

# Can UTeach? Assessing the Relative Effectiveness of STEM Teachers

Ben Backes, Dan Goldhaber, Whitney Cade, Melissa Dodson, Kate Sullivan  
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# Background on UTeach

- “Transforms the way universities prepare teachers” –National Math and Science Initiative (NMSI)
- Recruits math and science majors to pursue career in teaching
  - Free field-based courses for trying out teaching before committing
  - Pedagogy courses are specific to STEM
  - Designed to allow students to obtain B.S. degree and credential in 4 years
- Created in 1997 by faculty at UT Austin
  - Now available at 44 universities in 21 states
  - Texas sites: UT Austin, University of Houston, University of North Texas, UT Dallas, UT Arlington, and UT Tyler
  - Expansion funded by large grants (e.g. \$22.5 million from NMSI)

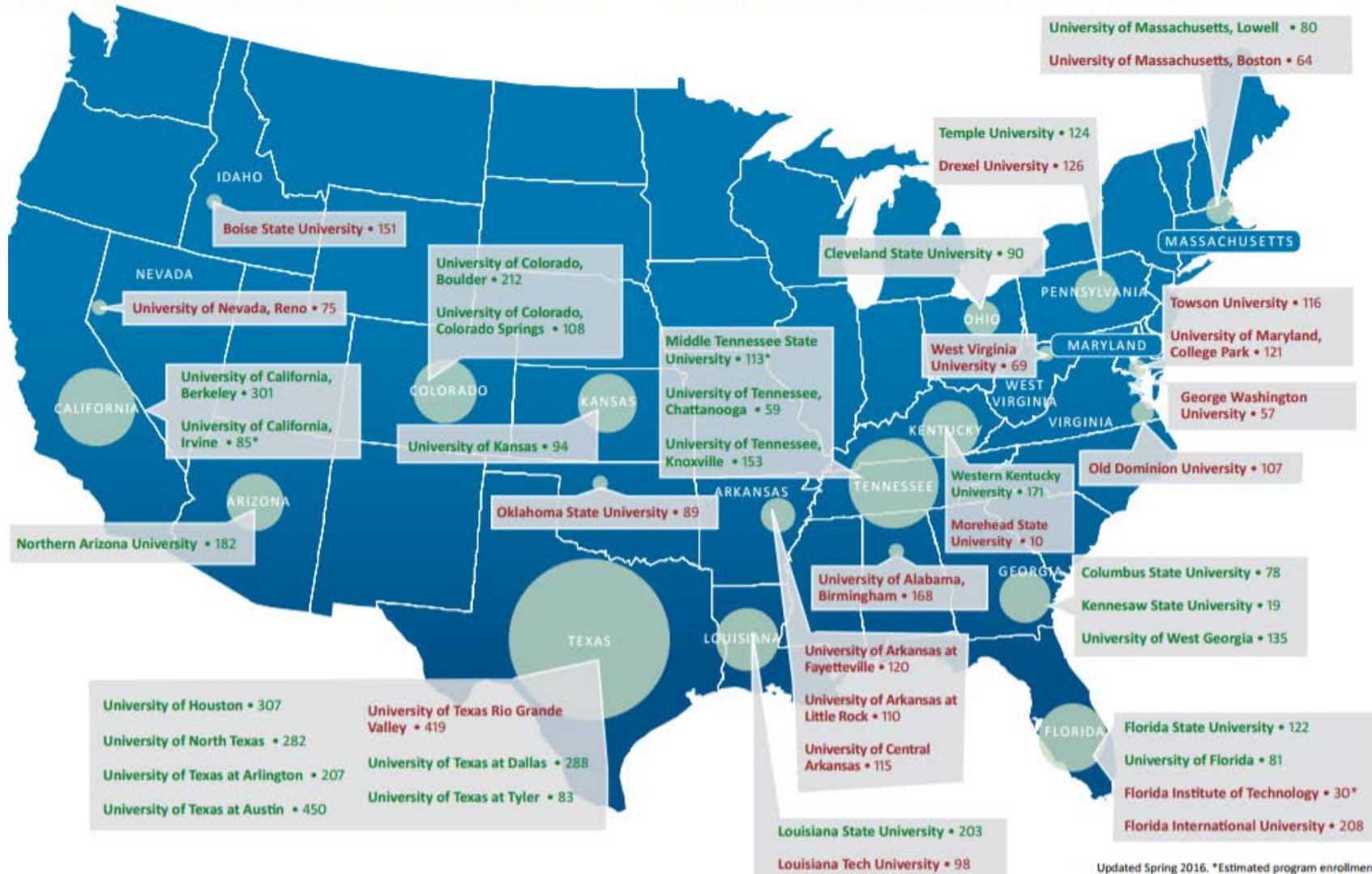


# Nationwide enrollment for academic year 2015–2016 (6,280 students)

Uteach Institute, [uteach-institute.org](http://uteach-institute.org)

**ESTABLISHED PROGRAMS** (BEYOND THE INITIAL FOUR-YEAR IMPLEMENTATION PHASE)

**DEVELOPING PROGRAMS** (CURRENTLY IN THE FOUR-YEAR IMPLEMENTATION PHASE)



Updated Spring 2016. \*Estimated program enrollment.



# Previous Research

- Little to no independent research on UTeach itself
- On teacher preparation programs (TPPs) generally
  - Recent work finds minimal differences between TPPs (Goldhaber et al., 2013; Koedel et al., 2015; von Hippel et al., 2016; von Hippel & Bellows, 2018)
  - Benefits of our data:
    - Larger samples (large state with multiple years)
    - More subjects tested: both middle school and high school



# Findings

- Controlling for observables, relative to other students in the state, students taught by UTeach graduates score higher in
  - Middle school math end of grade tests
  - High school math and science end of course subject tests
- Founding site (UT Austin) similar effects as replication sites in math
- Larger effects at UT Austin in science than replication sites
  - Proxies for institutional selectivity and individual aptitude explain part of the Austin – replication site differential and part of the UTeach – non-UTeach differential
- Some results sensitive to comparison group



# Data

- Administrative data from public secondary schools in Texas
  - Outcome years: 2011-12 through 2015-16
  - Students
    - Outcome tests: EOG math (grade 6-8), Algebra I, Geometry, Algebra II, Biology, Chemistry, Physics
    - Standard student-level demographic information: race, gender, FRL, ELL, etc
  - Teachers
    - UTeach teachers identified by combining degree institution, graduation year, and subject of teaching certificate
    - Years of experience



# UTeach Placement by 2016

	EOG M	EOC M	EOC S
Arlington	≤5	25	14
Austin	18	116	81
Dallas	≤5	19	21
Houston	6	50	43
UNT	11	78	25
Rio Grande	22	23	16
Tyler	28	13	≤5

Number of UTeach teachers in analysis sample in 2015-16 by campus



## Number of Teachers in Analysis Sample by Campus and Graduation Year

	Arlington	Austin	Dallas	Houston	Rio Grande	Tyler	UNT
2006	8	<b>25</b>	9	13	39	10	18
2007	5	<b>26</b>	8	10	49	7	19
2008	6	<b>43</b>	≤5	5	38	7	19
2009	10	<b>40</b>	5	5	39	10	13
2010	11	<b>27</b>	≤5	<b>10</b>	47	10	<b>30</b>
2011	19	<b>47</b>	<b>8</b>	<b>11</b>	39	10	<b>29</b>
2012	≤5	<b>43</b>	<b>11</b>	<b>27</b>	32	23	<b>38</b>
2013	8	<b>37</b>	<b>13</b>	<b>27</b>	25	<b>21</b>	<b>33</b>
2014	<b>26</b>	<b>40</b>	<b>16</b>	<b>36</b>	<b>41</b>	<b>18</b>	<b>30</b>
2015	<b>26</b>	<b>28</b>	<b>9</b>	<b>22</b>	<b>24</b>	<b>13</b>	<b>24</b>

**Red:** UTeach graduates





# Summary Statistics of Students

		EOC Math			EOC Science		
	<b>Non-UTeach</b>	<b>Austin</b>	<b>Replication</b>	<b>Non-UTeach</b>	<b>Austin</b>	<b>Replication</b>	
<b>Black</b>	0.12	0.12	0.16	0.12	0.11	0.16	
<b>Hispanic</b>	0.48	0.50	0.52	0.48	0.42	0.55	
<b>LEP</b>	0.09	0.12	0.16	0.09	0.09	0.17	
<b>FRL</b>	0.51	0.50	0.58	0.51	0.41	0.59	
<b>Prior math</b>	0.15	0.14	-0.05	-0.01	0.17	-0.13	
	(0.72)	(0.73)	(0.65)	(0.51)	(0.54)	(0.45)	
<b>Prior reading</b>	0.08	0.07	-0.14	0.05	0.24	-0.15	
	(0.60)	(0.62)	(0.53)	(0.54)	(0.57)	(0.51)	
<b>Prior science</b>				0.02	0.28	-0.10	
				(0.60)	(0.65)	(0.56)	



# Math

	1	2	3
<b>Panel 1: EOG Math</b>			
<b>UTeach</b>	0.06*	0.09***	0.07***
	(0.03)	(0.03)	(0.03)
<b>Panel 2: Algebra I</b>			
<b>UTeach</b>	0.12***	0.14***	0.01
	(0.02)	(0.02)	(0.01)
<b>Panel 3: Geometry</b>			
<b>UTeach</b>	0.06**	0.08**	0.04*
	(0.03)	(0.03)	(0.02)
<b>Panel 4: Algebra II</b>			
<b>UTeach</b>	0.06	0.09**	0.13***
	(0.05)	(0.05)	(0.05)
<b>Student chars</b>	X	X	X
<b>Teacher chars</b>		X	X
<b>Fixed effect</b>			School



# Science

	1	2	3
<b>Panel 1: Biology</b>			
UTeach	0.07***	0.09***	0.01
	(0.02)	(0.02)	(0.01)
<b>Panel 2: Chemistry</b>			
UTeach	0.11**	0.12***	0.05*
	(0.05)	(0.04)	(0.03)
<b>Panel 3: Physics</b>			
UTeach	0.14	0.20**	0.14
	(0.08)	(0.09)	(0.12)
Student chars	X	X	X
Teacher chars		X	X
Fixed effect			School



# Austin vs Replication Sites

	1	2	3
<b>Panel 1: EOG Math</b>			
Austin	0.12*** (0.04)	0.13*** (0.04)	0.07** (0.03)
Other UTeach	0.02 (0.05)	0.07* (0.04)	0.08* (0.04)
<b>Panel 2: EOC Math</b>			
Austin	0.10*** (0.03)	0.11*** (0.03)	-0.00 (0.01)
Other UTeach	0.12*** (0.02)	0.14*** (0.02)	0.01 (0.02)
<b>Panel 3: EOC Science</b>			
Austin	0.13*** (0.02)	0.14*** (0.02)	0.05*** (0.02)
Other UTeach	0.00 (0.02)	0.04* (0.02)	-0.03 (0.02)
Student chars	X	X	X
Teacher chars		X	X
Fixed effect			School



# Replication Campuses Prior to UTeach

	1	2	3
<b>Panel 1: EOG Math</b>			
Austin	0.12*** (0.04)	0.13*** (0.04)	0.07** (0.03)
Other UTeach	0.02 (0.05)	0.07* (0.04)	0.08* (0.04)
Other UTeach pre	0.01** (0.01)	0.01 (0.01)	0.03*** (0.01)
<b>Panel 2: EOC Math</b>			
Austin	0.10*** (0.03)	0.11*** (0.03)	-0.00 (0.01)
Other UTeach	0.12*** (0.02)	0.14*** (0.02)	0.01 (0.02)
Other UTeach pre	0.07*** (0.01)	0.07*** (0.01)	0.02** (0.01)
<b>Panel 3: EOC Science</b>			
Austin	0.13*** (0.02)	0.13*** (0.02)	0.05*** (0.02)
Other UTeach	0.00 (0.02)	0.03 (0.02)	-0.03 (0.02)
Other UTeach pre	-0.04*** (0.01)	-0.04*** (0.01)	-0.01 (0.01)
Student chars	X	X	X
Teacher chars		X	X
Fixed effect			School



# Non-STEM Graduates of Campuses With UTeach

	1	2	3
<b>Panel 1: EOG Reading</b>			
Austin	0.03*** (0.01)	0.04*** (0.01)	0.01 (0.01)
Other UTeach	-0.03*** (0.01)	-0.01 (0.01)	-0.02** (0.01)
Other UTeach Pre	-0.00 (0.00)	-0.01** (0.00)	-0.00 (0.00)
<b>Panel 2: EOC Reading</b>			
Austin	0.09*** (0.01)	0.11*** (0.01)	0.02** (0.01)
Other UTeach	0.04*** (0.01)	0.07*** (0.01)	0.02** (0.01)
Other UTeach Pre	0.03*** (0.01)	0.03*** (0.01)	0.02*** (0.00)
Student chars	X	X	X
Teacher chars		X	X
Fixed effect			School



# Discussion

- Graduates from UTeach are more effective than the average teacher in the state
- Part of UTeach effect may be driven by selection
- Suggestive evidence that UTeach boosts quantity of STEM graduates from given university
- Variation in teacher preparation program effects may be more pronounced at the high school level