

# How did Covid 19 Influence the use of Online Learning at Universities?

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*WISE Offshore project, January 2023*

From 2020 to 2022, universities and colleges around the world were temporarily shut down due to Covid 19.

This article takes a closer look at how the pandemic shutdowns have affected online education in Denmark, the Netherlands and Germany. Both when it comes to students' and teachers' attitudes toward digital learning and when it concerns their digital learning and teaching skills.

The paper is made under the Erasmus+ project WISE Offshore, which investigates the possibilities for digitalizing adult learning.

[Influence of Covid-19 on online teaching at universities and colleges in Denmark](#)

On the 12<sup>th</sup> of March 2020, Danish universities were shut down due to Covid 19. During the following months, many educational institutions were forced to rethink their way of teaching, and teaching sessions were moved to digital platforms.

The situation where instructional delivery is shifted to an alternate digital delivery mode due to crisis circumstances is denoted ERT, Emergency Remote Teaching, by Hodges et al. (2020). ERT is not planned and designed from the beginning to be online, but it involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or

as blended or hybrid courses and that will return to that format once the crisis or emergency has abated. (Hodges et al., 2020)

Although ERT is a temporary solution, this forced digitalization of teaching will give lecturers some experience in digital teaching that they can draw on later. It is likely that ERT will influence both lecturers' and students' perceptions of digital learning. Danish researchers, universities and public authorities have made reports on the use of digital teaching for the purpose of gathering experiences. Both to use them during the corona pandemic and to improve digital teaching in the long run (Georgsen 2021, Godsk, 2021, Hermansen 2021, Jensen et al. 2021, Lyngdorf et al. 2021, Rambøll 2020).

At Aalborg University many educators had no or limited experience in online teaching before the pandemic outbreak, but they were suddenly required to use digital learning technologies. After two months of distance learning, 800 lecturers from Aalborg University participated in a questionnaire survey that showed, that 12 percent of respondents indicated that they had a more negative attitude towards online teaching, while 55 percent generally were more positive than before the pandemic.

The lecturers found it relatively easy to conduct an online lecture, but it was difficult for them to help students working in groups. Many lecturers indicated that it had been very time-consuming to move to online teaching and that it was difficult to sense what the benefits of the teaching were for the students.

The study shows that the dynamics between the students and the teachers were affected as the teaching did not take place physically. The study also showed that the lecturers' attitudes towards online teaching were independent of how many years they had taught. Instead, it was characterized by whether they had difficulty using technological solutions. A number of respondents also stated that they saw great opportunities in using online teaching in the future e.g., in cases where you would otherwise have canceled the teaching due to, for example, a sick child. (Hermansen, 2021)

Lyngdorf et al. (2021) analyze the experience of ERT at Aalborg University. The study is based on qualitative data from 22 focus group interviews with teachers and students from faculties and departments across the university. The interviews were conducted from September to November 2020.

The analysis shows that there are large differences in the degree of digital competencies between the teachers, and therefore, digital learning activities have varied greatly in performance and degree of success. Regardless of the different approaches, the digital format made it challenging to do active learning. (Lyngdorf et al. 2021)

An analysis based on identical surveys pre and post the outbreak among 66 assistant professors and postdocs at Aarhus University, documents a statistically significant positive change in attitude towards technology one year before and one year after the pandemic outbreak.

Godsk (2021) states that there is no evidence to believe that the experience with ERT stigmatizes online teaching among the technical-science assistant professors and postdocs - rather the opposite (Godsk, 2021).

Based on a mixed methods design Rambøll (2020) studied the online teaching and exams at Aarhus University (AU) from May to October 2020. The survey showed that it was challenging for

educators to convert F2F teaching to online education at short notice. Almost half of the teachers did not feel equipped to conduct online teaching when the university was shut down and this challenged them in making good and successful online teaching. It was particularly challenging to reorganize group teaching, which involves a greater degree of interaction between teachers and students.

Interviews with lecturers and students also showed that there was a positive development in the quality of teaching, as both lecturers and students gained experience with online teaching. The teachers started to do synchronous online teaching with a higher degree of interaction between teachers and students, rather than just uploading PowerPoint presentations.

(Rambøll, 2020)

A consortium consisting of 10 higher education institutions has studied the use of online learning during the covid lockdown in spring 2020 (Georgsen and Qvortrup ed. 2021).

The study shows that the institutions involved were able to reorganize the organization very quickly and had the teaching carried out in alternative ways. The teaching activities that could be immediately transferred 1:1 generally worked well. For example, students solving assignments independently and lecturers giving presentations. Meanwhile, there was less joint discussion, fewer student presentations, less experimentation and less 1:1 dialogue between lecturers and students.

The students experienced a decrease in activity level and learning outcomes. 6 out of 10 students said that their professional development had been worse than usual

Also, teachers experienced a decreased quality in some teaching activities. Synchronous online teaching is a very different way of meeting the students than being together in a classroom and many lecturers were not used to "managing" or "controlling" the online room. (Georgsen and Qvortrup ed. 2021).

The Danish Evaluation Institute, EVA, sent out questionnaires to approximately 10.000 newly started students in 2017 and again in autumn 2020. A comparison of the results showed that a larger proportion of newly started students experience loneliness in 2020. The proportion of students who, to some extent, experience loneliness increased from a total of 56% in 2017 to a total of 63% in 2020. In 2017, 45% answered that they did not experience loneliness at all, while the figure in 2020 had fallen to 38% in 2020.

The overall motivation for students to study was largely the same among newly started students in 2020, as it was in 2017. (Danmarks Evalueringsinstitut, 2021)

The above-mentioned studies show that the university closure had negative consequences for both lecturers and students. It is repeated in the studies that it was challenging to carry out active teaching with a high degree of student interaction, dialogue, and experimentation. However, there are still many lecturers who have gained experience in online teaching and got a more positive attitude toward the use of digital learning technologies during the shutdown.

Universities are unlikely to return to what they did before the corona pandemic. Covid 19 has boosted the use of online learning technologies and caused permanent changes. (Christensen, 2021).

## Influence of Covid-19 on online teaching at universities and colleges in The Netherlands

### Timeline

The first Corona case in the Netherlands was reported on the 27<sup>th</sup> of February 2020. In the next weeks, the virus spread through the country. As in many countries, Dutch universities had to change their regular teaching activities. Before the first lockdown traveling to China, and later South Korea and Italy were banned. Universities focused on getting back their students and employees from those countries. On the 13<sup>th</sup> of March, the universities were closed. There was no physical education allowed and the universities had to switch to 'Emergency remote training'. In almost all the universities there was a basic infrastructure for online teaching. In the coming months, this infrastructure was expanded as fast as possible.

The development of the Corona pandemic in the Netherlands can be divided into 4 phases.

1. March until June 2020: A complete lockdown. The focus was on the continuity of education and the make the shift to online teaching.
2. From July until December 2020: There were limited options for physical education (first 20% and later 40% of the regular capacity). Most universities used a mix of physical and remote education.
3. December 2020 until April 2021: The second lockdown. Almost complete online education. With the exception of the examination, practical education and the coaching of vulnerable students.
4. December 2021 until January 2022: Third lockdown. Almost complete online education. With the exception of the examination, practical education and the coaching of vulnerable students.

Education was halted for longer periods during these lockdowns. Although education was continued online as much as possible, it was expected that students could suffer from study delays. That is why there were measures taken beforehand to minimize this delay. Universities were asked to renounce the so-called 'bindend studie advies' (BSA). This is the minimum amount of points a student should achieve to continue to the second year. In the end, the BSA was moved to the second year.

The coronavirus started to spread during the application and selection periods of the universities. These procedures were continued as much as possible. Prospective students were given more time to apply. The universities used this extra time to organize extra study choice activities.

Later it was decided to lower the admission criteria to start a master's degree.

- Bachelor students were allowed to join if they didn't get the chance to finish all their courses. For example practical or laboratory work.
- Universities were asked to allow bachelor students who had not finished all their points. To prevent delay. The so-called 'Harde knip' was abolished.

In the second and third lockdowns, the measures were different. The goal was to allow each student to come to the university once a week. There are self-tests available for students, but most of the education is still done online. After this period the universities were first opened with a maximum group size of 75 students. A few weeks later it was opened completely.

### Learning outcome

During the corona crisis, almost all the universities did not change their end qualifications. This means that the students need to know the same as before the corona crisis. Although there are

concerns that there is a decrease in the broader skillset that is taught at the university. Like social and personal growth and the development of soft skills like teamwork and discussing.

When asked the students themselves gave the education during the corona pandemic a 6-. They found that the quality of education decreased with respect to education before the corona pandemic. Only the ICT skills of the teachers did not change. The main points are the quality of interaction with teachers and fellow students. Other points are a lack of understanding of the teaching material, less interaction when the education is online, fewer possibilities of asking questions, less development in personal growth, and less depth in the teaching material, students say they have more problems concentrating and they are less motivated.

Of the students that had an internship planned during the corona crisis, 7.5% said they had to cancel it completely. From the internships that could continue, students found their internships less educational, less fitted and less intensive than before the corona crisis.

Students have indicated that their well-being could be improved by better guidance from the universities. They have a need for more physical encounters with fellow students and teachers, and more study and workplaces with the right facilities. To help students with their well-being, several measures were taken. But a lot of these measures were specific for students identified as vulnerable. Like international students, first-year students and students with a disability. For this group of students, there was extra coaching and they had priority in physical education.

For international students in the Netherlands, the corona crisis was even harder than for national students. They experienced more stress, loneliness and financial issues than national students. Still, the number of enrollments of international students is comparable with the years before the corona pandemic.

The one thing students were positive about is the input, creativity and flexibility of the teachers. Remote teaching required new technical and didactical knowledge and skills. Especially the older teachers did not always possess these skills. The online teaching environment posed problems regarding the group processes during an online meeting. Like the promotion of online interaction, the low attendance of first-year students, getting in contact with students and online working on an online group assignment. As the corona pandemic lasted, the digital skills of the teachers increased.

### *Curriculum*

During the corona pandemic, the existing curriculum was continued as much as possible. Where possible the teaching was done online, and the universities were flexible with the curriculum structure. Theory education and practical periods were moved. This fast shift was possible due to the flexibility of the universities and due to the already existing experience with online teaching. During the first period of the pandemic about  $\frac{3}{4}$  of all education continued. The parts that were canceled were the practical parts and the internships.

For the parts of the curriculum that were canceled, substitutions were found so that students would not delay their studies because of the pandemic. Alternatives for practical education and internships were found in take-home exercises and demonstrations. These alternatives are not comparable to the “normal” practical education and gave way less satisfaction. The universities have tried to make online internships available for students. When education was again possible in smaller groups, practical education was caught up as fast as possible. Though these alternatives

were available. This could not prevent that some internships had to be canceled and students suffered from a delay in their studies.

### Exams

- The universities found ways to still examine their students. For the exams could not continue in a physical form, the examination moments were moved to later in the year or there was a switch to a digital exam. These digital exams were kept equal to the original exam, but in some cases the criteria were changed.
- In approximately half of the universities, digital surveillance or proctoring was used. Proctoring is a tool that helps prevent fraud and makes it possible to have the “normal” exam at home. At most universities, proctoring was used because there was no other way. Universities saw proctoring as last resort because of the privacy aspects. Next to the privacy aspects, students had to manage to install the proctoring software. The use of proctoring software was experienced as unpleasant by almost 60% of the students. The students had to fulfill all kinds of rules within their own houses. Their desks had to be empty, no one could enter the room during the exam and a steady internet connection was required. The use of proctoring led to some discussions within the universities. Some universities explicitly choose not to use proctoring software.

### Influence of Covid-19 on online teaching at universities and colleges in Germany

The Corona virus reaches Germany for the first time on 27.01.2020. On 27.02.2020, a crisis team of the Federal Ministry of Health and the Federal Ministry of the Interior is set up to develop a pandemic plan (Bundesministerium für Gesundheit, 2022). Decisions on the health security of the population against a Corona infection are determined by the crisis team. In addition, the pandemic plan of the Robert Koch Institute, which is the central institution of the German federal government in the field of disease surveillance and prevention, is consulted.

The measures also refer to the university sector, which in Germany is the decentralized responsibility of the federal states. To counteract the spread of the new Corona virus pandemic, there will be a suspension of face-to-face teaching in the state of Bremen from 12.03.2020. From 23.03.2020, many universities will be sent into emergency operation (Lahmann., 2020). Only urgent areas of responsibility will be maintained on site. The buildings and premises are thus no longer accessible to the public. At Bremerhaven University of Applied Sciences, a need for presence must be requested from the rector. Digital formats and similar solutions are to be maintained. The university system is confronted with completely new requirements due to the outbreak of the Corona virus and the pandemic situation (Becker et.al., 2020). After a short period of time, attempts are being made to switch to online teaching. However, this often requires that the appropriate technical conditions are in place, that data protection regulations are adhered to and that the teachers have media technology and didactic skills. Until then, teachers have often taught exclusively in the presence of others and without any further technical support. At the same time, 49% of the teachers have been teaching digitally for the first time since 2020. (Deimann et al., 2020)

The technical infrastructure will be built and expanded in the coming semesters. The server performance often needs to be worked on so that it is also technically feasible to send so many students spread across many courses to meetings at the same time in a fully digital semester. It is decided individually by the respective states and individual institutions whether face-to-face teaching is suspended or postponed. Given these conditions, there have been good and worse implementations of the shift to online teaching. More digital elements and formats for teaching

are now being created due to the forced push by the pandemic circumstances. In 2019, 14% of universities in Germany have a digitization strategy. (Deimann et. al., 2020) "The use of technology now suddenly represented an indispensable element in the higher education didactic educational process, and existing face-to-face teaching concepts had to be digitized overnight." (Becker et.al., 2020). In the course of time, this has resulted in a desire on the part of students to permanently implement a mixture/combination of face-to-face and online teaching.

"Even in the second year of the Corona pandemic, students in Germany are satisfied with the crisis management of their university. This is shown by a CHE survey of around 6,000 master's students in the subjects of mathematics, computer science and physics. For the future, they hope for more digital elements and formats in teaching than before the pandemic. Four out of five students would like to see a blend of face-to-face and online on a permanent basis." (Horstmann, 2022). This could also be seen as an opportunity at some universities to offer an attractive teaching environment for students and thus attract new students. There are different types of offerings that can be carried out, but they depend on the competencies and equipment of the institution and the instructors. There is pure face-to-face teaching, hybrid teaching, blended learning concepts and pure online teaching. "Digitally supplemented [...] teaching is [however] not a foregone conclusion. In addition to a good concept and the appropriate media didactics, it also needs adequate framework conditions, from technical support to the facilities." (Becker, et.al., 2020). In the course of the Corona pandemic, the technical learning processes, the equipment of the university and the appropriate use of online tools have improved. Especially in the early days of Corona, didactic design of teaching was often not guaranteed and was left by the wayside. Since some lecturers only provide students with videos or streams (asynchronous teaching), there is no direct exchange and questions about the subject matter often remain unanswered. There is pure frontal teaching, which was no different in presence of many lecturers before the Corona situation, but no longer belongs to the current didactic approach of a lecture. However, these classic lectures could easily and quickly be converted into digital format. In addition, it depends on the motivation and availability of the teacher whether a justified contact takes place. Actually, the actual teaching-learning goals are to teach, activate, and engage students with the course content. (Wipper and Schulz, 2021). However, teaching itself is not subject to any directives, since the freedom of teaching at universities in Germany is even enshrined in the Constitution. (Article 5 of the Constitution for the Federal Republic of Germany: Freedom of science, research and teaching). Therefore, the teaching and exercise is independently determined and designed depending on the respective motivation.

Teaching at universities and colleges should always take place in dialog with students. In this way, the development of new perspectives and impulses can be ensured for both sides of teaching and a profit can be drawn. However, these teaching-learning goals were often no longer sufficiently taken into account in the extreme situation of the radical switch to online teaching. Students had to switch to completely independent learning from one month to the next without receiving important information or preparation. It depended on the extent to which the institution had or had not integrated digital media before the Corona situation. Mostly, it depended on the status of whether there was an extensive foundation of the basics of media education, media didactics, and informatics among the students. (Frey and Uemminghaus, 2021). Digital teaching is beneficial for students who have a largely self-directed learning style anyway. For students who are rather followers of the system and depend on information and hints from lecturers and fellow students, digital teaching is rather disadvantageous. Due to the fact that there were no motivational

impulses from the group dynamics, as many sat lonely in front of the screen and usually still turned off picture or even sound during the digital courses, so as not to overload the data connection. Thus, many students went through a major demotivating phase. In some cases, this has also caused students to drop out of their studies. However, it can be seen as an advantage that digital teaching has resulted in greater flexibility in terms of space and time. During the Corona Lockdowns, in which movement in public space was restricted, many individuals also experienced advantages. Even in the subsequent attendance periods, students now often preferred an online lecture, since in short learning units the time spent traveling is sometimes longer than the actual attendance time. This is eliminated in online conferences. Therefore, these are still preferred by students for certain events even after the lockdowns. One issue that occurred when the colleges reopened was the new course scheduling. Courses had been timed on a strict schedule even before the pandemic, with mostly short breaks. These were used in presence, for example, to change rooms. During the complete online lecture period, this scheduling was also possible to this extent, in order to take a short break between online classes and prepare for the next subject. Problems first developed after universities opened up, when face-to-face and online teaching now took place side by side at the same time. However, since universities do not provide their own workstations for students, it is not possible from an organizational point of view to hold one face-to-face course and then a subsequent course digitally shortly afterwards, as students would have to return to their homes to do this. Therefore, a need for coordination exists so that this constellation of successive face-to-face and digital formats can be managed. This results in a certain organizational incompatibility of digital and face-to-face formats and thus the need to adopt a standard approach at the respective institution.

The university also functions as a meeting place, and this has noticeably fallen away for everyone in the lockdowns due to Corona. There was much less constructive discussion about course content, but also less interpersonal conversation and interaction. In addition, the "spontaneity, the feeling for the right teaching speed and the uncomplicated demand in the seminar room [...] could not be completely digitized despite all the possibilities." (Becker et al., 2020). Normally, lecturers at universities and colleges have the task of providing students with opportunities to discover and develop their potential. (Frey, and Uemminghaus, 2021). Through positive attitude and motivation, starting from the lecturers, students can be carried along in the teaching material and also be enthusiastic about it. It is not to be ignored that also the lecturers act only humanely and were overtaxed by the extreme situation themselves. The stepwise information transfer of the countries did not simplify this for all involved ones. However, even after a certain period of adjustment, many have often lacked the necessary structuring of their teaching content in the digital format. In this context, structuring and motivation are two important factors for optimizing learning in the courses. Further problems lie in the courses that are supposed to give students practical experience in technical applications such as in laboratories, etc. These courses were initially held in the summer semester. For now, these could not take place in the summer semester of 2020 and were mostly postponed because there were no more precise regulations for feasibility in the given specified premises. Unfortunately, for such events it was necessary to wait and see how the Corona situation would develop, as it had to be ensured that participants could be hosted at laboratory events, for example. In most cases, such events could not be moved to the digital world, as work would have to be carried out on the specified equipment and machines in the (technical) laboratories. A major problem here was that in the digital space, the haptic component is usually completely absent, even for preparations for practical experience. Under strict conditions, selected



labs could be made up at the end of the summer semester of 2020. In the summer semester of 2021, the practical applications took place again to a large extent and since in the winter semester of 2021/2022, despite high Incidence numbers, the requirements were not taken up to a large extent, practical teaching and practice units could take place in subsequent semesters in Corona.

Another problem arises when it comes to exams for students. Exams, a classic form of examination, are difficult to map into digital forms. This usually results in significant restrictions. It is almost impossible to check that an exam was actually written by the person being examined and without any external aids under digital conditions. The camera that is switched on, which in some cases may not be used at universities for data protection reasons because it is an intrusiveness into private space, cannot replace this control because it is possible to look on the Internet on the same screen or with an additional tool next to it. However, there are technical solutions for checking tools that crash the system when other media are used. However, these are themselves very prone to crashing and external media (laptop, books, etc.) can still be used. In addition, for the digital exam concepts, the exam regulations have been adapted or changed to reflect this. The main opportunity is to design the digital exam formats in such a way that there is no purely classic knowledge testing. For example, researching solutions or getting help from third parties would simply be too time-consuming for the short time available in the exam. Case-specific reflections should take place, which are not evident from other sources, but only if the course content has been understood. However, this involves time-consuming work on the part of the lecturers during the performance assessment. Many lecturers who have previously used simple knowledge questions, which have hardly changed for years, as examinations are confronted with considerable new requirements. In some cases, the situation is difficult on both sides when it comes to examination formats that were simply designed for presence, such as presentations. These have been moved to digital conference media in the lockdowns even for final papers. The presenter usually speaks to the black screen and the audience cannot see accurate facial expressions and movements, as these are simply not sufficiently discernible through the formats. The personal presence gives an authenticity in examinations and presence formats such as presentations, which is missing through the digital formats. Due to these circumstances, especially at the smaller, mostly presence- and practice-oriented universities, there is a trend in the Corona period for many new students to enroll in large universities in major cities across the country. There was not such a sharp increase before, as the cost of living is high and housing is very expensive and limited, especially for students. However, since mainly online teaching takes place, which started rolling more quickly in the universities of large cities than in small universities, the online teaching time tended to these concepts and enrolled in large universities.

#### Assistance and guidance programs

Since many students depend on jobs to finance their studies, it hit them hard as such simple jobs were eliminated and cut during the Corona period, leaving many with a funding question as well. There was some support organized in the summer of 2020 to help students out. In addition, the guidelines for BAFöG guidelines were adjusted to still help students. In order to guarantee the operation for the winter semester 2021/2022, a vaccination campaign was started in the summer, so that at the beginning of the semester then many students and teachers are vaccinated and through vaccination an outbreak of the virus in the university can be reduced.

Aids have also been organized to ensure that all students have a level field for online teaching. However, due to the current housing conditions, not everyone has had the same conditions for the

availability and proper workability of videoconferencing. It is a concern that lack of technical equipment leads to inequality in access to and participation in higher education. In each case, about one-fifth of the students rated their living situation or Internet connection as unsuitable for digital teaching. (Deimann et. al., 2020). Attempts were made to provide students with financial assistance to achieve the basic technical requirements for teaching. Nevertheless, about 6% of students were unable to use many forms of digital teaching because of lack of equipment. (Deimann al., 2020). In addition, not every student has an undisturbed study room. There was often overloading of the local network, especially during lockdowns, so a faultless and smooth conference was not always a given. One of the biggest problems is that Germany is still lagging in terms of digitization, e.g., the expansion of the Internet.

## Conclusion

In March 2020, the universities and colleges in Denmark, Germany and the Netherlands shut down due to Covid 19. The three sections above show how this change in the learning environment had many similar consequences in the three counties:

The educational institutions were forced to rethink their way of teaching: First and foremost, teaching sessions were held online. This was a challenge in all three countries, as most lecturers had no online teaching experience, and the technical equipment and software were insufficient. These challenges affected the German institutions in particular, as they were less prepared for a digital transformation of teaching.

During the next months, the technical infrastructure was improved in all three countries, and the lecturers and students got more used to the digital format.

Student well-being was influenced negatively in all three countries, and the new teaching format resulted in a lower learning output for many students. Teaching practical skills and soft skills was particularly challenging, whereas the lecturers found it easier to translate traditional lectures into an online format. Online exams also posed a new challenge, as the universities and colleges had to develop ways to test the student's skills and at the same time balance the testing in relation to the risk of cheating and the student's right to privacy.

It is unlikely that universities and colleges in the three countries will return to the routines and teaching methods they used before the pandemic outbreak. The Emergency Remote Teaching not only brought problems but also showed the institutions new solutions that can be useful in an everyday life without corona. Online learning methods provide flexibility and enable new innovative forms of learning for both students and teachers.

The university and college lecturers have gained experience in digital teaching, the students have learned to learn through online lectures and the digital infrastructure has improved.

These experiences are also important within further education, as the improved digital infrastructure and the experiences with digital teaching also open new opportunities here as well.

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