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Self-discipline - The key

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Abstract

Die COVID19-Pandemie zeigt in allen Ebenen nur allzu deutlich die Stärken aber auch die jeweiligen Schwächen des Bildungssystems auf. Von geschlossenen Kindertageseinrichtungen, Grundschulen, weiterführenden Schulen, Fachhochschulen bis hin zur universitären Ausbildung sind die bildungstechnischen, persönlichen und sozialen Folgen des ausgesetzten Unterrichts bzw. der digitalen Varianten nicht absehbar. In allen Bildungsbereichen schien man nahezu unvorbereitet mit dem digitalen Zeitalter konfrontiert worden zu sein. Das Online-Format als solches schien bisher nicht in das (deutsche) Bildungssystem zu passen. Die Frage nach dem warum stellt sich hier nur allzu offensichtlich, da sowohl Schüler nahezu jeden Alters als auch Studierende täglich privat online sind. Das vorliegende Paper stellt kritische Fragen, wie online-Lehre sinnvoll für Lehrkräfte und Schüler/ Studierende umgesetzt werden kann, wo der Grundstock eines zielführenden online-Unterrichts gelegt werden muss und bei wem welche Zuständigkeiten für eine produktive Ausbildung liegen. Das umfangreiche Angebot an vertonten und visualisierten Kursen ist nur eine Seite der Medaille. Auf der anderen Seite stehen Themen wie Selbstdisziplin und -organisation. Sowohl die kindliche Ausbildung (Grundschule) als auch die Ausbildung an der Universität werden im Rahmen dieser Veröffentlichung aus Sicht der Autoren diskutiert und Kommentare sowie entsprechende Vorschläge zur Optimierung der Ausbildung auf Seiten der Lehrenden und Lernenden unterbreitet.

The COVID19 pandemic clearly showed the strengths and weaknesses of education systems at all levels. From closed kindergartens, gradeschools and highschools to universities, the educational, personal and social impacts of the suspended education system are inconceivable. In all areas of education, it was shown that the digital age was nearly fully unprepared to confront these challenges. To date the online format has proven not to fit to the (German) education system. The question that arises is why is this the case, since schoolchildren of almost every age are online privately every day. The following paper states critical questions such as how online education can be applied in a way that is reasonable for both students and teachers, where the foundation of a purposeful online lecture must be laid and by who do which portions of responsibility for a productive education lay? The extensive offer of recorded and visualized courses is only one side of the coin. On the other side lay topics such as self-discipline and organization. Both the gradeschool and university education are discussed by the authors in this publication, as are associated suggestions for optimization of the education from the sides of the teachers and students.

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1. Introduction

As part of the preparation for the Lessons Learned events in autumn 2020 and spring 2021, a variety of discussions took place between the authors of this publication as to why active participation in the teaching-learning process changes so abruptly when there is a shift from face-to-face to online teaching, whether there are similar phenomena in the educational systems of the USA and Germany, and what conclusions should be drawn for the future.

The primary questions are: How do we learn? How did learning and teaching take place in the past and today, and how should the learning process be accommodated in the future?

The private challenges associated with the COVID19 pandemic naturally play an immense role on the side of the teachers and lecturers, as well as on the side of the pupils and students, in the design of teaching and learning, as well as in scheduling. However, this area will not be dealt with in greater depth in the following work, as the picture is too diverse and thus does not necessarily lead to general statements for future teaching.

The purpose of this publication is to evaluate the possibilities offered by the digitisation of teaching, the tasks that result from it for the entire education system, being for both teachers and learners. Additionally, the problems we teachers have faced and still face and the approaches to solutions that have emerged will be evaluated. The focus of the observations should not be the detailed listing of and experiences with individual web meeting portals or the use of specific software and hardware. Rather, the authors wanted to take a step back and look at the entire education system.

When analysing the preparation, implementation and follow-up of their own courses, one central point crystallised among the authors: self-discipline. This may sound surprising at first, however the choice of this term was made because both the conversion of one's own teaching to digital formats and the associated effort in terms of time and costs on the part of the lecturer, as well as the constant *active* participation of the students on the other side of the screen, depend on one's own self-discipline.

The following article addresses the question of how self-discipline can be triggered in the context of education and how it must be taught or supported in the future.

2. How do we learn?

In order to pursue a complex question of "how do we learn?", the search for the training of self-discipline and self-organisation in our educational system is a central core issue.

During the years of school-based training, children were trained by a teacher in face-to-face lessons. For the children, direct contact, the opportunity to ask questions directly, learning non-verbal communication and also receiving comparison with their peers is possible here.

Fig. 1: Teacher-pupil communication in person [1]

This concept is based on the approach that as much external guidance as possible is needed at a young age to teach children "right" and "wrong". However, if one continues to follow the school education path, it quickly becomes clear that despite the increasing age, little changes in the leadership style of the education system. The focus is often on the content to be learned and tested (examinable) and less on the "how" and "why". In regular face-to-face teaching, there is compulsory attendance, which is not questioned in principle, as well as clearly defined tasks that have to be completed in class and as homework. Of course, the need for self-discipline increases with age. For example, students have to plan for themselves when they will start learning a poem or designing a poster. However, up to the final years, a

teacher or the parents are often there to remind the students of their tasks during the school year. In an emergency, there are still various possibilities to "iron out" the grade if something goes wrong.

In the context of the COVID9 pandemic, however, it has now become increasingly clear that this approach should be fundamentally reconsidered. Not only are the students and parents often overtaxed with education in the digital format, but a similar picture emerged among the students, especially in the first few months. The "hand holding" was missing. The day was long, the tasks *actually seemed* manageable on the page... so why start *now* and not a little later?

Our education system must therefore start to teach "learners" their own responsibility in a timely manner. The "why" and the "how" play an important role here in order to put the understanding, the necessity and the benefits of this turnaround into a concievable context for all concerned.

However, "guided learning" does not end at the school door. A similar trend can be seen in the university education system. Especially in STEM subjects, there fixed timetables for courses in Germany that students are encouraged to take and that are required to both pass the corresponding examination as well as to obtain the final degree. However, the term "compulsory" is apparently rather loosely translated and understood in some cases from the time of entering "adulthood". With end-of-semester exams in many cases accounting for nearly 100% of the final grade, one can well imagine that this examination strategy alone must lead to the development of self-discipline. The logical consequence should therefore be that students *continuously and actively* participate in the courses and - just like the lecturers - prepare and follow up on them. In reality, however, the procrastination path is often chosen. Terms such as "bulimic learning" make the rounds here, since during the semester active learning and self-study are in some cases nearly nonexistent, but shortly before the exam almost all stops are pulled out to compensate for the lack of expertise.

With that being said, an education system must include more than lectures and the transmission of technical knowledge. It is not only about how to find the correct solution, but which path one has been taken to find a solution and for what reason. Therefore, a deeper understanding of the cause of motivation is needed. The central approach must address how motivation can be developed and supported by our educational systems in order to find a strategy for teaching and learning, with special consideration of digital teaching during pandemic times.

Fig. 2: Lecturer-student communication in attendance [2]

After discussion of all the pros and cons and the approach of whether the problems of digital courses could stem from the fundamental educational policy approach of the authors' countries of origin, it became obvious that self-discipline or disciplinary measures seem to be a possible key to a "successful" course. This term does not refer to a particularly good average grade in the final examination, but to both the regular and interested participation by the trainees as well as internalisation of the subject matter and the *ability to apply* what has been learned. But it is not only on the side of the learners that the issue of self-discipline must be illuminated: a motivated lecturer with fresh ideas, a didactically valuable preparation of the teaching content as well as a fruitful interaction between the lecturer and the students are also necessary for a satisfactory outcome of the training. However, fulfilling the wishes and needs of the lecturer and the students are even more difficult to achieve in the context of a digital course than in face-to-face

teaching. Therefore, the focus in "early education" must be on self-initiated and active learning, and this must be supported by the "teaching staff". As this transition will be a long process, the need for self-discipline, self-study and questioning of facts and approaches must be taught, refreshed and supported at all levels of the education system.

3. Link between self-discipline and courses during the COVID19 pandemic.

If we now look at the above questions and theses from the point of view of the lecturers, the following picture emerges: The majority of lecturers who see teaching not only as a profession but as a vocation take advantage of available further training before and during pandemic times, and implement new tools, programmes, approaches, hardware and software. The COVID19 crisis thus represented a cause and opportunity - albeit a very hard and forced one - for the further development of teaching. Pragmatic solutions had to be found for the start of the 2020 summer semester. The first week of lectures was approaching and the country was in lockdown. Accordingly, the teachers and lecturers first used all the familiar tools and modified them - always with a view to the fact that this would hopefully be a short period in which distance teaching would have to take place. After a few days and weeks in this operation, however, it became foreseeable that the effort and quality of teaching in this approach would have serious consequences for education: In some cases, for example, slides were simply put online in pdf format. Other approaches such as "presentations set to music with PowerPoint" drove the teachers (including the authors) to the brink of madness, as the quality of the soundtrack was not satisfactory and if there was a small slip of the tongue or a short stumble, they preferred to record the slide again from the beginning. Now, even as an outsider, one can well imagine that the third, fourth or fifth attempt at a slide leads to a rapid decline in motivation. Self-discipline on the part of the teachers was also absolutely necessary here! The time investment for preparation increased rapidly and solutions had to be sought to improve the quality of teaching again and to reduce one's own weekly time commitment again, at least partially. This in turn meant: self-discipline, self-initiative and self-study on the part of the teachers: New tools, new didactic approaches, and new hardware were required! After more than a year of the pandemic, various tools are now known that are specifically suitable for digital teaching and some of which will most likely also be used in hybrid concepts or the face-to-face teaching that most lecturers long for in the future.

Many such ideas are being implemented worldwide and also at TU Dresden. The lessons learned events in autumn 2020 and spring 2021 showed the great commitment of the lecturers: The experiences with new programmes such as the lecture-specific Paella Player [3] were shared in this context. The aim of this tool is to improve the lecture experience for the lecturer as well as the students by simplifying navigation between the slides and the video, and to have simple ways to customise the screen. Other approaches such as the use of green screen technology [4] provided important insights into the advantages and disadvantages of the technology. With the help of this technology, the lecturer can integrate themselves into the lecture and thus interact better with his teaching content. Such ideas drove the further development of education despite difficult boundary conditions and are a model for the process of "invention through need".

Since the authors of this article only worked in the area of lectures in the previous "Corona semesters", their experiences are also limited to this. After a multitude of considerations, tested tools and new approaches, the authors decided to use the web meeting platform Zoom, among other things, because of the stability of the platform and the possibility of recording the course. This was a decisive advantage compared to BigBlueButton, for example, as it meant that students who were unable to attend a synchronous event due to lockdown, childcare, etc. also had access to the content. The integration of videos for a better explanation of the processes in the considered systems as well as the possibility of using survey tools such as Invote, Kahoot! etc. are additionally usable for the "synchronous" participants

and are both easier and more stable to integrate than with other platforms.

However, since lectures are only one part of the courses offered at the TU Dresden, new ideas for conducting practicals without presence were and are in demand, also. Laboratory practicals in physical chemistry, for example, were carried out using ideas such as Lab@Home [5], so that students could gain a deeper understanding of complex issues. The tasks previously carried out together in the PC pool have now been transferred to work at home (Lab@Home), with direct supervision from the department set up online. Another excellent example at the TU Dresden is a lab in the context of a physics practical course [6], where machines were displayed virtually and the students were able to view them independently on their home screens from different angles, which contributed to a better understanding of how they functioned. Of course, this procedure is not comparable to actually touching and trying out components and machines, but it represents a logical intermediate step between the desired haptic experience and an image as a pdf.

The examples given show only a fraction of the tools and approaches used at the TU Dresden. Basically, the following must be noted on the side of the lecturers:

The will is there, the possibilities are almost inexhaustible, but the time is quite limited.

After discussions with lecturers and practical instructors during the first two "Corona semesters", it became clear that, in most cases, the live audience had decreased rapidly. Compared to the participants registered in the OPAL education portal, some internally congratulated themselves on as little as 10% of this crowd attending the weekly events. With all the effort put into preparing for digital teaching, coupled with the fact that the cameras and microphones on the other side of the screens are mostly dark and silent during the lecture, the level of frustration is also progressive on the part of the teachers. Regarding the reduced participation in the synchronous event, one important point seems to be in the foreground: Is the live lecture made available digitally afterwards (including sound and images) or not?

The questions that arise for the authors are the following: Is it enough for students to listen to and watch lectures set to music? Do students actually like this offline teaching better than face-to-face teaching?

After consultation with individual students, the free allocation of time for "listening" to the teaching content emerged as the main reason. Is it therefore possible that only (or mainly) the lecturers would like to have teaching in the lecture hall back? Additionally: How can the active participation of students in online teaching be increased in order to evoke an *active* teaching experience among students and reduce "bulimic learning"?

Apparently, a variety of digital teaching methods are offered at the TU Dresden. However, these cannot replace the active and joint learning of the students and the support of the lecturer within the framework of the courses and beyond. Regular work on the part of the students must be strived for. Knowledge cannot be acquired in a meaningful and long-term way within a few days. This means that ways must be found to encourage and also challenge the process of learning throughout the semester.

If one now looks again at one's own educational path and school years, there were in principle two possibilities why a task was carried out: Either there was an awareness that it was necessary to understand and be able to apply one or the other teaching content, which implies that the causal connection up to one's own benefit of what has been learned is known, or there was a clear demand, including a directly related consequence/sanction, if the task was not fulfilled.

In the first, naturally intended case, it is the task of the teaching staff to explain why an assignment should be carried out and what the aim of the course and the final examination is. However, it must be emphasised here that the participants in a university course are young adults who have chosen their course themselves and should be anxious, or rather intrinsically motivated, not only to attend the events but to *actively* participate in them. Here, the causal connection between learning, one's own commitment of time and resources and one's own (professional) goal should be estab-

lished at a much earlier stage, preferably in childhood.

If this way is not successful, the second way is also a possibility: drawing consequences in the form of "intermediate examinations". These can be that participation in a course that is defined as compulsory and entails examinations. In this way, students who need more structure and guidance are offered appropriate assistance and all participants can regularly discuss the content of the courses. A further step towards regular learning is, following the school mode, homework or quizzes during the course, which form part of the module grade. These approaches are rarely practised in the university system in Germany. In other countries, for example in the home country of one of the authors of this article, the USA, these ideas are regularly implemented.

Of course, there are always advantages and disadvantages to the named approaches, which need to be considered carefully. However, a situation like we are facing during the COVID19 pandemic needs as many ideas, suggestions and alternative approaches as possible.

Especially with regard to the issue of self-discipline, the second approach mentioned in this section is, in the authors' view, the "wrong" one in the long run. It is true that this binds students to their own subject, but it must be made clear again in the education system that education is a privilege that is not made possible for everyone, and that one's own drive for further education and professional success is supported by the lecturers and that it is not a punishment to attend courses.

4. Suggestions and discussion: what is useful and meaningful?

In conversations with individual students as well as written feedback, it became clear that "*simple pdfs without comments are not very helpful*" and are considered by students to be "*unmotivated*" on the part of the teacher. Recorded versions or recorded lectures, on the other hand, are highly valued. The quality of the recording, the number of built-in gimmicks that we teachers are so proud of (due to the amount of time spent and the beautiful didactic approach), seems to be rather less important here. The main thing is that there is "*something there to explain*".

When asked why the cameras are turned off on the part of the students, a response came that was perplexing to the authors, but nevertheless quite logical. "After *all, we see you and have contact with you. We would not have thought that this would be funny for you*". Individual participants comply with the wish to switch on the cameras in order to interact better, but here, too, this has to be reminded again every lesson. The goal for digital teaching should, however, rather be the *joint* teaching event, in terms of content, both visually and acoustically (see Fig. 3).

Fig. 3: Participants in the International Refrigeration and Compressor Course, TU Dresden, 2020

In a self-test of how to "process" PowerPoint lectures set to music that are not attended live, the authors came to the conclusion that 90 minutes of concentrated listening is not possible - thoughts drift away if no questions are asked that require an answer and no urgently needed change of media takes place. This is because the medium - despite the lovingly prepared videos, animations, tablets used, etc. - is and remains the mp4/ppsx format. When asked by the students, it is mentioned that the courses are "*played back faster*" and that the speed is adjusted again for "*interesting things*". Comprehensible? Quite. Does it lead to a deeper understanding of the subject matter? Hardly.

An alternative to 90-minute block lectures are shorter recordings. On the one hand, 60-minute lectures with subsequent discussion and question opportunities were tried. The result

was that few to no questions were asked and the event ended a few minutes later. Teaching blocks of 15 minutes are quite possible in order to follow the events in a concentrated manner. However, there is the question of reducing the teaching content. Even with three 15-minute teaching blocks, 45 minutes of the previous teaching content remain. A simple option: self-study! This brings us back to the point of self-discipline. If "homework" is given during pandemic times, which we affectionately call "self-study" in adult education, how is it completed? Sobering results are probably pre-programmed in some cases. The question is, why was this possible in school but yet so difficult today? An unmolested semester and a final exam seem to be the problem here. Short tests, preferably unannounced, seem to offer a possible solution. The problem here seems to be the structure: one exam, no required active participation in the course, the end. The students are left alone with their (existing or non-existent) self-discipline. Is that helpful? For one side, both sides or in the end for none at all?

Perhaps approaches such as those listed in Fig. 4 are useful for a start to the lecture.

Fig. 4: Adaptation of meeting objectives for lectures [7].

Let's think of the multitude of online meetings that take place every day and how quickly one writes an email "on the side". Self-discipline needs to be brought to the fore again here. A new approach, which will be at the top of the "trial and error" list in the coming summer semester, is the suggestion to choose two goals to be fulfilled for the respective course, such as "camera on" and "at least one question asked in the chat". The objectives in Fig. 4 should of course be seen as illustrative and should be adapted accordingly.

For us, the aim of teaching has always been concomitant teaching and learning. Communication is nonexistent with black screens in a zoom course. Disciplinary measures, even if it's just a small quiz, are officially not possible (at least in the authors' modules), unless you go down the route of changing the examination regulations. The inclusion of small tricks, such as multiple choice questions in the lecture, is appreciated and completed by the participants (those who participate synchronously). However, relatively few then want to discuss the answers provided. Perhaps an improvement in digital teaching is possible with jointly set goals (camera on, question asked,...) and even greater openness on the part of the teacher towards the students with regard to the (non-content-related) course of the event. Practice shows, however, that the requests of some participants are fulfilled, but then the familiar image of "black screens" reappears over the semester.

In the internal discussions on teaching between the authors on the subject of self-discipline, the connection to one's own "time management" was always made. Each of us has our strengths and weaknesses here. We all have an internal laziness. The question is, how can we better teach students (and ourselves) to deal with it?

Fig. 5: Self-discipline [8].

The authors' proposal may be too strict for some here, but that is precisely why it should be put up for discussion:

A compulsory course on self-discipline, a "how-to" (online) collaboration and time management for all students at the beginning of their studies or next semester with subsequent testing on case studies. To go one step further: the integration of these "trainings" into the school routine, so that the causes and ways can be clarified at an early stage.

The added value of such an event is considered very high by the authors - not only for studies, but also for later professional and private life.

5. Summary

This article was written after a year of gaining knowledge regarding new software and hardware and the resulting experiences. New tricks, video editing programmes, tablets, online meeting tools, lighting, dubbing, advantageous video settings, and dos and don'ts were learned and tested - alongside everyday tasks. All this was only possible with a fair amount of enthusiasm and self-discipline, which a large number of lecturers and students also possess. Both "sides" need a push now and then for a good and satisfying course. From the authors' point of view, this is only possible if the lecturer does not speak into the great "darkness", but rather when the regular operation and *active participation is* made possible and transferred into the digital format.

We hope that the tone of this statement is not too negative. The difference between desire and reality had to be questioned several times last year. Not every tool that excites the lecturers evokes this enthusiasm in the students, and it is questionable whether the effort and the benefits become visible to the participants and achieve greater success. This article thus likely shares more the authors' own "lessons learned": from getting to know one's own frustration thresholds, unbelievable and not expected "aha" experiences, to using completely new approaches, to seeing the "light at the end of the tunnel".

As a final word and link to the thesis and the call for more self-discipline and self-organisation, all participants in a course - lecturer or student - should again be reminded of the meaning of the word "study". Both teachers and learners, from the authors' point of view, should always be considered as students (studens - Latin), because they should "strive" for knowledge and further education according to the definition of the word and "strive" for their own progress and that of others.

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