

**SHAPING THE FORCED CHANGE TO ONLINE TEACHING
TOWARDS A DIGITAL FUTURE: WHAT ARE THE
DISADVANTAGES IN FORESTRY HIGHER EDUCATION?**

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SHAPING THE FORCED CHANGE TO ONLINE TEACHING TOWARDS A DIGITAL FUTURE: WHAT ARE THE DISADVANTAGES IN FORESTRY HIGHER EDUCATION?

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Abstract

The leap in forced digitalization in higher education has led many to ponder the consequences over the long term. There is no fully going back to previous methods, because mindsets have changed. In this note we discuss the effects of the transition of forestry study programmes perceived by students to using more digital tools, and the pros and cons of some possible scenarios for the future. Experiences in two study programmes are analysed, one is the Bachelor programme Forestry and Environmental Technologies (TFA), the other the Master programme in Forestry and Environmental Sciences (SFA), taught at the University of Padua. Students were asked for their experiences and views regarding the novelty of didactic approaches and their opinion on the critical aspects and the future scenarios from the point of view of the learner. Results from the analysis of 248 answers show that technological solutions were on average considered well-performing, but that they were not enough to bridge the gap regarding social interaction and field visits. Various didactical approaches to online teaching are discussed critically.

Keywords: teaching remotely; online learning; digital lecturing.

Introduction

The COVID-19 pandemic impacted higher education, among other things. The first and foremost thought by teachers and learners was the following: “is it possible to lecture efficiently with online tools?” and “what are the main problems in this transition?”. Colleagues across the world started collaborating by sharing ideas and experiences from countries that were first to suffer from the pandemic and, hence, first testing solutions. One example that can be representative of the situation when teaching went completely online, were hard-skill courses teaching software-based topics. For example, geographic information systems courses for the Master programme of Forestry and Environmental Sciences (Science Forestali e Ambientali - SFA) at the University of Padova (UdP) had a smooth transition to online teaching for two trivial reasons: they are courses from a digital dominated discipline – thus already requiring students to use the computer – and University of Padova had invested in several tools for online interaction (i.e. Zoom©licence), which had already been tested, and the networking infrastructure had been improved to support the increase in internet network traffic. Topics requiring field visits and hands-on

experience in the forest were another story, as the physical presence of teachers and learners on the site is of utmost importance.

The jump of all courses to full online mode meant that the network traffic increased dramatically. Digitalization in this context refers to the use of digital interfaces, i.e. hardware and software, to extend or substitute experiences in the classroom or in the forest. Regarding online lectures during the pandemic students and lecturers had to learn to use several digital tools, i.e. online meeting software, portals for registering students' participation, video publishing and also editing in some cases. On top of software tools, also new devices had to be used, e.g. earphones, microphones and video cameras for lecturing. Also, the time spent in front of a computer screen increased significantly for both students and teachers. The former had to follow video-lectures, the latter had to prepare the video-lectures and both had to resort to remote teaching/learning. Devices are an important asset for students as learning tools. When some years ago notebooks were affordable by only a few, computer rooms gave all students the chance to use software. Now there is a shifting towards the "bring your own device" (BYOD) principle, with universities often financially supporting students needing to buy a notebook. The pandemic pushed further the necessity of students to have their own digital interface for learning. Recently UPd is testing the feasibility of giving each student access to a virtual machine profiled with software that is required for each course. This solution would allow students to access high-performing computers from low-cost devices, provided that they have a good internet connection.

Now that the pandemic seems to be over, some considerations can be made over the solutions used and which ones could have been improved. In this paper, we survey, report and discuss the students' perspective regarding technical solutions but also the impact of online teaching on learning to use different hard and soft-skills.

Materials and methods

Students from the forestry programmes were interviewed in a survey by phone after an invitation and their agreement via e-mail. This resulted in 248 survey participants. The questions were the following:

- What programme are you registered for?
 - What year did you begin?
 - Are you a working student?
 - What distance from the campus is your residence?
 - walking/bicycling distance;
 - same municipality;
 - same province;
 - same region;
 - >400 km distance.

- Hardware and software used for teaching: how was the experience with the sudden acceleration of their use? This question had the following sub-questions to which a score ranging between -2 to 2 could be chosen, with -2 = very bad, 0 = no insurmountable problem, 2 = very good, no problem found.
 - Was the internet connection from home was sufficient?
 - Online meeting software (ZOOM) - did you feel comfortable using it during the lessons?
 - Your device (PC, laptop, notebook, tablet, other) was sufficient or did you feel the need for a more performing device?
 - Has the portal for teaching (Moodle) been sufficient for the required activities?
- Do you think the practical exercises in the forest and the educational visits can be validly replaced with virtual exercises? For example with videos or movies?
 - -2 = absolutely not;
 - -1 = no, I don't think so;
 - 0 = neutral / indifferent / I don't know;
 - 1 = yes, enough;
 - 2 = absolutely yes.
- Which of the following elements do you think has undergone a change for the better or for the worse? This question had the following sub-questions to which a range between -2 to 2 could be chosen, with -2 = much worse; -1 = worsened slightly; 0 = remained the same; 1 = improved; 2 = much improved.
 - Interaction with teachers;
 - Exam procedures;
 - Field exercises / educational outings;
 - Relationship with other students;
 - Ease of following the lessons;
 - Administrative operations (e.g. enrolment in study programme, courses).
- How has distance learning influenced the effectiveness of learning in the various disciplinary fields according to your experience? If you did not follow the subject answer not applicable. This question had the following sub-questions to which a range between -2 to 2 could be chosen, with -2 = much worse; -1 = worsened slightly; 0 = remained the same; 1 = improved; 2 = much improved.
 - Forestry and silviculture;
 - Geomatics and/ GIS;
 - Economics and policy of forest resources;
 - Watershed management and hydrology;
 - Livestock chains and mountain agriculture.

- If recordings of the lessons are available online even after the lessons, how much can it lead the student not to participate in the original lesson on ZOOM? Scores from 1 to 10.
 - = no, I follow the lessons carefully;
 - 10 = yes, the availability of the video actually discouraged me from attending the lesson.
- How long do you think the recorded lessons should remain available to the student?
 - = 1 week;
 - = 2 weeks;
 - = 1 month;
 - = 3 months;
 - = 6 months;
 - = longer than 6 months.

Results

A total of 248 students answered the phone interviews. Of these, 116 were from the Master of forestry programme and 132 from the Bachelor of forestry programme providing quite a balanced set of data (see Figure 1). Eleven percent (11%) of these students are working students, which means that they register at the university with a special status allowing them to take less exams and still be in the course schedule, similar to part-time studying.

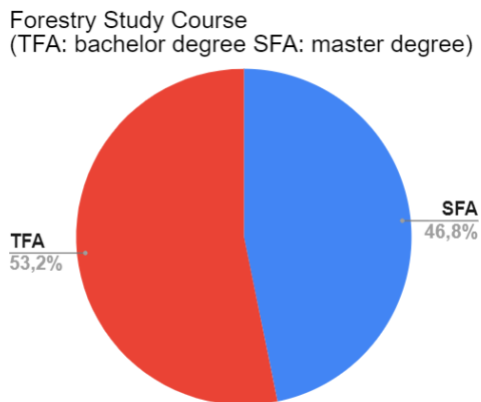


Figure 1: Students enrolled in the Bachelor programme (TFA) and the Master programme (SFA).

The Master programme is a two-years programme and the Bachelor programme is planned for three years. Table 1 shows the proportion of students who were interviewed according to study programmes and years. Also in this case the

participation percentage was balanced between the years. The term “FC” in the table and in the plot means that the student is “*fuori corso*” meaning that she/he is over-time with respect to the planned university career, and is thus delaying graduation till after the expected number of years that it should take (three years for Bachelor programme and two years for the Master programme).

The following sections show and discuss the results of the survey. The actual data has been plotted as box-plots for analysis. Three aspects of the perceived differences between the pre-pandemic situation and pandemic lock-downs will be presented. The first aspect is technical and relates the way in which hardware and software have been used during the sudden change to online teaching and learning. The second part is related to programme contents, the missed field visits and the relationship between students, lecturers and administrators during online-only interaction. The last part deals with methods and tools considered positive and to be kept, looking backwards at the moment that the pandemic situation is over; e.g. how much “online” should the future lectures be.

Hardware and software used for teaching: how was the reaction to the sudden acceleration of their use?

This first set of questions is related to the technical aspects of shifting completely to an online system in a short time. Table 1 below reports the scores grouped by degree and year.

Table 1: Average and standard deviation of answers from scores from -2 to 2 of the four questions regarding technical aspects. N=number of answers.

Study programme	Internet connection	Hardware/software	Devices	Web portal	N
SFA - FC	1.0(2.0)	1.0(2.0)	1.0(2.0)	1.0(2.0)	4
SFA - I°	0.7(1.2)	1.2(0.8)	0.9(1.1)	1.1(0.8)	39
SFA - II°	0.6(1.1)	1.2(0.8)	1.0(1.1)	1.0(1.0)	73
TFA – FC	-0.4(1.3)	1.1(0.7)	0.2(1.4)	0.7(0.8)	11
TFA - I°	0.8(1.1)	1.2(0.8)	1.2(1.3)	1.3(0.9)	40
TFA - II°	0.6(1.0)	0.9(0.9)	0.7(1.0)	0.7(1.1)	31
TFA - III°	0.5(1.1)	1.0(1.0)	0.9(1.2)	0.9(1.1)	50

The first question regarded an obviously limiting factor of online teaching: was the internet connection in students' homes good enough? Italy is not well known for its internet network as a ranking by the Worldwide Broadband Speed League in 2020 (IISole24Ore) showed that Italy is among the last European countries in terms of internet connection speed, with 23 Mb/s, where the average is 55 Mb/s. Nevertheless, the responses by students were overwhelmingly positive, with most answers (above 75%) being positive for all course degrees and years. A notable exception were the 11 students of the Bachelor programme that were outside the planned programme years (FC), which were well below the rest. This seems to indicate that students who have

difficulties with keeping pace with the course schedule in general also have difficulties following the lectures, being them online or in presence as before the pandemic.

The second question was more related in general to hardware and software, therefore to the programmes that were used for lectures, and the typical software used by students like spreadsheets, word processors, statistical software. In this case the answers were more positive than the previous ones, with all groups saying on average that no problems were encountered.

The third question was specific about the device used by the student, and how well it performed for lectures and homework. Devices can be home desktop PCs or laptops, or even tablets in some cases. Here the answers were similar to the ones related to the internet connection, with most of the groups responding positively except the FC of the Bachelor programme. Again this supports the hypothesis that these students have a general difficulty that has manifold aspects and should be addressed.

The fourth question, related to the online web portals of the university, had overall positive answers for all groups, without exceptions. To conclude, it seems that from a technical point of view the shift to online lecturing did not pose problems to the students except in specific cases that can be related to more personal difficulties of the students than a general one.

Impact of online lectures on practical work and social interactions

The second set of questions is related to the practical aspects inherent to forestry study programmes, e.g. field trips, visits to forests. This is, of course, a sensible factor as the hands-on learning in the field is a very important skill provided to future foresters. Table 2 below summarizes average and dispersion

Table 2: Average and standard deviation of answers from scores from -2 to 2 of the four questions regarding interaction and networking aspects.

Study programme - year	Interaction with lecturers	Exam procedures	Field work	Student networking	Lecture online attendance	Administrative tasks
SFA - FC	-0.8(1.0)	0.5(1.9)	-1.5(0.6)	-1.2(1.0)	0.5(1.9)	-0.7(1.2)
SFA - I°	-1.1(0.9)	-0.4(1.0)	-1.5(0.8)	-1.7(0.6)	0.7(1.3)	0.2(0.9)
SFA - II°	-0.8(1.0)	0.1(1.1)	-1.7(0.5)	-1.4(0.8)	0.7(1.4)	0.2(0.9)
TFA - FC	0.1(1.1)	0.1(1.4)	-1.5(0.7)	-1.6(0.7)	0.4(1.6)	0.0(0.8)
TFA - I°	-0.7(1.0)	0.1(1.0)	-1.1(1.0)	-1.0(1.0)	0.0(1.5)	0.2(1.1)
TFA - II°	-1.0(0.9)	-0.3(1.0)	-1.4(0.8)	-1.3(0.8)	0.2(1.5)	0.2(0.8)
TFA - III°	-0.9(0.9)	-0.3(1.1)	-1.7(0.7)	-1.4(0.8)	0.5(1.2)	0.0(0.9)

Students expressed their dissatisfaction with having virtual learning methods instead of field visits. This might depend on the technology used, which is not ready for a

fully virtual environment, but is also probably related to the students requiring to touch and feel what it is like to survey/visit a forest.

The interaction of students with the lecturers was seen as less than ideal, with students expressing a negative opinion on the change after the shift to online-only interaction. On the contrary, online examinations showed quite a neutral stand of students, with an overall median of zero (neutral) and a interquartile range between -1 and +1. Also averages for the different groups show results around this value. Slight variations probably depend on the specific topic and lecturers.

The other two questions regarded interaction with the teachers during field trips and interaction with fellow students. Field trips during the pandemic period had a very negative response as can be expected, as some teachers managed to record some video-lectures in the field, but it was far from the real experience. The interaction with fellow students was negatively affected. A different scenario was provided by the question related to how easy it was to follow the online lectures, which had overall positive results. This reflects the first part of the results, where hardware and software and internet connection were overall perceived by students as working well. Nevertheless, it must be noted that most, but not all students, gave positive feedback regarding the online lectures, with a large variability also towards the lower scores. Last but not least the interaction between students and administration was perceived as mostly neutral, without problems or improvements between the pre-pandemic and the pandemic periods. This seems reasonable as basically all results of tasks given had already to be presented online.

Lectures are aggregated in five categories. Students were asked if lecturing got worse or improved thanks to online lectures for respective category. The scores ranged from -2 to 2 with -2 = much worse; -1 = worsened slightly; 0 = remained the same; 1 = improved; 2 = much improved. The courses considered are listed in the methods section (question 8). Results show an overall average of -0.1 and a standard deviation of 1.1. The difference between the five groups was tested with a Wilcoxon non-parametric test for group differences, finding no significant differences except between geomatics and mountain agriculture, respectively the highest and lowest scores. This is likely due to the digital component of the geomatics course, where geographic information systems (GIS) courses not requiring field visits concern a large part of lectures and is thus not perceived as having lowered the quality with respect to more practical courses. Surprisingly though, no significant differences were found between other groups and overall the course quality was perceived as not having changed significantly (around zero score). Also the distribution around the mean is limited to basically a slight improvement or a slight decline of quality.

Online versus recorded lectures: what do students prefer?

The opinion on how helpful were the online lectures and the recordings of the lectures is of importance if students can access both and do it. There is a clear preference of recorded lectures, as can be seen in Table 3.

Both were considered extremely helpful by students, with a slight preference towards having the recorded lectures over having the online lecture. This can also be seen by the answer to the following question: “having to choose between having online lecturing only – but no recording of the video-lecture – and having a recorded lecture – but no possibility of online lecture – which do you prefer?” The students predominantly prefer the latter as can be seen in Figure 2.

Table 3: Question “how helpful were the recorded lectures” (columns) and “how helpful were the online lectures” (rows); values from 0 to 10 respectively 0=useless, 10=extremely helpful. Absolute numbers reported.

	0	1	2	3	4	5	6	7	8	9	10
0	1						1		1		1
1											1
2				1					1	1	1
3				1		1	1	2	1	3	5
4								1	2	2	2
5								1	6		7
6							2	2	9	3	6
7						1	2	5	4	2	10
8						1			5	6	28
9								1	2	6	10
10					1			2	1	2	93

It is interesting to note that not all students prefer recorded lectures over online lectures, when having only one choice. It can be interpreted as the need for interaction by students – even if somewhat virtual – with a lecturer, is considered an important asset by some. This does not mean that the other students don’t find that important, but not as important as accessing the recorded lecture independently. Further discussion on providing recorded lectures to students after the pandemic is debated

A=online lecture only B=only lecture recordings

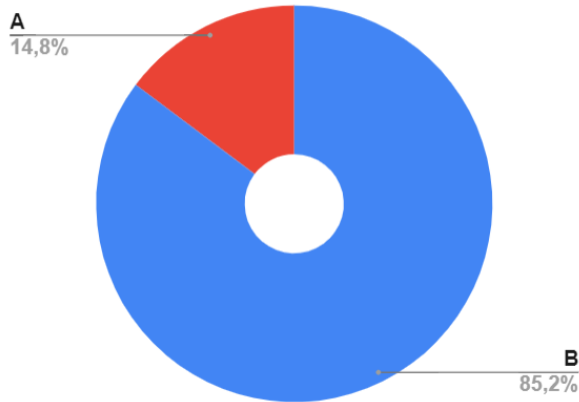


Figure 2: Students prefer online lectures only (A) or prefer recorded lectures (B). See text.

among students and lecturers. It is undoubtedly a factor that some students are less likely to go to lectures physically if a full lecture is video-recorded and available, due to easier access. Figure 3 also shows that the tendency of the student is to wish access to the recorded material without time limitation. If all courses allow this, the study programme risks to become fully virtual.

How long lecture recordings should be available to students

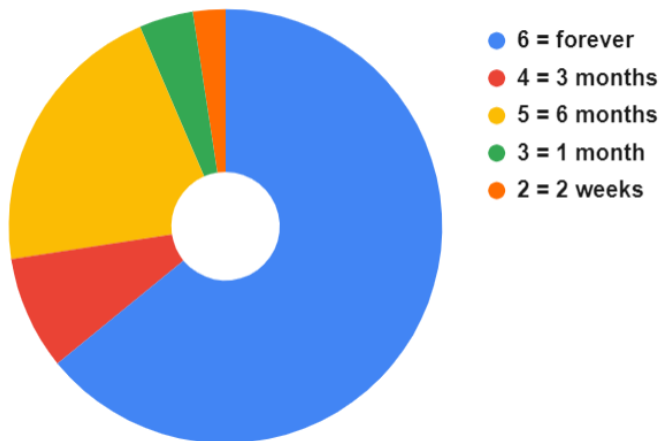


Figure 3: The amount of time that recorded lectures should be available to students, according to students. Forever?

Students will stay at home for many reasons. Distance from the campus implies commuting, which in turn means economic and personal effort. Some students also have a full-time or part-time occupation, and in this case self-pacing the lectures without a strict schedule due to the physical attendance is very important. On a personal level physical presence is a key factor to being with other students and

creating the necessary social networking making university life so important. This latter point is strongly highlighted by rectors of classical universities when asked about the increase of interest towards online virtual universities. Creating a network is one of the main objectives of a university, which strives to enhance personal growth of the students not only regarding knowledge, but also soft skills like communication and interaction with peers.

Conclusions

Recalling the title, the problems in online education are not easily detected. The students' opinions in the survey showed that from a technical point of view, the forestry study programmes have the ability to go "online" without students perceiving problems related to hardware, software and other tools such as communication programmes. When it comes to practical skills, particularly to be gained by field work and the relationship and networking with fellow students and lecturers, the online-only solution is decreasing the quality of the students' experience. It must be considered that university life is not only learning hard-skills, but also building competences in soft-skills, communication, networking and other things that are very different in the virtual world. Maybe, someday virtual reality will bridge the gap between field experience and real experience, but we are still quite far from that point. The results from the survey may suggest that the future might keep some of the online activities limited to some aspects such as hard-skills in using software, but that campus life is a holistic experience providing many aspects to be considered.

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