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All a-board: sharing educational data science research with school districts

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Extended Abstract

Educational data scientists often conduct research with the hopes of translating findings into lasting change through policy, civil society, or other channels. However, the bridge from research to practice can be fraught with sociopolitical frictions that impede, or altogether block, such translations—especially when they are contentious or otherwise difficult to achieve. Focusing on one entrenched and controversial educational equity issue in US public schools—racial and ethnic segregation—we conducted randomized email outreach experiments and surveys to understand how local school districts respond to algorithmically-generated school catchment areas ("attendance boundaries") designed to foster more diverse and integrated schools. In particular, we sought to explore the following research questions: 1) which messaging and outreach strategies are more or less effective in prompting school district leaders and community members in exploring potential boundary changes that could help foster more racially/ethnically integrated schools? And 2) how do school district leaders and community members perceive these boundary changes—namely, what potential merits and pitfalls do they see in both how these boundaries were produced and their potential viability in practice?

Data and methods. We started with the datasets and rezoning algorithms used in [3], which applied methods from combinatorial optimization to simulate alternative attendance boundaries for 98 large school districts across the US. The study found that it may be possible to reduce White/non-White segregation by a median relative 12% across these districts while also slightly reducing travel times. We expanded these simulations to over 4,000 US public school districts and displayed results through an interactive data dashboard, depicted in Figure 1. Next, we conducted several waves of cold email outreach to approximately 4,320 elected school board members[1] across the largest 800 districts in our sample that we also had board member contact information for. Each board member only ever received one email, and outreach proceeded as a series of cluster-randomized control trials, where board members within a district (cluster) received the same randomly-assigned email subject line and corresponding email body. Emails included a direct, personalized link to the dashboard so they could explore boundary changes for their district. Table 1 illustrates the different subject lines included in the study. On the dashboard, we included an optional survey to invite leaders and community members to share their feedback on the depicted rezonings, whose questions are shown in Table 2.

Results. We found that overall email open rates from this cold outreach were around 40%—relatively high and in line with a prior study that also involved cold outreach to school board members [2]—but click-through rates were extremely low (2.5%), and subsequent dashboard exploration was virtually non-existent. Board members, however, appeared responsive to different messaging techniques—particularly those that dovetailed issues of racial and ethnic diversity with other top-of-mind issues (like school capacity planning). The most effective subject lines were developed after hearing feedback from district board members through informal conversations conducted in between email waves. Figure 2 illustrates the estimated causal effect of subject lines on open and click-through rates.

[1]Contact information for these school district leaders was acquired through a data sharing agreement with the XQ Superschool initiative: `https://xqsuperschool.org/`.

Observing low engagement, we turned to another channel for reaching school districts: media coverage. We contacted an education journalist (with whom we had only conversed once previously about another project) for guidance on alternative channels for reaching school districts. The outreach resulted in two news articles about the dashboard, written by two different journalists, yielding over 3,700 dashboard explorations across 500+ school districts in 42 states. Perhaps most notably, districts with higher levels of White/non-White segregation were more likely to be explored. This suggests that media coverage was effective in drawing attention to those districts where there is, arguably, the greatest scope for diversity-promoting change.

Finally, through email outreach and media coverage, we obtained 11 total responses to the survey hosted on the dashboard. While an extremely small and biased set of responses, the input offered a number of rich qualitative insights. When asked what they found troubling or concerning about the depicted rezonings, many respondents commented on the fact that the depicted changes to school demographics were quite small. One school board member mentioned "The computer program only had 1 school out of 13 with a significant change which is not worth the headaches rezoning causes. The other 12 barely changed if at all." When asked what they found surprising, interesting, or novel about the depicted rezonings, several respondents expressed an optimistic outlook. For example, one community member commented that they felt "...Surprise that this could be done. Surprise that the transportation impact is so small." A school board member shared that "This is helpful information and a worthy project, and I don't want perfect to be the enemy of improvement. I think there are practical solutions to improving racial diversity here." These qualitative responses highlighted some of the potential merits and pitfalls of implementing algorithmically-informed boundary changes for fostering more integrated schools.

Discussion. In response to RQ1, we found district leaders to be responsive to different email subject lines—particularly those that dovetail issues of racial and ethnic diversity with other top-of-mind issues (like school capacity planning). Furthermore, media coverage drove more dashboard engagement, especially in more segregated districts. A small but rich set of survey responses from school district communities illuminated RQ2—by both identifying some potential drawbacks to implementing boundary changes for diversity, but also, features of the research findings that might support positive change on the ground. Our study has the potential to add to the small but growing literature on communicating research findings to education stakeholders in order to inform policy changes [4, 2]—and even beyond education, to the emerging field of "implementation science" [1] in order to better-understand how research findings can translate into real-world impact.

References

[1] Mark S. Bauer et al. "An introduction to implementation science for the non-specialist". In: *BMC Psychology* 3.32 (2015).

[2] Angele Delevoye. "School boards in 2020: deliberation and decision-making in a crisis". In: *Working Paper* (2021). URL: https://drive.google.com/file/d/1-2rcwRetEJ6J8QeSb8JWF4hb4noWUuN5/view.

[3] Nabeel Gillani et al. "Redrawing attendance boundaries to promote racial and ethnic diversity in elementary schools". In: *Revise and resubmit* (2022). URL: https://drive.google.com/file/d/1iK6kS7YnxBKNqIHwNP7sqTVh1lbqmiAM/view.

[4] Nozomi Nakajima. "Evidence-Based Decisions and Education Policymakers". In: *Working Paper* (2021). URL: https://nozominakajima.github.io/files/nakajima_policymaker.pdf.

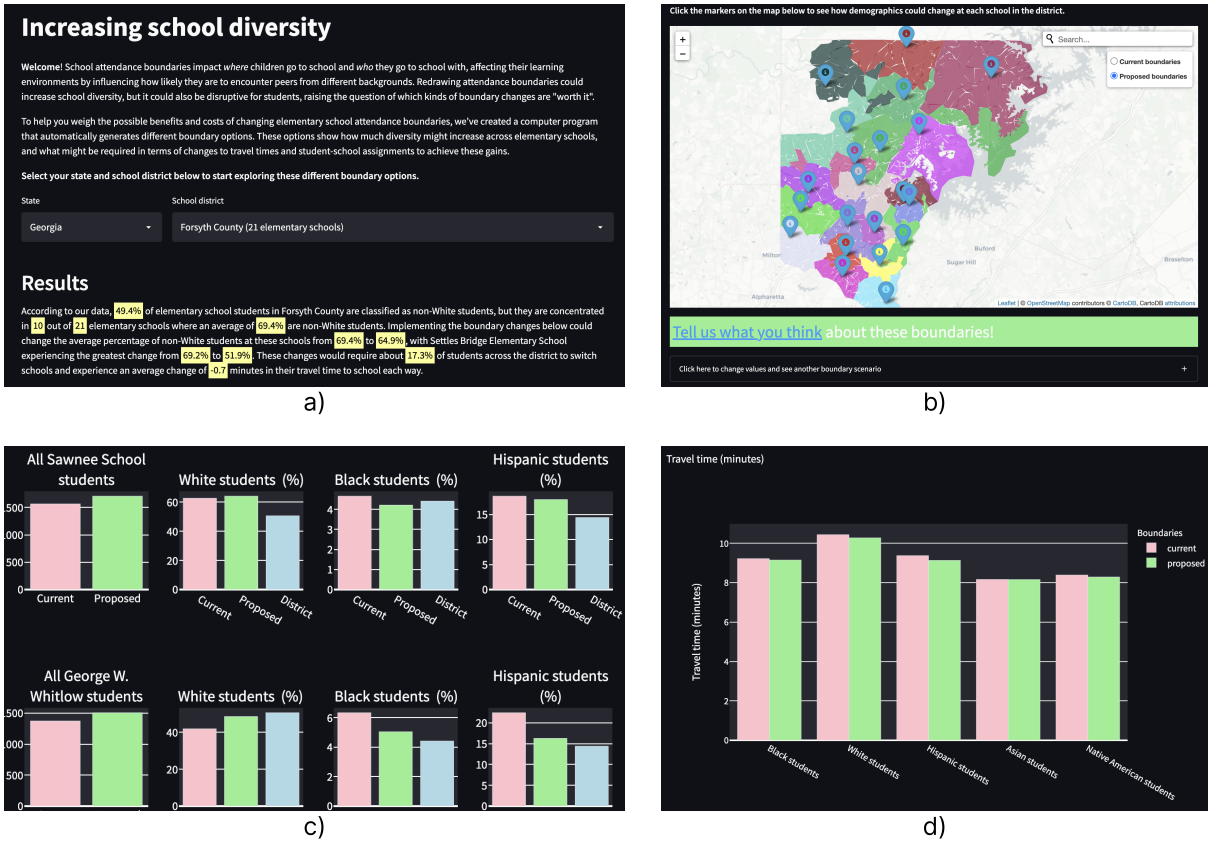

Figure 1: Key screenshots of rezoning dashboard, which can be found at [url redacted]: a) shows the view "above the fold" when users land on the page and includes a description of why attendance boundaries matter and what the objective of the dashboard is. It also provides drop-down boxes for users to explore hypothetical boundary changes for different school districts, and includes a verbal description of what the depicted changes for any given district would mean in terms of changes in diversity across its constituent elementary schools. b) shows a map view, where users can toggle between boundaries proposed by the redistricting algorithm and current "status-quo" boundaries. Further down the page and hidden by default is c), which allows users to drill into specific schools to understand how their demographics would change under the depicted rezoning. Finally, further down is d), which shows how travel times would change (on average) for different racial/ethnic groups under the rezoning.

Email subject line	**Hypothesis**	**Wave(s)**
Diversify Learning	Concise subject line that highlights project topic	Test, 1
Diversify Learning and get $20 for a school	A small incentive that board members can allocate to a teacher of their choice may increase engagement	1
Data science to diversify attendance boundaries	"Data science" might pique interest, especially in the context of boundary planning	2
$20 for your views on diversifying attendance boundaries	A small incentive that board members can allocate to a teacher of their choice may increase engagement	2
Data science to improve learning experiences	"Data science", focusing on learning instead of diversity may increase engagement	2
Data science to diversify learning experiences	Same as above, but mentioning diversity and learning together	2, 5
More diversity with shorter commutes?	Stating the main finding of [3] up front may increase engagement	3, 5
More diversity with shorter commutes? $20 for your thoughts!	Stating the main finding of [3] up front and adding the incentive may increase engagement	3
More diversity, less driving?	Pithy description of findings from [3]	4
2,000 pennies for your thoughts	Pithy version of incentive email	4
Improve discussions about school diversity with families	Heard from districts that they find it difficult to talk with families about diversifying schools	5
Data science to diversify learning and reduce commuting times	Combing learning, diversity, and shorter commute messages from earlier	6
Data science to decide which schools to open or close	Framing in terms of a problem school districts often face that triggers boundary planning may increase engagement	6
Data science to diversify learning and reduce commute times	Has elements of promising subject lines throughout runs	Final

Table 1: Email subject lines and corresponding hypotheses motivating their inclusion across different email waves.

Survey question

1. How happy would you be with this rezoning? [Very happy / Somewhat happy / Neutral / Somewhat unhappy / Very unhappy / Other:]

2. How happy do you believe other families would be with this rezoning? [Very happy / Somewhat happy / Neutral / Somewhat unhappy / Very unhappy / Other:]

3. How much do you trust the computer program that created this rezoning? [I trust it completely / I sort of trust it / I'm not sure if I trust it or not / I don't trust it / Other:]

4. After learning about this project, how do you feel about the idea of redrawing attendance boundaries to increase diversity in your district's schools? [More interested in the idea than before / Less interested in the idea than before / About the same level of interest as before / Other:]

5. How much do you agree with the following statement: "I believe changing attendance boundaries is a valuable strategy for promoting more diverse schools in my district" [Strongly agree / Agree / Neutral / Disagree / Strongly disagree / Other:]

6. What's something you found interesting, surprising, or novel about the proposed rezoning, if anything? [Open-ended response]

7. What's something you found troubling or concerning about the proposed rezoning, if anything? [Open-ended response]

8. Do you have any other thoughts or reactions that you'd like to share? [Open-ended response]

9. Please share your contact information if you would like for a member of our team to reach out to you to discuss this project further, including how it might be applied to your school district.

Table 2: Questions included in survey linked off of the dasbhoard.

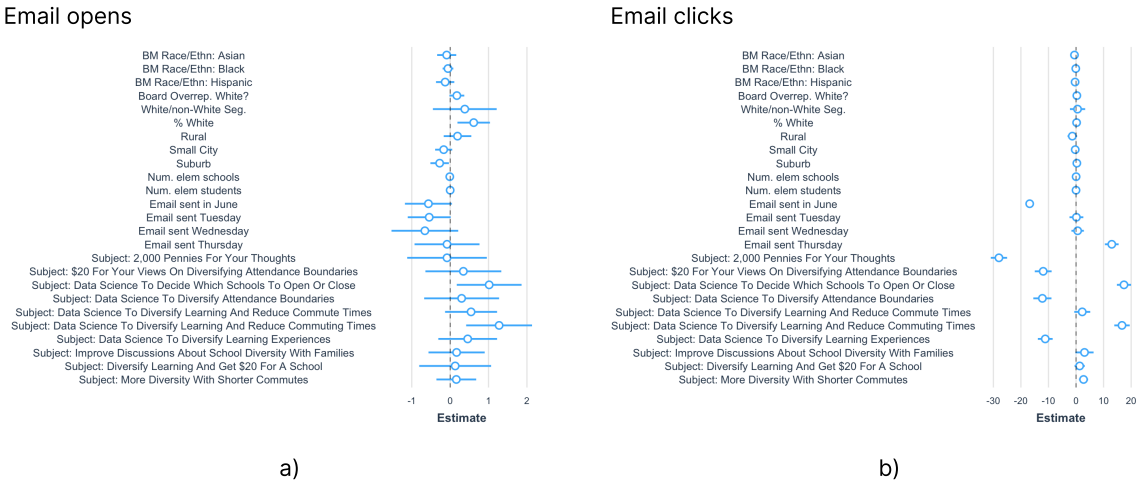

Figure 2: Associations between different logistic regression variables (with cluster-robust standard errors) and likelihood of board members opening and clicking emails, respectively. The "Subject: ..." variables represent different email campaigns and the depicted values can be interpreted as the magnitude of the causal effect of each campaign on open and click outcomes, since participants were randomly assigned to campaigns. Circles represent average associations (i.e., regression coefficient values, which indicate log odds), and lines represent 95% confidence intervals. Intervals that do not intersect zero indicates a statistically significant association between that variable and its depicted outcome at an α level of 0.05. The results for categorical variables indicate the magnitude of associations relative to a particular reference category: for BM Race, this is "White"; for Urbanicity, it is "urban"; for day of week email was sent, it is "Monday"; for month email was sent, it is "May"; and for the campaigns, it is the control subject line of "Diversify Learning".

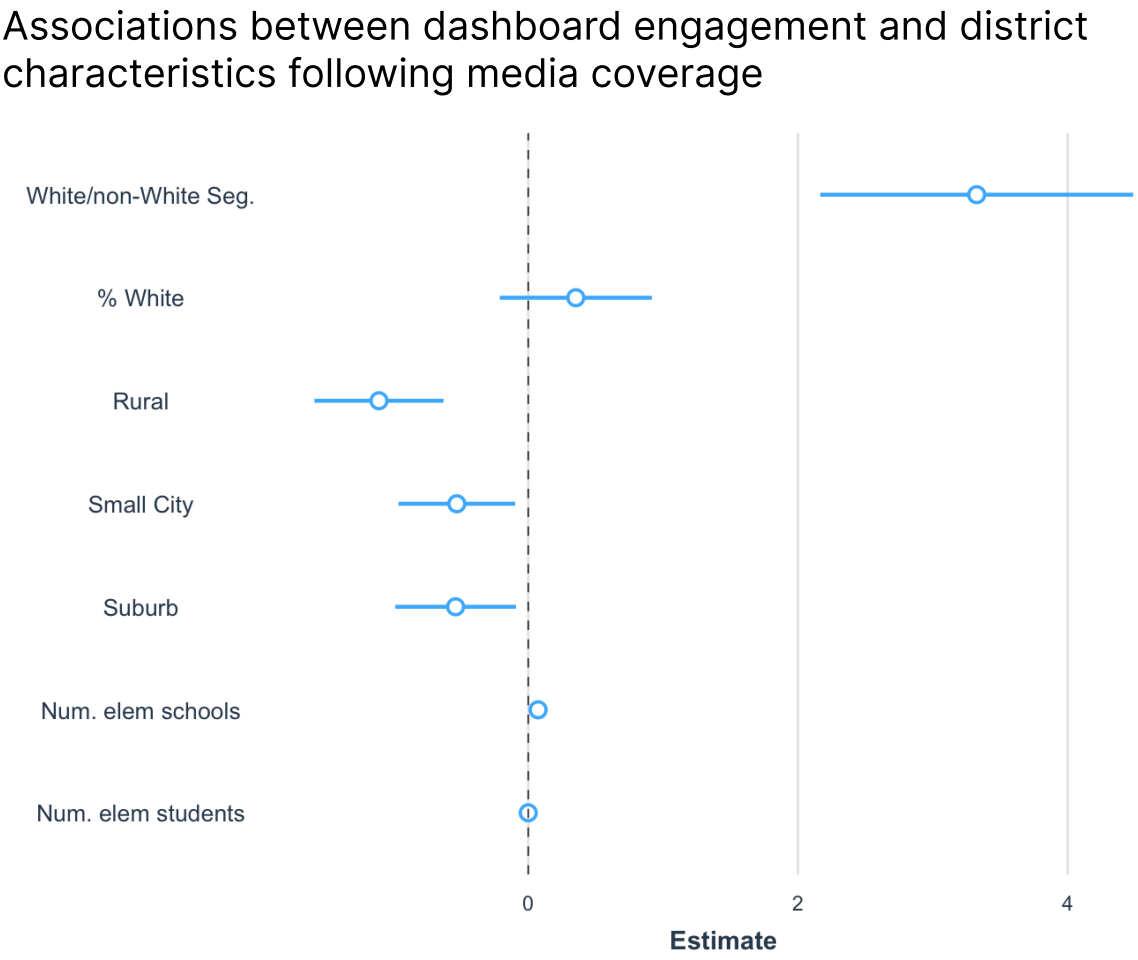

Figure 3: Outputs of a negative binomial regression depicting associations between the number of times a particular district is explored on the dashboard and various district-level characteristics.