DISTANCE LEARNING DURING THE PANDEMIC: OPINIONS AND ATTITUDES OF YOUNG STUDENTS¹

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Abstract. During the pandemic, school closures and distance learning were one of the main instruments to contain the spread of the virus. Even if the tool of distance education did not originate with the pandemic, as the virus spread and schools closed, the use of online tools became more and more conscious and widespread. This scenario has amplified the scientific (and non-scientific) debate on the role played by technologies and online education. The aim of the paper is to study the effect of distance learning on the (self-perceived) performances of students in Italy. Studies carried out in other countries about school performances during the pandemic show that the performance seems to have been negatively influenced, and the young were reported to have suffered more. The study exploits the data collected in 2021 by the Italian Institute of Statistics (ISTAT), with the support of the Ministry of Education, through a survey on "Children and Teenagers: behaviours, attitudes and future projects". The use of regression models allows us to understand the connections between personal and familiar characteristics of the students and the perception of the effects of distance learning on their school performance. Our results indicate that foreign students appear to have a greater probability, compared to native, of a negative influence on school results, as do those who feel they belong to a fairly or very poor family.

1. Introduction

Because of the spread of Covid-19, more than a hundred countries around the world have closed schools at all levels of education as a measure to contain contagions and impacted 91.3% of enrolled students worldwide (UNESCO, 2020). This represents the first global school closure since World War II. The first countries that closed schools were those on the Asian continent. Italy was the first country in Europe to close schools (9 March 2020) followed by several other European countries (Sarno, 2020). School closures and distance education were one of the

¹ This work is the result of a close collaboration among the authors.

main instruments to contain the spread of the virus (Schneider and Council, 2021). The tool of distance education, however, did not originate with the pandemic but was already researched, known, and implemented before COVID-19. Of course, as the virus spread and schools closed, the use of online tools became increasingly aware and widespread. This scenario has amplified the scientific (and non-scientific) debate on the role played by technologies and online education (Ranieri *et al.*, 2020).

Distance learning (DL), during the period of the pandemic, has increased social inequalities (UNESCO, 2020). In fact, differing conditions of access to technology also take the form of unequal access to education. In other words, the digital divide is configured as a cultural divide. It is estimated that only 15% of the countries that applied school closures were adequately equipped to allow students to access distance education, therefore, the remaining 85% could not ensure students a properly continued learning during the Covid pandemic (Sarno, 2020). In the Italian case, the National Institute of Statistics (ISTAT) highlighted that 45% of students, aged between 6 and 17, had no access to DL because they lacked devices (e.g., computers) in their homes (Ferraro *et al.*, 2020; Iavarone and Trocchia, 2020). Such students were mostly concentrated in southern Italy where 20% of students had no access to any device and were excluded from DL (Ferraro *et al.*, 2020).

The international literature has also highlighted other characteristics (less direct than those mentioned above) of the impact of DL on students' education. Compared to traditional learning (with the co-presence of teachers and students), DL requires the student to have a high level of motivation and self-discipline to be effective because the student is more exposed to the risk of distraction and dropping out of studies (Clark, 2020). Disengaged or unmotivated students have a higher risk of being penalized in educational performance with distance education (Burke and Dempsey, 2020).

In the case of vulnerable young people, e.g. low-income families, foreigners, single parents, education (and care) in the presence of teachers is particularly important, and being deprived of it puts them at greater risk of low performances and school dropout (Baker, 2020). In addition, belonging to low socio-economic status increases the risk of not having the proper tools (e.g., internet connection, computer, etc.) to effectively take advantage of distance education. During the period of the pandemic, the debate on DL in Italy was very heated and there were several authors who underlined how this increased inequalities (Saraceno, 2021).

2. Objectives and research questions

Contemporary research is increasingly investigating the consequences of distance education and school closures. However, there are still few answers in the literature on the role played by distance education on student learning. There is also a lack of quantitative information about school performance and long-DL. The purpose of this paper is to fill this gap by exploring, from the point of view of children and adolescents, the association between perceived school performance and DL. Two are our main research questions: has distance education played a positive or negative role in (perceived) student performances? What factors most significantly influenced students' perceptions of their own performance during DL? It is important to understand who were the most vulnerable students during the pandemic, also in order to plan specific actions to fill the gaps.

3. Data and methods

In 2021 ISTAT, with the support of the Ministry of Education, carried out a survey on "Children and Teenagers: behaviours, attitudes and future projects". It collected fundamental information for understanding the impact of the spread of the Covid-19 pandemic on the daily lives of young people, to highlight the vulnerabilities and strengths of the new generations. Through a short questionnaire administered exclusively with the CAWI technique (which can also be filled using a smartphone or a tablet), school issues were addressed - with a specific focus on the use and effects of DL-, relationships with schoolmates, friends in general and the family, the use of social media, citizenship, and future projects of the new generations.

The survey involved a random sample of around 41,000 pupils who, in the 2020/2021 school year, attended one of the first and second-grade secondary schools (Lyceum and technical and professional institutes) selected by the Student Registry of the Ministry of Education and distributed throughout the country. Continuing with the previous survey on the integration of second generations, foreign children constituted a specific survey target: 11,000 foreigners were included in the sample. The sampling design is based on two stratified stages, in which the primary sampling units are the schools and the final units are the pupils. The stratification concerns the first stage units (the schools) and therefore indirectly the final units.

To achieve the research objective and to investigate, according to the students' point of view, the association between perceived school performance and DL, purifying the effects of interrelationships with other different dimensions, we resorted to the application of a logistic multinomial model (Agresti, 2012). The

dependent variable - non-binary categorical - is represented by the perception expressed by the student in response to the question "How do you think DL has affected your grades in this school year 2020/2021?", with possible responses "It has affected them positive", "It has affected them negatively", "It hasn't affected them at all". As explanatory variables, we considered socio-demographic characteristics (citizenship, gender, cultural background, perceived economic status and type of family), characteristics related to the student's educational background (type of school and its location geography, opinion on one's school performance before the pandemic, incidence of pupils with foreign citizenship in one's school) and in particular to opinions on the effects of DL (understanding of lessons, degree of difficulty of individual subjects, lack of contact with teachers). Among the regressors, we included also other variables detected during the interview that identify particular aptitudes of the pupil (interest in school, psychological discomfort experienced during the pandemic) and the instrumental and non-instrumental difficulties they encountered (type of internet connection, availability of navigation devices, possibility of following the DL from the beginning of the first lockdown, opinion on the preparation of the school to face a year in DL). We applied the multinomial model by setting the reference value of the dependent variable "The DL had no influence on the grades", giving rise to model 1 "The DL had a positive influence vs she had no influence" and model 2 "DL had a negative influence vs she had no influence". We applied also a stepwise procedure with similar results. In addition, specific models for different types of schools were applied without particular shreds of evidence.

Due to the hierarchical nature of school data (students grouped into sections, in turn, grouped in classes, which belong to a school, and so on) we studied multilevel models. Specifically, being categorical the dependent variable, we proposed the multinomial multilevel logit models (MMLM) in our study (Skrondal and Rabe-Hesketh, 2003). MMLMs are direct extensions of models for binary responses and can incorporate random slopes and contextual effects for nominal responses. By using these models, we tried to investigate how school policies, teachers' practices, or class dimensions affect student outcomes while accounting for the hierarchical structure of the data.

MMLMs have proven to be useful in analysing school data, and the effects of the levels in these models have been found to be significant but exiguous. On the other hand, the interpretation of the results from MMLMs got more difficult, compared to simple multinomial logit models: given these considerations, we decided to continue the analysis without considering random school effects, by using the simple multinomial logit model that will be illustrated in the following sections.

4. Results

4.1 DL in the Italian Schools during the Pandemic: a descriptive analysis

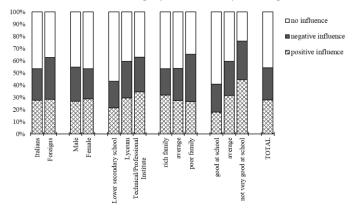
During the pandemic, boys and girls experienced for the first time a totally new way of "going to school" while staying at home. DL was an experience of great impact on the daily life of the very young and for many of them, it lasted over time. The DL has not only imposed a different way of holding and following lessons, but it has also greatly reduced the role of socialization agent that the school has always played, limiting the opportunities for meeting and comparison. This is a generalized in fact 98.7% of students (equal to over 4 million and 220 thousand) have faced periods of DL.

Surely the new generations were not without digital skills, many have defined these young people as "digital natives" because they were habitual users, even before the pandemic, of digital technologies for communication, information, gaming and the use of audio-visuals. However, the "forced" use of DL has introduced not only a change of pace in the use of ICT but also new elements of inequality connected to pre-existing socio-economic and digital gaps.

If it is true that the teenagers were already "very connected", not all of them had the most suitable tools, both in terms of hardware and network connection, to follow many hours of DL. 80% of Italian students were able to follow DL immediately and continuously in the period between March and June 2020; among foreigners, the percentage of those who were able to constantly attend online lessons dropped to 71.4%. DL has not convinced the vast majority of first and second-grade secondary school pupils: 67.7% prefer face-to-face teaching, 20.4% consider the two types of teaching to be the same and only 11.9% prefer DL. A slight difference between the two genders can be noted: it is girls who support face-to-face teaching more (69.5%) than boys (66.1%).

Regarding the influence on the performance of the DL, almost 46% of the interviewees think that it has not influenced the votes, 27.7% believe that it has had a positive influence and 26.4% that it has had a negative influence. Negative influence is reported more often by boys than girls. Middle school students most often said that DL had no influence on grades. Those who believe that the family is quite or very poor believe that in 39% of cases, there has been a negative influence of the DL on grades. Those who were very good at school before the pandemic in almost 60% of cases believe that the DL has not influenced their grades.

Figure 1 – "How do you think distance learning has influenced your gaps in this 2020/2021 school year?", percentages by citizenship, sex, kind of school, family perceived economic situation, school performances before the pandemic and Total.



Source: Istat, Survey on "Children and teenagers: behaviours, attitudes and future plans", 2021.

Studies carried out in other countries about school performances during the pandemic show that the performance seems to have been negatively influenced, and young were reported to have suffered more (Panagouli *at al.*, 2021; Engzella *et al.*, 2021; Hammerstein *et al.*, 2021). In Italy, we haven't yet pieces of evidence in this field. So, it could be interesting a deep and multidimensional analysis of the connection between school performances and some individual characteristics. We must underline that in this article the personal perceptions of the students are studied and not the objective achievements or the final marks reported at the end of the school year. The perceived performance aspect seems to be connected to various factors and a multivariate analysis can allow us to better understand the connection between the variables and the perception of the influence on students' performance.

4.2 DL and school performance: results of the regression model

The first result that emerges from the regression models is that, among the factors considered, some appear to have a specific impact in only one of the two models, determining either a negative or a positive influence of the DL on the grades received, others have a general impact on both models. Among the latter, citizenship, the type of school attended, the perception of school performance and the hardships experienced should be considered. Being a foreign citizen, attending an upper secondary school (rather than a middle school), showing interest in school, not having experienced psychological discomfort during the Covid-19 pandemic and

having declared very good school performances before the pandemic determined the same type of impact in both models, albeit with different intensity.

Net of all the other covariates considered, the students' perception of his or her performance at school before the pandemic appears to be, however, the factor with the greatest impact in both models. In the case of the positive influence on grades: having defined oneself as "Not very good" compared to "Very good" determines a more than 4 times greater probability of perceiving a positive influence compared to those who have not detected any influence of the DL on the grades (the probability of having a negative influence on votes, compared to having none, is 84%). Analysing model 1 (positive influence): even the self-perception of an "average" performance before the pandemic determines a double probability of having a positive influence compared to having no influence; the probability is double also in the case of those who attend a upper secondary school (both Lyceum and technical/professional institute) compared to those who attend a lower secondary school. The probability of perceiving a positive influence on grades is higher than 63% among students who declare that they had no difficulty in any subject during remote lessons, about 20% among foreign students and 10% among women. Among those who perceive that their family is neither rich nor poor, compared to those who instead feel they belong to a very rich family, or those have ascertained that the school, on the return of the 2020/2021 school year (after the total block of activities that took place in the spring of 2020), was not ready to face a year of DL, the probability of a positive influence is lower, by 25% and 17% respectively.

Analysing model 2 (negative influence): the perception of a negative impact of DL on grades is particularly accentuated among Lyceum students (the odds ratio is higher than 88%), less strongly it is in the case of students of technical/professional institutes (+48%). Once again, but more intensely, foreigners appear to have a greater probability, compared to native classmates, of a negative influence on school results (+50%), as do those who feel they belong to a fairly or very poor family (+40%). Even having faced the initial emergency with difficulty - not having been able to participate immediately in DL - or among those who complain of connection problems or a school unprepared for the management of DL at the beginning of the school year 2020/2021, the probability of a negative influence is higher (plus 65%, 21% and 21% respectively). On the other hand, the following are protected from a negative impact on grades: women (-24%), students of schools in the Centre and Southern Italy (-23% and 26%), those who show an interest in school (-31%), who did not suffer psychological discomfort (-47%) and who believed that the DL did not make the subjects or the understanding of the lessons more difficult (-42%).

Table 2 – Logistic multinomial model 1: distance learning has had a positive influence on your grades in school year 2020/2021; reference category "No influence" (1).

Variables		Od. R.	Confidence interval	
Citizenship (ref. Italian)	Foreign	1.188***	1.113	1.269
Sex (ref. Male)	Female	1.101***	1.044	1.160
Kind of school (ref. Medie)	Lyceum	1.801***	1.685	1.926
	Tech/Professional Inst.	1.991***	1.873	2.117
Geographical area of the school (ref. North)	Center	1.005	0.940	1.075
	South	1.097**	1.032	1.166
Parents' highest educational level (ref. Low (2))	I do not know	0.921	0.794	1.069
	High (3)	0.887*	0.828	0.951
Family perceived economic situation (ref. Rich)	Average	0.750***	0.685	0.820
	Poor	0.822	0.711	0.951
Household type (ref. Both parents)	Single parents or no parents	0.999	0.931	1.071
School performances before the pandemic (ref. Good)	Average	2.301**	2.166	2.446
	Not very good	4.347***	3.836	4.925
Interest in school (ref. Little)	Very much	0.806***	0.757	0.859
Psychological discomfort during the Covid-19 (ref. Yes)	No	0.748***	0.709	0.789
Internet connection at home (ref. Excellent connection)	With problems/No	0.903**	0.857	0.951
PC ownership (ref. Yes)	No	0.907**	0.845	0.973
DL immediately with continuity (ref. Yes)	No/partially	0.947	0.887	1.012
Preparation of the school in the management of DL (ref. Prepared)	Not prepared	0.835***	0.788	0.885
DL lessons more difficult to understand (ref. Yes)	No	1.003	0.952	1.056
DL has made more difficult to study subjects (ref. Yes)	No	1.627***	1.534	1.724
Miss direct contact with teachers (ref. A lot)	Little/No	1.148***	1.084	1.215
Incidence of foreigners at school	Low	1.023	0.841	1.245
(ref. No foreigners)	High	1.063	0.874	1.294

Note: levels of significance * p<0.1, ** p<0.05, *** p<0.001 Source: Istat, Survey on "Children and teenagers: behaviours, attitudes and future plans", 2021. (1) Number of observations = 37.523; Pseudo R^2 = 0,1815; Likelihood ratio = 6.556 (d.f. 50; p-value <,0001); (2) Includes: untitled, primary, lower secondary; (3) Includes: Upper secondary, Tertiary

Table 3 – Logistic multinomial model 2: distance learning has had a negative influence on your grades in school year 2020/2021; reference category "No influence" (1).

Variables		Od. R.	Confidence interval	
Citizenship (ref. Italian)	Foreign	1.504***	1.409	1.606
Sex (ref. Male)	Female	0.761***	0.721	0.803
Kind of school (ref. Medie)	Lyceum	1.876***	1.755	2.007
	Tech/Professional Inst.	1.483**	1.392	1.580
Geographical area of the school (ref. North)	Center	0.767***	0.716	0.822
	South	0.737***	0.692	0.786
Parents' highest educational level (ref. Low (2))	I do not know	0.880	0.758	1.022
	High (3)	0.844**	0.787	0.905
Family perceived economic situation (ref. Rich)	Average	1.082**	0.979	1.197
	Poor	1.400***	1.210	1.619
Household type (ref. Both parents)	Single parents or no parents	1.152***	1.075	1.234
School performances before the pandemic (ref. Good)	Average	1.360	1.282	1.442
	Not very good	1.841***	1.618	2.095
Interest in school (ref. Little)	Very much	0.693***	0.650	0.739
Psychological discomfort during the Covid-19 (ref. Yes)	No	0.527***	0.498	0.558
Internet connection at home (ref. Excellent connection)	With problems/No	1.205***	1.142	1.272
PC ownership (ref. Yes)	No	1.092**	1.019	1.170
DL immediately with continuity (ref. Yes)	No/partially	1.646***	1.549	1.750
Preparation of the school in the management of DL (ref. Prepared)	Not prepared	1.211***	1.144	1.282
DL lessons more difficult to understand (ref. Yes)	No	0.579***	0.549	0.612
DL has made more difficult to study subjects (ref. Yes)	No	0.583***	0.552	0.615
Miss direct contact with teachers (ref. A lot)	Little/No	0.945*	0.891	1.003
Incidence of foreigners at school (ref. No foreigners)	Low	1.098	0.894	1.348
	High	1.028	0.836	1.263

Note: levels of significance *p<0.1, **p<0.05, ***p<0.001

Source: Istat, Survey on "Children and teenagers: behaviours, attitudes and future plans", 2021. (1) Number of observations = 37.523; Pseudo $R^2 = 0.1815$; Likelihood ratio = 6.556 (d.f. 50; p-value <,0001); (2) Includes: untitled, primary, lower secondary; (3) Includes: Upper secondary, Tertiary.

5. Conclusions and next steps

New generations have a greater ability to socialize through digital tools than before. They know how to use social media platforms effectively and create networks useful for learning through the exchange of materials and through mutual help (Hernandez-de-Menendez *et al.*, 2020). However, their increasing ability to use digital tools to interact with peers' results in a decrease in in-person relationships.

If for many students (46%) DL was neutral in terms of performance, for others, it exerted a negative influence and for almost the same percentage it played a positive role. The regression analysis helped to understand better the characteristics of different groups of students. For some categories, the results seem very polarized (for example for the foreigners). In some students' subpopulations DL increases the propensity to have both better and worse scholastic performance at the same time. If these results could seem "counterintuitive", they can be easily interpreted like this: DL is a school modality which leaves nobody indifferent. Someone has loved it, gaining, in terms of school performance. Someone else has not liked it, obtaining during the pandemic period, worse scholastic results.

It can depend on many different aspects that are difficult to include in the regression models. For example, the fact that during the pandemic in Italy exams – and school tests - were simplified and in general the number of failures was reduced. Some students may considered these aspects, while others did not. In general, the perception is not in favour of reduced performance as mostly reported in the literature, but, of course, it can depend on the fact that almost all the considered studies are based on objective information. In addition, not all the studies agree on the effect of DL. Zierer (2021) reported that in the case of secondary education, no significant differences could be found between the learning progress of pupils in face-to-face and those in DL. An aspect that emerges from the regression models and that is in line with reported cases in the international literature is the protection effect played by high-level performances before the pandemic. High-achieving students suffer minor negative effects of DL.

In the next months, it will be important to check the results of the present analysis with the information collected by the Ministry of Education – above all about failures and interruptions of the studies - and the ones collected by INVALSI. In this way, the perception of the students could be compared with objective data about the performances during the pandemic and after.

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