The Digital Divide in Online Education: Who Was Prepared for Online Education Before the COVID-19 Pandemic Took Place?

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The crisis resulting from the COVID-19 pandemic has disordered the educational process of millions of children. Distance education through online communication channels has become the practice in many societies since March 2020 (UNESCO 2020[1]). While schools slowly reopen in many societies, and despite the great efforts that schools and teachers make to deal with the immediate change of life, it is likely that the corona crisis keeps affecting the educational process for some time to come.

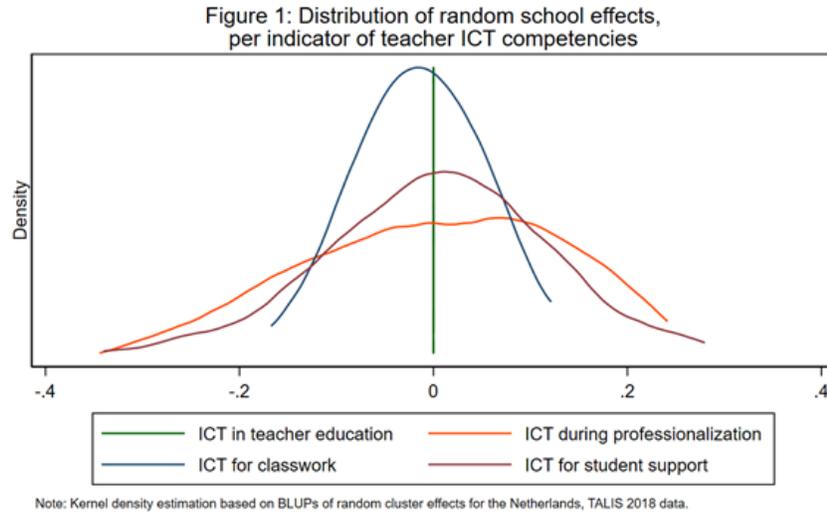## Which children are well-prepared for online education?

One question that instantly arises is how the school closures will affect the sociodemographic inequalities in educational progress. For distance education to work, it takes a good study place with digital equipment, sufficient digital experience and skills, involved parents, as well as well-prepared schools and teachers – and these circumstances are likely to be socially stratified. While we cannot know yet how the COVID-19 pandemic will impact inequalities in educational outcomes, we can already examine the pre-existing inequalities in children's preparedness for this immediate change to online education. Who is digitally prepared, who is not? Which digital resources do children have, which ones do they lack? Addressing these questions can inform the future study of educational inequalities resulting from the pan-

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[1] https://en.unesco.org/covid19/educationresponse, accessed 11 May 2020.

Figure 1: Distribution of random school effects,
per indicator of teacher ICT competencies

Note: Kernel density estimation based on BLUPs of random cluster effects for the Netherlands, TALIS 2018 data.

demic as well as policy-makers' actions to facilitate the transition to (and from) online education.

What is the situation at the brink of the pandemic?

To assess the extent to which students are ready for online teaching and whether this readiness varies by their sociodemographic background (socioeconomic origin, migration background, sex), we analyze data about students, schools and teachers that were collected in 2018 within the framework of two international survey programs, the OECD Teaching and Learning International Survey (TALIS)[2] and the International Computer and Information Literacy Study (ICILS)[3]. Importantly, we consider both students' individual readiness for coping with online education, as well as the readiness of their school. Both are needed: how well the transition to online schooling works for a student depends not only on their personal ICT access, experience and skills, but also on that of their schools and teachers. Thus, a 'digital divide' in online education can arise as much from inequalities in students' individual ICT resources as from inequalities in the ICT provisions of the schools they attend.

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[2] We use teacher- and school principal-level data from the TALIS study for the Netherlands. Moreover, in the paper underlying this blog (van de Werfhorst, Kessenich & Geven, 2020), we study 44 further countries that are spread across all continents and as diverse as Sweden, Saudi Arabia, Colombia and Vietnam.

[3] We use student-, school principal- and school ICT coordinator-level data from the ICILS study for three countries: Chile, Denmark and France. In the paper underlying this blog post (van de Werfhorst, Kessenich & Geven, 2020), we furthermore study the situation in Finland, Germany, Italy and South Korea.

Schools are differently prepared for online learning

Looking first at the digital preparedness of the schools that students attend – that is, having teachers that are well-skilled and experienced with ICT – it becomes evident that there are substantial differences in the digital preparedness of schools. However, these differences are unrelated to the socioeconomic and migration background of the student population. In the Netherlands, for instance, the ICT competencies of teachers in some schools are considerably higher than those of teachers in other schools. These school differences are depicted in Figure 1. Interestingly, schools vary in the extent to which teachers recently attended an ICT-related professional development activity, how often teachers let students use ICT for classwork, and how much teachers use ICT to support student learning. By contrast, there are hardly any differences across schools in how well teachers were trained in ICT during their initial teacher education. Schools in the Netherlands thus mainly differ in the extent to which teachers continuously update and use their ICT skills in the classroom. However, whether teachers do this is unrelated to the socioeconomic and migration backgrounds of the students. As shown in Figure 2, teachers in schools with more than 60% of students from disadvantaged socioeconomic[4] or migration backgrounds[5] tend to be neither significantly more nor less digitally apt than teachers in schools without disadvantaged students. Comparing the distributions of teachers' digital competencies internationally, there are relatively large school differences in how digitally apt teachers are in the Netherlands. Similar to the Netherlands, however, we also observe in other countries that school differences can hardly be explained by students' sociodemographic background.

The importance of students' socioeconomic status and migration background

The fact that the sociodemographic make-up of the student body is unrelated to the digital preparedness of schools does not mean, however, that a student's readiness for online education is not socially stratified. In Denmark, for instance, the situation is comparable to the Netherlands in the sense that the ICT competencies of a student's teachers do not depend on that student's social status (see Figure 3). Likewise, the ICT infrastructure (i.e. technology and software resources) that a student's school possesses is unrelated to the student's sociodemographic background. By contrast, a student's personal skills to use ICT effectively are very much related to a his/her background: children from advantaged socioeconomic backgrounds

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[4] The percentage of students from socioeconomically disadvantaged backgrounds relies on the respective school principal's estimate of the proportion of students that lack the 'basic necessities or advantages in life'.

[5] The percentage of students with migration background is based on the respective school principal's estimate of the proportion of students that either themselves or whose parents were born abroad.

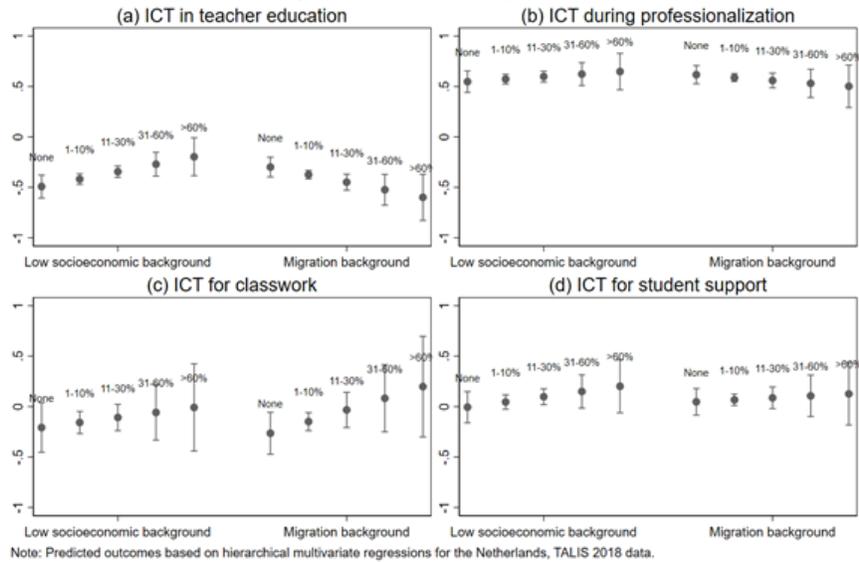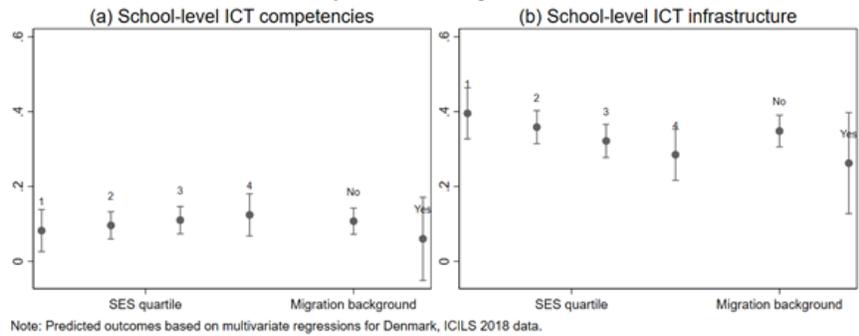**Figure 2: Predicted level of teacher ICT competencies, by school student composition**

Note: Predicted outcomes based on hierarchical multivariate regressions for the Netherlands, TALIS 2018 data.

Figure 3: Predicted level of school-level digital readiness, by student background

Note: Predicted outcomes based on multivariate regressions for Denmark, ICILS 2018 data.

are more digitally skilled than children from disadvantaged socioeconomic backgrounds[6], students without a migration background are more skilled than students with a migration background[7], and girls are more skilled than boys (see Figure 4). Albeit of substantial magnitude, the Danish digital divide with regard to students'

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[6] A student's socioeconomic background is identified based on their score on a summary index (NISB) of parental occupational status, parental educational level and the number of books at home. Students' relative socioeconomic position is determined based on the intra-country quartile they are positioned in.

[7] A student is defined as having a migration background if the student and/or at least one parent was born abroad.

Figure 4: Predicted level of individual digital skills, by student background

Note: Predicted outcomes based on multivariate regressions for Denmark, Chile and France, ICILS 2018 data.
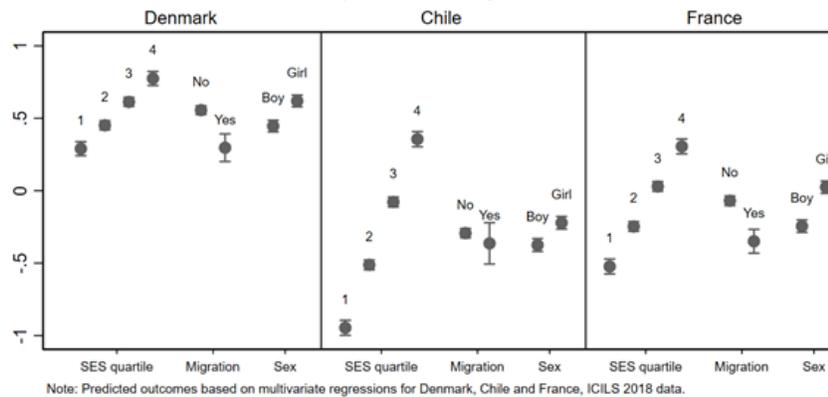
digital skills is even relatively modest in an international comparison. For example, the class-based digital divide is much larger in Chile, and within Western Europe, the class-, migration-and sex-based digital divides are considerable larger in France than in Denmark.

Both schools and student background matter

To conclude, we find that students are unequally prepared for online education, and that both students' personal as well as their school's ICT resources contribute to this inequality. Some students have, as individuals, more experience with and are better skilled at using ICT than others, and some students go to schools and are taught by teachers that have more experience with and are better skilled at using ICT than the schools and teachers of others. There is thus a digital divide that comes to light with online education, and it operates at both the individual and the school level. Nonetheless, there is a crucial difference between the two levels: whereas students' personal digital preparedness is stratified along their class, migration background and sex, the digital preparedness of schools does not diverge along these 'classical' sociodemographic lines. This implies that students' personal digital readiness is independent of their schools' digital readiness. Two students of equivalent social status are likely to have equally developed digital skills, but if they do not go to the same school, they could nevertheless be unequally prepared for online education. Vice versa, two students who go to the same school are likely to have equally digitally competent teachers, but if they are from different socio-economic backgrounds, they could nevertheless cope unequally with the school closures. To promote equality of educational opportunity in times of online education, therefore, both students' individual digital readiness as well as the digital readiness of students' schools and teachers need to be considered carefully – and independently of each other.

This blog summarizes the results of:

This text has been posted on the blog international-education.blog and it is available in different languages on international-education.blog

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