

An examination of the second digital divide on online education during the COVID-19 pandemic in public Arizona schools

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Abstract

The COVID-19 pandemic negatively affected many students in their online learning environments. One of many reasons for this is the second digital divide which disproportionately affected students of lower socio-economic statuses and students with disabilities. This paper suggests that a study should be conducted using a mixed-method survey of public Arizona schools interviewing principals, teachers, and guidance counselors to see how far behind these students are compared to their peers; and how they recommend bridging the divide between these students.

Introduction

The COVID-19 Pandemic disrupted the world and had negative repercussions on all aspects of society. One such aspect that was negatively impacted was education. Students and teachers rapidly changed from an in-person learning environment to online platforms while the world stayed inside to help mitigate the spread of the disease (Middleton, 2020).

With this rapid change, students and teachers experienced many hardships which prevented students from fully embracing online-learning (Middleton, 2020). One hardship, out of many,

that students specifically faced was the challenge of overcoming falling behind their peers due to not having access to online material (Middleton, 2020).

Students falling behind from their peers can be quantified by Kuhfeld et al. (2022), where they found in the first two years of the pandemic, out of 5.4 million students from the United States in 3rd grade to 8th grade, had their math scores .20-.27 standard deviation (SD) and reading scores .09-.18 SD lower than students in 2019. Kuhfeld et al. (2022) also highlighted that the gap between student test scores from low and high-poverty schools grew by .10-.20 SD.

With the visible deprivation of education that the pandemic brought to the education sector going online around the world, van de Werfhorst et al. (2022) noted the second digital divide (SDD) needed to be reexamined in this context. The first digital divide (DD) examines the gap in physical access to the web according to Lythreatis et al. (2022) while the SDD explores the gap in digital literacy (Hargittai, 2002). Digital literacy can be defined broadly “...as an ability to understand and to use information from a variety of digital sources and (...) [can be seen as] literacy in the digital age” [1].

There are many factors that affect the widening disparity of the DD. One factor was found to be socioeconomic status (SES) by Lythreatis et al. (2022) where they examined that SES was one out of nine categories that affects the DD from 50 studies of current literature on the DD. This is an important finding for this research seen through the lenses of the prior literature because it shows how SES may impact how students perform in online learning.

The SDD is more prevalent in hindering online learning during the pandemic compared to the first DD because research shows that many students, regardless of SES, had access to physical devices for online learning. Gu (2021) found that in a sample of low-income Chinese students,

86.38% of the sample was able to access the web for online classes. van de Werfhorst et al. (2022) found that students with a lower SES were not less likely to go to a school with poor online learning infrastructure; and saw that students who were from a lower social class, among other factors like migration status and gender, were more likely to be impacted by the rapid switch to online school because of the SDD.

The above sentiment is further supported by Mann et al. (2021) where they examined how pre-pandemic online students still did not receive the same education as their peers from before the pandemic, even with equal access to the web and skill development. They specifically found that “...students identified with specific exceptionalities, students who identify as male, students from disadvantaged socioeconomic backgrounds, and students from cities or fringe rural areas were more likely to struggle in their online courses” [2].

Even with equal access to the web, it can be seen with quantified data from Kuhfeld et al. (2022), that students from lower SES were at a disadvantage for online school compared to their peers. This was amplified by the SDD because people from lower SES are more likely to be negatively impacted by the SDD. One finding that supports this is from Klosky et al. (2022) who conducted a qualitative study of administrators and parents from Georgia schools where they found that many of those sampled felt that the students’ learning declined because of the pandemic due to not having the necessary digital literacy for online school. This was amplified for students and parents of marginalized groups.

Another study supports the above finding. Azionya and Nhedzi (2021) found that students from marginalized universities in South Africa used Twitter to explain their frustrations with the rapid shift to online learning. One factor hurting students that was discussed was they felt like they did

not have the same skills to utilize the web as students from wealthier schools. This is a factor impacted by digital literacy which pertains to the SDD.

SES and digital literacy skills prevented some students from properly utilizing online learning during the pandemic. Another status that may have affected many students' ability to learn online during the pandemic was disability status. Wu et al. (2014) found in a sample of Taiwanese students separated into two categories, students with a disability and students without a disability, had around the same levels of access to the web for online school; but students with a disability were not able to keep up with their peers' skills as they grew and had their own skills plateau.

Another factor that contributed to students with disabilities' online school experience during the pandemic was the structure of the websites themselves not accommodating for disabilities, which barred many people from information online. Maboe et al. (2019) examined the accessibility of two popular e-learning websites, Unisa and myUnisa, and found that they did not have images with alternate text or use alternate text correctly, which is an important feature for people with visual disabilities. Some of the participants also did not know how to use the layout of the site to navigate between pages. Although these findings are before online learning during the pandemic, it shows how students with disabilities may have had to interact with material for online learning. This is another aspect of the SDD.

To conclude, the SDD likely impacted online student learning during the COVID-19 pandemic affecting students from lower SES and students with disabilities. These two groups of students already face hardship from the education system which was exemplified during the pandemic partly because of the SDD. It is imperative to examine how far behind these two groups of

students are compared to their peers to see how they can get additional assistance in getting an equal digital literacy status and bridge the divide in education.

Methods

To find how far behind students who are from lower SES and those with disabilities are compared to their peers, I propose a mixed-method study consisting of a survey to be conducted to gather first-hand accounts from teachers who witnessed how the SDD affected student learning. As noted by Middleton, there are many reasons why students fell behind from online school during the pandemic, so it is important to examine the SDD in this context, which is one of the likely contributing factors to the increase in lower student grades from this time period.

The mixed-method study will be modeled partly after Klosky et al. (2022)'s paper titled *Effects of Remote Education During the COVID-19 Pandemic on Young Children's Learning and Academic Behavior in Georgia: Perceptions of Parents and School Administrators*. The methods the authors used were survey data and qualitative data from interviews and focus groups.

This proposed study will use a mixed-method approach by deploying a survey like the authors in the above paper did. If this project were to receive funding, a financial incentive would be provided to attract participants. The participants in this study will consist of teachers, guidance counselors, and principals from Arizona schools.

The survey will include questions like:

- Did you teach online classes at any point between 2020-2022?
- What struggles did students have in online classes?

- What students' education was most negatively affected by online school?
- How did students from lower SES perform in online school compared to students from a higher SES?
- How did students with a disability's grades compare to students without a disability's grades in online school?
- How were students impacted by the SDD?
- How far behind in time/material are students from lower SES and those with disabilities compared to other students?
- What can be done to get students who suffered from the SDD caught up to other students?
- What can be done to help bridge the SDD in online education?

The above questions are just an example, as more questions will be included to gauge staff experiences, observations, and opinions regarding students' struggles with the SDD in online education. These questions will give me both quantitative and qualitative data, which will help answer how far behind these students are compared to their peers because of the SDD while also gaining valuable insights from staff on what can be done to help repair the damage that has been done to these students' education. It is important to examine how far behind these students are and equitable ways to get them caught up, so they can continue their education alongside the other students in a fair manner.

The questions will be held on a digital survey using Google Forms. This can be easily sent to participants while relaying the information back to me. If this study is conducted, I would not collect any personal data from the participants themselves or data that could identify them in any way.

I am choosing the state of Arizona to sample because I hope that possible participants will be more likely to respond to me as a student who goes to Arizona State University. Within this sample of Arizona public schools, I will be sending the survey to participants from schools with a diverse range of students. To find out this information, I will use the National Center for Education Statistics' database of Public School District Finance Peer Search to find schools to survey around the median revenue per student.

The revenue per student will provide a proxy for determining school wealth. The median schools will be chosen to prevent outliers and to ensure the school has a diverse range of students who come from different SES. To reduce the results, I will limit them from the database to schools within 50 miles of Phoenix Arizona using the zip code 85001. I will then limit the results further to only public schools.

To have the survey sent out to the staff of the schools, I will contact the administrators of each school that is left from the edited database to send the survey if the school allows it. Receiving answers from administrators and the survey can take time, so I would like the schools' staff to have as long as possible to reply to the survey without hindering the progress of the research. I believe a two-month window should suffice.

Once the window for completing the survey is finished, I will then analyze the data. I will first clean the data by manually deleting the rows with bad data or using python if there are enough replies. Once the data is cleaned, I will find the median time of how long the schools' staffs believe lower SES students and those with disabilities are behind from the rest of their peers because of the SDD during online school. I will then manually conduct a thematic analysis of the qualitative answers about what the schools' staff believe can be done to bridge the gap in the SDD and students who are behind from others due to online learning. I will also include the

proposed solutions in the papers by Wu et al. (2014), Cheshmehzangi et al. (2023), and Azionya and Nhedzi (2021).

Limitations and Ethics

Ethical Considerations

The proposed study strives to be as ethical as possible. This study will need to be approved through Arizona State University's IRB since it is surveying people. To be ethical, I propose to keep the participants fully anonymous. The data that is collected that is somewhat personal, such as school and position, will not be released. The data will be securely stored as well. No personal information on the students will be collected. No personal statements made by the staff will be included in the paper. The only data that will be released is the median time for how far these students are compared to others and a thematic analysis of what can be done to bridge the gap. This information will not lead back to any specific staff member from a specific school.

Limitations

As with any study, this study will fall short in a few areas. It will only be a small sample of Arizona public schools near Phoenix that is surveyed. Although this sample will provide valuable insights, it must be remembered that this study should not represent the entire student population. The observed time period that states how far behind some students are, is not factual but based on the perspectives of staff. This must be considered when dealing with this data elsewhere. This should also be considered with the thematic analysis as well. This study also looks at a single problem of education from the Covid-19 pandemic. While this is an important

study, this is a nuanced topic that requires much more consideration. This paper only aims to examine a small facet of a larger problem.

Conclusion

The COVID-19 pandemic caused many students to fall behind their peers when classes were online. One of these reasons being the SDD. It is important to find out how far behind academically students from lower SES and students with disabilities are compared to their peers because they faced additional challenges in an online environment due to the SDD. Figuring this out, combined with how to help bridge the divide, will help schools adopt measures to help marginalized students get caught up with their peers. This is important because all students deserve to have the same equitable education.

About the author

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Acknowledgements

I would like to thank my professor Alexander Halavais for the help with the project. He helped develop my idea and gave me valuable insights to further the project along. I would also like to

thank all my classmates who gave me feedback on this project and for continuing to challenge me as a student, giving me the room to grow.

Notes

1. (Gilster, 1997 as cited in Bawden, 2008, p. 18)
2. (Mann et al., 2021, p.1)

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