2022

InclUDE
Technical Guidelines for Accessible Digital Higher Education

InclUDE

Acknowledgements

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"Die Behindertengruppe ist eine der einzigen Minderheitengruppen, denen Sie jederzeit beitreten können." (The group of disabled people is one of the only minority groups you can join anytime.)

(Cockrell & Bryant, 2022)

QuickStart Guide: Where can I quickly find what I need?

I want to know about inclusion and accessibility:

- Definitions
- The four criteria of accessible websites
- The seven principles of Universal Design
- Accessible design
- A first test of accessibility
- Microsoft Accessibility Check

I am not sure if my students need any accommodations:

- Does anyone need accommodations?

How can I help students with a need for accommodations in general?

- Target group students with disabilities/chronic somatic illnesses
- Accommodations for digital teaching based on target groups

I am looking for accommodations for students with a certain disability (in alphabetical order):

- Students with acute/chronic illnesses or disabilities
- Students who are blind
- Students with cognitive processing difficulties
- Students with deafblindness
- Students who are deaf
- Students with dyslexia
- Students with a hearing-impairment
- Students with reduced (fine) motor skills
- Students who are neurodivergent
- Students with psychological disorders
- Students with vision-impairments

I want to know about technical accessibility:

- Stable internet connection
- Live streams
- Video conferences
- Videos

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I want to know about the switch to online teaching during COVID-19:

- The switch to digital education (due to pandemic lockdown)
    - Support during the switch
    - Video-conferencing tools
    - Technical issues
    - Hybrid models
    - How to create accessible digital lectures
    - Pros and Cons of online lectures

I want to create accessible documents:

- How to design accessible documents
    - Accessible Word files
    - Accessible PDF files
    - Accessible PowerPoint presentations (PPTs)

I want to know about the project and its results:

- About the InclUDE project
- About the Technical Guidelines
- The role of higher education institutions regarding accessible education
- Results of the online survey
- Key findings from survey, interviews and focus groups

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Introduction

About the InclUDE project

These guidelines have been written within the framework of the Inclusive University Digital Education (InclUDE) project, which aims to promote the realisation of accessible and inclusive higher education opportunities for all students. Funded by the Erasmus+ Programme of the European Union, the project is a collaboration between the **University of Wolverhampton** (UK), **Fakultätszentrum für Gebärdensprache und Hörbehindertenkommunikation** (Austria), **Université Rennes II** (France) and **European Association of Service providers for Persons with Disabilities** (Belgium). On the project page you can find general information about the project InclUDE. Three reports on the key aspects were created: The use of accessibility tools in higher education (IO1), Technical aspects of inclusive digital education (IO2) and Didactical aspects of inclusive digital education (IO3).

About the Technical Guidelines

Ironically, the COVID-19 pandemic led to an unexpected increase in digitization through the enforced stop of in-person courses in the spring of 2020, promoting online teaching among other things. Still, there were students who were confronted with new problems they did not expect.

This is where the Erasmus+-project "InclUDE" comes in. In terms of the UN-CRPD (United Nations Convention on the Rights of Persons with Disabilities) policy "Nothing about us without us" (Beauftragter der Bundesregierung für die Belange von Menschen mit Behinderungen, 2018), the target groups were invited to participate in several surveys, to identify problems and possible solutions.

In addition, we carried out interviews with individuals and focus groups (teachers, students, e-learning experts). You will find a summary of the results in the chapters The switch To Digital Education (due to Pandemic Lockdown) and Key findings from survey, interviews and focus groups. We used what we learned from these and an additional internet search to create these guidelines. They are meant to provide lecturers with an overview of how to improve the accessibility of their online teaching and materials. Additionally, the project team searched for digital tools that will help with checking accessibility and accommodating students. You will find useful tools as well as a selection of guidelines and information about accessibility in the InclUDE Repository.

All references used during the production of these guidelines, please find in the References.

Inclusion and accessibility in higher education

Definitions

The key word "inclusion" is used everywhere. When defining it as "full and effective participation in all aspects of life" (Technische Universität Dresden (Hrsg.), 2017, p. 9), we still have a long way to go.

Higher Education refers to the educational level following the completion of secondary education, for the acquisition of an academic or professional degree, including universities and other institutions that provide qualifications for higher learning degrees. (Vaughan & Tavishi, 2022, p. 4). An inclusive education is defined as a learning environment in which all barriers that could limit the participation and achievement of any learner are removed http://www.iiep.unesco.org/en/inclusive-education) (Vaughan & Tavishi, 2022, p. 4).

According to the Austrian Federal Disability Equality Act (Federal Ministry Social Affairs, Health, Care and Consumer Protection. Republic of Austria, 2019) in the current version, in paragraph 6 (5) "accessible" refers to "structural and other facilities, means of transport, technical commodities, information processing systems and other designed areas of life, if they are accessible and usable for persons with disabilities in the generally customary manner, without particular difficulty and in principle without the need for external assistance." (Rechtsinformationssystem des Bundes, i.d.g.F.)

Many people associate the topic of disability first and foremost with wheelchair users and blind people. In fact, disability includes "[a]lso chronic or mental illnesses, specific learning disabilities (SLD) such as dyslexia, autism or other long-term impairments …" (Deutsches Studentenwerk e.V., 2022). The Austrian Federal Disability Equality Act, paragraph 3 refers to disability as "effect of a non-temporary physical, mental or psychological functional or sensory impairment which is likely to hamper their participation in social life". "Non-temporary" means here "a period of probably more than six months". (Rechtsinformationssystem des Bundes, i.d.g.F.)

Article 1 of the UN Convention on the Rights of Persons with Disabilities describes it as follows:

> "Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others." (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz (BMSGPK), 2016, p. 6), also (United Nations. Department of Economic and Social Affairs. Disability., o.J.)

The role of higher education institutions regarding accessible education

The guidelines "Barrierefreie Hochschullehre" (Accessible University Teaching) note that for 90% of students with disabilities and/or chronic illnesses, this is invisible from outside (Technische Universität Dresden (Hrsg.), 2017, p. 7). Especially people with chronic illnesses often do not regard themselves as "disabled" and may consciously forego all the claims and rights that come with that – perhaps also because they do not want to make it public, cf. (Deutsches Studentenwerk e.V., 2022). Psychological problems, cognitive processing difficulties and perceptual disorders are frequently overlooked as well.

Therefore, measures to include all students are urgently needed:

> "In order to improve the participation of students with disabilities instead of inadvertently excluding them, the universities must ensure that digital formats for teaching and exams are accessible and that the existing legally binding requirements are implemented."

> (Deutsches Studentenwerk e.V., 2020, p. 1)

An important legal requirement is the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). Article 24 (5) refers to (Higher) Education:

> "States Parties shall ensure that persons with disabilities are able to access general tertiary education, vocational training, adult education and lifelong learning without discrimination and on an equal basis with others. To this end, States Parties shall ensure that reasonable accommodation is provided to persons with disabilities." (United Nations. Department of Economic and Social Affairs. Disability., o.J.)

In Austria, the UNCRPD is in effect since October 26, 2008.

One of the few advantages of COVID-19 was that the topic of digitalization – and, in connection, the topic of digital accessibility – received an unexpected boost as it was the only way to keep teaching. Our interviewees also noted that it would be imperative to "anchor" accessibility in teaching and administration. For example, by having the Human Resources Department offer respective trainings, e.g. for accessible documents. One way to do this would be that new lecturers would be required to attend such a course, although the information should be offered to all employees (maybe in a video format or as an online course). Ideally, all employees will have a respective basic knowledge in the future; while working towards the goal of fulfilling the legal requirements, good templates can further accessibility. All in all, accessibility has to be included in university policy and Corporate Design as well. Moodle offers some ideas and suggestions on how to realize accessibility within an organisation in their guide From reactive to proactive accessibility in course design.

Within the EU, ten member states, including Austria, offer financial support for training measures for academic and administrative staff at higher education institutions on the topics of diversity and inclusion. In Austria, implementation is on a voluntary basis, without a corresponding obligation or recommendation – cf. (European Commission/EACEA/Eurydice, 2022, p. 76).

The switch to digital education (due to pandemic lockdown)

At the beginning of the pandemic, only a small percentage of lecturers had experience with online teaching – except for Moodle courses and uploading materials to them. For the majority, there was no online teaching as such (and especially not in a synchronous format), just offering materials on the platform for reading/downloading.

Therefore, the enforced switch to complete online teaching meant a complete rethink. One of our interviewees described the first time as "ordered chaos" – quick solutions needed to be found so that teaching could continue. At first, this happened more or less individually. Most people used what they already knew, which led to differences, based on prior experiences and preferences. Our interviewees kept mentioning the enormous effort of all involved parties (especially e-learning departments, IT departments, lecturers, but also students) just to keep everything up and running. This phase in the first half of the year was described as "trial and error" or "self-organizing chaos" – simply experimenting with different approaches. It took some time until a certain unification and optimization set in, but even then, different higher education institutions made different decisions.

Frequently, existing materials like PowerPoint presentations were modified and extended. Usually, going through the materials in an online class took longer than in a face-to-face course, although the lecturers found it easier to keep an eye on time than during a live presentation. However, a lecture and nothing else soon led to drowsiness; it turned out that simply "clicking through" PowerPoint slides was not sufficient. Therefore, lectures had to be broken up by questions, discussions, videos, short tasks, etc. Transferring a face-to-face course to an online format without any changes did not work at all: our interviewees reported that they had to make a substantial change in didactics if they wanted to keep students' attention. Especially if students did not have a webcam, or the webcams were turned off, the temptation to do something else was enormous. This is why e-learning experts recommend switching frequently between different formats and activities to liven up the lecture. Of course, taking breaks is important, too (details about that can be found in the Didactic Guidelines).

Over time, quizzes (integrated in Moodle or done with other programs) were used to interact with the students and to check whether they had understood the content of the course. Polls are also useful to further students' involvement.

It is also helpful if students collaborate directly. During a video session, this can happen in separate break-out rooms, but also in a written form (via shared notes or a whiteboard) or through apps that encourage individual posts, e.g. Padlet (one of our interviewees also mentioned that finished Padlets may be kept as a kind of "archive" or "museum").

Chats are not really accessible and should be avoided as much as possible. If you are using chats, you might do a "waterfall chat" – all students are writing their contributions, but will not post their messages as soon as they have finished. Instead, they will wait until the teacher asks them to send their texts and then do so all at the same time. This means that all messages arrive simultaneously, and students who are slower at writing or struggle with the written language have the same chance as everybody else.

Sometimes, students received course contents in advance to study them on their own. These contents were later discussed in synchronous online meetings (this technique is called "Flipped Classroom"). According to the lecturers, not all students took advantage of this opportunity. Therefore, they had to consider carefully, which format to use for teaching (self-study or working collaboratively).

This was not just about knowledge transfer; exams had to be adapted to the new circumstances as well, both the contents and the formats.

It was a hard time for the students as well. Not only did they not all have suitable technical equipment (some interviewees pointed out that this ought to have been provided by the universities), but they also lacked interaction with other students. New students, who had not attended any in-person courses and therefore did not have an existing network of contacts, suffered especially from the switch (whereas it worked well for people who did not feel comfortable in larger groups).

Support during the switch

Universities and organizations with their own e-learning departments had a clear advantage; especially, if these had already been working toward digital teaching (even if nobody had expected such a rapid and drastic transition). The IT departments did their best to support and assist, and soon a lively exchange of best practice developed between the staff members. Naturally, lecturers and students with prior knowledge of technology did better, but people helped each other. Mainly, people used "learning by doing".

People especially liked "snack-sized" information, e.g. arriving regularly via e-mail. This is something the Centre for University Learning and Teaching (CULT) of the Universität Klagenfurt did: every month, they sent out tips to improve online teaching and present new online tools ("Info-Snacks To Go").

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Video-conferencing tools

At the beginning of the pandemic, practically every university/organisation made their own choices, thereby using different video-conferencing solutions. Mostly, they were based on what was already used and/or familiar. After this first period, most universities preferred a certain program, due to individual considerations: software features, data protection, license fees, etc. Some universities published guides for these programs.

The various software solutions had their individual pros and cons. In the following overview, we collected comments from our interviews and surveys (tools are listed in alphabetical order):

- **BigBlueButton:**
  - "Number 1" among the video-conferencing systems according to an e-learning department
  - Partially provided by universities
  - Freeware, so no license fees
  - Requires hardware, servers and maintenance staff
  - While local hosting ensures data protection, it also makes a total server failure possible
  - Significantly improved new version May 2021 (e.g. possibility of transmitting sound through screen sharing)
  - Some of the problems with accessibility that were noted during the interviews have already been fixed: e.g. pinning certain videos (like sign language interpreters) is now possible
  - May be used for digital exams
  - May be integrated in Moodle
  - Creation of "classrooms" for various requirements
  - Described as "good for lecturers"
  - Good possibilities for cooperation (shared notes – although one can overwrite another's text; Whiteboard)
  - Recognition of audio and video devices can be a problem (in the new version, one may choose the device directly)
  - Video and audio quality described by some as worse compared to Zoom (sometimes, there were discrepancies between picture and sound, which led to problems with sign language interpreting); for others, the sound was alright
  - Smaller maximum number of users

- **Collaborate:**
  - Described as "not very accessible"; it seems to have improved after initial problems

- **Skype (for Business):**
  - Barely used for teaching
  - Access via internet
  - Quality problems if too many people are using video

- **Teams:**
  - People were often already familiar with it (work, school, etc.)
  - Better for internal communication than for digital teaching
  - Used for some EU projects (including data management)
  - Requires a Microsoft account; described as "quite nice" for Microsoft users
  - Users belong to groups
  - At the beginning, important features were missing
  - Multi-functional, but interviewees described it as "confusing" and "bewildering"
  - User interface described as "not so elegant" or "a bit inconvenient" (different sizes; connections unclear)
  - Can cause problems when cooperating via apps or OneDrive (one may drop out of a conference if using a smartphone)
  - Regarded as less accessible than Zoom
  - Problems with log-in; log-in takes some time
  - Often, people only can join as guests, and so do not have full access to all files
  - Problems with videos for d/Deaf people (arrangement, sizes); videos may be cut off, it may jump from one video to another
  - Few options for individual accommodations
  - Sound: sometimes white noise and crackling

- **Webex**
  - Initially described as "catastrophe", but has improved in the meantime (using its own client); described as "not as good as Zoom"

- **Zoom:**
  - Partially provided by universities
  - Widely used (e.g. international students, guest lecturers)
  - No home server, therefore a total failure is practically impossible
  - Can work well even with a bad internet connection (lots of Zoom servers)

- o Some concerns with regard to data protection (where are data stored?)
- o Web-based; one does not have to download anything (direct access via link and web); settings may be chosen online
- o Installed Zoom-client works well with screen readers; hardware is shown, so it is simple to switch the sound card to another device; use of Hot Keys is possible
- o Keeps developing new features for improved usability
- o Perceived as the most user-friendly program
- o Perceived as "easier"
- o Log-in unproblematic
- o Accessibility:
  - ▪ "Pinning" of certain videos, e.g. sign language interpreter
  - ▪ Automatic captioning (has to be activated)
  - ▪ Partially, they bought an additional written channel from another company; for captioning, another software was used
  - ▪ Video and audio quality described as "excellent"; picture and sound are simultaneous (important for sign language interpretation)
  - ▪ Acoustics are a bit better with Windows; Mac does not have a good sound quality
  - ▪ Sound is a bit faint without earphones
  - ▪ Problems with copying text from chat (e.g. links) or saving chat

Technical issues

Some students could not activate their webcams due to technical issues. Especially in larger groups and if the participants did not know each other, they were reluctant to switch on their webcams.

Hybrid models

There were also hybrid models, but this regularly led to technical issues. It was also hard to manage both groups (participants in presence and online) equally. Ideally, at least one other person is monitoring the video conference screen and chat (e.g. e-tutors). The lecturers would like easy solutions for hybrid models, just pressing a button to have it work.

Up till now, these are more systems for the synchronous streaming and/or recording of lectures (during the lockdowns, so-called "ghost lectures" without any participants took place). These streaming systems can be pre-installed in lecture halls, but there are also mobile systems ("streaming cases") with a better camera and room microphones. In addition, the lecturers need to use a video-conferencing system (e.g. BigBlueButton).

With regard to hybrid models, more work is required. Right now, university teaching has mostly reverted to in-person courses. Nevertheless, digital and hybrid teaching will play a role in the future.

How to create accessible digital lectures

Accessibility has three main aspects:

- o the technical aspect
- o the content aspect
- o and the organisational aspect

For people with disabilities, care needs, etc. the new online format offered challenges, but also chances. Asynchronous formats lead to a flexible time management, cf. (Kaufmann, et al., 2020), and one could go through the materials at one's own pace and repeatedly. These possibilities were appreciated by all students, especially, if they were not able to attend a synchronous lecture (for health reasons or due to other obligations), and to prepare for the final exam.

What showed clearly, was that there are no "one size fits all" solutions. It is essential to take the individual situation and preferences of each person into account. Please cf. also the chapter Accommodations for digital teaching based on target groups. This was underlined by inquiries to the e-learning department – before COVID-19, these were mainly about accommodations for online exams (Sichere Prüfungsumgebung, SPU; "Secure testing environment") that people sat in person in lecture halls, e.g. using a digital pen or a screen magnifier.

However, digital teaching simplifies using tools: for example, a lecture and comments are accessible without any background noise, if the sound quality is good. A screen reader may be used without irritating other students, or one can easily magnify the contents on the screen. Partially, materials may be downloaded in different formats.

Many universities/organisations published detailed guidelines and materials with regard to accessible digital teaching and accessible documents. You will find examples of these in the InclUDE-Repository.

The decisive factor is that accessibility is visible, and that lecturers and students are made aware of this topic.

Standards for accessible course design can be found in the "OSCQR SUNY Online Course Quality Review Rubric and Process". This webpage also provides a list of: "Technology and Tools".

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Pros and cons of online lectures

Depending on the individual situation and personality, online lectures were perceived as a strain or easing of the burden. Those who did not already have a good internet connection and the respective equipment (microphone, webcam, etc.), had a basic problem (in the worst case, students had to follow the lectures with their smartphones, e.g. via free internet access for customers in a shop). This also led to unexpected costs (increasing internet capacity, etc.). Sometimes, several people had to share equipment and internet (e.g. parents working in home office, school-age children in distance learning, etc.) or to be provided with additional devices. Ergonomics ("working at one's kitchen table") was another issue.

The internet connection needed to work reliably – once it crashed, the whole lecture was interrupted or – in the worst case – over. With in-person lectures, if the equipment in a lecture hall fails to work, one can still go on speaking or listening.

Flexibility was regarded as the biggest advantage: online lectures/presentations are location-independent, which often led to a much higher number of participants. People saved time and money, because they did not have to commute, which also helped to reduce CO_2 emissions. One also did not have to switch between different means of (public) transport, find one's way in unknown buildings, etc. If a lecture had to be postponed, the lecturer did not have to change anything in the room reservation system.

Basically, everybody was sitting in the front row, which is especially important for d/Deaf participants – they had an excellent view of the sign language interpreters, with consistent lighting, and they could pin and/or arrange the videos according to their individual preferences.

Digital teaching has special advantages for students with mobility problems. Nevertheless, students who live farther away or work simultaneously, appreciated that as well – especially, if there was bad weather. One may also join from other regions or internationally (even if there is a time difference of several hours).

Our interviewees noted that quick or well-organized meetings worked well online. Sometimes, they even preferred an online meeting to a phone call. Going into details, however, should happen with all the participants present.

On the other hand, the obvious time savings tempted people to have one video conference after the other: it was not unusual to leave one conference and to join the next one, because there were no enforced breaks through moving to a different room. Some of our interviewees reported that they joined up to five video conferences per day, which would have been unthinkable for "live" meetings. One of them said that a change of location helped with "changing" your thoughts. Others appreciated the commute home because it allowed them to switch mentally into an after-work mode.

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Our interviewees praised the efficiency of digital teaching and the possibility of providing the students with more materials and links.

People with a more introverted personality liked this form of lecture: they did not have to do any small talk and – with a single mouse click – were back in their private life. Others, especially new students, suffered from reduced social contacts for months. University staff missed networking and the personal exchange in corridors and during coffee breaks, which is important for the flow of information. Dedicated chatrooms were perceived as an insufficient substitute and therefore used rarely (only for special occasions like online Christmas parties). Most people regarded this lack of contact as negative. Online options for social contact (within the university or in the form of "meeting rooms" during online conferences) were used only occasionally. Our interviewees mentioned that – especially during conferences –personal interaction is essential.

Lecturers also experienced the lack of feedback from the students – particularly at the beginning of the pandemic – as negative. During the first days and weeks, where there was either no equipment/internet connection at all or it did not work too well, there was little feedback via webcam and/or microphone. Lecturers reported that they did not know if somebody was listening, because there were no or only few comments (usually via chat). The situation improved, as the students had better equipment/internet connection and they got used to attending lectures online. Nevertheless, this is not a full substitute for seeing the concentration and emotions of the students directly on their faces and from their reactions during in-person courses. Some lecturers asked their students to switch on their webcams, in order to gauge their interest and because this led to a more active participation.

Apps that provide direct feedback from the students (both during digital teaching, but also in face-to-face courses) can help participants to interact, e.g. [Tweedback](). This is an Audience Response System, that allows lecturers to gauge the emotions or to start surveys via smartphone or tablet. It is also possible to design quizzes with open or closed questions. On a chat wall, the students may post their comments (also anonymously). There are also "panic buttons" for frequent situations like "Too fast", "Too slow", "An example, please", etc.

Quick polls via video-conferencing programs (like BigBlueButton) or similar tools worked even better online than in face-to-face courses. Smaller groups (up to approximately 20 people), helped to boost interactivity.

Courses that were based on the direct communication/interaction between lecturers and students, especially language courses (and sign language courses), practical exercises, etc. suffered the most from digital teaching. In addition, people who did not use spoken language or only in a limited way, had problems.

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Usually, the lecturers had to actively ask the students to switch on their webcams (and not even all the lecturers themselves used a camera). One of the initial issues was that people did not like strangers to practically get a look into their living-room (in the meantime, this problem has been solved through features like soft focus and artificial background). Sometimes, personal reasons played a role as well for not switching on the camera. At the beginning of the pandemic, it happened from time to time that other members of the household, pets, etc. suddenly appeared on the screen and unintentionally became visible to all other participants.

Another drawback is that – especially with the webcam not switched on – one is tempted to do something else at the same time, something that is very hard in a face-to-face course. During hour after hour of digital teaching, the students tended to "switch off" mentally – especially, if they knew that the lecture was being recorded and/or their active participation was not required. A certain measure of anonymity was regarded as positive as well as negative: some dared express themselves more, others even less. Student interviewees also mentioned that there is a higher risk of distraction at home.

The archiving/recording of online lectures was regarded as positive by all. Especially with synchronous lectures, the students appreciated this option – if they were unable to attend (e.g. for health reasons), but also when studying for an exam. The same held for scientific conferences, where normally there would have been only synchronous presentations and a publication; but now everything was recorded and available online, e.g. the PowerPoint presentations.

Lectures as such can be done online by using various tools, as long as the aims are clearly defined. In particular, the method of "flipped classroom" is a good way of doing that. Preparing an online lecture means more work for the lecturers though (e.g. producing videos), but videos and other materials are available for a longer period of time. For example, they can be integrated in Moodle with H5P and quizzes can be added to check what the students have learned. Students also appreciated recorded lectures as videos divided into chapters.

Our interviewees considered it likely that there would be return to in-person courses, but also that digital teaching would remain to a certain degree. They were thinking about "a good mixture" of online and presence courses: keeping what worked well online and switching to presence courses where digital teaching led to problems. Especially with regard to accessibility, it is essential to make the right decision for each target group (e.g. when sign language interpreters need to be booked).

More information about didactics (including topics like workplace, breaks, etc.) can be found in the Didactic Guidelines of InclUDE.

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Target group students with disabilities/chronic somatic illnesses

Does anyone need accommodations?

Ideally, all materials will be prepared in a way that makes them completely accessible. Unfortunately, this is usually not the case (yet). Although it goes against the basic idea of inclusion, experts still recommend to ask during the first lecture (in both spoken and written language), whether anyone needs accommodations (Deutsches Studentenwerk e.V., 2020), cf. also (Heinrich-Heine-Universität Düsseldorf. Koordinierungsstelle Diversity, 2020, p. 1) :

> "Just talk to the students and ask, if you are unsure about how to deal with them. Do not patronise, simply ask whether they wish for any accommodations and if so, in which form." (Technische Universität Dresden (Hrsg.), 2017, p. 10)

The guidelines for lecturers "Accessible University Teaching" of the Technische Universität Dresden recommends using the following:

> "If anyone, because of a disability or health problems, will need some accommodations right now or at a later point in time, please feel free to approach me after the lecture or during my office hours. You are also welcome to discuss accommodations with my assistants. My office hours are from … to … . You can find me: address and room number." (Technische Universität Dresden (Hrsg.), 2017, p. 15)

Another example of how to formulate this can be found in the guide "Accessibility in Online Teaching":

> "You are welcome to bring along your interpreters/assistants into my seminars. If you let me know in advance, I can adapt my teaching to that. If I can better meet your needs by using certain software/microphones/colour schemes or such, please inform me via e-mail or after the lecture. Should you wish to talk to me before the semester starts, concerning accommodations or accessible teaching materials, please write me a respective e-mail, so we can fix an appointment." (Kaufmann, et al., 2020)

Show that you are open to such requests, so the students feel "noticed" (Saure, et al., 2020).

On the internet, there are also examples for questionnaires that do not only deal with individual accommodations, but also with possible technical problems. Here are the links to the questionnaires:

[Accessible teaching in the time of Covid-19](#)

[Student Survey: Considerations for Online Teaching/Learning](#)

Should you be unsure or wish for more information, you may always contact experts for accessibility. Usually, your university will have a special officer and/or department that you may consult with, and that will help you to find suitable solutions.

It may also help to record lectures and to have written materials that are as accessible as possible (both should be available at least until after the exams). Students should also have the option of making further inquiries or participating in alternative ways (Heinrich-Heine-Universität Düsseldorf. Koordinierungsstelle Diversity, 2020, p. 2).

Many of the accommodations that are mentioned in these guidelines will also be of use to additional target groups, e.g. students with care responsibilities (children, the elderly) or international students who do not know the language very well. All students will benefit from recordings and written materials.

Accommodations for digital teaching based on target groups

Relevant disabilities for academic success

When dealing with students with disabilities, it is essential to consider disabilities that are relevant for their academic success. The same disability may have different effects, depending on students' subject of study. For example, people with reduced mobility (this may also be for a limited period of time only, for example, a broken leg) will have more problems if they are studying sports or physical education than if they are studying the humanities. If you have a problem with arithmetic, this will have more influence if you are studying mathematics than another subject where you do not have to do calculations. As the Universität Wien states on its website, "diagnoses and classical medical reports often are of less use than the effects on their concrete studies. This may refer to the exams and lectures, but may also be relevant only for a certain part of their studies (extension curriculum, special subject)" (Universität Wien, o.J.).

The homepage of the TU Wien also offers information and best practice for students with various disabilities under the category "Services für Lehrende" (services for lecturers) – cf. (Fuhrmann-Ehn, o.J.)

Individuality in support is needed

As the interviews showed clearly, **every person needs individual accommodations**.Do not believe that there is a "universal remedy" for people with disabilities. There are still many misconceptions: one interviewee mentioned a concrete example where many people think that students with a visual impairment simply need all materials enlarged. While this may hold true for some cases, the usefulness of this method depends on the respective visual impairment. For example, if a particular eye disease leads to extreme tunnel vision,

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enlargement will not help at all, because the disabled person will only be able to see a tiny part of the enlarged copy.

Sometimes, the kind of accommodations that a disabled person needs may be influenced by their individual biography: for example, with deaf or deafblind people, the age when they were deafened plays an important role (prelingual or postlingual – i.e. before or after they could learn the spoken language). It is also essential to know which mode of communication someone prefers – did a deaf person grow up using sign language, did they learn sign language at a later age, or do they not use it at all? With people who are deafblind, their communication mode often depends on whichever disability came first: people who are deaf who acquire a visual impairment later on often use manual modes of communication, e.g. tactile sign language (a form of sign language where one "feels" the signs the other person is producing). If the visual impairment or blindness came first, people may prefer to use a mode of communication that is based on written language, e.g. the Lorm alphabet in German-speaking countries. Nevertheless, there are always individual differences and preferences.

Therefore, it is imperative to regard each person as an individual. Usually, they themselves know best what they need and how (often based on their experiences at school). However, be prepared to accept if someone does not wish for accommodations at all (Emmerdinger, et al., o.J., p. 5).

Should you or your students need some expert advice, many universities and higher education institutions have someone that may assist you, e.g. a disability officer or a department for accessibility. Make use of their knowledge!

Basically, you will need to answer the following questions, cf. (Emmerdinger, et al., o.J., p. 5):

- Are your materials accessible?
- What are the preferred file formats?
- What do you need to consider when preparing documents?

The W3C Web Accessibility (WAI) has published a checklist for possible preferences in connection with media. They list the following options (in addition, please cf. the information in the chapter Accommodations by target group):

- People who are d/Deaf:
    - captions or transcripts (also depending on their written language competence)
    - Sign language

- People who are hard-of-hearing:
  - Audio + captions (in case something was not understood)
  - Captions
  - Transcripts (for processing information at their own pace)
- People who are blind:
  - Audio description for videos
  - Operation via keyboard
- People who are deafblind:
  - Screen reader/Braille for reading descriptive transcripts (including audio-visual information)
- People who are neurodivergent:
  - Descriptive transcripts
- People with reduced motor skills:
  - Operation via voice-recognition software

There is a wide range of options, even in this list. Additionally, the WAI points out that some of these measures may be implemented simultaneously, so that the information complements each other. However, this depends on the individual wishes for accommodation.

Do consider that all students/users will profit from any of these measures – the WAI even gives some examples, cf. (W3C Web Accessibility Initiative, 2021):

For example, people may skim a transcript (and – in connection with media – find out whether they would really like to watch/download the file, thus reducing the data consumption of mobile devices). Moreover, they can be read offline, printed, be converted into Braille, etc. Captions will also help if you are in a loud environment, or if you are somewhere where you either cannot or must not make any noise. They are also useful if you do not have full written language competence. As a side effect, the human brain retains information better if you listen to it and read it at the same time.

General accommodations

First of all, one needs suitable equipment. Ideally, one will have a PC/laptop/tablet with webcam, earphones and microphone (headsets will leave one's hands free to use the devices). If one does not have the respective equipment, some way of acquiring it must be found (e.g. loan devices for students). One also needs a stable internet connection of sufficient quality.

Online lectures/presentations are far more intense than in-person courses, therefore breaks should occur at regular intervals (also for the lecturers, because they need not factor in the way to and from different lecture halls as natural breaks). The guide "Accessibility in Online

Teaching" recommends a first short break of five minutes after 45-60 minutes (Kaufmann, et al., 2020).

Lectures should include varied activities and tasks, not just consist of talking for hours. Lecturers may use videos, discussions, group activities, surveys, quizzes, etc. to keep students' attention. E-learning experts recommend switching between different activities after ten minutes. Use all the options of the digital world and do not try to transfer your usual face-to-face course one-to-one to an online lecture. Use tasks for groups and individuals, as this may improve the inclusion of students with disabilities, cf. (Muhl B.A., et al., 2018).

Especially for students with disabilities, digital teaching may even offer better opportunities to participate in a lecture – not only a reduction of interfering noise, but also the option of individual audio settings (e.g. for screen readers), of magnifying screen contents or changing the colour contrast. Recordings that are available online (e.g. via a video-conferencing program) and (accessible) materials allow students to work at their own pace, repeat certain contents or catch up on things they missed. This is even more important, if students have problems with taking notes. Other students will use these options as well. If the materials are available in advance, the students may have a look at them and prepare themselves for the lecture.

It is also very important to have feedback in both directions. Unless all the participants have switched on their webcams, the lecturer will have no idea of how they react – are they interested, bored, was the content understood? Therefore, it is essential to get regular feedback, by asking questions, through polls, the use of digital tools like Tweedback, etc. Encourage your students to comment during your lecture (also individually via chat or microphone).

You may also use the option of asynchronous learning and processing, by providing information to the students before or after the online lecture. Next to individual solutions, you can take your pick from the following accommodations – cf. (Heinrich-Heine-Universität Düsseldorf. Koordinierungsstelle Diversity, 2020):

- Recordings of online lectures (with a good video and audio quality and an interference-free background)
- General video/audio recordings
- Written materials, e.g.:
  - Texts
  - Scripts
  - Transcripts

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- o Moodle course
- o PowerPoint files
- o Pictures/screenshots of what was written or drawn during the lecture
- Internet links

You may use these to have the students prepare for certain tasks (group activities, discussions, etc.). However, many students also appreciate having the option of working through the contents of the lecture again, at their own pace. This is also helpful if they are unable to attend a lecture or to prepare for exams. Ideally, all materials are fully accessible and/or will be available in different formats (video, audio, text, etc.).

The recordings of the lectures and all other materials should be available at least until after the exams, so the students can work through or look up contents.

In the feedback to our questionnaires, students thought it helpful if lecturers asked from time to time whether everything was understood, because this may motivate the participants to ask questions. Even outside your lectures, offer the students various modes of contacting you for further information (in person, via phone or electronic communication media).

If you want to avoid students overlooking important information, you can send them short messages (e.g. via the e-mail function of an internal platform or a Moodle forum). Some lecturers also send video messages.

Inform students about important dates and time limits as early as possible (e.g. dates for presentations or exams), cf. (Lux, 2020, p. 3f). For example, you can mark the dates in the Moodle calendar so that they are visible to all.

Some universities offer their staff templates for accessible PPTs. This furthers a unification of materials, avoiding every lecturer having to design their own from scratch.

Please note that concerning accessibility, there may be differences between Windows PCs

Accommodations by target group

Disabilities and chronic illnesses may have an impact on the long- and short-term time management of students, cf. (Universität Wien, o.J.). They may not be able to attend synchronous online lectures or exams. Probably, they will also need additional time for tasks, presentations, etc. Therefore, it may be necessary to extend time limits. You also need to consider that these students may find it hard to concentrate for a longer period of time.

On the next pages you will find suggestions for possible accommodations for various target groups (in alphabetical order). Please note that one person may belong to more than one target group.

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Individual accommodations and how to implement them, should always be discussed together with the disabled person themselves and perhaps also experts for accessibility.

You will find information on how to design accessible documents in the chapter How to design accessible documents.

Students with acute/chronic illnesses or disabilities

These may be chronic or longer illnesses like diabetes, cancer, multiple sclerosis, autoimmune diseases, chronic infections, etc. On the other hand, there are also acute illnesses/disabilities, e.g. infections or trauma-related injuries (fractures, etc.).

In both cases, pain and medication may lead to reduced concentration. Because of their illness/disability, the students may not be able to meet deadlines, due to medical appointments or hospitalisation. Perhaps they cannot sit or finish an exam. The same holds for regular attendance in online lectures. Also, they may be unable to take notes for a brief or a longer period of time, e.g. because of tendonitis or a wrist fracture.

Find this and more detailed information about possible consequences on the website about accessible teaching of the Universität Wien:

https://barrierefreielehre.univie.ac.at/beeintraechtigungsformen/akutechronische-erkrankung/

Students who are blind

As typical barriers for vision-impairments (vision-impairment, blindness, deafblindness, colour blindness), the Universität Stuttgart lists the following (Universität Stuttgart, o.J.):

- Lack of keyboard support
- Lack of alternatives to text
- Texts and pictures with low contrast
- Videos without audio alternative

Moreover, all visual information should be acoustically accessible for blind students and/or be accessible in another way, e.g. with Braille. Pictures will need alternative texts. During a lecture or a presentation, visual information should be explained acoustically (e.g. reading a quote shown on a PowerPoint slide). All functions and contents should be accessible via keyboard, cf. (Onlineredaktion der Hochschulkommunikation, 2019, p. 1).

As taking notes is usually impossible or at least very hard for blind students, you should record your lectures. All materials should be accessible so that they can be used with a screen reader (you will find more information on how to do this in the chapter How to design accessible documents.

However, digital teaching does have some advantages for blind students: digital materials may be read by a screen reader without other students noticing. They also have the option of using two different audio channels: for example, a video conference on one audio channel and the screen reader on a separate second one, e.g. with a Java Bluetooth headset and an earbud under the earphones. This requires the video-conferencing program to have the option of choosing an audio device directly in the menu.

Blindness often requires more time, e.g. for writing texts, getting accessible literature, etc.

Find this and more detailed information about possible consequences of blindness on the website about accessible teaching of the University of Cambridge:

https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments-4

Students with cognitive processing difficulties

Attention and concentration problems may be caused by a disability like attention-deficit/hyperactivity syndrome (ADHS) or other psychological problems like depression. In some cases, they may also be caused by certain medication for chronic illnesses.

This target group will generally need more time (e.g. extended time limits). Otherwise, the general recommendations apply as well: provide the students with recordings of the lectures and digital materials. Maybe other students could take notes for them. During group discussions, only a single person should be talking (not several people at the same time). As for exams, you can make them easier by offering individual exams.

Find this and more detailed information about possible consequences on the website about accessible teaching of the University of Cambridge:

https://www.disability.admin.cam.ac.uk/teaching-disabled-students/understanding-effects-impairments-study/adhd-attention-deficit

Students with deafblindness

Do not consider deafblindness simply as deafness plus blindness – this is a separate disability (ÖHTB Österreichisches Hilfswerk für Taubblinde und hochgradig Hör- und Sehbehinderte, o.J.). In various countries, deafblindness is already recognized as a separate disability, as was demanded by the EU back in 2004 (e.g. in Austria since 2010) (Republik Österreich Parlament, 2010).

As both senses are affected (maybe only to a certain degree; percentages can vary up to 100%), the students cannot substitute one sense for the other like with deafness or blindness. Unless deafblindness is caused by an accident or age, the second disability often sets in at a later point in life. Please note that preferences for certain communication modes

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may differ, based on whether a person used spoken language or sign language first, whether they know Braille, etc. Therefore, it is essential to respect individual preferences.

Probably you will need keyboard support and alternatives for text and audio/video. These should be discussed individually.

The website of the IRIS Center at the Peabody College of Vanderbilt University gives some recommendations on how to adapt teaching materials:

https://iris.peabody.vanderbilt.edu/module/v02-successsight/cresource/q2/p05/#content

https://iris.peabody.vanderbilt.edu/module/fac/cresource/q2/p06/#content

Students who are deaf

The Universität Stuttgart lists the following typical barriers (Universität Stuttgart, o.J.):

- Voice command function
- Lack of sign language
- Difficult texts
- Audio contents without written alternatives

For students who do not hear, use only the term "deaf", never "deaf and dumb" or "deaf-mute". The latter are old terms that are not true – deaf people are not mute, but communicate in a different way – and are regarded as discriminating by the Deaf community. In English, orthography differs between "deaf" (medical term) and Deaf (cultural term).

Generally, d/Deaf students will perceive all information via their eyes – therefore, acoustic information should always be available in a visual way as well.

Moreover, it is important to know which mode of communication the students prefer: sign language or spoken/written language. This may depend on when deafness set in (prelingually or postlingually), but also on whether they grew up with d/Deaf or hearing parents.

Please note that biographies may vary a lot; the d/Deaf are no homogeneous group. Deaf people who grow up in a family of sign language users, will frequently use sign language. Deaf people who grow up in a hearing family, will sometimes encounter sign language only at a later point in life. In this case it is possible that they learn sign language and prefer it from then on; others may prefer to stay with spoken language. The level of sign language competence may differ as well, depending on when and how sign language was learned.

There is not just one single sign language; they differ from country to country (please note that sign languages and their affiliations need not correspond to those of spoken languages;

for example, Austria, Germany and German-speaking Switzerland use three different sign languages). These national sign languages also have dialect variants. For international communication, d/Deaf people can use "International Sign". This is not a full sign language, but an artificial language with a limited vocabulary and grammar.

You may already be familiar with fingerspelling. These manual alphabets also differ from country to country. Usually, they are used for spelling proper names, foreign words, etc. It is also possible to spell out a word and ask for the respective sign. However, a longer communication with fingerspelling is painstaking and exhausting.

Communication with sign language and sign language interpreters

For sign language users, true accessibility is only achieved through sign language. Ideally, the lecturers themselves are fluent in sign language. If that is not the case, sign language interpreters may be used. If you need an interpreter yourself, you should book their services well in advance with your (local) sign interpreter association. For longer events, two interpreters will be needed who will change at regular intervals (usually every half-hour).

Many sign language interpreters will also do online interpreting. Please note that during interpretation, you only look at the d/Deaf person, never at the interpreter, and you also talk only to the d/Deaf person. Breaking eye contact abruptly is considered impolite in Deaf culture (e.g. when a phone rings or somebody enters the room) as it interrupts the communication. If something like this happens, please explain the reason why you are turning away first ("My phone is ringing"), as the d/Deaf person cannot hear the ringing.

During online teaching or an online presentation, it is essential that the interpreters' video is large and visible for the whole duration (and that the interpreters can see the d/Deaf person they are interpreting for). When you are using spoken language, the video of the speaker is usually automatically enlarged. As video-conferencing programs do not react to movement, d/Deaf people prefer programs that allow for pinning certain videos. At the moment, Zoom seems to work very well and is used on a large scale (also because of good video and audio quality). However, other programs are following their lead, for example, BigBlueButton. New versions include this function as well (you can select it by clicking on the three dots in the lower right-hand corner of a participant's video). When the interpreters change, the pinned video has to be exchanged as well – this may take a little time.

Please note that d/Deaf students cannot watch the interpreter and a presentation at the same time. In this case, explain what is shown in the presentation first. The interpreters will sign this. Afterwards, the students will need a little time to look at the presentation. The same holds for working with a computer, where students are expected to try something out. For the same reason, d/Deaf people cannot take notes – as soon as they look away from the interpreter to write something down, the flow of information is interrupted.

You should not give too much information at once (e.g. in a chat), and this should be given in a visual way, as d/Deaf people are very visual by nature.

Text interpreters

Another possibility is to offer information in written language. For example, text interpreters will simultaneously write down everything that is said. In this way, you can read everything that the audience hears. However, this does not correspond to note-taking; notes would have to be done separately (and perhaps edited).

Relay Service

For the sake of completeness, relay services should be mentioned. In such call centres, sign language interpreters mediate between d/Deaf and hearing people. What the d/Deaf person signs, is interpreted into spoken language for the hearing communication partner and vice versa. In the UK, this service is offered by Relay UK.

Captioning

Captions are another option, e.g. in videos. Some video-conferencing programs already come equipped with automated captions (e.g. Zoom) but there may be a time lag, or there may be mistakes that can even affect understanding. Nevertheless, captioning can at least help with understanding videos or video conferences.

Please note that captioning alone does not guarantee full accessibility. Although they may help with understanding, this is not equal access. Also, comments/feedback in sign language from d/Deaf persons will need interpreting. Chats are not sufficient, as not all d/Deaf people have the respective written language competence.

Written communication

If, without an interpreter, there are problems with communication, it is helpful to write down important information, questions, etc. However, this should not be a permanent solution!

Please note that written language is a second or even third language for many d/Deaf people and that they may have problems with longer or more complex texts. Foreign words, idioms and figures of speech, metaphors, etc. may cause difficulties as well. If you are writing texts for d/Deaf people, use short, simple sentences and a lot of examples.

In case you receive texts written by d/Deaf people, do not be surprised if they contain grammar mistakes or strange-looking constructions: sign language grammar differs from that of spoken language and may influence their writing. Typos are quite frequent as well.

Deaf people tend to be more direct than hearing people and usually do not use polite phrases – hearing people sometimes misinterpret this as being impolite. Nevertheless, this is

a part of Deaf culture. Therefore, get right to the topic and avoid beating around the bush. Sign language usually does not use a polite form and d/Deaf people may have difficulty using a written polite form correctly.

Lip-reading

Some deaf people grow up orally, i.e. with spoken language, or they are deafened at a later point in life. They often use lip-reading (however, this does not exclude their using and even preferring sign language later on). Although there are excellent lip-readers, only 30-40% of lip movements are unambiguously identifiable – many look the same, like B and M (for example, German "Butter" and "Mutter"). The rest has to be guessed from the context like a cloze test. Therefore, it helps to know the topic, because certain words may be excluded from the beginning, and if the sentences are kept rather short and simple.

Good lighting and an unobstructed view of the mouth are important (no eating/drinking, chewing bubble-gum, beard covering the mouth, etc.). You should talk clearly, but not exaggeratedly and at a normal volume. Lip-reading needs a lot of concentration and leads to exhaustion over longer periods of time. Following a lecture only via lip-reading will not be possible for the majority of d/Deaf students, even under perfect circumstances.

That means that for d/Deaf students, solutions and/or alternatives will have to be found for spoken-language lectures/presentations, note-taking, group discussions and oral exams. This can only be done together with the respective d/Deaf person, based on their experiences and preferences.

You will find an overview over d/Deafness and possible consequences in the information about accessible teaching provided by the University of Cambridge:

 https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments/deaf

The Universität Rostock summarizes what you should consider when designing materials (the information refers partially also to hearing-impaired people) (Universität Rostock, 2018):

- Write clearly (e.g. "Do this.") and avoid difficult wording and idioms.
- Avoid giving information only in audio or video format; provide captioning and/or transcripts.
- Use a linear, logical layout; do not use complex layouts and menus.
- Avoid long paragraphs; break them up with headings, pictures and videos.
- Provide alternatives for contacting you (not only via phone call).

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Students with dyslexia

Dyslexia concerns approximately 4% of mankind. This Specific Learning Disability can make reading or writing texts difficult. However, it does not lead to a decreased mental capacity – although these persons are sometimes falsely accused of being "lazy" or "stupid". They may make orthographical or grammatical mistakes (distortions, elisions, etc.). This target group may also have problems with the structure of texts. They may read slower; sometimes they will have trouble understanding the contents of the text. Cf. (Kontakt- und Informationsstelle für Studierende mit Behinderung und chronischer Erkrankung (KIS)., 2011, p. 2f)

The following checklist will give an overview over possible symptoms of dyslexia:

https://www.nhs.uk/conditions/dyslexia/

People with dyslexia often find it hard to concentrate for longer periods of time. They have problems with structuring their tasks and estimating, how much time they are going to need for them. Usually, it will take them longer to complete tasks. Time pressure can lead to stress, e.g. when preparing for an exam.

It helps if the students can learn individually and at their own pace. For this, you may use the following methods – cf. (Swiss Online School, 2021):

- Option of doing tasks on their own, together with another person or in a group
- Offer materials in different formats (e.g. video plus text, text plus audio)
- Printable texts
- Give individual feedback (also possible as audio feedback)
- Playful interim tests/quizzes that will let you assess the learning process of the student

Written materials should be well-structured with clear (bold) headings and in a suitable font without serifs, e.g. Arial or Verdana. They should be at least 14 pt. Perhaps the contrast will have to be adapted as well (you will find tools for checking the contrast in the InclUDE Repository). Take care to use sufficient line spacing so that the text will not become blurred or the lines seem "compressed" (Lux, 2020, p. 4). Avoid Italics and underlining, if possible (both should not be used in accessible documents, cf. also the chapter How to design accessible documents. Do not use capitals only (Microsoft Support, o.J.)

Use lots of graphics, not just texts. You may also consider offering an audio version (in this case, you may use text-to-speech tools; you will find examples for reading software in the InclUDE Repository).

Take care that texts are not only read but also understood. Tasks (work assignments, exam questions) should be given verbally or read out loud. You may also give the option of doing

work assignments or exams orally. Formulate assignments clearly and unambiguously. You may also offer some help with structuring. For writing texts, the students might use speech-recognition software with text output.

If you use chats during your lectures, think about using "waterfall chats": the students get a certain period of time for writing their comments. However, they will only post them when the lecturer gives the command to send all the messages – in this way, they will all appear at the same time and slower writers have the same chances.

Recordings (video and audio) will also help students with dyslexia. Perhaps note-taking can be organised in some way. It is important that people with dyslexia get extended time limits to finish their tasks. Texts with special layouts (e.g. certain fonts) or tools that make the structure of a text visible will help as well (you will find examples of such tools in the InclUDE Repository).

Find this and more detailed information about possible consequences of dyslexia (and other Specific Learning Disabilities) on the website about accessible teaching of the University of Cambridge:

https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments-1

The Universität Rostock summarizes what to consider when preparing materials for people with dyslexia (Universität Rostock, 2018):

- Support them by using pictures and diagrams instead of long, complex blocks of text
- Texts should be left-aligned and have a consistent layout
- Avoid Italics, underlining and writing in capitals
- Offer information in other formats as well (audio, video)
- Do send reminders or prompts (e.g. for deadlines)
- It should be possible to increase contrast between text and background
- Do not use too much content at once

Students with a hearing-impairment

The Universität Stuttgart identifies the following barriers as typical for people with a hearing-impairment (Universität Stuttgart, o.J.):

- Voice control
- Lack of sign language
- Difficult texts
- Audio contents without a text alternative

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Hearing-impaired students access a lot of information visually, therefore, acoustic information should also be made accessible in a visual way.

The degree of hearing loss may influence the choice of preferred language. Many hard-of-hearing people (especially, if the hearing loss sets in later in life) use only spoken language. Others come in contact with sign language and switch to that – at least in certain situations (please note that their sign language competence may vary). Especially during lectures/presentations, etc. a sign language interpreter may ensure understanding. You can find more information on sign language and different ways of interpreting in the chapter Students who are deaf. Please note that biographies as well as preferences may differ.

Captioning

Captioning is important for accessibility, e.g. for videos. Some video-conferencing programs already come equipped with automated captions (e.g. Zoom) but there may be a time lag, or there may be mistakes that can even affect understanding. Nevertheless, captioning can at least help with understanding videos or video conferences.

Written communication

If, without interpreting, there are communication problems, it can help to write down important information, questions, etc. However, this should not be a permanent solution!

Lip-reading

Many hard-of-hearing people use lip-reading. Still, even if they are excellent lip-readers, only 30-40% of lip movements are unambiguously identifiable – many look the same, like B and M (for example, German "Butter" and "Mutter"). The rest has to be guessed from the context like a cloze test. Therefore, it helps to know the topic, because certain words may be excluded from the beginning, and if the sentences are kept rather short and simple.

Good lighting and an unobstructed view of the mouth are important (no eating/drinking, chewing bubble-gum, beard covering the mouth, etc.). You should talk clearly, but not exaggeratedly and at a normal volume. Lip-reading needs a lot of concentration and leads to exhaustion over longer periods of time. Following a lecture only via lip-reading will not be possible for the majority of hard-of-hearing students, even under perfect circumstances.

For group discussions, speakers need to talk one after the other, not at the same time!

You will find an overview over hearing-impairments and possible consequences in the information about accessible teaching provided by the University of Cambridge:

https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments/deaf

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Students with reduced (fine) motor skills

The Universität Stuttgart identifies the following barriers as typical for those with reduced motor skills (Universität Stuttgart, o.J.):

- Lack of keyboard support
- Small control elements
- Tight time limits

A lack of (fine) motor skills may be temporary (because of illness or accidents). Examples are tendonitis or a wrist fracture. There may be periodic attacks, e.g. with rheumatitis or gout. Permanent impairments are also possible, e.g. when a limb is missing or the person manifests symptoms like palsy, spasms, muscle weakness, tremors, etc.

All functions and contents should be accessible via keyboard, and the control elements should not be too small (Onlineredaktion der Hochschulkommunikation, 2019, p. 1). You will find hot keys for common video-conferencing programs in the chapter Hot Keys.

For online lectures, lack of fine motor skills matters the most (movements of fingers/hands or the mouth): these may also lead to difficulties with writing. Therefore, such students will need more time for producing text (e.g. during a written exam). Their speech may be slurred as well, for example, through multiple sclerosis or an apoplexy. This will make it harder for these students to join in oral or written discussions (e.g. via chat). If possible, try to find alternatives (compensation; or using "waterfall chats", where the students post their messages only after the lecturer tells them to, so that they all arrive at the same time).

In addition, the general recommendations will be helpful as well: provide recordings and digital materials. Perhaps other students can take notes for these students.

This information and details about possible consequences can be found in the information from the Dyspraxia Foundation:

https://dyspraxiafoundation.org.uk/wp-content/uploads/2014/12/Dyspraxia-in-Further-and-Higher-Education-revised-2012.pdf

The Universität Rostock summarizes what you should consider when preparing materials (Universität Rostock, 2018):

- Use large click surfaces for any actions (e.g. for consent: "Yes")
- Avoid using click surfaces where precision is needed
- Use large input fields
- Do not jam interactions together
- Offer keyboard operation and voice control
- Avoid dynamic contents where mouse action is necessary

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- Consider mobile devices and touchscreens during designing
- Do not set tight time limits for actions (the input may be delayed)
- Provide shortcuts (e.g. drop-down menus for inputs)
- Avoid exhausting the users through long scrolling and too many inputs

Students who are neurodivergent

The Universität Stuttgart identifies the following as typical barriers for mental problems (Universität Stuttgart, o.J.):

- Complex navigation and page layouts
- Unpredictable navigation and control elements
- Moving, flashing or flickering content
- Complex sentences and uncommon words

Students with autism spectrum disorders

Students with autism spectrum disorders cf. (Fabri, et al., 2016, p. 1) often show little flexibility (e.g. with regard to deviations from the norm) and a low attention span. They need to be in control and to have clear structures. Usually, they work slower, due to start-up difficulties and/or distractions. There is a danger of feeling overwhelmed; in this case, the students may take refuge in repetitive actions. Social situations are especially difficult. These students will also need more time for exams. Cf. (Dachverband Österreichische Autistenhilfe, 2019, p. 5f)

It is essential to formulate assignments or tasks precisely: what should be done? How? How much time do I have to do this? etc. Please note that everything will probably be interpreted literally. Avoid using irony, metaphors, etc. as well as multiple assignments/tasks (separate shorter ones are better).

Tasks during an exam should be clearly defined: what do you expect? How much? What are the grading criteria?

Longer, attentive listening is hard for these students; therefore, it is better to break this up with tasks. They may also have difficulties when processing auditory inputs; when they are taking notes, these may show gaps or note-taking may even be completely impossible. Therefore, it is important to provide respective materials. Audio files need to be without any distracting noise from the background, and it should be possible to listen to them repeatedly.

Written materials should be organised in a clear way (structure, paragraphs). Important parts should be highlighted (e.g. underlay with colour or marked). Individual pages/slides should not be packed with text or contain distracting decorative graphics, etc. Helpful are

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page numbers and topic on each page/slide. Cf. (Dachverband Österreichische Autistenhilfe, 2019, p. 15)

In case you use chats during your online lectures, use "waterfall chats" where the students have a certain period of time to write their comments but only post them after you have instructed them to do so, making them appear simultaneously.

Please note that autistic students may find it hard to speak in front of an audience, cf. (Fabri, et al., 2016, p. 11).

Our interviewees commented that – for personal communication – WhatsApp was preferred, because e-mails contained too much text and too many words.

Disability Rights UK gives more suggestions:

https://www.disabilityrightsuk.org/adjustments-disabled-students-and-apprentices

The Universität Rostock summarizes what you should consider when preparing materials (Universität Rostock, 2018):

- Plain colours instead of vivid colours with a strong contrast
- Use clear language instead of idioms and figures of speech
- Use self-descriptive buttons (e.g. "Attach file") instead of ambiguous and unpredictable buttons (e.g. "Click here").
- Use simple and consistent layouts instead of complex, packed layouts

Students with psychological disorders

Please note that psychological disorders are invisible. Frequently, such students are ashamed to out themselves (Universität zu Köln, 2016, p. 6); moreover, other people often cannot comprehend psychological disorders. Also, other health problems can affect the mind as well (FernUniversität in Hagen, 2018, p. 10f).

Please do not forget that this is not a homogeneous group. Psychological disorders span a range from anxiety disorders over depression to burnout etc.

Depending on the individual psychological disorder, regular attendance may be hard (for example, with recurrent attacks). Anxiety disorders can make it impossible to sit an exam. Also, attention and time management may be affected – especially with group assignments or group presentations. There may be problems with social situations as well.

The general recommendations for students with a disability will help here as well: provide recordings of your lectures and digital materials. If possible, offer compensation tasks (e.g. for missed lectures or participation) and individual exams. Keep the stress level during exams as low as possible.

Details together with a list of psychological disorders and possible consequences can be found in the information about accessible teaching of the University of Cambridge:

https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments-0

Students with vision-impairments

The Universität Stuttgart identifies the following barriers as typical for those with a vision-impairment (including colour blindness) (Universität Stuttgart, o.J.):

- Lack of keyboard support
- Lack of text alternatives
- Texts and pictures with low contrast
- Videos without an audio alternative

For students with a visual impairment (e.g. multiple sclerosis, glaucoma, cataracts, retinal detachment, partial blindness) all information should be accessible acoustically and/or in a processed form. Make sure that texts and pictures have a high contrast (Onlineredaktion der Hochschulkommunikation, 2019, p. 1); in the InclUDE repository, you will find tools to check the contrast. Depending on the degree and kind of vision-impairment, visual information like pictures/graphics will be only partially accessible or not at all. This means that alternative texts are required. During a lecture or presentation, visual information should be referred to in an acoustic form (for example, reading a quote shown on a PowerPoint slide). The students may also have problems with "recognizing details and moving pictures, as well as the simultaneous perception of a larger area with a limited field of vision" (Emmerdinger, et al., o.J., p. 4).

Discuss any measures with the respective student; for example, simply enlarging everything may not help with a limited field of vision (e.g. tunnel vision), as only a small percentage of the information will be accessible visually.

Note-taking will usually be very hard or completely impossible, therefore, you should provide recordings of the lectures. All materials should be accessible to screen readers (information about how to do this can be found in the chapter How to design accessible documents. Use a suitable font size and colours/high contrast (you will find some tools for checking this in the InclUDE-Repository).

The British Home Office has also produced a poster about how to design materials that are accessible to screen readers. This includes the following tips (Home Office Digital, o.J., p. 3):

- Provide alternative texts for images and transcripts for videos
- Follow a linear, logical layout instead of spreading content all over the page

- Use style sheets for structuring instead of manual placement and font size
- Provide keyboard navigation
- Use descriptive headings and links

In addition, they offer the following recommendations (Home Office Digital, o.J., p. 4):

- Use high contrast and a readable font size
- Use a combination of colour, shapes and text; do not colour-code meanings
- Put buttons for actions in context (not separated – e.g. "Submit")

The Guidelines for Lecturers of the Hochschule Deggendorf include detailed information about how to prepare teaching and learning materials. This includes:

- Short presentations and not too much information on each slide
- Font size of at least 30 pt.
- High contrast (black font on white background)
  - Avoid using patterns and various backgrounds
- Avoid hyphenation and block capitals
- Avoid text blocks
- Avoid Roman numerals, as screen readers will read these as letters
- Give precise explanations ("As point 3, we will talk about")

They also recommend recordings of lectures and podcasts (Emmerdinger, et al., o.J., p. 18).

Especially for students with a visual impairment, digital teaching can be an advantage: if materials are available online, certain areas may be enlarged (in contrast to presentation in face-to-face courses). Tools like screen magnifiers are helpful; simple screen magnifiers are usually available in basic programs like Windows:

https://support.microsoft.com/en-us/windows/use-magnifier-to-make-things-on-the-screen-easier-to-see-414948ba-8b1c-d3bd-8615-0e5e32204198#:~:text=Press%20the%20Windows%20logo%20key%20%2B%20Ctrl%20%2B%20M%20to%20open%20the,adjust%20the%20zoom%20level%20accordingly.

You will find information about screen magnifiers in the InclUDE Repository.

Generally, you will need good lighting and a good sound quality without any distracting background noise. During group discussions, speakers should not talk at the same time, but one after the other.

A visual impairment can also lead to increased time expenditure – i.e. when writing texts or looking for accessible literature, etc.

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You will find an overview of visual impairments and possible consequences in the information about accessible lectures of the University of Cambridge:

https://www.disability.admin.cam.ac.uk/staff-supporting-disabled-students/teaching-disabled-students/understanding-effects-impairments-4

Basic principles of digital accessibility

E-learning makes it possible to "offer location- and time-independent teaching and learning materials" as well as to "visualize complex issues through multi-media and interactive ways of presentation processes", while taking care to make teaching materials accessible (Albert-Ludwigs-Universität Freiburg. Stabsstelle Gender and Diversity, 2017, p. 4f).

Let's have a look at the definition of "digital accessibility":

> "It is one of the basic principles of digital accessibility, to design websites, software and digital media in way that they will adapt flexibly to various needs of users, their preferences or individual situations." (TUM Technische Universität München. Zentrale Informationstechnik. TYPO3-Team, o.J.)

The range spans from the use of screen readers and keyboard support to captioning and sign language videos and descriptive links and alternative texts for graphics (TUM Technische Universität München. Zentrale Informationstechnik. TYPO3-Team., o.J.)

The four criteria of accessible websites

There are legal regulations for digital accessibility, e.g. the Web Content Accessibility Guidelines (WCAG), although these "do not provide an answer to all kinds, characteristics and combinations of disabilities" (Nehlsen & Wiese, 2019, p. 3) . German and English websites in Europe can get their accessibility approved by the WACA initiative and the "Zertifizierungsstelle TÜV Österreich" with the WACA certificate in gold, silver or bronze (for three years), like the Technische Universität Wien with the certificate in silver. You will find detailed information about this certificate on the Website Web Accessibility Certificate.

The four criteria for accessible websites are the following, cf. (e-teaching.org | Ein Angebot des IWM, 2022):

- Perceivable (there are equal alternatives for any content)
- Operable (content is accessible with alternative devices)
- Understandable (contents and usability)
- Robust (functioning and conforming to standards)

If, while teaching online, you keep to these four principles, you are well on the way to accessibility.

Our interviewees also noted that staff responsible for designing websites should undergo further training for accessibility.

The seven principles of Universal Design

Accessibility is also possibly by using "Universal Design". This includes "designing products, environments, software and services in a way that all people can use them as much as possible without accommodations or a special design" (FernUniversität in Hagen, 2018, p. 42); however, this includes the use of assistive devices.

The original seven principles of "Universal Design" are the following (National Disability Authority. Centre for Excellence in Universal Design, 2020):

Principle 1: Equitable Use

Principle 2: Flexibility in Use

Principle 3: Simple and Intuitive Use

Principle 4: Perceptible Information

Principle 5: Tolerance for Error

Principle 6: Low Physical Effort

Principle 7: Size and Space for Approach and Use

Accessible design

As one of our interviewees aptly put it, a good design is accessible – and if something is not accessible, it is not designed well. Fact is, that accessible websites are not enough. As Joe Clark put it: "The total of contents on the web is field of work." (Clark, o.J.). Moodle differs between "reactive accessibility" and "proactive accessibility" (Cockrell & Bryant, 2022). The first mindset reacts to explicit requests for accessibility (although this at least includes a certain awareness of the issue), while the second one tries to promote accessibility from the beginning. Moodle recommends the following: "Before getting started, it's important to gain knowledge about accessible design practices. From there, you can focus on larger organizational changes." (Cockrell & Bryant, 2022)

At first glance, this seems to mean a lot of extra work, but this is not strictly true:

> "This includes provisions for how to use digital tools and what better not to use. For digital Word, PowerPoint or PDF files, it is not too much work, if you start out considering certain rules."
>
> (Technische Universität Dresden. Fakultät Informatik., 2020, p. 1)

In the end, the lecturers themselves will also benefit:

> "All will benefit from clear structures and reduced complexity in using the wide-ranging possibilities of digital tools, even you as the lecturer yourself."
>
> (Technische Universität Dresden. Fakultät Informatik., 2020, p. 2)

A first test of accessibility

Quick and simple tests will give you a first impression of how accessible your websites or files are. Start with asking yourself the following questions, cf. (Nehlsen & Wiese, 2019, p. 50f) :

- Does everything work even without using a mouse?
- Does everything work on a mobile device (smartphone)?
- Can I still read everything when magnifying the font size to 200 %?
- Are all images necessary and is the content also available in the text?
- Can I print out the page in black and white?
- Is something moving? Do images change or do videos start automatically?

Microsoft Accessibility Check

If you want to have a more specific test, you can use tools that will check the accessibility of various elements. For example, Microsoft Word offers an in-built accessibility checker. You can open this via "Review" > "Check accessibility". If there are any issues with accessibility, the tool will warn you and you can go through them one by one (these warnings are about text structure, missing subtitles, colour contrasts, etc.). You can even check accessibility while you are working.

The accessibility checker will give you hints how to improve the accessibility of contents. However, as with all automated checks, you need to have a personal look at all the issues detected, as some of them may be indicated incorrectly. Additionally, Microsoft offers the option to activate an accessibility reminder.

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Technical accessibility

Whether you as a student, lecturer or presenter can participate successfully in online lectures/presentations, will depend largely on your technical equipment and your IT knowledge. During the lockdowns, other issues cropped up as well, like a stable internet connection, individual characteristics of various video-conferencing programs or accessible videos. In the following subchapters, we have collected some recommendations.

Stable internet connection

If possible, avoid the rush hours between 10 AM and 4 PM. Maybe a second person can be ready to take over, in case your internet connection breaks down. As an alternative, you may stream a video, if the connection is unstable or does not work at all. Cf. (TUM Technische Universität München. ProLehre | Medien und Didaktik., o.J.)

It is best to test everything in advance, with the same equipment you will be using during the lecture/presentation. If possible, the participants should log in a bit early, just in case something does not work as expected. Together with the link, send them some information for "emergency communication" (via e-mail, phone), so that participants who have trouble logging in or connecting can alert you. Cf. (TUM Technische Universität München. ProLehre | Medien und Didaktik., o.J.)

The following recommendations hold for lecturers/presenters and participants:

- If possible, connect the laptop directly to the LAN router with a network cable; else, put your computer/laptop as close as possible to your router.
- Switch your camera on only when you are talking, in order to save bandwidth (this will also help save CO_2).
- Ideally, keep an alternative device close at hand.
- Use respective tools to check your connection (examples to be found in the InclUDE Repository)

Record your lecture/presentation and make it available online for later viewing, in case some students lose their connection.

The Events Team of the University of Wolverhampton offers trainings with simulated technology breakdowns, so you can experiment with your reactions. In addition, they created a template with instructions for a stable connection that you can send out to all the participants. This will be especially helpful for participants who are not so familiar with the video-conferencing program. Perhaps your IT or e-learning department has something similar; else you might suggest for them to develop such trainings/templates.

Live streams

Decide whether a synchronous or an asynchronous format works better for what you want to do (Technische Universität Dresden. Fakultät Informatik., 2020, p. 2). You can also use both by recording a video conference. Base your decision also on the requirements of your students and the degree of accessibility of the video-conferencing program that you are using (you will find more about this topic in the chapter Video conferences. Remain in regular contact with your students, in order to identify possible problems (Universität Hamburg, 2020, p. 4) .

You will need good lighting. The background should be as interference-free as possible. It is best to use a headset in order to guarantee a good sound quality. Talk freely, clearly and at a normal volume. Use emphasis and pauses – so students will have time to think and you will keep their attention. Cf. (Technische Universität Dresden (Hrsg.), 2017, p. 18).

Avoid using technical terms and foreign words as much as possible. If this is not possible, explain them, cf. (Technische Universität Dresden (Hrsg.), 2017, p. 19) . Stress what is important and what the students will have to do. Repeat or summarize questions and comments from the audience, in case they were difficult to understand, before answering.

If you use a presentation with images, describe what is shown on them. You can use keywords from a slide in your explanation. Read out longer texts, definitions or quotes and avoid telling the students "You can read these at home".

The Web Access Initiative published checklists for audio and video that give a good overview of possible measures. We have summarized them in the following list:

- General measures:
  - Accessible audio
    - Live or recorded: subtitles
    - Live or recorded: sign language
    - Live: text interpreter (also for Braille devices)
    - Transcript
      - separate from audio
      - with live formats, ideally also a live transcript
  - Accessible video that does not cause seizures
    - subtitles
    - Live or recorded: Transcript with audio information
    - Live or recorded: Descriptive transcript (visual information) or audio description
    - Live or recorded: sign language
  - Accessible Media player (e.g. keyboard support)

If any information is not necessary for understanding (for example, when there is only background music in the video), the WAI recommends informing the users. They also suggest providing subtitles as well as transcripts – subtitles for d/Deaf and hearing-impaired people, transcripts especially for deafblind and neurodivergent people, but also for all others. The transcripts may be based on the subtitles.

Transcribing text by listening to it is painstaking (although there are software tools to facilitate this). Therefore, the WAI recommends using speech-to-text software for doing transcripts (which will have to be checked, as mistakes may make the text difficult or even impossible to understand). Cf. (W3C Web Accessibility Initiative WAI, 2020)

What should be described? Everything that is said (and maybe how), but also all important sounds (background music only to be mentioned, if it is essential for understanding). You can find details on the website of the WAI:

https://www.w3.org/WAI/media/av/transcribing/#what-to-transcribe

There you will also find detailed information about transcripts and captioning:

https://www.w3.org/WAI/media/av/

https://www.w3.org/WAI/media/av/captions/

https://www.w3.org/WAI/media/av/captions/#caption-tools

https://www.w3.org/WAI/media/av/transcripts/

https://www.w3.org/WAI/media/av/transcribing/

You can find some examples for transcripts on the following website:

https://www.w3.org/WAI/perspective-videos/captions/#transcript

There is also detailed information on transcripts on the website of uiAccess:

http://www.uiaccess.com/transcripts/transcripts_on_the_web.html#justdoit

Video conferences

General recommendations

Get familiar with the program and its functions in advance. There is also the possibility of using a stream deck, where you can assign frequently used functions to each button.

For synchronous formats, consider accessibility as much as possible. Here are some recommendations:

After you have welcomed the participants, inform them about etiquette (you had better wait a few minutes for late-comers, or you will be forced to repeat everything):

- How to signal questions – via chat, hand-raising (button), etc.?
- Microphones should only be switched on for comments, in order to avoid distracting noises.
- Inform the participants about data protection issues (comments/link in the chat will be visible to all, recording, etc.).
- Do not interrupt others and avoid background noises as much as possible (Technische Universität Dresden (Hrsg.), 2017, p. 20).

Use a headset to improve the sound quality and talk slowly, with a lot of breaks. Give the participants some time to react to questions, etc.

Ideally, all participants will have individual microphones to avoid feedback loops from room microphones and to enable everybody to switch them on/off individually.

For larger events, it is recommended to have an additional person monitoring the chat, etc., so you yourself can concentrate on presenting the contents. For example, during screen-sharing, the chat will be invisible to you.

Have your PowerPoint, web pages, etc. already opened. It is recommended to test in advance whether embedded videos will work, so as not to get a nasty surprise later on.

In case any of the participants are going to show a PowerPoint presentation as well, discuss beforehand how you are going to handle this: will you upload them or will the participants do that themselves? Or are you only going to share your screens?

Provide any interim results in writing (e.g. outcomes of discussions). (Technische Universität Dresden (Hrsg.), 2017, p. 20)

Breakout rooms offer a bit more privacy and reduce the feeling of being watched.

Video conferences with sign language interpreters

Deaf people need an interference-free background (e.g. no passers-by) and a high contrast (e.g. a grey background). You should avoid "visual noise", also with regard to clothes – nothing that glitters, flashes or dazzles, no backlight, etc. The lighting should not be too bright or too dark. Maybe the lighting can be improved by an additional desk lamp and/or by darkening the windows.

The positioning of the camera is important as well: the sign language interpreters must not be too small or at a wrong angle. The participants should be alone in front of the camera (not several people simultaneously).

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While interpreting, the sign language interpreters need to be visible at all times. Therefore, the video-conferencing program needs to include a "pinning" function (e.g. Zoom, BigBlueButton). This is also important for moderators and speakers, in order to coordinate with the interpreters: please note that during longer events the interpreters will change regularly (usually, every half hour), and that the videos have to pinned again. Normally, the interpreters will announce a change. Often, only d/Deaf participants, interpreters and perhaps speakers will have their cameras switched on, while all others will be asked to switch their cameras off.

Make sign language interpreters co-hosts in order to facilitate their work. If possible, the interpreters should receive all materials (PPTs, etc.) a few days in advance. Give administration rights also to the d/Deaf participants, so that they can arrange all videos to their liking.

At the beginning, explain briefly how the conference is going to work. Announce each change of speaker. Specify, which cameras will be/remain switched on, and how participants can be given the floor if they want to ask questions, etc. (e.g. hand-raising, chat, etc.).

When there are sign language interpreters, you should always allow for more time, as the d/Deaf participants will only be able to look at graphics in a presentation, etc. after having watched the signed explanation (while hearing participants can do this simultaneously).

Deaf Unity gives a summary of what you should consider when using Zoom with sign language interpreting (most of the recommendations will also work for other video-conferencing programs):

https://deafunity.org/article_interview/tips-on-using-zoom-with-a-sign-language-interpreter/

Accessibility

Please note that the accessibility of different video-conferencing programs may vary. Some may be more or less accessible for certain purposes. Our interviewees praised the accessibility of Zoom (especially with regard to d/Deaf students and pinning videos); now, other programs are following suit. The Deutsche Verein der Blinden und Sehbehinderten in Studium und Beruf ("German Association of the Blind and Vision-Impaired at university or on the job") calls Zoom the "probably most accessible solution" (dvbs Deutscher Verein der Blinden und Sehbehinderten in Studium und Beruf e. V., o.J.). You can find the feedback from our interviewees about various video-conferencing programs in the chapter Video-conferencing tools.

If a program can be used via internet browser or app, test what works better for you. Please consider that some participants may have problems with their connection or have only a small display available (e.g. mobile phone).

The choice of a video conferencing system also depends on the participants. People without any hearing-impairment get the information mainly via the acoustic channel – the video is only additional information. However, for d/Deaf participants, the quality of the video channel is essential.

Use the following checklist to see whether the program you want to use meets the necessary requirements:

- Good video and audio quality
- audio and video devices can be selected individually from a program menu
- "Pinning" videos is possible (so that d/Deaf participants will always see the interpreter's video)
    - Can you spotlight videos?
    - Can you arrange the videos according to your preferences?
- (Automated) captioning (this needs to be enabled by the host in advance)
    - Can you add manual captions or captions produced by a third party?
    - Can you edit automated captions? (with automated captions, mistakes will happen that can make understanding hard or even impossible)
    - Can you save captions?
- Can you select functions via hot keys (without a mouse)?
- Does the program interface with screen readers?
    - Can screen readers recognize the control elements?
    - Are blind users alerted to new chat messages?
    - Can screen readers read the chat messages?
- Can you enlarge the font size?
- Can you change the contrast (e.g. dark mode)?
- Does the program help with keeping the participants' attention (e.g. the focus mode in Zoom, where videos and screen sharing are administrated by the host and co-hosts)

If possible, avoid using chats as these might not be accessible for all (e.g. for participants with screen readers/magnifying tools) or might cause mental overload for neurodivergent participants (Technische Universität Dresden. Fakultät Informatik., 2020, p. 8). There might also be problems with a small display without an external keyboard (Lux, 2020, p. 9).

Chats cause problems especially for blind or visually impaired students, as the screen reader may be heard by all or interfere with spoken comments. During video conferences with many participants, there are often lots of chat messages, so blind people would have to

spend a lot of time having the screen reader read them (not counting the overlapping). Assistants can help with that, by reading the chat messages and summarizing relevant issues during breaks, and also posting answering messages.

Should you need chats, you can save them and make them available online later on. You can also use "waterfall chats", where the participants write their messages but only post them when the lecturer/presenter tells them to do so. In this way, people who cannot write so fast are not at a disadvantage. Instead, you can also choose to use asynchronous communication modes like e-mail or a forum (e.g. in Moodle).

Please note that people with a visual impairment may be visible from the side in their videos, because they move close to the screen, and may only look at the camera when speaking.

Make any materials available in advance (especially for sign language interpreters, but also for participants) or after the video conference. This will also help with small displays, bad connections, and make additional information like links available to all (Lux, 2020, p. 7). This also allows the participants to adapt size, contrast, etc. according to their preferences and/or needs. In case that the materials will only be available afterwards, participants may ask for a magnification during the conference – so you had better test that beforehand.

Ideally, the participants will also be given any questions to be discussed before the start of the video conference.

If possible, record the video conference so that students who could not attend (for health reasons, care obligations, interrupted network connections, etc.) can work through the contents afterwards and at their own pace. This will also help students preparing for an exam.

Describe all visual information (e.g. images, graphics, sketches, tables, etc.) acoustically for vision-impaired or blind participants and take care, that other presenters are doing this as well. This will also help with too small displays or interrupted network connections. Perhaps you may also ask students to do this, in order to keep their attention. If you find it hard to describe something, consider whether the graphic is essential for understanding or rather decorative and may be deleted.

If there are any vision impaired or blind participants, the speakers could say their name before they start talking, so their identity is clear (Critical Design Lab, 2020). Avoid visual hints like demonstrative pronouns ("Here you can see…") and give precise information instead (e.g. "point x in table x") (Georg-August-Universität Göttingen. Abteilung IT, 2019, p. 3).

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Take care that participants do not withdraw and stop participating. If that is the case, try to engage them via personal communication (e-mail, phone calls, video chats) and to find solutions together (Technische Universität Dresden. Fakultät Informatik., 2020, p. 9). Offer different communication options, so that visually impaired/blind or hard-of-hearing/Deaf students are not excluded (Universität Hamburg, 2020, p. 4).

Hot Keys

Programs like Zoom, BigBlueButton, Teams and Skype can also be operated with hot keys, cf. (dvbs Deutscher Verein der Blinden und Sehbehinderten in Studium und Beruf e. V., o.J.):

- [Hot Keys BigBlueButton](#)
- [Hot Keys Skype](#)
- Hot Keys for Skype Business (for different operating systems):
  - [Windows](#)
  - [MacOS](#)
  - [Android](#)
- Hot Keys for Teams (for different operating systems):
  - [Windows](#)
  - [MacOS](#)
- [Hot Keys Zoom](#)

Videos

- Videos should be accessible and operable (BIK für Alle, o.J.).
  - The video player must be accessible and operable with keyboard support (BIK für Alle, o.J. a).
  - The video player should also be accessible to blind people.
- The videos should contain captions for hearing-impaired people. Such extended captions (BIK für Alle, o.J. b) need to contain descriptions of audio impressions (e.g. noises).
  - "Open captions" are visible all the time (BIK für Alle, o.J. a). These should be avoided with neurodivergent people (Technische Universität Dresden. Fakultät Informatik., 2020, p. 7); vgl. auch (Lux, 2020, p. 11)
  - "Closed captions" are optional (BIK für Alle, o.J. a)
- The videos should contain audio descriptions for blind people (alternatively, all the information required for understanding can also be made available acoustically) (BIK für Alle, o.J. c).
- The contents should not flash more frequently than three times a second, so as not to cause seizures (BIK für Alle, o.J. c)

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Captions

When creating captions, please consider the following recommendations (BIK für Alle, o.J. d):

- position: bottom centre (unless there are other overlays there; in that case, top centre)
- high contrast
- easily readable font
- two lines
- visible for at least two seconds
- simultaneous with the sound and as synchronous with lip movements as possible
- stay as close to the original as possible; if you need to reformulate, avoid losing information
- show numbers as numbers (with a dot as decimal separator)
- name music genres

More information about captions can be found in connection with the international standard [ISO/IEC DIS 20071-23 Information technology -- User interface component accessibility -- Part 23: Guidance on the visual presentation of audio information (including captions and subtitles)](#) (Stand 11/2017).

Audio descriptions

Audio descriptions are required when information cannot be transmitted in any other way (e.g. acoustically or via text). This means speaking descriptions of actions, people, settings, etc. in a new sound track during pauses. In this way, you can understand a video through hearing alone (BIK für Alle, o.J. e).

More information about audio description can be found in connection with the international standard [SO/IEC TS 20071-21:2015 Information technology -- User interface component accessibility -- Part 21: Guidance on audio descriptions](#).

How to design accessible documents

Accessibility does not only concern wheelchair ramps and other structural measures, but also documents. Especially in teaching and studying, electronic files abound. However, digital files alone do not automatically imply accessibility, as many people think – cf. (Sohn, 2018, p. 3).

Not only people with disabilities benefit from accessible documents:

"Accessible documents are an advantage for all! They have a clear structure that supports a structured way of working and thinking. This means that it will be easier for the readers to understand the contents. Moreover, accessible documents allow users to employ assistive technology. A text-to-speech function can also help people with dyslexia, if they have trouble reading a text. People who are easily distracted or who have difficulty focusing, for example, people with ADHS or some psychological illness, will profit from text-to-speech as well. The same holds for people who do not have German as a mother tongue, for whom it will facilitate text comprehension. For vision-impaired or blind people, texts are usually only accessible with special software. The so-called screen readers convey screen contents via text-to-speech. They are not limited to texts, but can also read graphic elements like menus, application windows and symbols. Provided that, the original is designed accessible." (Sohn, 2018, p. 5)

In any case, avoid using documents that were scanned as graphics or with a low resolution. If you use scans, take care to scan them in an OCR format with character recognition.

It is always easier to design a new, accessible document from scratch than trying to make an existing one accessible.

On the internet, you will find useful guidelines (a selection of those also in the InclUDE-Repository under the heading "Guidelines") and checklists what to consider when designing documents:

https://www.aau.at/universitaet/service-kontakt/services-fuer-menschen-mit-behinderungen/#toggle-id-6

What should you consider when designing a new document?

- If you are designing a new document, start with entering all metadata (authors, title, tags, etc.).
- Check that the language of the text is identified correctly, so that a screen reader can recognize it and read the text in the correct language. Words or phrases in another language should be marked respectively (e.g. English words in a German text).
- When choosing a layout, keep in mind that people may view the document on mobile devices. (Onlineredaktion der Hochschulkommunikation, 2019, p. 1)
  - Avoid references like "left" or "right", because the view may change when using mobile devices (Onlineredaktion der Hochschulkommunikation, 2019, p. 1)
  - Avoid tables (if possible), as mobile devices may not show them correctly (Onlineredaktion der Hochschulkommunikation, 2019, p. 4)
- Use a clear and logical structure for the document.

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- Work with style sheets if possible; do not structure the text by using blank spaces or blank lines, etc. Instead, use the options provided by the software (for example, line breaks, tabs, page breaks). Style sheets guarantee that screen readers will recognize text elements and formatting and will also allow navigating within the document. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 6)
- Structure your texts with the headings provided by the software – later on, you may use these to generate a table of contents. Users will get an overview of the document and can also directly jump to certain chapters.
  - Choose the correct heading corresponding to its structure level (even if you would prefer another heading for aesthetic reasons)!
- Use links and bookmarks to allow for jumping to certain text passages in the document.
- Take care that all contents are also accessible via keyboard support (without the use of a mouse).
- When designing a document, keep in mind that it may have to be enlarged. (Heinrich-Heine-Universität Düsseldorf. Koordinierungsstelle Diversity, 2020, p. 4)
- Use colours sparingly and with high contrast (also between text and background). Check whether all contents remain understandable if you change to grey scale (e.g. for grey scale printing). You will find some tools to check the contrast in the InclUDE-Repository.
  - It is recommended to use a black font on a white background (or vice versa). In the latter case, please enlarge the font size and use bold font). (Sohn, 2018, p. 24)
  - Avoid red-green. It is recommended to use dark/strong colours instead, or a blue or bold font. (Emmerdinger, et al., o.J., p. 17)
  - Avoid complementary colours like blue-orange or yellow-purple as this may lead to flicker effects. (Sohn, 2018, p. 24)
  - With coloured backgrounds, use a high contrast. Do not use images or colour shading as backgrounds. (Sohn, 2018, p. 24)
  - Avoid putting texts on pictures, as these may be hard to read. (Sohn, 2018, p. 25)
  - Avoid coding information only through colours (especially red and green), or use additional symbols or text. Differences may also be shown in other ways, e.g. by using longer bars in a diagram. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 5)
  - Avoid any references to colour (e.g. "in the red box").
- Choose a font without serifs (e.g. Arial, Calibri) with a suitable font size. (Sohn, 2018, p. 24)
  - Do not use fonts that are too thin or too wide.

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- - Avoid highlighting with italics.
  - Avoid highlighting with underlining (this might be confused with links).
  - Choose suitable line spacing: ascenders and descenders should not touch.
- Avoid technical terms, foreign words and abbreviations as much as possible (or add an explanation).
- Avoid visual references ("in the box on the right", etc.). When referencing, use accessible descriptions like "in paragraph x", "in the box for contact information", etc. (Hellbusch, 2018, p. 9)
- Avoid links that are not descriptive ("click here", "more", "more information", etc.) so that users with screen readers know where the links will lead. Do not write "Find more information here", but "Find more information on the website of x". (Onlineredaktion der Hochschulkommunikation, 2019, p. 2)
- For enumerations and numbering, use the respective software functions.
- Avoid animations as much as possible (as it is very hard to describe them in alternative texts) (Technische Universität Dresden. Fakultät Informatik, 2020, p. 4)

For all documents, use the **two-senses principle** as much as possible (FH Oberösterreich. University of Applied Sciences, 2021, p. 8), cf. also (Lux, 2020, p. 3f):

- **Everything that is visible should also be audible!** There are different options, e.g.:
  - Alternative texts for images and graphics
  - Audio description
  - Reading/Explaining visual information when presenting the document.
    - In case you are drawing something during the lecture, wait until you have finished the graphic before describing/explaining it.
- **What is audible, should also be visible!** There are different options, e.g.:
  - Sign language interpreting
    - Sign language interpreters
    - Sign language videos
  - Text interpreters that transfer speech to text
  - Speech-to-text: there are different options, e.g.:
    - Captioning
    - Materials
    - Written notes (by assistants or other students)
    - Text-to-speech software and apps

Create PDF files directly from Word files; do not scan any word files. You will find more about word and PDF files in the chapters Accessible Word files and Accessible PDF files.

In case you are providing texts, it is frequently recommended to offer different formats (.txt, Word and PDF), to cover different accessibility needs.

Accessible Word files

If you want to design an accessible document in Word:

- As a first step, fill in the metadata (the correct identification of the text language is essential so that screen readers will recognize the language and pronounce words correctly – mark words in a foreign language within the text as well). (Universität Stuttgart, o.J.)
- In recent Word versions, you will find the option "immersive reader", so you can check whether the words are pronounced correctly.
- Use a high contrast between text and background – you may check this with special tools (some examples to be found in the InclUDE-Repository). Information should not be accessible by colour only, but with additional explanation or graphics or symbols.
- Use a font without serifs (e.g. Arial, Calibri) and do not choose a font size that is too small (although it may be magnified later on).
- Write left-justified (not fully justified).
- Use a logical structure – not only for accessibility, but also for all readers. Especially for blind people, the reading order is essential as they will go through the text sequentially with their screen reader (Technische Universität Dresden. Fakultät Informatik, 2020, p. 9). You can check the structure in the outline view or the navigation area. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 14)
- Use pre-defined style sheets so that screen readers will recognize text elements correctly. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 13)
  - Use pre-defined headings: You may then generate a table of contents which will allow direct navigation. You can also link to certain words or paragraphs internally, e.g. by adding document links or bookmarks.
  - Headings should be descriptive and map the structure of the text. (Onlineredaktion der Hochschulkommunikation, 2019, p. 2)
  - Use the appropriate sequence of headings, do not leave out any headings or choose them for aesthetic reasons. (Onlineredaktion der Hochschulkommunikation, 2019, p. 2)
  - Do not use heading styles for highlighting. (Onlineredaktion der Hochschulkommunikation, 2019, p. 2)
  - Use the formatting tools provided by Word (e.g. page break). Do not use blank spaces or blank lines for formatting, as the screen readers will read them every single time. Check this after finishing your document by switching

to the page view that shows the respective symbols. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 20)

- o For enumeration, use bullets or numbering.
    - ▪ Do not use pro/con listings with plus and minus signs. (Onlineredaktion der Hochschulkommunikation, 2019, p. 25)
    - ▪ In case you use hyphens or indentation for listings, explain this in the text. (Georg-August-Universität Göttingen. Abteilung IT, 2019, p. 2)
  - o For multi-column texts, do not use the tab key but the correct formatting tools. (Aktion Mensch, o.J.)
- Information should not be visually accessible only. Use alternative texts to describe the visual content (you can find more information about alternative texts in the chapter Alternative texts for graphical elements). Use decorative graphics sparingly and mark them as such. If you are grouping several images, save them as a new graphic and add an alternative text.
- Diagrams and formulas are best saved as graphics with an additional alternative text. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 33)
- For complex graphics (like diagrams, etc.), the content should also be explained in the text.
- You should not use colour as the only distinguishing feature (Hellbusch, 2018, p. 5). For example, for pie charts it may be necessary to add some text (not just the legend). There is also the option of using patterns (e.g. hatching).
- Use tables sparingly and mark headings as such. Tables should not contain any empty cells.
- When copying, insert text only, do not take over any formatted contents.
- Avoid textboxes, as they may cause problems for screen readers.
- Anchor free forms/illustrations in a way that they are in the correct context to other parts of the text and the reading order is correct as well. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 22)
- If the document contains any links and you do not want to use the full link address (as this is too long or too complex), use descriptive link names. You can define link names via Insert > Hyperlink or with a right-hand click on the link and "Edit hyperlink". Avoid link names like "here", "more information", etc. (Sohn, 2018, p. 10). Hyperlinks should not be marked by colour only, but always show underlining (avoid underlining for other purposes then if possible, so that there are no misunderstandings).
- Do not use automatic or manual hyphenation. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 21)
- Once you have created the file, check the accessibility with the respective Word tools and/or with tools from the InclUDE-Repository.

The UK Government has comprehensive guidelines on how to create accessible files (you will find other guidelines in the InclUDE Repository):

If you want to convert a Word file to PDF:

- Never scan a Word file to convert it to PDF, as this is not accessible to screen readers. Scans with OCR (i.e. character recognition) are (partially) accessible, cf. (Hellbusch, 2005)
- Please avoid also "Print to PDF" as this is not accessible to screen readers either. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 6)
- Ideally, you create an accessible Word and convert this to PDF.
- If possible, always provide Word and PDF files so that the users can opt for the format that is more accessible to them.

Alternative texts for graphical elements

Graphics need to be formatted and named so that screen readers can recognize them. Also, this allows one to create an automatic list of figures. (Sohn, 2018, p. 8)

Alternative texts need to differ from captions. They should tell blind people the purpose of a graphic as well as its content (Technische Universität Dresden. Fakultät Informatik, 2020, p. 32). In order to do so, it should:

- Be objective
- Be comprehensible (with regard to target group and content)
- Provide complete and concise information
- Use a structure with a fixed sequence
- Go from the general to the specific

Although some programs will suggest possible alternative texts, you should check them and – if necessary – edit them.

If you write alternative texts yourself:

- Do not repeat any information contained in the text. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 38)
    - You do not need alternative texts, if the caption contains the complete information (e.g. the name of the person shown in the portrait photo). (Onlineredaktion der Hochschulkommunikation, 2019, p. 3)
    - You do need an alternative text, if the picture contains additional relevant information, e.g. a special atmosphere (festive, happy, etc.)
- You do not need the introduction "This picture/photo shows" – the screen reader will add this automatically. (Onlineredaktion der Hochschulkommunikation, 2019, p. 3)

- For active elements like pictures used as hyperlinks, do not describe the picture but give the link target instead. (Onlineredaktion der Hochschulkommunikation, 2019, p. 3)

A suitable alternative text contains (Technische Universität Dresden. Fakultät Informatik, 2020, p. 38ff):

- Purpose of the picture
- What is visible?
  - Location
  - People and objects
  - Emotions/atmosphere
  - What is happening?
  - Colours
- Texts contained in the graphic (e.g. logos)
- Text variant of formulas

Purely decorative graphics that do not contain any relevant information, should be marked as such so that screen readers will ignore them.

It is recommended to insert diagrams as images. In that case, please describe the following:

- Overview: Title, diagram type, content, alignment of the diagram
- Horizontal and vertical axis (labels, units, scale, intersection, etc.)
- Data
- If you are adding subjective interpretations, please identify them as such

Generally, alternative texts should not be longer than one or two sentences (approximately 100 characters) (Technische Universität Chemnitz, o.J.) . If you are uncertain whether an alternative text is needed or not, it is better to err on the side of caution and add one.

You can find more information on alternative texts in the following guidelines:

[Leitfaden für Redakteure: Digitale Barrierefreiheit / Webseiten der Universität Stuttgart](#)

[Leitfaden: Alternativtexte für Grafiken (Technische Universität Chemnitz)](#)

[Accessible documents: Guide for creating accessible PDF files with Word](#) (in German)

Excellent information is also provided by the "AG Services Behinderung und Studium" (Working group Disability and Studies): https://tu-dresden.de/agsbs/dokumente (2020)

Tables

The use of tables may cause problems with screen readers. Therefore, you should take care that information is not only contained in tables, but also in the text. Cf. (Sohn, 2018, p. 11) , cf. also (Technische Universität Dresden. Fakultät Informatik, 2020, p. 29)

For making tables as accessible as possible, you need to consider the following:

- Avoid drawing tables manually. Create tables with the menu function Insert > Table.
- If you want to convert the file to a PDF format later on, do not insert any tables from Excel – this may cause problems. If you do, be aware that you will need to edit the tables for converting them to a PDF format. (Sohn, 2018, p. 30)
- Avoid complex tables. Instead, use several smaller tables.
- Tables need a logical structure as visual orientation may not be possible.
- Screen readers read each table row separately – consider this when designing a table.
- The first row of the table needs to be marked respectively. (Table Properties > Row > Repeat Header Rows)
- Avoid empty or different-sized cells.
- Each row should have the same number of columns.
- Add an alternative text to the table. Select the table and use a right-hand click to call up the table properties.
- You can add more information as well. Select the table and use a right-hand click to "Insert Label". You can also create a list of figures.
- Do not use tables to align text or graphics! (Universität Stuttgart, o.J.)
- For large or complex tables, give a summary in the alternative text. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 31)
- For people with a visual impairment, tables should show high contrast and all information should be comprehensible even without colour (Technische Universität Dresden. Fakultät Informatik, 2020, p. 32)

If you have used optical accommodations for visually impaired people, this will have no effect on screen readers.

Accessible PDF files

PDF is the abbreviation for **P**ortable **D**ocument **F**ormat. PDF files are often confused with Adobe Acrobat. However, other software is also suitable to create, edit or show PDF files as well (Clark, o.J.). Adobe Acrobat includes functions for accessibility (e.g. keyboard shortcuts, contrast changes, text flow). Cf. (Heuwinkel, o.J.)

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PDF files can be created directly, but one may also convert a source file – usually a Word file – to a PDF file, cf. (WebAIM. web accessibility in mind, 2021). Adobe Acrobat gives the best results, but one can also save a file in PDF format directly in Word, cf. (WebAIM. web accessibility in mind, 2021). Please note: Even if you have checked your Word file for accessibility, this does not guarantee that there will not be any problems after the file has been converted to a PDF format! Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 39).

CAUTION:

- PDF files should never be created by scanning a text, because such files will be saved as graphics and therefore are not accessible to screen readers. Character recognition with OCR software ("optical character recognition") is possible, even afterwards, but one should always include manual checking and – if necessary – editing. Cf. (Hellbusch, 2005)
- PDF files should never be created by printing a file to PDF format – all information about accessibility (like document structure, alternative texts, etc.) will be lost. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 6)

Originally, the purpose of a PDF file was to keep the visual impression of a document, not accessibility: PDFs were created to guarantee that a document would look the same on any platform and keeps its original layout, font, colour, etc., also when being printed, cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 9)

Use PDF files only when it makes sense to do so (Hellbusch, 2005) – for example, when an exact reproduction of the content is essential (e.g. with forms, graphics, mathematical/scientific notations, etc.).

However, accessibility requires individual accommodations (e.g. font size, contrast, etc.). Keyboard support, reading order and automatic language recognition are not always a given. For accessible PDF files, invisible structural information ("tags") is added. These tags make the file accessible, via alternative texts and bookmarks that work like hyperlinks. For the latter, the original Word file needs to have a clear structure with headings and text (using style sheets) (Sohn, 2018, p. 6), so that the PDF file will allow navigation. Readability alone is not enough – just imagine having to find a certain information in hundreds of pages of text without any possibility for navigation … (Aktion Mensch, o.J.)

When creating a PDF file, there are three basic options:

- as a pure graphic (Aktion Mensch, o.J.)
- formatted manually
- formatted with style sheets

For sighted people, there is no difference – all three options look the same to them. For screen readers, however, only the third option is accessible.

Since 2012, there is the standard **ISO 14289-1** or **PDF/UA**. While UA means "Universal Accessibility", this only refers to the technical aspects for accessible or highly accessible PDF files (Technische Universität Dresden. Fakultät Informatik, 2020, p. 10). This includes the following:

- Set the main language of the file, unless this has been copied from Word (Universität Stuttgart, o.J.)
- A structural tree that mirrors the logical reading order contains all meaningful elements as well as how they are related to each other. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 10)
- Within the file, navigation must be possible.
    - For longer texts, there has to be a table of contents, so that users can directly jump to certain sections. – Cf. (Hellbusch, 2005)
- Information must not be in a visual form only; images, graphics, etc. need alternative texts.
    - Meaningful elements must be marked as such and differentiated from purely decorative elements (Technische Universität Dresden. Fakultät Informatik, 2020, p. 10)

It should be standard to use PDF/UA files everywhere; our interviewees mentioned accessible certificates as an example. Ideally, the universities provide templates for PDF/UA files which the staff can then use to create accessible PDF files.

Please note that with the standard **PDF/A**, the "A" does not stand for "accessibility" but for "archive". This refers to long-time archiving of files, not accessibility.

Although non-accessible PDF files can be edited with special software (e.g. Adobe Acrobat Pro), this requires a lot of time and effort. It is much easier to create an accessible Word file first and then convert it into PDF. In this case, additional information "tags" are added to the PDF, which can only be recognized by screen readers (WebAIM. web accessibility in mind, 2021). The final PDF should be checked for accessibility once more, as minor editing may be required (WebAIM. web accessibility in mind, 2021). An excellent tool for checking the accessibility of PDF files is PAVE (https://pave-pdf.org/); you will find this and other tools in the InclUDE-Repository.

Caution: if you check a PDF file for accessibility with the aid of online tools and upload it to a website, also check the data protection policy of this website – will your file be stored there permanently or will it be deleted after the check? (Technische Universität Dresden. Fakultät Informatik, 2020)

When receiving a PDF without tags or with incomplete tags, where you do not have any access to the original file, it is possible to convert the PDF to another format with Adobe Acrobat.

For users with a vision-impairment or a small display, contents can be magnified (Hellbusch, 2005). In order to reduce horizontal scrolling, standard texts can be magnified in the document window first, when using Adobe Acrobat Reader use the function Reflow (use the hot key CTRL + 4 for this). However, there may be problems with forms or documents with a digital signature, cf. (Hellbusch, 2005). Further details concerning this function please find at [Adobe Support > Reading PDFs with reflow and accessibility features](#).

It should be emphasized that PDF files are not optimal for important information that should be accessible to all (Hellbusch, 2005), especially with the use of screen readers (Technische Universität Dresden. Fakultät Informatik, 2020, p. 5). Consider therefore, whether contents need to be in PDF format or if other, more accessible formats might be used instead, e.g. a website. If you still want to send a PDF file, provide information also in other formats to avoid problems. If you hyperlink to a non-accessible document, you could add another hyperlink to accessible information. Cf. (Universität Stuttgart, o.J.)

A very powerful tool to create accessible PDF files is offered by [PAVE](#).

Accessible PowerPoint presentations (PPTs)

Generally, the same rules are valid for PPTs than for all accessible files (please refer also to the chapters [How to design accessible documents](#) and [Accessible Word files](#)). In any case, you need to use slide layouts and master slides.

Microsoft Support provides an in-depth guide for various operating systems and trouble-shooting:

https://support.microsoft.com/en-us/office/make-your-powerpoint-presentations-accessible-to-people-with-disabilities-6f7772b2-2f33-4bd2-8ca7-dae3b2b3ef25

- PowerPoint may be used with keyboard shortcuts (Technische Universität Dresden. Fakultät Informatik, 2020, p. 12)
- Keep the presentation rather simple.
  - Normally, a simple two-colour design with high contrast will be sufficient (e.g. black on white or vice versa).
  - The slides should not be overloaded.
- Enter the title and other file properties.
- Select the language of the document.
- Check the structure with the outline view. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 18)

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- Use layout templates as much as possible so that the elements on the slide are easily recognizable. (Sohn, 2018, p. 20)
- Do not use text boxes for headings, as these will not be shown in the outline (Sohn, 2018, p. 20)

- By using slide layouts, you will end up with a uniform design, where placeholders will remain in place. You can adapt them, but you should not replace them with your own. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 13f)
  - Use a unique heading for each slide. You may also use invisible headings, if you do not want them visible on the slide (you can hide the heading with the Selection toolbar). Even if you convert the file into a PDF format, the headings will remain invisible. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 25)
  - If you do not use a field, delete it, as empty fields will be read by screen readers as well. (Sohn, 2018, p. 21)
  - When adding fields, check the reading order of all fields afterwards. (Sohn, 2018, p. 21)
  - When making changes, you can apply them to all the slides in the document with the slide master.
  - Visual characteristics of the text should be defined with the slide master (font size and colour, placeholders, etc.). (Technische Universität Dresden. Fakultät Informatik, 2020, p. 22)
  - Do not use blank spaces or blank lines for the layout. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 22)
  - For text columns, use the respective slide layout instead of several text boxes, so as to keep the reading order intact.
  - Elements that remain the same (e.g. page numbers, footers) can be added to the slide master as text boxes, so they will not be read every single time. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 15). However, if the PPT is converted into a PDF file later on, the screen reader will read them all.

- The reading order in PowerPoint is not based on where an element is on the slide, but when it has been added to the slide. A newly added element will be read last, even if it is placed at the top of the slide. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 26)
  - The Selection toolbar allows you to check and – if necessary – adapt the reading order.
  - Using the slide layouts provided by the software guarantees a working reading order.

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- Activate the greyscale filter (Select Start > Settings > Accessibility > Colour filters. Turn on the Colour filter switch, and then select Greyscale.)
  - For highlighting, do not use only colour, but also bold type, font size, etc.
- Use a font without serifs (e.g. Arial, Calibri).
  - Use a bigger font size (at least 18 pt).
  - Leave sufficient white space.
  - Avoid excessive italics.
  - Avoid using all capital letters.

    Further details on this can be found at the [Microsoft Support page for accessible PPTs](#).

- Avoid animations as much as possible (as alternative texts for them are very complicated). Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 4)
  - Do not use animated slide transitions (e.g. blinking, rotating texts). Cf. (Sohn, 2018, p. 20)
- Use alternative texts.
  - For images with text on them, repeat the text in the presentation.
  - Also use alternative texts for videos (when converting the PPT into a PDF, a description of the video contents should also be added for sighted people, as well as a visible hyperlink to the source (Technische Universität Dresden. Fakultät Informatik, 2020, p. 36) – e.g. in form of a text box that follows after the video in the reading order).
- Use descriptive hyperlinks.
  - You can also add quick info pop ups that will be displayed when you hover over the link.
  - For lists, use the respective tools – also for indents. Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 27)
- Use tables for data only!
  - Do not use any split or merged cells, as screen readers count the cells.
  - Do not use nested tables.
  - Mark the header. Unfortunately, PowerPoint does not offer this option. However, if you design the table in Word, you can select the option "Repeat Header Rows", so screen readers will identify them correctly. Cf. (Sohn, 2018, p. 23)
- Do not use hyphenation (manual or automatic). Cf. (Technische Universität Dresden. Fakultät Informatik, 2020, p. 22)
- Videos should be accessible (with captions and audio or video descriptions). You can read more about videos in the chapter [Videos](#).

Once you have finished, check the accessibility.

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You can find more in-depth guidelines on how to create accessible PPTs in the InclUDE-Repository

Accessibility in Moodle

Moodle keeps working on its accessibility. You can even find a dedicated section for accessibility on the Moodle website. Moodle lists accessibility issues and also offers plug-ins to improve accessibility. By the end of 2019, the Login page, the Dashboard, Quizzes, Calendar, the Course page, the Participant page and the gradebook were audited. Moodle then tried to find solutions for the accessibility issues. Moodle 3.10 obtained the WCAG 2.1 level AA Accreditation that is valid for a year (last certification in November 2021). Moodle will keep working on accessibility issues, to make education accessible to everyone. Find the details in "Improving the accessibility of Moodle".

Moodle also gives recommendations on how to make courses accessible, cf. (Moodle, 2021). Cf. also the chapter How to design accessible documents).

- In texts, use the preformatted headings: mark the respective texts, click the Styles button in the text editor and choose the appropriate heading.
- Use descriptive links that describe where the link will lead to (avoid: "click here"). Also, avoid plain URLs, as screen readers will read them out.
- Link behaviour should be consistent. Moodle recommends the following:
  - Links within the course should open in the same window.
  - External links should open in a new window.
- Use a font without serifs.
- For important information, use a separate paragraph. Moodle recommends additional emphasis, e.g. using "important" or symbols like asterisks. Avoid highlighting with styling like bold, italics, underlining or different colours, as this may not be accessible to everyone.
- If you want to remove any styling, select the text and click on the "Clear formatting" button in the text editor. (Moodle, 2022)

If you want to check your courses, you can use the HTML editor Atto that contains an accessibility checker (Moodle, 2022). This will check the following:

- Images with missing or empty alternative texts
- Contrast of font colour and background colour, according to WCAG AA guidelines
- Long blocks of texts are sufficiently broken up into headings
- Accessibility of tables

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You can change your standard text editor to Atto. For this, go to Administration > Site administration > Plugins > Text editors > Manage editors. In Atto, you can also use "Keyboard Shortcuts".

Apart from that you may refer to the general information on accessible documents concerning structure, fonts, links, etc. (cf. the Kapitel Allgemeine Vorgaben für barrierefreie Dokumente).

You will also find useful information on the following sites:

- The Humboldt-Universität zu Berlin provides online information and examples for Moodle accessibility: "Barrierearmes Moodle"
- The ZHAW in Zurich lists the Dos and Don'ts of accessible Moodle courses: "Dos and Don'ts in barrierefreien Moodle-Kursen"

The Moodle Academy provides free asynchronous online courses, e.g.

- "Include Your Learners": two-hour e-course on how to include all learners, independent from their background, personal learning needs and internet connection
- "Accessible Teaching Basics": three-hour e-course on accessibility issues in connection with learners with one or more disabilities)

You can find more about accessibility in Moodle on the websites "Accessibility Toolkit", "Accessibility" und "Accessible Course Design". There is also a forum, where users can post questions and issues in connection with accessibility and usability and discuss them. (Araujo & Green, o.J.)

Key findings from survey, interviews and focus groups

The move to online teaching happened for both – lecturers and students – more or less without prior experience

The sudden switch to online teaching due to COVID was completely unexpected. Many of the lecturers and students lacked the respective experience. Most of our interviewees told us that online teaching had consisted mainly of uploading learning materials to Moodle.

In the beginning many different platforms and conferencing tools were used – a kind of "self-organizing chaos"

This meant that people did not have any fixed solutions but had to improvise. Therefore, everybody used what they knew best, e.g. conferencing tools which they had already used in other contexts. One of our interviewees called it a "self-organizing chaos", which is an excellent description of the first days after the switch to online teaching. Later on, the universities made individual choices about what to use – naturally, each video conferencing tool came with its own advantages and disadvantages. Besides, one needs the respective technical equipment/internet connection (in the beginning, some people lacked both).

Universities with prior e-learning experience had a clear advantage

Some universities had already worked towards future e-learning; of course, these had a clear advantage, because they were better prepared for online teaching. However, most universities provided guidelines/trainings for their staff as soon as possible. Especially new "snack-sized" formats dealing with software and online-tools were appreciated.

What online-teaching needs: interactive exchange to keep up concentration and focus

Soon lecturers realized that online teaching was not just about doing in front of a camera what they had done in a lecture hall. Showing PowerPoint slides and talking for one-and-a-half hours did not work with distance teaching. To involve the students and to keep them focused, it needed interactive exercises, varied activities and tasks.

Online-teaching has come to stay

In the meantime, many universities have moved back to presence courses. However, everybody agreed that online teaching has come to stay, at least to some extent. Potentially, hybrid teaching may be used as well, but for this, usability will have to be improved. It may also be possible to use a mix of online and presence formats.

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There is no "one-size-fits-all" solution for accessibility

There are some general measures (e.g. recordings, accessible documents with a clear structure) from which everybody will benefit. Still, every person is different, so they need different accommodations, tailored to the individual student.

PROs & CONs of digital lectures

PROs

- **Can promote accessibility – e.g. better sound quality, screen magnifiers, screen navigation via keyboard**
  Online teaching can help with accessibility. Some things work even better online – usually the sound quality is better than in a lecture hall with many students. You can use screen magnifiers to enlarge contents on your monitor and you can use your computer with a keyboard instead of mouse, to name just a few.
- **Offers flexibility as to time schedules (if recorded) and location**
  What everybody regarded as positive was that online teaching offers much more flexibility. You do not need to be in a certain place at a certain time, you just need a good internet connection wherever you are. And if the online teaching is recorded, you can access it whenever you want and also several times, e.g. to brush up before an exam.
- **Helps to reduce time and money for commuting**
  Everybody also agreed that if you don't have to commute to the university this saves a lot of time and usually also money, maybe even CO_2.

CONs

- **Increases the demands on technical equipment and internet connection**
  However, in order to use online teaching, you need the necessary technical equipment and as has been mentioned before a good internet connection – some people did not have that in the beginning.
- **Reduces personal and social exchange**
  What was seen very critically was the massive reduction of personal and social exchange caused by online teaching. All those little encounters in the corridor or while having some coffee… People really missed that personal contact.
- **Individual overload due to tighter schedules for meetings, appointments, etc.**
  In addition, what many people reported was that they tended to keep tighter schedules online, because they did not need the time to move to another location. Some left a video conference and immediately joined the next one, and often they were online for hours, which was stressful.

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Annexes

As Annex 1 we will present the results of the online survey. Annex 2 is a printable version of the survey we used. As Annex 3, you can find the guidelines we drafted for the focus group discussions and one-on-one interviews. The results of both – survey and focus groups – were used to create the Technical Guidelines. All relevant information was implemented in the respective chapters and the Key findings from survey, interviews and focus groups.

Annex 1 - Results of the online survey

These guidelines are based on surveys about accessibility that have been sent out in the partner countries. The target groups were students, higher educational professionals, social service providers in the field of education, lecturers and policy makers. The surveys were meant to give an overview of the use of tools for online teaching and/or online presentations and connected challenges.

Parameters of the survey and general information

The survey was designed by the InclUDE partners and published online in English, French and German. It was possible to participate in the survey from April 5, 2022, to May 8, 2022. The English version of the questionnaire can be found in Annex 2.

All in all, 431 persons took part in the survey (299 of them completed it). The number of answers may vary as we also used the answers from incomplete surveys, so that we would not lose any information. Of the participants, 47 were higher education professionals, 64 were lecturers and 253 were students. We received one survey from a policy maker, 19 from social service providers in the field of education and 22 from people with other professions.

Profession	Number of surveys
Higher education professionals	47
Lecturers	64
Students	253
Policy makers	1
Social service providers in the field of education	19
Other professions	22
Not specified	25
Total	431

Table 1: Number of surveys according to target group

In this report, we define tools for accessibility as " software or equipment that can be used by individuals, including persons with disabilities, to be able to more easily use/access another product, system, service or digital environment" (Vaughan & Tavishi, 2022, p. 5).

You can find more about the general use of digital accessibility tools in the report "Use of accessibility tools in Higher Education".

The present survey was led by the Universität Klagenfurt. This time, the focus was on the technical aspects of online teaching and/or online presentations. Our main aim was to get an overview of possible problems and solutions. In order to facilitate the use of screen readers, the survey was designed with LimeSurvey. The German original was later translated into English and then into French. Tailoring the survey to the target groups, we asked for the participants' profession first, so that from the 93 questions, only the ones that were relevant for their target group were shown. There were three target groups: lecturers, students and others.

The survey contained the following topics:

- General information
- Technical challenges
- Technical aspects of accessibility
- Best Practice

At the end of the survey, the participants had the possibility – in case they were interested in the results of the project and/or focus group interviews – to leave their e-mail address.

General information referred to the profession (cf. table 1) and the country where the person worked or studied (cf. table 2). Table 3 gives an overview of the results of both questions.

Most answers came from France (226), followed by Austria (145), United Kingdom (24) and Belgium (1). There were five participants from Germany, two from Italy and one person each from Iceland, Cyprus and Romania.

Location	Number of surveys
Austria	145
Belgium	1
France	226
United Kingdom	24
Other country	10
Not specified	25
Total	431

Table 2: Number of surveys according to place of work/study

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For lecturers (34) and higher education professionals (34), most answers were returned from Austria. The highest number of students (208) participated in France.

Location	Students	Lecturers	Higher education professionals	Social service providers	Policy makers	Other	Total
Austria	44	34	34	19	1	13	145
Belgium	0	0	1	0	0	0	1
France	208	15	3	0	0	0	226
United Kingdom	0	13	6	0	0	5	24
Other country	1	2	3	0	0	4	10
Total	253	64	47	19	1	22	406

Table 3: Number of surveys according to place of work/study and profession

Technical challenges

The first analysis showed that especially sound and video are essential for online teaching/presenting: 335 participants mentioned audio quality, 293 video quality. As the majority of participants is probably hearing, it is small wonder that audio quality is seen as crucial: audio problems will interfere with communication in a massive way, while for hearing people, video is frequently regarded as an extra.

What stood out from the beginning were the most common issues the participants had to contend with (multiple answers were possible): for the students, these were especially the internet connection (122 answers) and audio (100 answers), but also problems with video-conferencing software (73 answers), audio hardware (43 answers), video hardware (42 answers) and internet browser (22 answers). Surprisingly, accessibility seemed to be less of an issue, as this was mentioned only five times.

Technical problems	Student answers
Internet connection	122
Audio	100
Video	87
Video-conferencing software	73
Audio hardware	43
Video hardware	42
Internet browser	22
Accessibility	5
Total	494

Table 4: Most frequent technical problems of students

The other professions using online teaching/presenting (lecturers, higher education professionals, social service providers, policy makers) present a different picture. For them, the main issue was video-conferencing software. However, internet connection and audio came second and third place as well. It is interesting to note that accessibility seemed to be more of an issue to lecturers/presenters than to students – 22 mentions against 5 mentions by students.

Technical problems	Mentions for online lectures/presentations
Video-conferencing software	46
Internet connection	32
Audio	27
Accessibility	22
Video	20
Audio hardware	13
Video hardware	10
Internet browser	4
Total	174

Table 5: Most frequent technical problems mentioned by lecturers, higher education professionals, social service providers and policy makers

Annex 2 – Survey on Technical Aspects of Inclusive Digital Education (printable version generated in LimeSurvey)

Based on the results of the first survey concerning the awareness level for accessibility tools, the focus of this questionnaire is for the project partners to get a more concise idea of what to include in our technical guidelines for making online classes/presentations more inclusive.

This survey is being conducted within the framework of the 'Inclusive University Digital Education' (InclUDE) project, which aims to promote the accessibility and inclusivity of higher educatioon institutions, including universities.

The survey should take no longer than 10 minutes to complete.
Please note that using assistive technologies it might take a bit longer.

Thank you in advance for your participation - we really appreciate your support!

There are 93 questions in this survey.

General information

Who are you?

Choose one of the following answers

- Student
- Higher Educational Professional
- Social Service Provider in the field of Education
- Lecturer
- Policy Maker
- Other

If two or more roles are applicable to you, please choose the most relevant one, or fill in a separate survey for each role.

Which country do you work/study in?

Choose one of the following answers

- Austria

- Belgium
- France
- United Kingdom
- Other

Technical challenges

*When comparing online and face-to-face classes, do you think that the video quality has an impact on online teaching/studying? ***

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was 'Student' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 2 --------

Answer was 'Lecturer' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- No difference
- Yes
- Other

*When comparing online and face-to-face meetings, do you think that the video quality has an impact on online presenting? ***

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was 'Higher Educational Professional' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 2 --------

Answer was 'Social Service Provider in the field of Education' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 3 --------

Answer was 'Policy Maker' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 4 --------

Answer was 'Other' at question '1 [GenInf1]' (Who are you?)

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Choose one of the following answers

- No
- No difference
- Yes
- Other

When comparing online and face-to-face classes, do you think that the audio quality has an impact on online teaching/studying? *

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was 'Student' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 2 --------

Answer was 'Lecturer' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- No difference
- Yes
- Other

When comparing online and face-to-face meetings, do you think that the audio quality has an impact on online presenting? *

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was 'Higher Educational Professional' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 2 --------

Answer was 'Social Service Provider in the field of Education' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 3 --------

Answer was 'Policy Maker' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 4 --------

Answer was 'Other' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- No difference
- Yes
- Other

*Did you experience any technical challenges during online classes/presenting? ***

Choose one of the following answers

- No
- Yes

*Studying online I experienced technical challenges. ***

Only answer this question if the following conditions are met:

Answer was 'Student' at question '1 [GenInf1]' (Who are you?) *and* Answer was 'Yes' at question '7 [TechCh3]' (Did you experience any technical challenges during online classes/presenting?)

Check all that apply

- Problems with the internet connection (e.g. interruption, lagging, "frozen" screens)
- Problems with internet browser
- Problems with video (e.g. bad quality, bad lighting)
- Problems with hardware connected to video (e.g. webcam, screen size)
- Problems with audio (e.g. strange voices, bad quality)
- Problems with hardware connected to audio (e.g. speakers, headsets)
- Problems with conferencing software (e.g. Zoom, BigBlueButton, Teams)
- Technical problems linked to special accomodation (e.g. interpreters not visible, closed captions not displayed)
- Other:

*Presenting online I experienced technical challenges. ***

Only answer this question if the following conditions are met:

Answer was 'Social Service Provider in the field of Education' *or* 'Lecturer' *or* 'Policy Maker' *or* 'Other' *or* 'Higher Educational Professional' at question '1 [GenInf1]' (Who are you?) *and* Answer was 'Yes' at question '7 [TechCh3]' (Did you experience any technical challenges during online classes/presenting?)

Check all that apply

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- Problems with the internet connection (e.g. interruptions, lagging, "frozen" screens)
- Problems with internet browser
- Problems with video (e.g. bad quality, bad lighting)
- Problems with hardware connected to video (e.g. webcam, screen size)
- Problems with audio (e,g, strange voices, bad quality)
- Problems with hardware connected to audio (e.g. speakers, headsets)
- Problems with conferencing software (e.g. Zoom, BigBlueButton, Teams)
- Technical problems linked to special accommodations (e.g. interpreters not visible, closed captions not displayed)
- Other:

*What internet browser did you use? ***

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was at question '8 [TechCh4a]' (Studying online I experienced technical challenges.)

-------- or Scenario 2 --------

Answer was at question '9 [TechCh4b]' (Presenting online I experienced technical challenges.)

Check all that apply

- Mozilla Firefox
- Google Chrome
- Microsoft Edge
- Other:

In your opinion, what would you need to deal with the technical challenges?

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '7 [TechCh3]' (Did you experience any technical challenges during online classes/presenting?)

Check all that apply

- Personal assistance for technical questions
- Guidelines for technical questions
- Guidelines for technical accessibility issues
- Other technical support

What would you prefer as guidelines for technical questions? *

Only answer this question if the following conditions are met:

Answer was at question '11 [TechCh5]' (In your opinion, what would you need to deal with the technical challenges?)

Check all that apply

- Handbook
- Video tutorials
- Audio book
- Other:

What would you prefer as guidelines for technical accessibility?

Only answer this question if the following conditions are met:

Answer was 'Guidelines for technical accessibility issues' at question '11 [TechCh5]' (In your opinion, what would you need to deal with the technical challenges?)

Check all that apply

- Handbook
- Video tutorials
- Audio book
- Other:

What other technical support would you need to improve the technical challenges? Please give us more details.

Only answer this question if the following conditions are met:

Answer was at question '11 [TechCh5]' (In your opinion, what would you need to deal with the technical challenges?)

Please write your answer here:

Did you have any technical assistance? *

Check all that apply

- No
- Yes, I had a colleague helping me
- Yes, I had help from IT-services
- Yes, I had help from eLearning-services
- Other:

*Did you get any training in connection with online teaching/presenting? ***

Only answer this question if the following conditions are met:

Answer was 'Higher Educational Professional' *or* 'Social Service Provider in the field of Education' *or* 'Lecturer' *or* 'Policy Maker' *or* 'Other' at question '1 [GenInf1]' (Who are you?)

Check all that apply

- No
- Yes, I attended a formal training (e.g. at your HE organization)
- Yes, but informally (e.g. I asked colleagues for advice)
- Other:

*Did you get any training in connection with online classes/presenting? ***

Only answer this question if the following conditions are met:

Answer was 'Student' at question '1 [GenInf1]' (Who are you?)

Check all that apply

- No
- Yes, I attended a formal training (e.g. at your HE organization)
- Yes, but informally (e.g. I asked other students for advice)
- Other:

*What do you do if you need technical support? ***

Check all that apply

- I turn to my organisation (e.g. a specialized departement)
- I look for information on the internet
- I ask somebody else
- Other:

*Where do you look for information on the internet? ***

Only answer this question if the following conditions are met:

Answer was at question '18 [TechCh8]' (What do you do if you need technical support?)

Check all that apply

- Forum
- Journals
- Video tutorials

- Blogs
- Other:

*Who do you ask? ***

Only answer this question if the following conditions are met:

Answer was at question '18 [TechCh8]' (What do you do if you need technical support?)

Check all that apply

- Experts
- Colleagues
- Family and Friends
- Other:

Accessibility challenges (technical approach)

*Do you need any accessibility accommodation? ***

Only answer this question if the following conditions are met:

Answer was 'Student' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- Yes, for myself

*Do you need any accessibility accommodation? ***

Only answer this question if the following conditions are met:

Answer was 'Other' *or* 'Policy Maker' *or* 'Social Service Provider in the field of Education' *or* 'Higher Educational Professional' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- Yes, for myself
- Yes, for my audience

*Do you need any accessibility accommodation? ***

Only answer this question if the following conditions are met:

Answer was 'Lecturer' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

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- No
- Yes, for myself
- Yes, for my students
- Yes, for my students and myself

Accessibility challenges (technical approach)

Which kind of accessibility accommodation do you need? Check all that apply.

Blind/vision-impaired people *

Choose one of the following answers

- No
- Yes

Which kind of accommodation for blind/vision-impaired people do you need? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '24 [AccCh2a]' (Blind/vision-impaired people)

Check all that apply

- Screen reader
- Contrast checker
- Other:

Deaf/hearing-impaired people *

Choose one of the following answers

- No
- Yes

Which kind of accommodation for deaf/hearing-impaired people do you need? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '26 [AccCh2b]' (Deaf/hearing-impaired people)

Check all that apply

- Transcription tools
- Sign language videos
- Closed captions
- Other:

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*Dyslexic people ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for dyslexic people do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '28 [AccCh2c]' (Dyslexic people)

Check all that apply

- Text checker (e.g. grammar, spelling)
- Text simplification
- Font adaption
- Other:

*People with a lack of (fine) motor skills ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for people with a lack of (fine) motor skills do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '30 [AccCh2d]' (People with a lack of (fine) motor skills)

Check all that apply

- Keyboard navigation
- Transcription tools
- Document level navigation tools (e.g. HeadingsMap)
- Other:

*Neurodivergent people (e.g. ADHS, autistic) ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for neurodivergent people do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '32 [AccCh2e]' (Neurodivergent people (e.g. ADHS, autistic))

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Photosensitive Epilepsy Analysis Tool (e.g. PEAT)
- Other:

*People with cognitive processing difficulties ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for people with cognitive processing difficulties do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '34 [AccCh2g]' (People with cognitive processing difficulties)

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Text checker (e.g. grammar, spelling)
- Text simplification
- Other:

Other accessibility challenge

Please write your answer here:

Accessibility challenges (technical approach)

Which kind of accessibility accommodation do you cater for? Check all that apply.

*Blind/vision-impaired ***

Choose one of the following answers

- No
- Yes

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Which kind of accommodation for blind/vision-impaired people do you need? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '37 [AccCh3a]' (Blind/vision-impaired)

Check all that apply

- Screen reader
- Contrast checker
- Other:

Deaf/hearing-impaired people *

Choose one of the following answers

- No
- Yes

Which kind of accommodation for deaf/hearing-impaired people do you need? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '39 [AccCh3b]' (Deaf/hearing-impaired people)

Check all that apply

- Transcription tools
- Sign language videos
- Closed captions
- Other:

Dyslexic people *

Choose one of the following answers

- No
- Yes

Which kind of accommodation for dyslexic people do you need? *

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '41 [AccCh3c]' (Dyslexic people)

Check all that apply

- Text checker (e.g. grammar, spelling)

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- Text simplification
- Font adaption
- Other:

*People with a lack of (fine) motor skills ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for people with a lack of (fine) motor skills do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '43 [AccCh3d]' (People with a lack of (fine) motor skills)

Check all that apply

- Keyboard navigation
- Transcription tools
- Document level navigation tools (e.g. HeadingsMap)
- Other:

*Neurodivergent people (e.g. ADHS, autistic) ***

Choose one of the following answers

- No
- Yes

*Which kind of accommodation for neurodivergent people do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '45 [AccCh3e]' (Neurodivergent people (e.g. ADHS, autistic))

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Photosensitive Epilepsy Analysis Tool (e.g. PEAT)
- Other:

*People with cognitive processing difficulties ***

Choose one of the following answers

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- No
- Yes

*Which kind of accommodation for people with cognitive processing difficulties do you need? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '47 [AccCh3g]' (People with cognitive processing difficulties)

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Text checker (e.g. grammar, spelling)
- Text simplification
- Other:

Other accessibility challenges

Please write your answer here:

Accessibility challenges (technical approach)

How did you deal with technical accessibility accommodation? Check all that apply.

*Not at all. I did not have the necessary information. ***

Choose one of the following answers

- Not applicable
- Applicable

*I wanted to, but it was not possible. ***

Choose one of the following answers

- Not applicable
- Applicable

*I wanted to, but it was not possible... ***

Only answer this question if the following conditions are met:

Answer was 'Applicable' at question '51 [AccCh4b]' (I wanted to, but it was not possible.)

Check all that apply

- for technical reasons
- for time reasons

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- for financial reasons
- Other:

*I got the necessary information. ***

Choose one of the following answers

- Not applicable
- Applicable

*I got the necessary information... ***

Only answer this question if the following conditions are met:

Answer was 'Applicable' at question '53 [AccCh4c]' (I got the necessary information.)

Check all that apply

- from a colleague
- online
- Other:

I used existing solutions, namely

Please write your answer here:

I found my own solution(s), namely

Please write your answer here:

Accessibility challenges (technical approach)

*If you catered to one particular group, did this cause issues for any other groups? ***

Only answer this question if the following conditions are met:

((AccCh1b.NAOK == "A2") or (AccCh1b.NAOK == "A3") or (AccCh1a.NAOK == "A2") or (AccCh1c.NAOK == "A2") or (AccCh1c.NAOK == "A3") or (AccCh1c.NAOK == "A4")) and ((! is_empty(AccCh4d.NAOK)) or (! is_empty(AccCh4e.NAOK)) or (AccCh4c.NAOK == "A2"))

Choose one of the following answers

- No
- I don't know
- Yes

Accessibility challenges (technical approach)

What do you do if you need technical support in connection with accessibility issues?

*I turn to my organisation (e.g. a specialized department) ***

Choose one of the following answers

- No
- Yes

*I look for information on the internet (e.g. online forums) ***

Choose one of the following answers

- No
- Yes

*Where do you look for information on the internet? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '59 [AccCh6b]' (I look for information on the internet (e.g. online forums))

Check all that apply

- Forum
- Journals
- Video Tutorials
- Blogs
- Other:

*I ask somebody else. ***

Choose one of the following answers

- No
- Yes

*Who do you ask? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '61 [AccCh6c]' (I ask somebody else.)

Check all that apply

- Experts
- Colleagues
- Family and Friends

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- Other:

Best practice

*Were there any general elements (e.g. recordings) that you put in place to make it easier for your students to study online? ***

Only answer this question if the following conditions are met:

-------- Scenario 1 --------

Answer was 'Lecturer' at question '1 [GenInf1]' (Who are you?)

-------- or Scenario 2 --------

Answer was 'Applicable' at question '51 [AccCh4b]' (I wanted to, but it was not possible.)

-------- or Scenario 3 --------

Answer was 'Applicable' at question '50 [AccCh4a]' (Not at all. I did not have the necessary information.)

Choose one of the following answers

- No
- Yes

*Which general elements did you put in place? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '63 [BeP1a]' (Were there any general elements (e.g. recordings) that you put in place to make it easier for your students to study online?)

Check all that apply

- Access to the presentation files
- Additional information material (e.g. texts, link collections)
- Recording of the online session
- Polls during the online session
- Tableau blanc partagé/notes partagées pendant la session en ligne
- Checking the level of comprehension during the online session
- Other:

*Were there any general elements (e.g. recordings) that your lecturers put in place to make it easier for you to study online? ***

Only answer this question if the following conditions are met:

Answer was 'Student' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- Yes

*Which general elements did your lecturer put in place? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '65 [BeP1b]' (Were there any general elements (e.g. recordings) that your lecturers put in place to make it easier for you to study online?)

Check all that apply

- Access to the presentation files
- Additional information material (e.g. texts, link collections)
- Recording of the online session
- Polls during the online session
- Shared whiteboard/notes during the online session
- Checking the level of comprehension during the online session
- Other:

*Were there any general elements that you put in place to make it easier for your audience to follow online? ***

Only answer this question if the following conditions are met:

Answer was 'Higher Educational Professional' *or* 'Social Service Provider in the field of Education' *or* 'Policy Maker' *or* 'Other' at question '1 [GenInf1]' (Who are you?)

Choose one of the following answers

- No
- Yes

*Which general elements did you put in place? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '67 [BeP1c]' (Were there any general elements that you put in place to make it easier for your audience to follow online?)

Check all that apply

- Access to the presentation files

- Additional information material (e.g. texts, link collections)
- Recordings of the online session
- Polls during the online session
- Shared whiteboard/notes during the online session
- Other:

*Did you exchange best practice with others? ***

Choose one of the following answers

- No
- Yes

*With whom? ***

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '69 [BeP2]' (Did you exchange best practice with others?)

Check all that apply

- Experts
- Colleagues
- Family and Friends
- Other:

*Do you have any advice on best practice in connection with technical challenges? ***

Choose one of the following answers

- No
- Yes

We appreciate receiving details on the topics listed.

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '71 [BeP3]' (Do you have any advice on best practice in connection with technical challenges?)

*Do you have any advice on best practice in connection with technical accessibility challenges? ***

Choose one of the following answers

- No
- Yes

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We appreciate receiving details on the different kinds of accommodation listed below.

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '73 [BeP4]' (Do you have any advice on best practice in connection with technical accessibility challenges?)

*Are there any programs or apps you personally would like to recommend? ***

Choose one of the following answers

- No
- Yes, namely

*Are there any areas in online classes/presenting that you would like to know more about but found it difficult to get information? ***

Check all that apply

- Technical challenges
- Accessibility challenges
- Other:

*What kind of technical challenges would you like to know more about? ***

Only answer this question if the following conditions are met:

Answer was 'Technical challenges' at question '76 [BeP6]' (Are there any areas in online classes/presenting that you would like to know more about but found it difficult to get information?)

Check all that apply

- Problems with the internet connection (e.g. interruptions, lagging, "frozen" screens)
- Problems with video (e.g. bad quality, bad lighting)
- Problems with hardware connected to video (e.g. webcam, screen size)
- Problems with audio (e.g. strange voices, bad quality)
- Problems with hardware connected to audio (e.g. speakers, headset)
- Problems with conferencing software (e.g. Zoom, BigBlueButton, Teams)
- Technical problems linked to special accommodation (e.g. interpreters are not visible, closed captions are not displayed)
- Other:

Would you like to know more about accessibility challenges for blind/vision-impaired people?

Only answer this question if the following conditions are met:

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Answer was 'Accessibility challenges' at question '76 [BeP6]' (Are there any areas in online classes/presenting that you would like to know more about but found it difficult to get information?)

Choose one of the following answers

- No
- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '78 [BeP6b]' (Would you like to know more about accessibility challenges for blind/vision-impaired people?)

Check all that apply

- Screen reader
- Contrast checker
- Other:

Would you like to know more about accessibility challenges for deaf/hearing-impaired people?

Choose one of the following answers

- No
- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '80 [BeP6c]' (Would you like to know more about accessibility challenges for deaf/hearing-impaired people?)

Check all that apply

- Transcription tools
- Sign language videos
- Closed Captions
- Other:

Would you like to know more about accessibility challenges for dyslexic people?

Choose one of the following answers

- No

- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '82 [BeP6d]' (Would you like to know more about accessibility challenges for dyslexic people?)

Check all that apply

- Text checker (e.g. grammar, spelling)
- Text simplification
- Font adaption
- Other:

Would you like to know more about accessibility challenges for people with a lack of (fine) motor skills? *

Choose one of the following answers

- No
- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '84 [BeP6e]' (Would you like to know more about accessibility challenges for people with a lack of (fine) motor skills?)

Check all that apply

- Keyboard navigation
- Transcription tools
- Document level navigation tools (e.g. HeadingsMap)
- Other:

Would you like to know more about accessibility challenges for neurodivergent people (e.g. ADHS, autistic)?

Choose one of the following answers

- No
- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '86 [BeP6f]' (Would you like to know more about accessibility challenges for neurodivergent people (e.g. ADHS, autistic)?)

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Photosensitive Epilepsy Analysis Tools (e.g. PEAT)
- Other:

Would you like to know more about accessibility challenges for people with cognitive processing difficulties?

Choose one of the following answers

- No
- Yes

Only answer this question if the following conditions are met:

Answer was 'Yes' at question '88 [BeP6h]' (Would you like to know more about accessibility challenges for people with cognitive processing difficulties?)

Check all that apply

- Document level navigation tools (e.g. HeadingsMap)
- Text checker (e.g. grammar, spelling)
- Text simplification
- Other:

I would be interested in information about other challenges:

Please write your answer here:

Further information

Would you like to be updated on the progress of InclUDE? *

Choose one of the following answers

- No
- Yes - Please enter your e-mail address

Would you be interested in taking part in a focus group discussion about technical accessibility online (e.g. Zoom, BigBlueButton)? *

Choose one of the following answers

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- No
- Yes - Please enter your e-mail address

***Would you be interested in taking part in one-on-one interviews about technical accessibility online (e.g. Zoom, BigBlueButton)? ***

Choose one of the following answers

- No
- Yes - Please enter your e-mail address

Thank you for taking the time to fill in this survey!

If you have any questions concerning this survey or the InclUDE project in general, please send an e-mail to inclUDEProjectErasmus@gmail.com or visit the InclUDE project page https://easpd.eu/project-detail/inclusive-university-digital-education-include/.

Submit your survey.
Thank you for completing this survey.

Annex 3 – Guidelines for Focus group discussion and One-on-One Interviews

Choice of Interviewees

The aim is to have 5-10 interviewees for each country. Ideally, try to find at least one representative of each of our target groups: Students / Higher Education Professionals / Social Service Providers in the field of Education / Lecturers and Policy Makers.

Inviting the Interviewees

Invite the interviewees by e-mail. Ideally, they already know what we will be talking about when joining the interview/group discussion. To make sure, please give them a brief summary of the project, the link to the homepage as well as the questions from the guidelines. You can use the text and the advantages for the respective target groups from the information leaflet for this.

Choosing the Type of Interview

As COVID 19 restrictions still apply to many countries, it might be easier (and safer for all participants) to do the interviews in an online format. Also, the interviewees do not have to sacrifice so much of their time as there is no travel involved. Additionally, it might also facilitate the involvement of interviewees from locations farther away.

Both a focus group and one-on-one interviews have their advantages and disadvantages. In a larger discussion, points may be raised that would not have come up in a one-on-one interview. However, many people feel more comfortable in a situation where there are not so many other people present (also, online interviews may be easier with only two or three participants). Finding a date and time that suits all participants might also be a problem for group discussions. However, choose the format that you think will get you the best results.

Preparing an Online Interview: Choosing a Video Conference Program

If there are more participants involved, choose a video conference program that people (and you) are familiar with and/or that best suits your needs. For example, if you have Deaf interviewees who use sign language, they often prefer Zoom, as this program allows you to "pin" the sign language interpreter's video so that it remains visible all the time. Decide if you will be sharing your screen or using a PowerPoint presentation – this might influence your choice of conferencing tool.

This may sound trite – but test your equipment in combination with the conference tool chosen in advance, as technology tends to malfunction at the worst moment possible.

Conducting the Interview

If you want to record the interview (as might be advisable for further reference), ask the interviewee(s) for their consent. Make sure that you have some proof of that consent.

Ask the questions that you have prepared based on the responses to IO1 and these guidelines for focus group discussions/interviews about IO2, but let the interviewees talk freely as much as possible – interesting notions might come up.

Examples of questions for different target groups

Lecturers:

- Did you use online teaching before COVID-19 (Spring 2020)?
  - If so, did your online teaching change because of COVID-19?
  - If not, how did you deal with the challenge of switching to an online format?
- Did you need assistance with online teaching?
  - If so, where did you get the necessary information and/or whom did you turn to?
  - Did your HE institution provide any assistance?
    - If so, in which way?
- What kind of materials do you use during your online teaching?
- Which video conference program(s) do you use for online teaching?
  - If you use different ones, which one do you like best and why?
- Did you have any problems with technical equipment, hardware and/or software? Do you have any recommendations for others in connection with technical issues?
- Have you already catered to target groups mentioned in the survey? Do you have any recommendations for others in this connection?
- Do you need any accessibility accommodation yourself?
  - If so, what would you like other people to do so that you get the most out of online teaching?
- What helped you the most, when developing your online teaching?
- In your opinion, what are the advantages and disadvantages of online teaching?
- **In your opinion, is there anything that should absolutely be included in Guidelines for Technical Accessibility?**

Additional question:

- Do your students use a webcam and/or microphone?
  - Are there alternatives to using a webcam and/or a microphone for people who are unable to use them or do not like to use them for personal reasons?

Students:

- Did you have online classes before COVID-19 (Spring 2020)?
  - If so, did your online classes change because of COVID-19?
  - If not, did you have any problems with switching to online classes?
  - Did you have any problems with technical equipment, hardware and/or software?
  - Do you use a microphone and/or webcam?
- Did you need help with following online classes?
  - If so, where did you get the necessary information and/or whom did you turn to?
  - Did your institution provide any assistance?
    - If so, in which way?
- Which video conference program do you like best? Why?
- Are you aware of accessibility issues when you are preparing a presentation to be held online?
- Do you need any accessibility accommodation yourself?
  - If so, what would you like other people to do so that you get the most out of online classes?
- In your opinion, what are the advantages and disadvantages of online classes?
- **In your opinion, is there anything that should absolutely be included in the Guidelines for Technical Accessibility?**

All other target groups:

- In which way are you connected to online teaching/presentation?
- Did you have any experience with online teaching/presentation before COVID-19 (Spring 2020)?
  - Did you have any problems with technical equipment, hardware and/or software?
  - Do you use a microphone and/or webcam?
- Did you need assistance in connection with online teaching/presentation?
  - If so, where did you get the necessary information and/or whom did you turn to?
- Which video conference program do you like best? Why?
- Do you need any accessibility accommodation yourself?
  - If so, what would you like other people to do so that you get the most out of online teaching/presentation?
- In your opinion, what are the advantages and disadvantages of online teaching/presentation?
- **In your opinion, is there anything that should absolutely be included in the Guidelines for Technical Accessibility?**