphone connections and mono setting.

Image IV: Behringer back panel, 'phantom power' set to 'on'.

3.2.3.

To film the classroom on site, connect the (7) 360 º camera to the support notebook via the USB-c cable and to the power supply via the power cable. Here we are using a Kandao Meeting Pro camera. Important in the case of the Kandao Meeting Pro camera: Pay attention to the connections. The port for the power supply, as well as the port for the notebook are both USB-c ports. The port for the notebook is marked with a small screen icon. (see also Image (see also Image V).

The frame of this camera is shown as 'one participant' in, for example, Webex. Place the camera in such a way that the students can be recorded (see also Image V and VI).

Image V: USB-c-connection room camera - notebook.

Image VI: Place room camera.
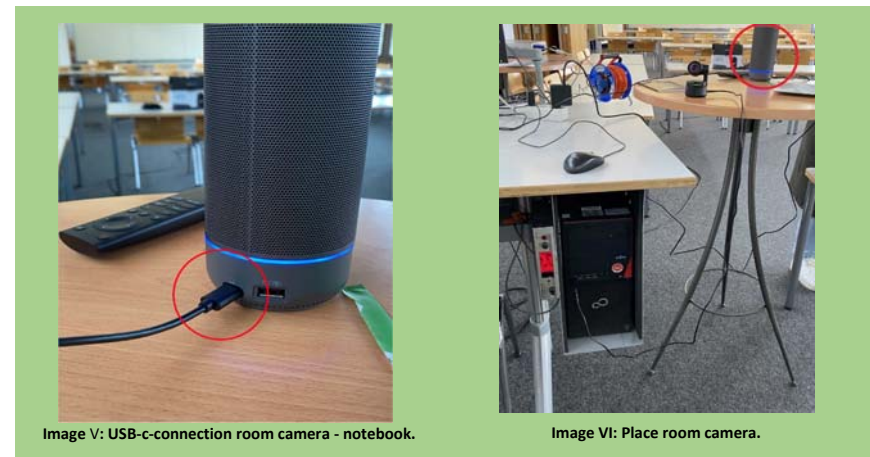
3.2.4.

Connect the speaker to the support notebook. (Here we use Anker speakers that can be connected to the notebook via Bluetooth).
Unfortunately, in classrooms at the university you can also use the on-site audio system and connect it to the support notebook, if one is available. With this speaker (or audio system), the questions or comments of the online participants can be heard by all participants on site in the classroom.

3.2.5.

Also connect a second beamer to the support notebook in order to present the image of the online participants on a whiteboard in the classroom.

As mentioned before, the lecturer notebook must be set to mute in Webex.

In the support notebook, the audio settings in Webex must be set as following with regard to the Behringer USB-Audio / MIDI Interface (see also Image VII):

- Speaker (Lautsprecher): realtek HD Audio 2nd output (When the classroom speaker system is connected.)
- Microphone (Mikrofon): IN 1-4 (2- BEHRINGER UMC 404HD)

In the same way, before everything is switched on, channels 1-4 must be selected on the support notebook in the driver software of the Behringer USB-Audio / MIDI Interface. Also, 16mbit must be set for the transmission in the driver.
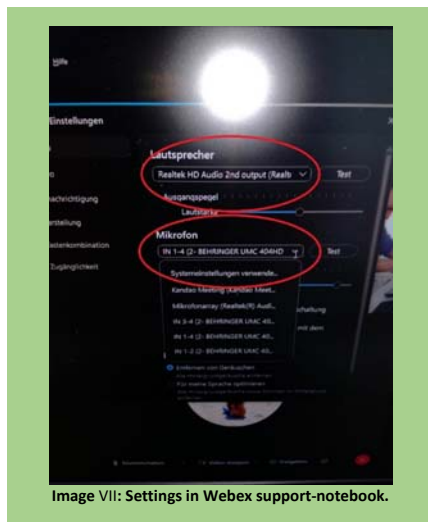
Finally, switch on the devices.

Image VII: Settings in Webex support-notebook.