Education III: Information Problems in Education

Eric Chan

May 24, 2017

1 Introduction

Eric is a graduate student at Columba Teachers' College. Prior to attending Columbia, Eric was a K-12 student in Boston Public Schools, as a low-income, ESL, and special education student, and eventually he worked for BPS for several years as a Research Fellow. These experiences shaped much of his research in the economics of education and improving outcomes for low-income students.

1.1 Review of Information Problems

- Educational outcomes (especially those that can be addressed at an informational level) often result from various parent and student inputs.

- Parents and students do not always make decisions in rational ways that maximize the outcomes we think are best for them.

- Why do parents sometimes misallocate educational investments for their children?

  - E.g. (Dizon-Ross 2016 [7]): Most parents believe that schooling is more valuable for high performers, but often have trouble distinguishing which of their students are higher performing. In this field experiment in Malawi, after parents were provided with academic performance information, there was increased retention in school among higher-performing students but decreased retention among lower-performing students, and parents shifted textbook allocation to favor higher-performing students.
  - E.g. (Avery & Kane 2004 [1]): High school students from low-income family backgrounds have very little understanding of e.g. college tuition levels and financial aid opportunities, providing an explanation for the general consensus in the literature that low-income families send able students to college less frequently; (Horn, Chen & Chapman 2003 [9]).

- Why do students not choose to exert maximum effort, even when it is "optimal" (can improve grades or learning) to do so? (Lavecchia, Liu, Oreopoulos, 2014 [12])

  - (Bergman 2014 [3]) 20% (or up to 50-60% in certain districts) of students fail to complete assignments on time; (Romer 1993 [14]).

- Result: A rise of interventions that attempt to change behaviors.

- They do more than just try to change beliefs (as this may have undesirable outcomes in terms of changing behavior).
- Two types of information interventions are popular nowadays: information-only interventions for changing beliefs; and "nudges" for assisting certain actions.

1.2 Information Interventions

Types of Interventions:

- Information-only interventions are used to change underlying beliefs (and hopefully, behaviors):

  - Misinformation may lead to suboptimal outcomes.
  - Perceived returns to school may be too low (Jensen, 2010 [11]): in this experiment, they gave randomly selected students in DR information on labor market returns to education. Treated students completed more schooling.
  - Low-income parents have less access to information about schools and schooling outcomes, so they have an inaccurate perception of student and schools (in this talk: Bergman, 2014 [3]; Bergman & Chan, 2017 [5]; Bergman, Chan, Hill, & Schwartz, in progress).
  - Low-income families may overestimate costs or may not know about tax credits for college (Bergman et al., 2016 [4]): in this experiment, they give families information about tax credits for college by both email and snail mail; this did not affect college enrollment at all.
    * This might be showing the ineffectiveness of information-only treatments at attempting to get families to make a (possibly) suboptimal decision.
    * One possible reason for ineffectiveness: emails were typically read only by students who were determined to be highly probable to enroll in college without the intervention.
    * Another possible reason for ineffectiveness: Tax credits were not well designed, and may not have properly incentivized parents.

- Information and "nudges" are used to remind, encourage, or assist people through complex decisions:

  - In the economics literature, a "nudge" is a positive reinforcement or suggestion to influence incentives and decision-making of certain groups of individuals; it is usually not entirely informational, also includes some suggestive or influential nature.
  - E.g. Students have difficult time navigating the college enrollment process. (Castleman & Page, 2015 [6]) used text reminders, alerts, and support for students for due dates for financial aid applications etc., with the goal of reducing 'summer melt' (students intending to go to college don't show up).
  - Low-income parents do not know as much about supporting children's education. (York & Loeb, 2014 [18]) used text messages to parents about how to support children's reading progress at preschool age (instructions, encouragement to give children); (Chan

& Sneth, in progress) use high-touch information via audio messages to Indian parents to support social, emotional and academic skills of children under 5.

– Overall, these seem to have more effect than information-only interventions.

Issues in Information Interventions

- We do not yet know about the optimal timing, frequency, and modes of giving information and nudges. (Chan & Sneth, in progress)

- There may be different reasons depending on levels of complexity and number of options - and many other issues related to psychology and behavioral economics literature (e.g., Iyengar et al., 2004 [10]; Scott-Clayton, 2011 [17]; Hastings & Weinstein 2008 [8])

  (Scott-Clayton, 2011 [17]): At community colleges, many students cannot navigate the complexity of having too many options, which contributes to dropout rates; (Hastings & Weinstein 2008 [8]): When parents are given too many options, they often only consider distance, and not other aspects such as quality of the school.

- *Question:* Intuition would say that giving people more options is better. Is it the case that sometimes a one-size-fits-all approach would be better?

  Answer: That really depends. The literature often bears out that if there are too many options they often go with the 'default', 'easiest', or 'nearest' choice, which may be worrisome depending on whether the default choice is appropriate for them. What a lot of the literature emphasizes is that simplicity (in the form of people understanding the options) is important.

  For example, when changing the school choice process at BPS, parents didn't necessarily want more choices. They wanted to understand the choices they were receiving for their child. It wasn't enough to be given a lot of choice but only see that 'my child got into this school but I don't know why'. (This was based on Eric and BPS going out into all the neighborhoods of Boston to encourage parents to attend meetings with administrators, teachers, and researchers, and collecting detailed feedback in such meetings about what parents and schools wanted in the school choice process.)

2 Leveraging Parents: The Impact of High-Frequency Information on Student Achievement (w/ Peter Bergman)

Motivation

- In Los Angeles:

  – 11% of parents didn't understand the A-F grading system (e.g. believing that an F was better than an A).
  – Parents understate their child's missed assignments by 10+ .

- In Michigan:

  – 31% of parents did not know how many report cards they should receive.
  – 33% of parents heard from their school 2 times or less a year.

- 24% of parents couldn't identify a B- as better than a C+.

- In West Virginia (setting for the paper):

  - Parents understate their child's absences (-1.7 days in last month).
  - Median contact from school: Less than once every 3 months.

- Information asymmetries exist between parents and children [Akabayashi (2005), Bergman (2014), Bursztyn and Coffman (2012), Cosconati (2009), and Weinberg (2001)].

- Providing information impacts student achievement [Bergman (2014), Kraft and Dougherty (2013), Kraft and Rogers (2013), Bergman and Rogers (2016)].

The Experiment

- Goal: Low cost, high impact informational intervention.

  1. Previously: High-touch community-based organization (Bergman, Edmond-Verley, Notario-Risk, 2016).
  2. Previously: Web access/parent portals (Bergman, 2016 [2]).
  3. This paper: Automated alerts.

- The technology:

  - Automatically draw grade data from existing digital teacher gradebooks
  - Sync with attendance data system
  - Sync phone numbers with Student Information System
  - Use Twilio's API to send text messages

- The alerts:

  - Low-grade Alert: (sent once per month, if child had <70% average)
    Jared has a 31% average in: MATH II. For more information, log in to:www.*gradebook*.com.
  - Missing Assignments Alert: (sent once per week)
    Joan has 4 missing assignment(s) in Science. For more information, log in to: www.*gradebook*.com.
  - Absence Alert: (sent once per week)
    Emily has 1 absence(s) in: SPANISH III. For more information, log in to: www.*gradebook*.com.

- The context:

  - West Virginia school district
  - 22 middle and high schools
  - 50% of students receive free lunch
  - Similar test scores to state averages
  - Remark: Not particularly low-achieving, but very low-income

- The design:

- Randomize schools/grades into treatment/control (accounting for spillover effects)
- Treatment: turn on alerts
- Can't prevent the control group from turning them on (they have access to alerts but they are not automatically turned on, only 1-2% of control group turned on these alerts)
- Randomized which parent (father/mother) received messages
- Stratify by school level, below-median GPA

- Balance:

Variable	Control Mean	Treatment Difference	P-Value	Obs.
Female	0.49	-0.01	0.71	1133
English Learner	.02	0.00	0.82	1133
Black	0.16	0.04	0.09	1133
Grade	7.62	0.00	0.99	1133
GPA	2.84	0.00	0.99	1129
Percent Days Absent	0.06	0.01	0.13	1131
Parents in Household	1.77	-0.03	0.26	1133
Target Parent is Female	0.62	-0.02	0.56	988
Suspension Occurrences	0.20	0.03	0.44	1004

Results

Primary Academic Outcomes

	Classes Failed	Class Attended	Retained	Math	Reading
Alerted	-0.38***	48.46**	0.02**	-0.01	-0.08
	(0.14)	(23.08)	(0.01)	(0.06)	(0.05)
Control Mean	0.97	277.70	0.97	0.00	0.00
Observations	1,113	1,137	1,137	927	925

Most results driven by below-average GPA and High School students.

This table shows treatment-on-the-treated (TOT) effect estimates on primary academic outcomes specified in the pre-registered analysis plan. Treatment effects are estimated using 2SLS regressions with the instrumented alerted variable, an indicator for parents who received at least one text. All regressions include strata indicators and a set of demographic covariates described in the text. Standard errors are clustered at the grade-school level. Outcome variables are from gradebook and administrative data. Classes failed are total failed courses after treatment started. Classes attended is the numerical total of classes marked as present after treatment started. Retention is defined as taking courses after the intervention began. Math and Reading scores are z scores from standardized test scores. All tests for primary outcomes are one-sided tests. *** p<0.01, ** p<0.05, * p<0.10

Student failed fewer classes and attended more classes, but there were no observable effects on standardized tests (which, it should be noted, were not viewed as reliable measures of student performance as they had no stakes for the students).[1]

Student Grades

	F	D	C	B	A
Alerted	-0.38***	0.10	0.29**	-0.17	0.25
	(0.14)	(0.10)	(0.12)	(0.12)	(0.26)
Control Mean	0.97	0.84	1.32	1.79	3.33
Observations	1,113	1,113	1,113	1,113	1,113

*** p<0.01, ** p<0.05, * p<0.10.

Fewer F's (turned into D's and C's).

Assignment Scores, Missed Assignments, Class Exams Scores

	Assignment Scores	Missed Assignments	Class Exams
Alerted	0.09***	-0.02	0.13***
	(0.03)	(0.01)	(0.04)
Control Mean	0.02	0.09	0.00
Observations	70,076	77,418	7,342

*** p<0.01, ** p<0.05, * p<0.10

No real effects on missing assignments, but scores went up on average.

---

[1] The state superintendent's commission expressed concerns that the exams are not "an accurate gauge of student achievement" and "doesn't give much reason for students to take it seriously."

Parents' Behavioral Responses

Panel A.	Contacted the School	Talked w/ Child	Parent Logins
Alerted	0.17***	0.07	7.07
	(0.06)	(0.06)	(6.40)
Control Mean	0.33	0.74	30.1
Observations	443	438	1,137
Panel B.	**Took Privileges**	**Grade Inaccuracy**	**Continue Texts**
Alerted	0.08	-0.19*	0.04**
	(0.05)	(0.10)	(0.02)
Control Mean	0.32	0.50	0.94
Observations	401	307	433

*** p<0.01, ** p<0.05, * p<0.10

Parental beliefs about missing assignments were not strongly affected (not visible in table, but shown in the paper) and parental beliefs about grades became more accurate.

- *Question:* How should we interpret the coefficients?

  Answer: Most coefficients are standard deviations (e.g. the 0.17 for 'Contacted the School'). 'Classes Failed' and 'Classes Attended' are in terms of absolute numbers of classes. 'Math' and 'Reading' are standardized.

- Note: Much of the improvement was driven by changes in outcomes of high school students with low average GPA.

- Aside: They had initially wanted to perform the experiment in DC with high school students, but received pushback from parents that high school students would not change student behavior based on parent engagement. However, in the experiment in this paper ,the impact was much higher on high school students than on middle school students.

- *Question:* This seems to be a low cost experiment with great results. Have people picked it up? Is it being used everywhere?

  Answer: The possibility to scale is definitely there. The biggest barrier to implementing it more widely is that information systems in school districts are highly varied and usually very poorly set up. If you go into two different school districts, they generally use different systems. It's generally not a place where districts have the capability to use the information unless there are companies working on information systems in the school district willing to

do this. (Once the system is in place, the code is not difficult to write and the intervention not difficult to implement.)
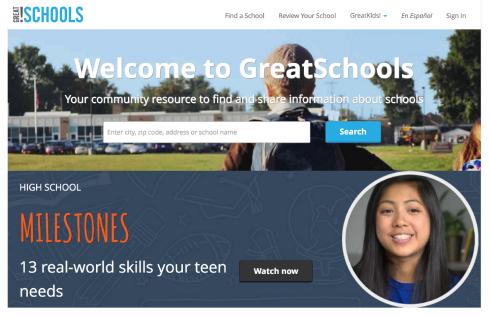
3 Improving School Choice Through Informed Residential Choice: Preliminary Evidence from a Large-Scale, Randomized Trial (w/ P. Bergman, M. Hill, & H. Schwartz)
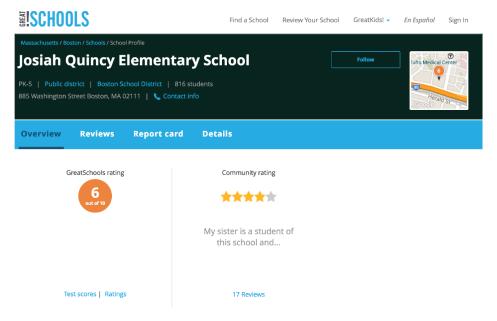
Motivation

- Housing Location is a powerful factor in childhood development.
  - High quality schools can improve student achievement. (e.g., Schwartz, 2010 [16])
  - Yet low-income families often do not choose high-performing schools or do not choose to live in neighborhoods with high-performing schools. (Orr et al. 2003 [13])
  - Possible Explanation: Lack of Quality Information on School Quality / Information Asymmetry. (e.g., Hastings & Weinstein, 2008 [8]; Schneider, Teske, & Marschall, 2000 [15])
    - * E.g. On websites such as Zillow, used by those above the low-income range, one can view quality of schools in the neighborhood of the property.
    - * But many families on housing vouchers etc. don't have access to that kind of information when making residential choices.
- Our Study: RCT to provide school quality information to low-income families.

The Experiment

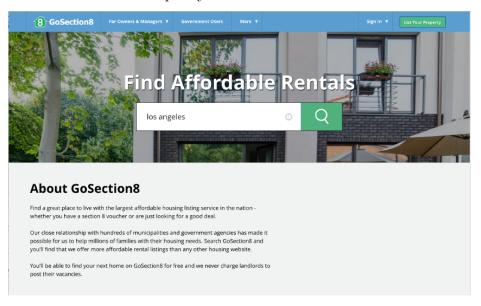- Study partner: GreatSchools.org (which provides information on school quality)
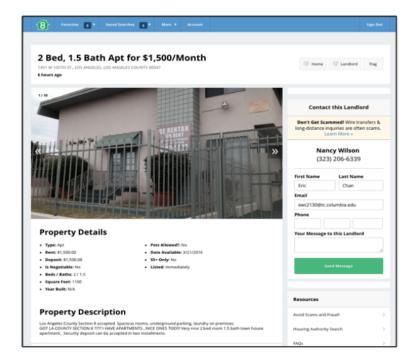

(a) Home Page

(a) Example School Rating

- Study partner: GoSection8.com
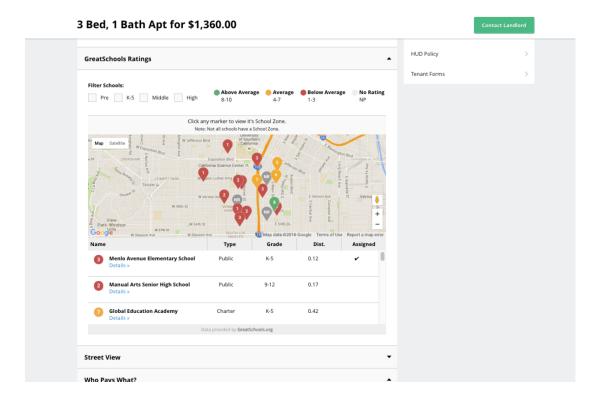 Note: No information on quality of schools in the area.

(a) Home Page

(b) Example Property Listing

- Pilot Intervention: Including GreatSchools Information about neighborhood schools.

No results yet, but they collected a treasure trove on how parents make decisions using school data (which is waiting to be analyzed).

- *Question:* How many participants actually used the GreatSchoolRatings component of the GoSection8.com intervention? (And how did you determine this number?)

  Answer: This section was open by default, visible right after walk-scores.

- *Question:* Which cities use GoSection8, and do those cities use school choice or neighborhood schooling?

  Answer: It covers the entire country and works with most of the largest housing authorities, such as New York City public housing website (on their own website, but run by GoSection8). This is the largest website for people using housing choice vouchers ($\approx 60\%$ market share; the second-biggest is SocialServe.com, $\approx$ 20-25% market share).

- *Question:* What goes into the rankings used by GreatSchools?

  Answer: Typically standardized test scores within each state. Sometimes they also use other data such as college enrollment rates etc. The methodology varies from state to state—numbers are only comparable within each state. They aim for a normal distribution in each state with an average score of 5-6.

Next Steps

- Analyze:

  - What is the treatment effect on residential search behaviors and demand for properties?
  - Do users target good schooling? Access to HUD data.
  - How does treatment affect rates of non-moving?

- Treatment Extensions:

  - Add a search filter for minimum school-quality criterion.
  - Send text alerts to users when listings that meet certain criteria are available.
  - Other interventions: We have a total of 5 interventions for a project analyzing landlord and tenant behaviors. (However a lot of pushback from landowners and landlords, as the schools near low-income properties are typically very poorly rated.)

References

[1] Christopher Avery and Thomas J Kane. Student perceptions of college opportunities. the boston coach program. In *College choices: The economics of where to go, when to go, and how to pay for it*, pages 355–394. University of Chicago Press, 2004.

[2] Peter Bergman. Nudging technology use: Descriptive and experimental evidence from school information systems.

[3] Peter Bergman. Parent-child information frictions and human capital investment: Evidence from a field experiment. 2015.

[4] Peter Bergman, Jeffrey T Denning, and Dayanand Manoli. Is information enough? evidence from a tax credit information experiment with 1,000,000 students. Technical report, Working Paper, August, 2016.

[5] Peter Leopold S Bergman, Eric W Chan, et al. Leveraging technology to engage parents at scale: Evidence from a randomized controlled trial. Technical report, CESifo Group Munich, 2017.

[6] Benjamin L Castleman and Lindsay C Page. Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *Journal of Economic Behavior & Organization*, 115:144–160, 2015.

[7] Rebecca Dizon-Ross. Parents beliefs and childrens education: Experimental evidence from malawi. *Unpublished Manuscript, University of Chicago*, 2016.

[8] Justine S Hastings and Jeffrey M Weinstein. Information, school choice, and academic achievement: Evidence from two experiments. *The Quarterly journal of economics*, 123(4):1373–1414, 2008.

[9] Laura J Horn, Xianglei Chen, and Chris Chapman. Getting ready to pay for college: What students and their parents know about the cost of college tuition and what they are doing to find out. 2003.

[10] Sheena S Iyengar, Rachael E Wells, and Barry Schwartz. Doing better but feeling worse: Looking for the best job undermines satisfaction. *Psychological Science*, 17(2):143–150, 2006.

[11] Robert Jensen. The (perceived) returns to education and the demand for schooling. *The Quarterly Journal of Economics*, 125(2):515–548, 2010.

[12] Adam M Lavecchia, Heidi Liu, and Philip Oreopoulos. Behavioral economics of education: Progress and possibilities. Technical report, National Bureau of Economic Research, 2014.

[13] Amy J Orr. Black-white differences in achievement: The importance of wealth. *Sociology of education*, pages 281–304, 2003.

[14] David Romer. Do students go to class? should they? *The Journal of Economic Perspectives*, 7(3):167–174, 1993.

[15] Mark Schneider, Paul Teske, and Melissa Marschall. *Choosing schools: Consumer choice and the quality of American schools.* Princeton University Press, 2002.

[16] Heather L Schwartz. Housing policy is school policy. 2010.

[17] Judith Scott-Clayton. The shapeless river: Does a lack of structure inhibit students' progress at community colleges? ccrc working paper no. 25. assessment of evidence series. *Community College Research Center, Columbia University*, 2011.

[18] Benjamin N York and Susanna Loeb. One step at a time: The effects of an early literacy text messaging program for parents of preschoolers. Technical report, National Bureau of Economic Research, 2014.