

Two Screens for Teachers: Impact Evaluation

Summary. In a recent survey of over 3,800 teachers, teachers reported feeling nearly twice as connected to their students after receiving and using a second monitor. Similarly, teachers rated their students as significantly more engaged in online classroom learning. These improvements in teacher-student connection were likely due to the increases in the teachers’ organization and content delivery, as well as physical and technological comfort.

Purpose. The purpose of this report is to describe results from an online survey of teachers who received a second computer monitor, cable, and technical support¹ from Two Screens for Teachers (Two Screens), a non-profit, community-based organization located in Seattle, Washington. The survey was designed and implemented in *Qualtrics* and analyzed in R by Dr. Elizabeth Sanders and two of her graduate research assistants² in Measurement & Statistics at the University of Washington³ (UW) College of Education. The **primary focus of the project was to gauge changes in student and teacher connectedness after teachers were able to use the second monitor they received from Two Screens for online teaching**, in addition to changes in teachers’ instructional flow, technological comfort, and physical comfort during online teaching. To this end, we used “retrospective” item design with “before” and “after” ratings, ranging from 1 (poor) to 5 (excellent)⁴. Teachers were also asked about the grade levels and subjects they taught over the last year, as well as their teaching experience both in terms of their online teaching with the second monitor as well as their total teaching career experience. Last, teachers were given space to write about their experiences about how the monitors were beneficial, as well as any issues or suggestions they had. The survey was open for one week during the second week of January 2021, with an incentive to participate for a chance to receive one of two Amazon gift cards.

Survey Sample. Two Screens provided the UW team with a list of 18,478 teachers to survey; of these, 17,933 were actually surveyed⁵. From those surveyed, $N = 3,847$ (21%) accessed the survey questionnaire and of these, **3,418 were included in statistical analyses**⁶, resulting in a 19% response rate⁷. The analytic sample represents 48 of the 50 U.S. states as well as the District of Columbia⁸, with response rates varying by state (Figure 1). **In terms of participation counts, six states comprised over 50% of the sample:** CA, KS, MA, NY, OR, WA, and VA.

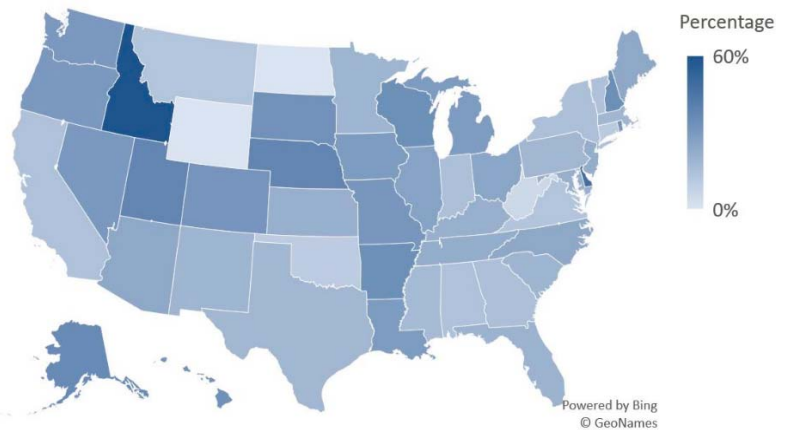


Figure 1. Heat Map of Survey Response Rates

¹ Some teachers had not yet received the monitor due to COVID19 shipping delays or very recent requests.

² LizAnne Ngo and Nathan Abe served as graduate research assistants for this project. LizAnne assisted with survey design and Nate assisted with data analytics and visualization.

³ The UW Institutional Review Board deemed this project as an evaluation activity (non-research); therefore teacher consent to participate was not required; nevertheless, teachers were free to not respond or discontinue participation at any time.

⁴ To maximize response rates, response completeness, and avoid burden on teachers’ time, simple rating scales are best.

⁵ Of the original list, 473 emails were undeliverable, 66 emailed that they had not received their equipment yet, and 6 had just received equipment.

⁶ Inclusion was defined as teachers who completed at least the ratings portion of the survey.

⁷ Online survey response rates are typically 10 – 30%.

⁸ Of the original list, North Dakota ($n = 7$), Wyoming ($n = 2$), and Puerto Rico ($n = 3$) had no responses.



Before-After Monitor Changes. Multilevel regression models, which controlled for correlations among teacher responses within zip codes and states, were used to estimate changes in teachers’ ratings⁹ adjusted for dependencies¹⁰. Results from these analyses revealed **significant positive change across all items** (coefficient *t*-test *ps* < .001), **with large effect sizes of 1.3 points or more in increases** (Cohen’s *ds* ≥ .8). Further, after controlling for all available predictor variables (such as teacher experience), these increases remained statistically significant. Sample means for each item before and after using the monitor are provided below (variable descriptive statistics provided in the Appendix).

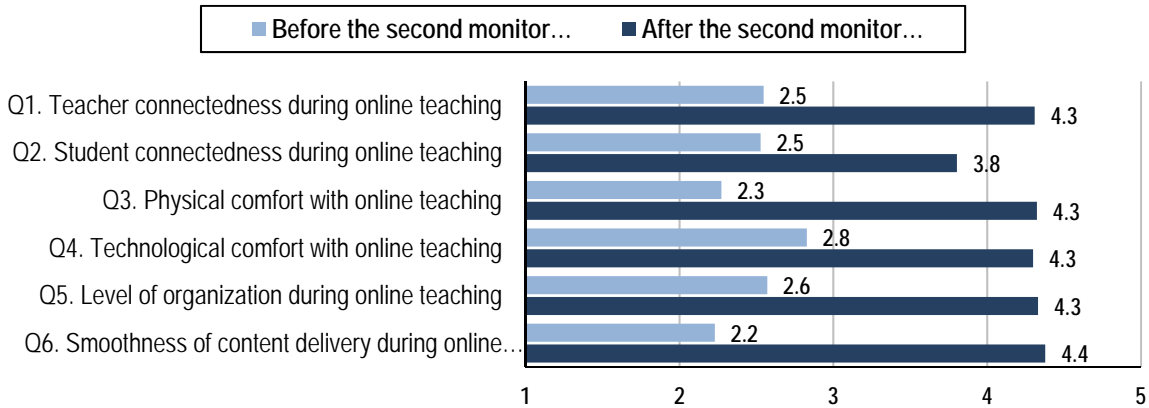


Figure 2. Before- and After-Monitor Mean Ratings

Factors Linked to Changes. In addition to evaluating mean rating increases, we also tested whether any teacher-related variables were significantly associated with changes, again using multilevel regression models. Results showed **three consistent indicators of greater positive change: 1) teachers from high poverty schools¹¹, 2) teachers who taught grades K-5, and 3) teachers who had more time using the second monitor.** Other unique relationships were also found, but depended on specific variables (see Appendix). Notably, subject taught had few links with ratings increases.

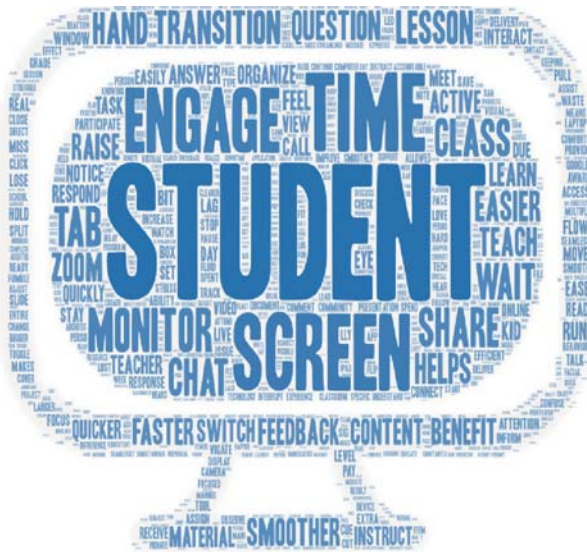


Figure 3. Text Display of Student Benefits

Open Ended Responses. At the end of the survey, teachers were asked to describe their thoughts in their own words. Importantly, we asked the question: **“Were there any specific benefits for your students you observed in being able to use the second monitor for your online teaching?”** Simple analysis of the text corpus, excluding terms like “the,” revealed the top 10 most frequent terms (in order of most to least frequent) were: *Engage, Share, Lesson, Question, Transition, Smoother, Content, Feedback, Faster, and Helps.* Figure 3 displays the entire corpus of unique terms (greater size indicative of greater frequency). A random selection of 10 teachers’ quotes are shown in the Appendix.

⁹ Before-after monitor measured using retrospective questions with a 5-point scale (1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent).
¹⁰ N = 3,418 teachers across 48 states and Washington, D.C. Models estimated in R using lme4 with lmerTest (coeff tests use Satterthwaite *df*).
¹¹ Higher poverty schools are those designated as having school-wide student enrollment in Free- and Reduced-Lunch (FRL).



Appendix

Variable ¹²	<i>M</i>	(<i>SD</i>)
School FRL Status = Yes	0.71	(0.45)
Experience Teaching (Years)	14.18	(8.65)
Experience with New Monitor (Months)	2.25	(1.53)
Grades Taught		
Preschool	0.05	(0.22)
K-5	0.37	(0.48)
6-8	0.25	(0.44)
9-12	0.29	(0.45)
Other (e.g., Counselor)	0.02	(0.13)
Subjects Taught¹³		
Subject = ELA	0.35	(0.48)
Subject = Math	0.32	(0.47)
Subject = Science	0.27	(0.44)
Subject = History	0.07	(0.26)
Subject = Social Studies	0.23	(0.42)
Subject = Art	0.06	(0.23)
Subject = Foreign Language	0.03	(0.18)
Subject = Other (e.g., P.E.)	0.29	(0.45)
Before-After Monitor Change (Gain)		
Q1. Teacher Connectedness ¹⁴	1.76	(0.97)
Q2. Student Connectedness	1.28	(0.96)
Q3. Physical Comfort	2.05	(1.10)
Q4. Technology Comfort	1.47	(1.06)
Q5. Instructional Organization	1.76	(1.13)
Q6. Instructional Delivery Smoothness	2.15	(1.04)

Table A1. Sample Means and Standard Deviations (Unadjusted for State/Zip Code)

¹² *N* = 3,418 teachers across 48 states and Washington, D.C.

¹³ Subjects taught are not mutually exclusive.

¹⁴ Before-after monitor measured using retrospective questions with a 5-point scale (1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent).



Variable ¹⁵	Q1. Teacher Connect	Q2. Student Connect	Q3. Physical Comfort	Q4. Technology Comfort	Q5. Instruction Organization	Q6. Instruction Smooth Delivery
School FRL Status = Yes	+	+		+	+	
Experience with New Monitor (Months)	+	+	+	+	+	+
Experience Teaching (Years)	+	+	-		-	
Grades Taught						
Preschool			-	-	-	
K-5	+	+	+	+	+	+
6-8	-	-			+	
9-12	-	-	+		+	
Other (e.g., Counselor)						
Subjects Taught ¹⁶						
Subject = ELA						
Subject = Math						
Subject = Science	+					+
Subject = History			+	+	+	
Subject = Social Studies						
Subject = Art						
Subject = Foreign Language	+			+		
Subject = Other (e.g., P.E.)	+					+

Figure A1. Multilevel Regression Results Before- and After-Monitor Rating Gains using Teacher Variables (positive sign = greater increase, negative sign = less increase)

¹⁵ N = 3,418 teachers across 48 states and Washington, D.C.

¹⁶ Subjects taught are not mutually exclusive.



Teacher ID	Response (verbatim)
16887	I'm able to keep screen share up for my students all period. I don't have to keep exiting screen share to do private matters, like take attendance or putting in grades.
4183	When I started using a second monitor, I felt free to began to use more interactive teaching activities, such as annotation in Zoom and online games that I've created. Students have become more involved in the lessons, and their achievement has increased.
15525	I was able to see them and monitor them better which helped them be more engaged and get more help when needed.
4945	There is much less wasted time as I have them on one screen and my slides on another screen. It really helps the sessions go smoothly.
3414	I believe the students benefit because I am more comfortable with sharing the screen and documents because I have the ability to see more of the total picture.
1179	They appreciated not having to wait for me to move the gallery out of my way or have to tell me that they couldn't see something because I was off the screen and didn't know it.
5183	My student are visual learners so having a second screen is very beneficial.
12177	They saw less disruption in sharing screens and heard me say, "Wow, this is amazing to have an extra screen. It's so helpful".
5516	If I'm more organized, it affects them positively.
13316	It keeps me better organized with less downtime, so it's a better experience for the students.

Figure A2. Random Sample of Quotes from Teachers about Student Benefits from Second Monitor

