GOOD LACK – (Good) Lessons Learnt from Distance Learning During the COVID-19 Pandemic in Styrian Schools

Harald Burgsteiner[1]

Abstract

The COVID-19 pandemic caused turmoil in the entire social and economic life worldwide since 2020. As a result, the pandemic changed teaching as we knew it (at least temporarily). We tried to find out what teachers experienced during the distance learning in the past lockdowns. We therefore designed a mixed methods study in the form of an online survey in which 1,519 teachers from primary, middle, and high schools completed a questionnaire consisting of closed and open questions. We analysed the results using quantitative and qualitative methods. Based on this, the situation during the lockdown in Styrian schools is described, but also lessons learned for the future of teaching are presented. The most negative aspects mentioned included the lack of social contacts, an immense additional time needed for preparation, missing financial support, technical issues, and health related problems. Still, many positive conclusions were also drawn by the participants ranging from more intensive contact with students and their parents, increase collegial cooperation, many new inspirations for the personal future teaching coming from the digital media used during distance learning, to hopes, that not everything introduced during the lockdown like online meetings, online collaboration and partially distance learning should be forgotten after all restrictions seize. Finally, we can draw some didactic conclusions coming from the answers to the open questions that include a transformation of classic classroom methods to formats that include digital media like e. g., flipped classroom that gives more time for social exchange and discussion in future classes.

Keywords

COVID-19, distance learning, survey results, school, lessons learnt

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1 Introduction and Background

The COVID-19 pandemic caused changes in the entire social and economic life worldwide in 2020 and 2021. Nearly 1.6 billion learners (94% of the world's student population) were affected by the closure of educational institutions at the peak of the COVID-19 crisis (UNESCO, 2020). As of June 2020, this number still was at a high 1 billion. Due to the imposed lockdowns, schools and universities were forced to digitise conventional teaching in a very short time and to convert teaching and learning formats partially or completely to distance learning. In Austria, the first COVID-19 case was reported on February 25, 2020. As of March 16th, 2020, the first national lockdown lasting several weeks including all schools took place. In autumn 2020 the measures were tightened again and on November 17th, 2020, a second hard lockdown went into effect lasting until December 6th. Only about three weeks later, on December 26th, a third hard lockdown until January 24th, 2021, went into effect. Distance learning was ordered during all the lockdowns mentioned above. The duration varied for different types of school, e. g., primary school pupils were allowed to return earlier than those of the secondary school level 1. Today, although vaccination programs are in place in many countries, temporal or regional lockdowns still occasionally take place. For how much longer it will be, we currently do not know.

As a result, the pandemic definitely changed the teaching as we knew it (at least temporarily). Classroom teaching with blackboard, teaching with partner work and in large and small groups on site was no longer possible. Teachers, even those who had previously rejected digital media and especially categorically rejected distance learning, were forced to convert, and digitalise their own teaching. One could assume that such a transfer should be fairly easy, since for some years now, the teaching of digital skills of various kinds has been a part of the public educational mandate of schools in many countries, e.g., in Germany (KMK, 2016) or in Austria (BMBWF, 2018). Supporting this content in school education, consequently, further training courses for teachers exist, that are increasingly dealing with the topic of digitalisation. School textbooks from various publishers are also becoming increasingly digital, contain digital supplementary products or are offered purely digital.

Nevertheless, digitalisation in schools does not seem to keep pace with developments in society: before the pandemic the use of digital technologies in the classroom was often limited to maintaining traditional teaching methods, in which teachers, e. g., digitise or create individual presentation media instead of using an overhead projector, replace the classic blackboard with an interactive board like (Higgins et al., 2007) or gamifying education within the classroom (Wang et al., 2016). A change in teaching from purely analogue to purely digital or also hybrid teaching naturally requires a lot of work (if one wants to implement the teaching in a high-quality way): (Partially) new content must be created, new methods that are also suitable for distance learning must be planned and tried out, and new technologies, some of which have never been used before for teaching in schools,

must be examined and tested for their suitability for teaching. Although the equipment of schools and the hardware and software possibilities are becoming more powerful, there is a lack of concrete subject-didactically reflected possibilities for using digital media. In order to exploit the full potential of digitalisation and to successfully teach with digital tools, teachers must have the appropriate qualifications.

The changes in everyday teaching brought by distance learning were felt worldwide (Edirisingha, 2021). According to first studies, these changes were received very differently in many countries. Differences presumably arose, among other things, from the different preconditions with regard to the respective

- National social structure and existing educational inequality.
- (Previous) Training of teachers and university lecturers.
- Degree of digitalisation in the field of education.
- Speed, content and scope of the reactions of governments and competent authorities.
- Monitoring of the challenge by school and university administrations.

The current literature like e. g., Niemi and Kousa (2020), Basilaia and Kvavadze (2020), Joshi et al. (2021), Rasmitadila et al. (2020) or Carrillo and Flores (2020) just to name a few, report partially overlapping but also very different aspects of teaching during the COVID-19 pandemic. We also looked at publications that evaluated teaching and learning especially in several specific countries like in Bokayev et al. (2021), Shahin (2021), Semionova & Tokareva (2021) and Nilsson (2021). Many focus on regional specialities, evaluate different technologies being used for distance learning, investigate suitable pedagogical methods, general barriers of teachers and students under home environment settings, financial restrictions, lack of usable technological infrastructure at home or in school, commitment, and collaboration among students, or (additional) time invested in the preparation of lessons or time needed to solve homework. Others investigate the (negative) effects of prolonged school closures and home quarantine on children's physical and mental health that can be substantial and long-lasting (Brooks et al., 2020). Finally, the image of teachers in public might have changed due to the pandemic and the distance learning in different ways (Asbury & Kim, 2020).

Similar studies have been published in German speaking countries like Germany, Switzerland and Austria, too. Helm et al. (2021) in their analysis provide a systematic overview of the state of quantitative research on teaching and learning during school closures during the COVID-19. A first presentation about findings from a project is available by Schwab et al. (2020), where they investigate the experiences of students, teachers and also parents during the implementation of home schooling in Austrian schools. The Styrian directorate of education was especially interested whether any specific experiences were

made during the first lockdown and additionally investigated lessons learnt that can be transferred into future personal teaching. Hence, we wanted to investigate in how far these topics were an issue also in regional schools here in Austria, especially in Styria.

2 Methods

In order to wait for the first experiences of the teachers, we decided to conduct the study only after the end of the (first) lockdown. In addition, experience has shown that neither the summer holidays nor the month of the start of school are good times to hope for numerous cooperation from teachers. We also hoped that this would not unnecessarily increase the burden already placed on teachers and that a later start would increase the response rate. So, the planned start of the study was set for November 2020. Unfortunately, we were too optimistic about the end of the pandemic and so the survey fell exactly into the period of the second (partial) lockdown at Austrian schools.

2.1 Research Design

Hence, it quickly became clear that personal interviews would not be effective in times of contact avoidance and tight time budgets. The choice therefore fell on a principally anonymous survey with a mixed-methods approach (i. e., closed and open questions) by means of an online questionnaire, with the possibility to indicate a contact option for possible questions or inclusion in further studies with personal interviews.

The design of the questionnaire was partly based on the studies already mentioned above, in order to be able to draw possible comparisons with other international studies. Statements about "distance learning", "digital tools", "the role of teachers", "ways of working in distance learning", "technical and other problems" and the "state of students and teachers" etc. were extracted from these scientific articles and additionally from various newspaper and media reports and formulated as hypotheses, from which questions were then generated to test them. The instruments for this study were developed by the authors. Although some published international studies did not give details about the concrete questions they used, we used the results of them as a guidance to develop our questions.

The online questionnaire contained a total of 33 questions including questions about demographic data and the optional question about a contact option. We divided the main survey into a part with questions on more technical and didactic/methodological content and a second part with questions from the sociological and psychological area. Finally, general demographic data was collected in order to be able to assign the participants to certain groups of teachers. All closed questions had to be answered compulsorily. Without an answer, there was no possibility to get further in the questionnaire.

Some of our hypotheses were generated from the results of the literature reported above in order to test the reported results for "our" local teachers as well, others were constructed from personal experiences and observations in media and helpdesk requests. They are just implicitly given in this paper to avoid repetitions: for all questions (except for statistical ones) the hypothesis can be read in the question text, e. g., the item "Distance learning has led to an increased exchange with my colleagues about didactic methods" results from the underlying hypothesis that teachers might have asked their colleagues more than before how to didactically deal with certain contents or technologies.

As one can see from the overview of questions in Table 1, the planned topics from the hypotheses to be tested resulted in a very extensive questionnaire, which was additionally evaluated by a small test group beforehand. Based on their feedback, some final changes were made, and the order of the questions was adjusted accordingly. The feedback from the test group suggested that the questionnaire takes about 25 minutes to complete. Participants also later reported that it took them about 25 minutes to completely fill out the questionnaire, although some also reported that it took them 1 hour, presumably due to very detailed information entered in the optional open free-text questions.

The final questions from the survey can be found in Table 1. A PDF version of the complete (German) questionnaire can be obtained from the author of the article upon request.

Table 1: Overview of all questions from the questionnaire used including the corresponding question type or answer possibilities

Question number and question text	Question type / Answers
A1 What experience can you draw on that you already had before the COVID-19 regulation?	4 areas with a 4-point Likert scale each
B1 Which of the following digital formats did you already use in your teaching **before** the COVID-19 regulation?	Multiple selection of 22 tools including 'none' and 'others'
C1 Which of the following digital formats did you use in your teaching **during** the COVID-19 regulation?	Multiple selection of 22 tools including 'none' and 'others'
D1 From where do you mainly know the digital tools you use?	7 options including 'others'
E1 Which of the following digital formats would you like to **continue using** in your teaching in the future, regardless of any COVID-19 regulations?	Multiple selection of 22 tools including 'none' and 'others'
F1 Which tools do you use for synchronous, virtual teaching („live teaching"‘)?	Multiple selection from 10 options including 'others'
G1 Which learning platforms do you use for asynchronous, virtual teaching („offline teaching"‘)?	Multiple selection from 6 options including 'others'
H1 What strengths and weaknesses do you see in the use of digital technologies for the following areas of application?	4 areas with a 4-point Likert scale each

I1 How much do you agree with the following statements?	19 statements from the technical and methodological areas with a 6-point Likert scale each (+ 'I don't know')
I2 You have stated that you would like to see further training in the area of distance learning. What topics should these trainings mainly cover?	Open question
J1 How did you find the changeover to virtual teaching („distance learning") last semester?	Single choice from 3 options
K1 How much time do you estimate you personally spent per week during the COVID-19 regulations last semester?	Single choice from 7 options
K2 What caused the change in the time commitment?	Open question
L1 After the experiences of the last semester: if you were to regularly use digital elements in your teaching from now on, how do you estimate your time commitment would change (compared to the classic „purely analogue" teaching)?	5 options with a 3-point Likert scale
M1 How do you assess the impact of virtual teaching on the following aspects for the majority of students?	10 competencies of students with a 4-point Likert scale
M2 Have you noticed any effects of virtual teaching on other aspects for your students?	Open question
N1 For what percentage of your students do you see the following obstacles to the use of virtual learning environments?	11 possible technical or organisational difficulties rated from 0% to 100% in 10% increments
N2 Are there any other obstacles to the use of virtual learning environments on the part of your students?	Open questions
O1 What obstacles do you see yourself in the use of virtual learning environments in your own teaching?	Multiple selection from 17 options including 'none' and 'others'
P1 What do you think about the impact of using virtual learning environments in relation to the following criteria?	7 areas with a 3-point Likert scale
P2 Are there any other effects and changes you have observed through the use of virtual learning environments?	Open question
Q1 For approximately what percentage of your students are each of the following statements true?	9 statements of social and psychological concern rated from 0% to 100% in 10% increments
R1 How much do you agree with each of the following statements?	14 statements from the social and psychological area with a 6-point Likert scale each (+ 'I don't know')
S1 What support do you personally still need for smooth online teaching?	Open question
S2 What support do you need to better support students in online teaching?	Open question

S3 Looking back at the time of lockdown and distance learning, what positives or negatives can you take away?	Open question
T1 Your gender?	3 options
T2 How much teaching experience do you have?	Single choice from 4 options
T3 What age groups do you teach?	Multiple choice from 4 options including 'others'
T4 What type of school do you teach at?	Multiple choice from 5 options including 'others'
T5 What subject areas do you teach?	Multiple choice from 12 options including 'others'
T6 How many people live in the municipality where your school is located?	Single choice from 5 options
U1 Optional possibility to leave your eMail address.	Open question

Note: The Likert Scale for question H1 consisted of the options "clear strengths", "strengths", "weaknesses" and "clear weaknesses", question M1 had the options "very negative", "negative", "positive" and "very positive", I1 had "strong approval", "approval", "rather agree", "rather disagree", "rejection", "strong rejection" and "don't know", L1 had "will increase", "remains constant" and "will decrease", M1 comprises "very negative", "negative", "positive" and "very positive", P1 consisted of "increase/improvement", "no change" and "decrease/worsening", R1 had the same answering options like question I1, T1 included the possible choices "male", "female", "diverse" and finally the municipality sizes could be chosen from "< 1,000", "1,001 – 5,000", "5,001 – 10,000", "10,001 – 50,000" and "> 50,000".

2.2 Implementation

We used the software packages LimeSurvey[2] hosted on our own server at the university to ensure data protection for all participants. We used the eMail addresses of all teachers who enlisted themselves for further training in the last years. This way we were able to send out an anonymised invitation link to a total of 11.365 regional teachers, including primary, secondary and vocational education. Participation was not obligatory to any of the selected teachers. The first invitation was sent out on November 5th 2020 and a friendly reminder was sent out additionally on November 20th 2020. The online survey was finally closed on November 30th 2020. The answers of some participants had to be removed due to obvious false answers (e. g., selection of extreme values like 0% or 100% for all answers).

The IBM SPSS Statistics software package (version 26) was used for statistical analysis of the closed questions and any possible correlations. Some figures were additionally generated with MS Excel. The data analysis of the open questions was carried out using the qualitative content analysis according to Mayring (2015) using the MAXQDA 2020 software

2 The software can be found on its homepage located at https://community.limesurvey.org/

tool. Therefore, a coding scheme was developed and applied in the qualitative analysis of all question with an open question format. This procedure enables a reduction of a big number of verbal data coming from open questions in a questionnaire to a comprehensible amount and to obtain concise statements and contents from the source material (Mayring, 2015). Inter-coder agreements or inter-rater reliability measures cannot be reported in our context, since the coding of the qualitative answers had either been done by a single person or (in most cases) by two persons working together and instantly discussing possible interpretations of the answers given.

For reliability analysis, Cronbach's alpha for standardised items was calculated to assess the internal consistency of the constructed items. The internal consistency of the questions with Likert-scales (58 items) is satisfying, with Cronbach's alpha of 0.866. When considering all items with Likert-scales and additionally those with a percentage scale (e. g., see questions N1 and Q1 in Table 1) the Cronbach Alpha for standardised items yielded a satisfying value of 0.812 for the 83 items. Some individual Cronbach Alpha values are reported with the corresponding Figures 4, 5 and 6.

3 Results

After closing the survey, the numbers showed an impressive response rate which can be found in Table 2. Also, the rate of participants who entered text in optional open questions was relatively high with 55%. This gave us a first hint that the topic and problems dealt with in our survey were of very high concern to the participating teachers, which was also proved later during the analysis of the data collected. Due to space limitations, it is unfortunately not possible to go into the answers to all questions. However, we will report about the results for what we consider to be the most important or interesting questions of the survey. All data with missing values have been excluded from the sample before analysis. The data used consisted solely of the 1,519 fully completed questionnaires.

Table 2: Absolute and relative numbers of participation and completely filled out questionnaires for our online survey after sending out an invitation, a friendly reminder after closing the survey

	Absolute numbers	**Relative numbers**
Invitation received	11,365	100%
Total participants	2,530	22.26%
Completely filled out questionnaires	1,519	13.37%

3.1 Evaluation of the demographic data

Table 3 shows that the participants were spread quite evenly among the different types of schools, which results in a valid picture for statements about teaching during distance learning phases. For the analysis of the data, we split the answers according to the type of school for some questions, which will be indicated later on in this section for specific questions.

Table 3: Relative share of participants among the different school types

Type of school	Primary	Middle (Secondary I)	High (Secondary II)	Vocational	Others
Relative share	26.9%	26.3%	22.9%	21.7%	7.5%

This is also true for the distribution of participants among rural and urban areas, which can be seen in Table 4. We observed no concentration of participants on e. g., larger towns. Hence, we see results that include statements and opinions for students coming from the countryside, where e. g., access to the internet might not be as good as in urban areas, as well as from teachers with classrooms in towns with a much more diverse composition of students and more potential social problems among their families.

Table 4: Relative share of the participants among the population size of the district of their corresponding school

Population	< 1,000	1,001 - 5,000	5,001 – 10,000	10,001-50,000	> 50,001
Relative share	2.07%	28.60%	22.97%	16.62%	29.74%

Figure 1 indicates that the participants also teach very different subject areas resulting in very diverse shared insights. There is no obvious concentration of subject areas that can be seen in some studies that investigate the use of technologies in teaching in schools or universities, where e. g., digital media is primarily used in topics like natural sciences.

Finally, two thirds of our participants stated that they had more than 10 years of teaching experience. Another quarter had 4–9 years of experience and the rest had up to 3 years of teaching experience. Nearly 80% of the participants were female.

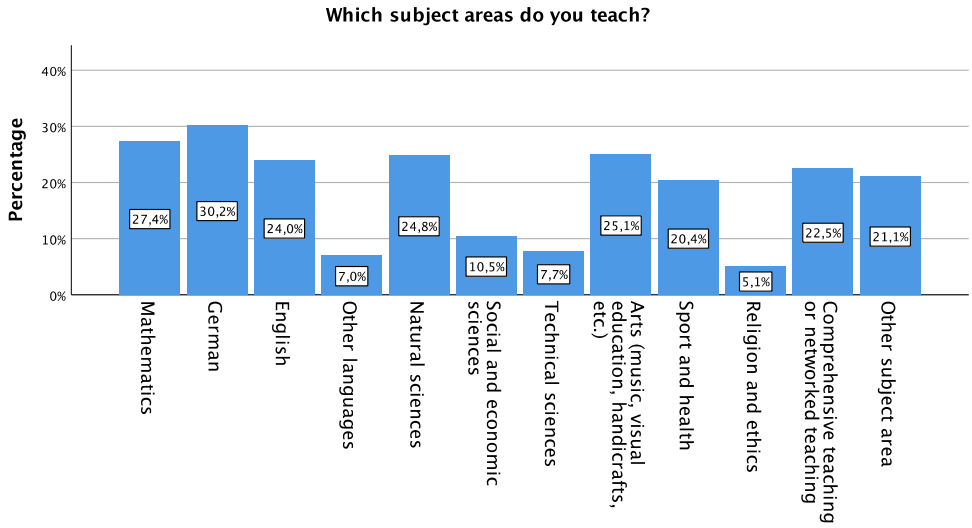

Figure 1: Relative share of the participants among the subjects they are teaching

3.2 *Interpretation of the technological/methodological answers*

Regarding the first question about whether or not participants have experiences with digital technologies in teaching, about ¾ of all participating teachers answered that they do have previous experiences with digital teaching materials (selected "applicable" or "rather applicable"), while the rest checked the answers "rather not applicable" or "not applicable". The same tendency can be seen in the question about experiences with the successful use of digital tools in the classroom and experiences with digital communication with students. In both questions, values of about ⅔ were on the affirmative side. Only when it came to the use of digital collaborative methods in the classroom, only 50% stated that they had already used them.

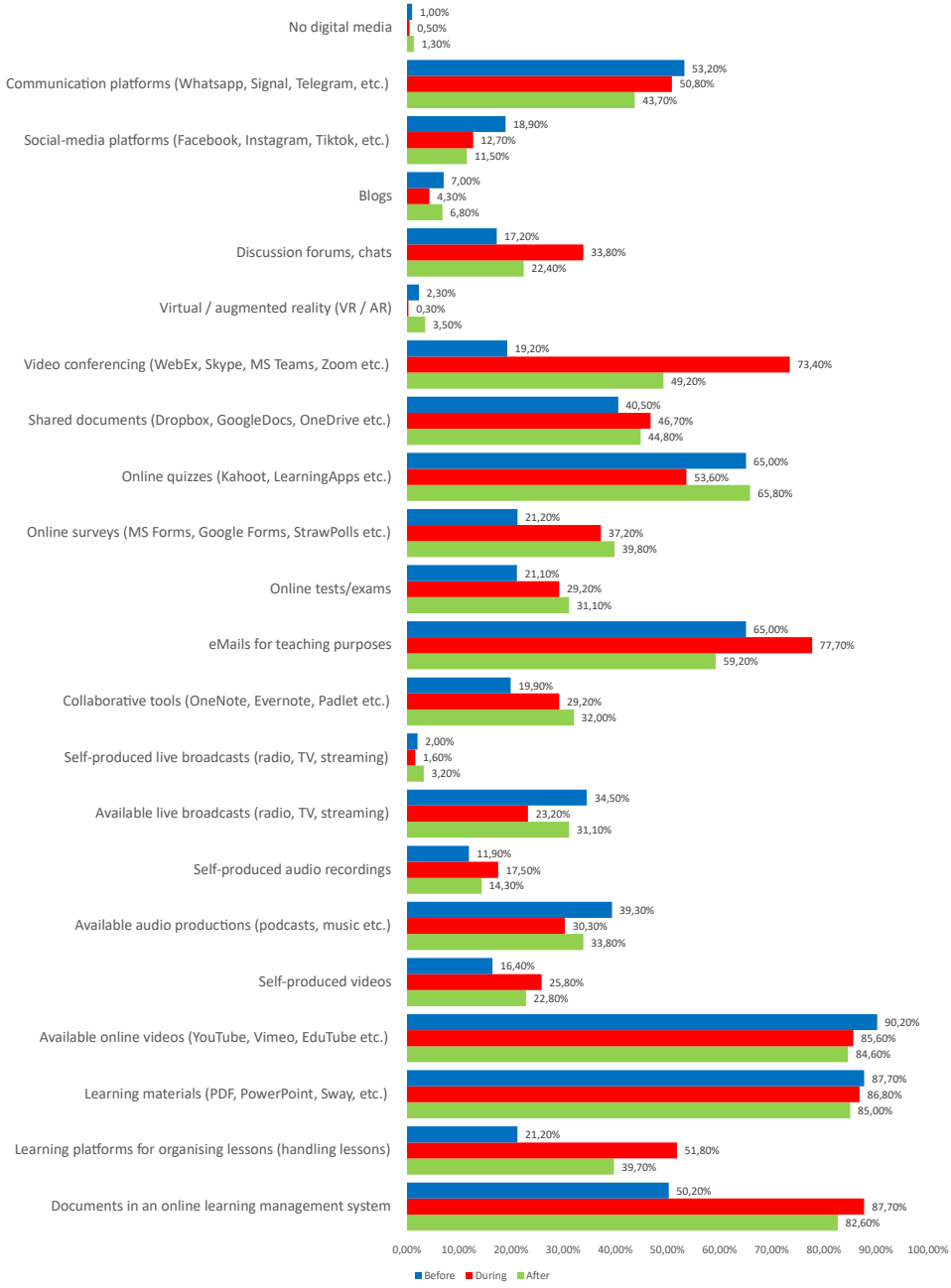

Figure 2: Usage of different kind of tools in teaching before (blue) and during (red) the COVID-regulations, compared to which tools will be used after (green) all restrictions are lifted again. Data shown without primary schools.

Figure 2 gives an overview about which tools and forms of teaching with digital material can be expected in schools. We asked in three consecutive questions about certain tools and methods of teaching about whether or not a specific form of a digital tool has been used in the past already, was being used during lockdowns and which ones the participants will be using even after all regulations and restrictions will be lifted again. While some digital media show very high usage before and after COVID-restrictions (like e. g., shared documents, online quizzes, available online videos, digital learning material and communication platforms), the most interesting changes are those forms of digital media for which teachers say they will continue to be used, because they seem to somehow add value in comparison to the previous teaching methods. These digital media include video conferencing, online surveys, collaborative tools and handling courses and learning materials in learning management systems. Note, that the data shown is not including participants from primary schools to get a clearer picture about the other school types, because our data showed that primary school teachers tended to use digital material far less, even during the COVID-19 lockdowns.

Unsurprisingly, MS Teams together with MS Office 365 was the most used (about 60%) toolset for synchronous and asynchronous virtual lessons, because both were suggested to teachers and offered for free by the Austrian ministry for education. A little less than 10% used Zoom or Cisco Webex for their synchronous teaching. Moodle was used by about 15% of the teachers for asynchronous teaching activities.

When asked about strengths and weaknesses of digital technologies in several application areas, the participants saw "clear strengths" and "strengths" in the areas of distribution of teaching materials (about 90%) and organisation and coordination of spreading out and handing in homework etc. (70%). No clear advantages or labour saving could be seen for communication (~50%) or cooperation among students (~45%).

In the next question we asked the participants with a 6-point Likert scale ("strong approval", "approval", "rather agree", "rather disagree", "rejection", "strong rejection") about several statements. More than 70% at least agreed to the following statements (in descending order upon agreement):

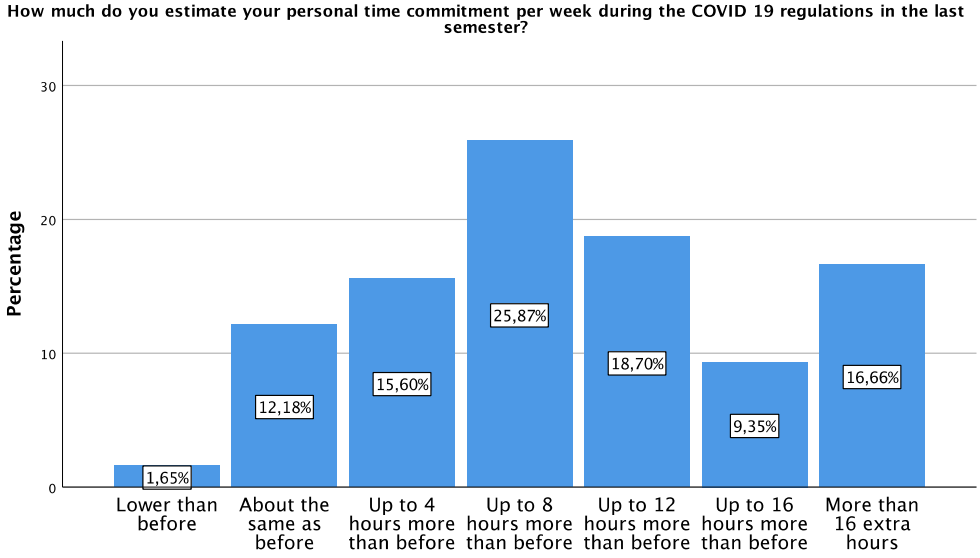

Figure 3: Estimation of the additional personal time commitment per week during the COVID-19 regulations in the last semester

- I give appropriate breaks during the online sessions so that students have time to reflect on the topic and formulate their questions (~93%)
- In distance learning there is a lack of direct contact with the students (~92%)
- Distance learning can only be effective if all students use a microphone (~89%)
- The online environment simply takes more time than face-to-face teaching to work effectively (~88%)
- I have sufficient computer, media and IT skills to carry out my distance learning (~87%)
- It is better to keep distance learning short or as a series of short sessions (~86%)
- It is more difficult online to get immediate feedback on what has been taught (~85%)
- The times for distance learning were very flexible in the last semester (~78%)
- Distance learning can only be effective if all students use a video camera (~77%)
- Online tools are easy to use when delivering lessons (~74%)
- I would like to have further training in the implementation of distance learning (~72%)

The three statements the participants agreed least upon were:

- I would like to have central guidelines for the preparation of online materials (~43%)
- Distance learning and the tools used allow for better differentiation of learning scenarios for students (~42%)
- Distance learning is more effective than traditional classroom teaching (~7%)

Even though many teachers said to like to have a further training in distance learning and digital media, the answers show a positive picture about the actual implementation of distance learning, agreeing that the time schedule they had was very flexible, allowing students breaks and time to reflect on the topics and offering adapted lesson structures with rather short sessions in comparison to conventional classroom teaching. Among the topics that teachers said to like to have a further education, the top ranked were: IT foundations (hardware and software troubleshooting, computer networks, software installation and configuration), working with learning management systems and online teaching, methodology and didactics with electronic media, online collaboration and media production (podcasts, videos, YouTube channel).

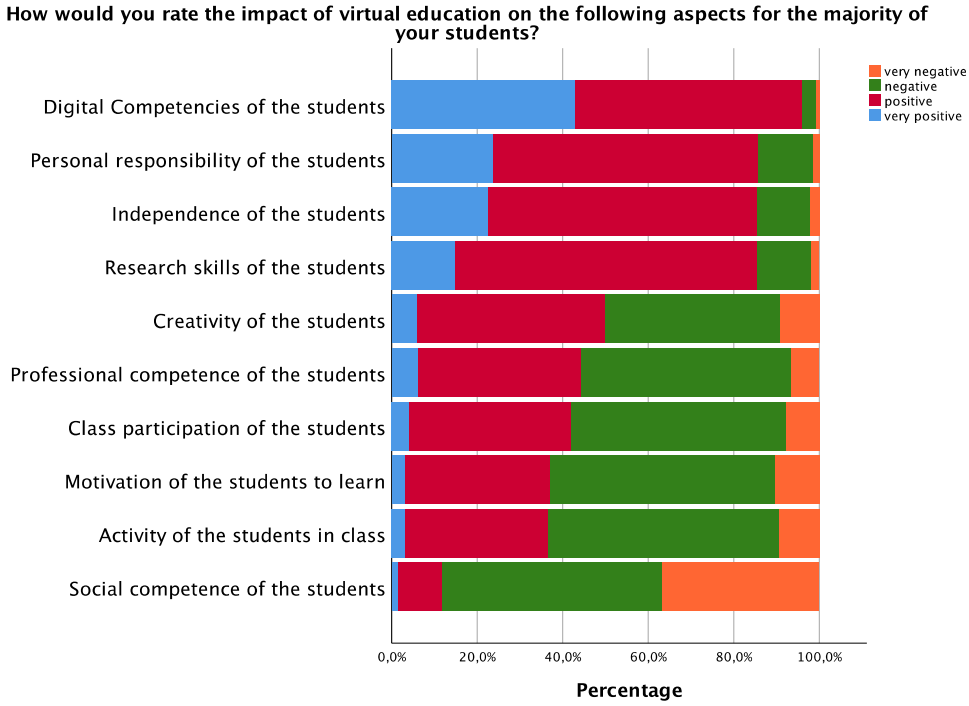

Figure 4: Development of the students' competencies during the COVID-19 distance learning (Cronbach Alpha 0.854).

The price invested in the reconfiguration of the previous teaching methods was very high. According to Figure 3, the typical workload of most of the teachers increased dramatically. More than 70% of the participants said to have worked up to 8 hours more per week than before and 16% needed more than 16 hours of additional work to cope with the increased workload during the COVID-19 regulations. This shows us that teachers also count to those groups of workers (like e. g., nurses, doctors etc.) whose workload increased more than those of others due to the pandemic. While for many others "only" the way of working or the place of work changed from e. g., an office at the company to home office, most of the teachers were not able to simply reuse their previously created learning materials in an online setting. In many cases, the pedagogical method and the material had to be completely reworked and additional digital media like self-produced videos had to be created.

The reasons for the additional working time needed were (according to our qualitative analysis of the open answers) basically "more individual feedback" (~⅓), "adapting or creating teaching materials" (~27%), "getting used to new technologies and tools" (~10%), but also many observed that they needed much time for "giving advice for colleagues" or "assistance with technical problems of colleagues and students". Many also felt that due to the working at home, "you feel like you are constantly in work mode – the distinction between work and free time becomes blurred and working hours increase significantly".

The answers to the next question surprised. We asked if even after the experiences of the COVID-19 lockdowns and regulations when the teachers were to regularly use digital elements in their lessons from now on, how would they estimate the time commitment would change (compared to the classic "purely analogue" lessons). About ¾ of the teachers responded that they think the time needed to incorporate digital elements in their teaching will still be higher than without digital media. This contrasts with expectations that the time needed for preparation will decrease, especially when considering that digital media can be reused with very little effort once they are created.

Still, our participants saw some positive aspects of the distance learning as well. Figure 4 shows the change in personal competencies among the majority of their students due to the teaching in virtual classrooms. They see "very positive" and "positive" changes in students' digital competencies, personal responsibility, independence and their research competencies and a rather neutral development among the students' creativity, subject competence, participation in class, motivation to learn and their activity in class, each with about 40% to 50% respectively. The only very negative attribution had development of the students' social competencies: only about 10% said they saw a positive tendency.

When asked about what obstacles the teachers see in using virtual learning environments in their own teaching, the most common answers were:

- not having a direct, immediate response through gestures and facial expressions (~73%)
- difficulties in recognising the support needs of individual learners (~55%)
- technical problems e. g., computer crashes, WLAN connections, software errors (~54%)
- uncertainties in the assessment of students' overall performance (~52%)
- changed didactic-methodical challenges (~48%)
- difficulties of keeping track of the individual performances of the students (~47%).

The answers in the field "others" revealed several more obstacles that the teachers felt. By far the most frequently mentioned problem was the lack of personal technical equipment at home, which had to be financed entirely by the teachers themselves. This was followed by a missing personal further education in the area of digital media, eDidactics and methods for online teaching. Another factor that should not be overlooked according to the participating teachers was the plethora of constantly changing requirements from the Ministry of Education and the respective local school authorities. A reason for frustration was also the timing of the publication of these requirements. The teachers did not have a head start on the parents and thus were not able to answer the questions and problems of the parents that arose immediately, because they themselves were not yet prepared.

Looking on the bright side, impact of the use of virtual learning environments also saw an increase of personal technical competencies, the quality of the personal technical equipment and also the quality of the technical equipment in schools. But a majority thinks that the quality of their lessons, the transparency of the performance assessments, the amount of the content that can be taught und the sustainability of the content learnt decreased. Especially the supposed decline in transparency is surprising, since the praised use of learning management systems – if applied correctly – makes all performances and their evaluations constantly visible and therefore maximally comprehensible.

3.3 *Interpretation of the social/psychological answers*

The second section of questionnaire dealt with questions regarding social, emotional, and psychological background. We tried to figure out whether and if so which social and/or mental difficulties could be observed by the teachers in their classes and with themselves.

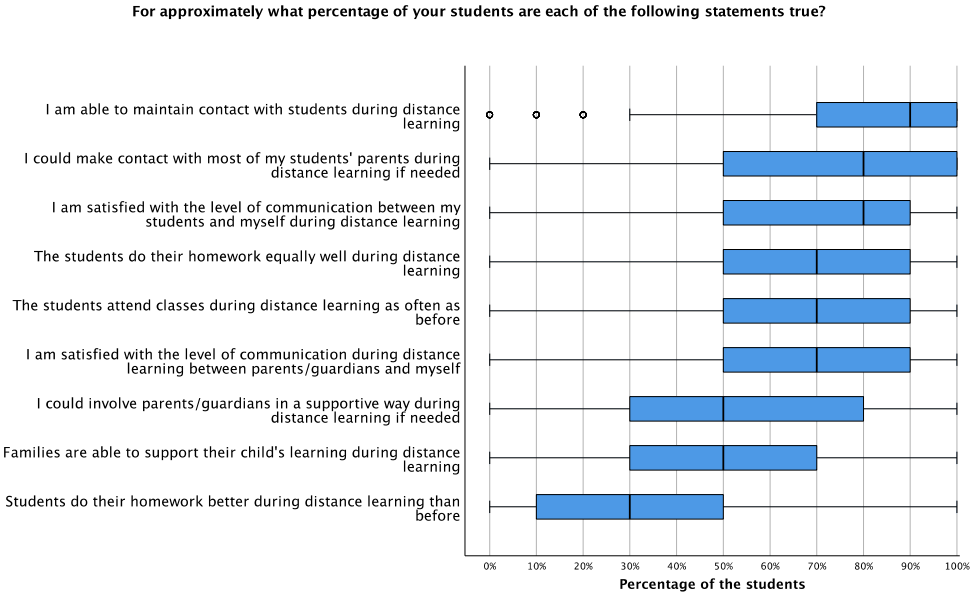

Figure 5: Teachers' assessment of the percentage of students for whom the following statements apply (Cronbach Alpha 0.813).

First, the participants were asked to give an estimation for which percentage of their students several statements do apply. The answers can be seen in the boxplot in Figure 5. The very broad range of answers from 0% to 100% can be interpreted as some participants did not want to answer this question, so they set the value to either one of the limits. The median together with the box range of about ±20% yields a good estimation about the opinion of the majority of the participating teachers. Most of them seemed to cope quite well during the times of distance learning in terms of communication, participation and homework. They are quite satisfied with the communication with the students (median at 90%) and their parents (80%). But only 70% of the students did their homework as good as during normal classes and participated as much as then. And only about half of the families were thought to be able to support their kids at tasks for the school.

Figure 6 gives hints about some of the true reasons why many of the participants in this study became teachers. Through the absence of standard classroom teaching during the times of the COVID-19 lockdown in schools, many teachers came to think about their usual doing in class and what they are missing in distance learning sessions. The answers combined with statements from the open question show that most of the teachers think about their profession as a very social labour. We sorted the answers in Figure 6 in a descending order according to the strongest agreement to the various statements. In this order the statement strongest agreed upon is that the teachers are worried about the mental health and the well-being of their students during the times of lockdowns.

The statement that had overall the strongest agreement (rather agree, agree plus strong agreement) was that the teachers enjoyed the interaction with their students in online sessions, especially when we combine this answer with those that said that online teaching is best when all participants use microphones and cameras. In the top range of the statements that most of the teachers agreed overall were the worries that the students might not get everything they need to be successful during distance learning. Still, most of the students do ask questions and clear up ambiguities during distance learning sessions (70% agreement overall).

A second part of these statements included questions about the possibly changed relationships between the teachers and their colleagues. A majority of the participants agreed that the distance learning has led to an increased exchange with their colleagues about electronic teaching tools (~75%) and that distance learning also led to an increased exchange about didactic methods between the colleagues (~55%). For more than half of the teachers, distance learning has also increased collegiality and cooperation. But not even a quarter has actually participated in a lesson of a colleague to e. g., be able to exchange some ideas about didactic methods or give feedback on their lessons, although collegial hospitations and observations proved to be a very valuable tool to reflect on one's own teaching competence (Burgsteiner, 2014).

About 41% said that they were also concerned about their own mental health and wellbeing during the lockdown. Only about 37% said, that they would also like to teach online more often after the COVID-19 pandemic. A very strong agreement also received the statement, that access to technologies and learning materials is an obstacle to equitable quality in public education.

3.4 Discussion and interpretation of the answers to the open questions

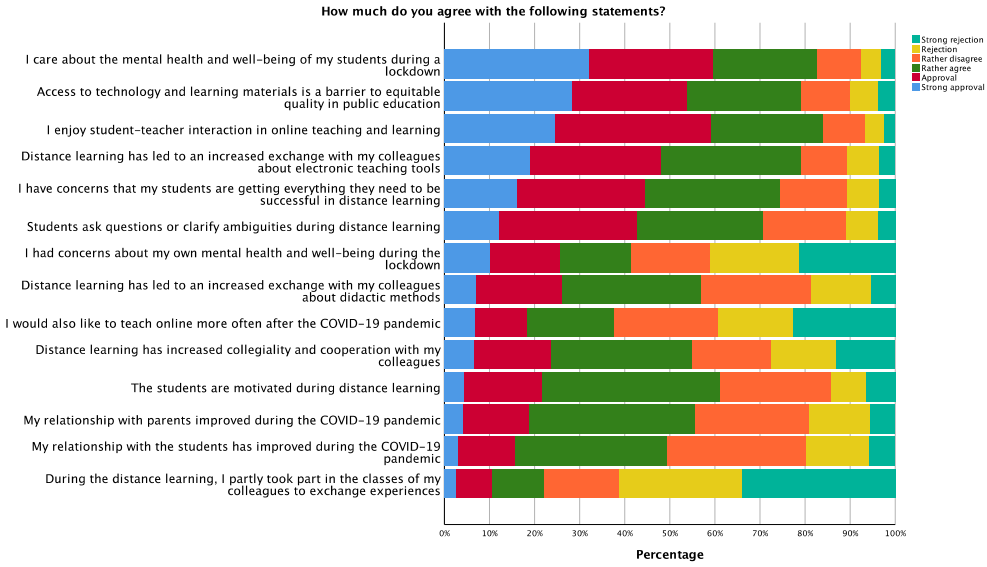

Figure 6: Level of agreement with several social and psychological statements using a 6-point Likert scale ranging from strong rejection to strong acceptance (Cronbach Alpha 0.714).

A conglomerate of opinions, personal insights and suggestions were revealed by the last question: "Looking back on the time of the lockdown and distance learning, what positive or negative things can you take away?", which is also a good starting point for conclusions and discussions of lessons learnt from the distance learning during the COVID-19 lockdown. The large number of responses to this question, some of them very long, shows the great concern during the lockdown, but also that not everything was seen in a negative light. On the contrary, we did not observe a general "bashing" of online teaching here (like one could have suspected), but a very differentiated view on the experiences of the last few months on the side of the teachers participating in this survey.

One thing we saw was that distance learning in the primary schools looked very different from those in secondary or higher education. Although this questionnaire was intended to be for teachers of children of every age, we had to filter out the answers of those from primary school teachers to some questions, because they would have distorted the overall picture of distance learning. Many primary school teachers stated that virtual teaching is not suitable for children of that age because of technical difficulties or because the basic content like learning to write with pencils cannot be done exclusively online. In many cases, they therefore reverted to printed worksheets, which parents collected from school

every day and then brought when the children (or the parents themselves like many teachers suspected) were finished with them. At least communication tools with parents (e. g., Schoolfox) are seen positively, also some valuable learning applications were discovered (e. g., Anton) that the teachers said they will continue to use in the future.

The overall most common named negative aspect was the missing social contact that is lost in pure distance learning (223 mentions). Many teachers were "feeling alone" because microphones and cameras of the students were switched off. Learning and teaching has a lot to do with interpersonal relationships. School is seen as a place of encounter and personal interactions.

Online teaching and distance learning is often seen as a deficient form of teaching (109 nominations), because e. g., learning and motivation curve falls after some time and the content being learnt is not sustainable (41). But there is apparent connection of motivation and sustainability with the form of teaching (e. g., pure distribution of worksheets vs. interactive live teaching). In many schools the elimination of all non-binding exercises and optional subjects was problematic because this is what the students normally do voluntarily and with pleasure. And the assessment becomes more difficult too because it is not clear who has done what (e. g., parents or grandparents), with sometimes unfair positive marking due to these circumstances.

The insufficient equipment, both in the private sphere and in schools, was criticised just as strongly (297). This was also associated with the own living situation (e. g., several people in the household and only one PC, no separate workrooms available, too weak an internet connection for so many parallel virtual meetings) of teachers and students as well. In some cases, high investments in hardware and software were necessary, for which, however, there were no substitutes, borrowed equipment or training by the employers. There was also little support felt from the ministry, the education directorates (e. g., too many and sometimes not very comprehensible decrees, hardly any support) or the school administrations in case of difficulties. Distance Learning revealed the partly poor equipment at Austrian schools (too few PCs with webcams and microphones in the classroom and too slow internet connection).

The increased time commitment on the part of the teachers mentioned above (142 mentions) also meant that a lot of time was spent in front of the PC – with all the negative physical and psychological effects on health (47). In particular, back and digestive problems were mentioned, as well as psychological stress and depression. Teachers also stated several times that these effects were also observed in pupils. The unaccustomed role and work in the home office instead of in the classroom as before also led to the boundaries between private and professional life becoming blurred for many (40 mentions). This often resulted in the danger of overwork and too little self-delimitation due to the changed work situation. Working in a home office – as some said – also has to be learnt first, such

as not always being available. What contributed to this was that there was little collegial exchange and even less organised supervision or intervision.

One aspect that has rarely been pursued in the literature on COVID-19 and teaching (but e. g., Asbury & Kim, 2020 did) is that of public media representation of teachers (19 mentions here). According to our participants, the image of teachers in the media was not portrayed very well, especially in the beginning. The lockdown was partly perceived as "no teaching" because "the parents were teaching". The initial image was more of parents as victims, teachers as refusers of work. Later, as our participants said, perceptions changed and over time parents recognised the difficulties and challenges of teaching and increasingly acknowledged teachers' achievements.

An important and relatively frequently mentioned aspect of distance learning is that of equal opportunities, which is often not given and a lack of it is more noticeable (47 mentions). Online lessons were perceived as "very difficult" especially for children with increased special educational needs (mostly with a form of disability), in so-called "hotspot schools" where an increased proportion of foreigners meets a low social status and low educational level of the parents, as well as generally for children with a migration background without a German mother tongue. Here, effects are particularly evident due to e. g., living in socially precarious conditions (few separate rooms and poor technical equipment) or single parents who of course find it particularly difficult to provide additional support for their children at home. Especially children with non-German mother tongues were attested by the participating teachers to have regressed linguistically in part due to the lack of German-speaking peers and the sole mother tongue at home. In general, a difference in the children's development was observed when comparing the academic performance of children who were supported at home, e. g., by parents, and children who were not supported.

As mentioned before, there was not only a list of negative impressions. The participating teachers also recognised many positive things that they got to know during the lockdowns. Most of the positive mentions were related to their own new experiences in dealing with digital media and the possibilities that arise from their use (376 mentions). Many fears, especially of a technical nature, have also disappeared and the teachers say that they are now more courageous in using the new media in the classroom. In particular, some see significant advantages for some settings, especially for small group teaching. Advantages are also recognised in the area of administration, especially because by participating in online meetings, for example, these can be planned and held more flexibly in the future (80). Many hope for time savings as meetings can be held from home and recognise online teaching as a complementary form of teaching in the future.

132 Participants in the study found increased motivation among students compared to face-to-face teaching and increased independence in their work. Presumably because children were able to work at their own pace and were not pushed or disturbed by other

classmates. It was also observed by some, that students who were often absent in regular classes were sometimes more productive in virtual classes and delivered homework more regularly. Some students who were rather shy in face-to-face classes really blossomed in the distance learning phase. However, the gap between good and bad students often widened, especially the gap between children who were supported at home and those who were not became more visible.

Many (38) also said that the relationship and contact with the children and also with the parents improved. Due to the above-mentioned labour-intensive but more individualised support of the students, the teacher, the students, and their families got to know each other better. The relationship with students and parents was greatly intensified. Later, increased gratitude and great appreciation from the parents was also perceived. Parents and students appreciate the teachers' work now more than before (100).

Positive changes in the relationships between teachers were also perceived. Specifically, that it has been shown that there is strong cohesion in exceptional situations (47 mentions). Cooperation among colleagues was mentioned as particularly positive. The climate has improved. A self-image was drawn that teachers are incredibly flexible and solution-oriented, which is only clouded by some "black sheep" who sometimes refuse to work and ruin the otherwise good reputation of teachers. From the answers we can also conclude that for many teachers the meaning and role of "school" in society became clearer and its importance was recognised again. Students were looking forward to "school" again.

4 Discussion and Outlook

4.1 Possible limitations of this study

Since we used a bulk eMail sent out to most of the teachers of our area, we basically created a self-selecting sample of participants. We did not filter or limit the answers according to e. g. official government statistics about gender, school types or subject areas taught. This of course can lead to sample biases. When comparing our sample with the official statistics from the government (Statistik Austria, 2016), we can see differences for some selection criteria. Interestingly, the various types of schools are represented quite well. When comparing our statistics to the official one, we can see that there is nearly no difference for primary schools (26.9% in our data vs. officially 26.4%), middle schools (26.3% vs. 26.15%) and vocational schools (21.7% vs. 22.4%). A slight difference can be observed for the high schools (22.9% vs. 18.9%), although this might also be explained by different methods to count: For the official statistics, teachers from some middle schools count as high school teachers, because the organisational type of the school belongs to a high school (although they are in fact teaching at a middle school). The overall gender distribution is also in the range of the official data. While about 78.5% of the participants in

our study were female, there are officially 71.9% of all teachers in Styria female as well. However, we did not check whether the gender distribution is also valid for all school types in this study. We have a small surplus of female participants, but this does not affect the overall results of this study.

We used Cronbach's alpha for standardised items for the reliability analysis and to assess the internal consistency of the constructed items. While the internal consistency of the questions with Likert-scales (58 items) with Cronbach's alpha of 0.866 is satisfying, the value drops to a value of 0.812 when considering all items with Likert-scales and additionally those with a percentage scale. This is probably due to the fact that the questions of this type are quite extensive, and participants may have tended to fill in those questions rather superficially, as they are very tedious and demanding, leading to a lower Cronbach Alpha.

One also must keep in mind, that we have presented findings that stem from opinions and experiences of teachers only (although some participants noted, that they found themselves in the double role of being teacher and being a parent at the same time). Helm and Postlbauer (2021) for example focus on students and parents during the third school closure in Austria. Interestingly, their findings correspond to those of our study, e. g., that they think that students have learnt less during distance learning in comparison to conventional lessons or that the motivation of students to learn dropped during the school closures. Hence, the views and experiences of these three groups seem to be consistent.

4.2 (Good) Lessons learnt – implications of the findings for school practice and educational policy

What else can we take away from the teachers' answers as "lessons learnt" and what should be taken into account in order not to simply return to a status quo like before the lockdown? There has been a massive increase in digital literacy on the part of teachers and students. This must not be lost again and must therefore also be used in the future. Right now, there is an opportunity to break up old structures in the school system and to think about a change in forms of teaching, a rethinking and restructuring of the current material and the implementation of teaching. This would be an important step into the digital future of teaching, which holds many new didactic possibilities and could improve the quality of teaching in some places. The data show a statistical correlation between "good knowledge of digital media in online learning" and "positive experiences with students (motivation, activity, collaboration, etc.)". Further training in the area of teaching with digital media should be increasingly offered and used by teachers. In this way, their own didactic methodological diversity can be further expanded, and the possibilities of digital teaching can be demonstrated.

Other positive changes experienced should also be maintained after the end of all COVID-19 restrictions, according to many teachers. These include, above all, various meetings, conferences, and some further training, which should also be held online in

the future. Likewise, individual digital elements, hybrid teaching or a weekday of online teaching could be introduced where possible, e. g., in high schools or evening schools.

Positive didactic aspects should also be retained, such as the digital submission and collection of homework, additional digital communication channels and feedback on students' work. Further didactic "lessons learned" from the data collected include that purely asynchronous lessons are mostly experienced negatively ("passive") and that live lessons increase motivation on both sides. Students appreciate the mix of live lessons (e. g., using a web conferencing tool with compulsory attendance) and free time allocation for offline tasks (project and plan work). Time investments in digital teaching materials pay off in the following years, e. g., when creating own learning videos that can be reused as often as desired later on. In addition, these videos have other effects that have been mentioned as well: especially the weaker students benefit from them because they can watch the videos again as often as they want. Videos can also be used very well for repeating and refreshing material, too. Additionally, they allow for a didactic transformation ("flipped classroom"), where additional time can be used for more intensive social interaction and exchange in class, instead of using it for pure frontal explanations.

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