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RICE UNIVERSITY SCHOOL MATHEMATICS PROJECT (RUSMP)

Technology Use of Mathematics Teachers at Urban Schools

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Purpose

The purpose of this study is to investigate the extent to which:

a) teachers use emerging technologies at urban schools

b) teachers' habits of using technology change after a professional development program

Technology

- Rapidly changing and growing
- Implications for education
- Vital component of a high-quality mathematics education
- Maximum potential to develop student understanding
- Should be accessible for all students

(National Council for Teachers of Mathematics [NCTM], 2008)

Research

Integration of technology

- Increases student engagement, self-confidence in math, and math achievement
- Explains achievement gaps between individuals and schools
- Hindered by teachers' lack of knowledge
- Requires "appropriate" use of technologies

(Delen & Bulut, 2011; Jakobsson, 2006; Niess, 2006)

Research Questions

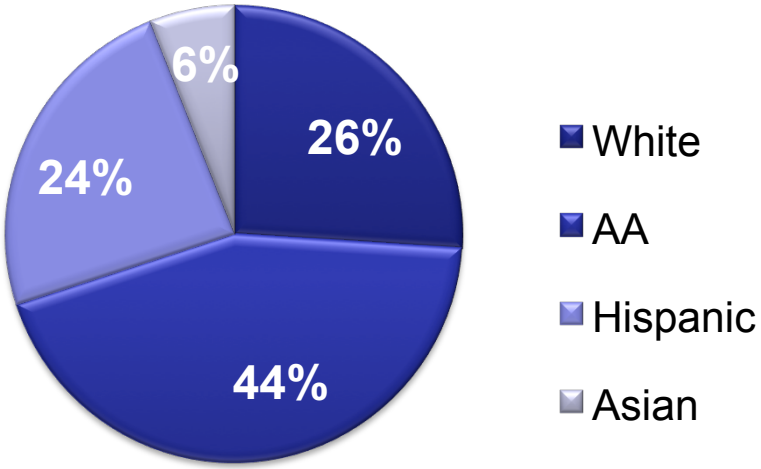
- To what extent do teachers use emerging technologies in mathematics instruction?
- For what purposes do teachers mostly use technologies in mathematics instruction?
- To what extent does the frequency of their technology-use change after a three-week technology-enriched professional development program?

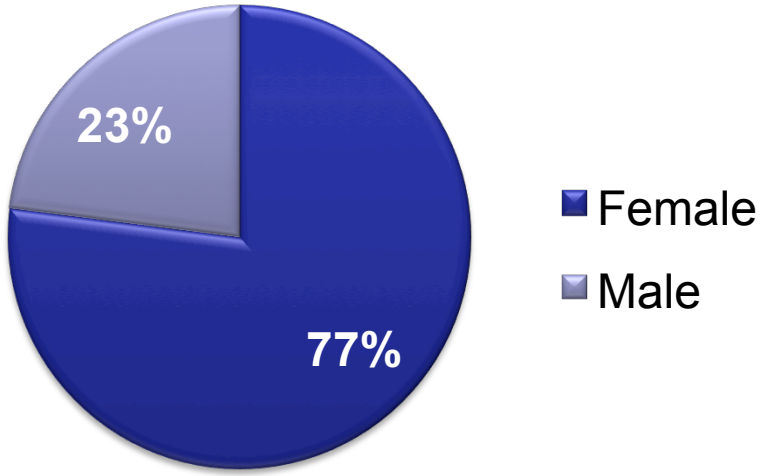
Professional Development

- Content-based and technology enriched
- Three weeks in June (84 contact hours)
- Six academic year meetings
- To improve teachers' mathematical knowledge for teaching

Participants

- 140 K-12 math teachers in Greater Houston
  - Summer 2012 (cohort 1): 80
  - Summer 2013 (cohort 2): 60





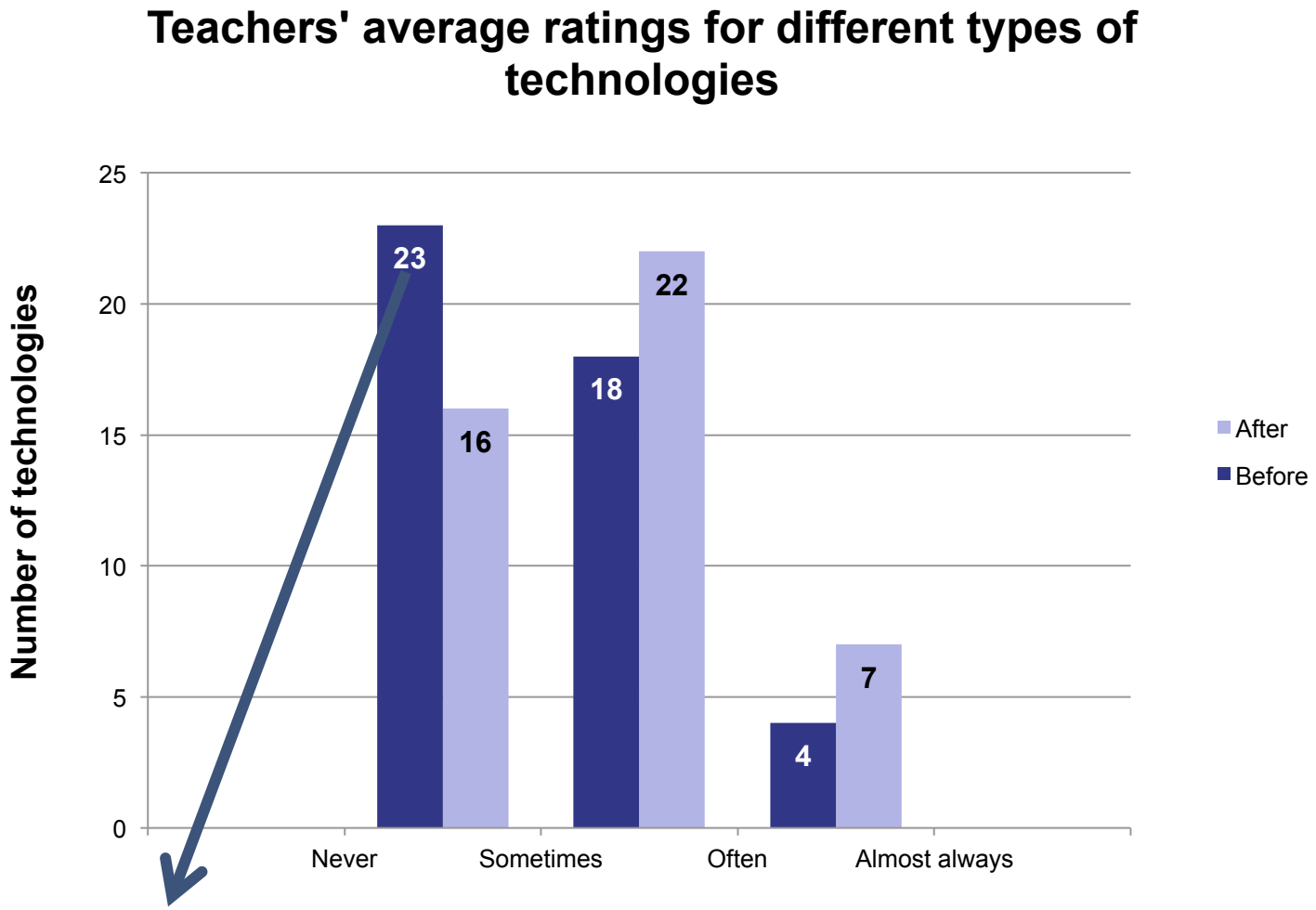
Survey

- 18 items asking teachers how often they use particular technologies and how useful they find technology for ***planning, instruction***, & ***assessment*** purposes
- 4-point Likert scale (0-never, 3-almost always)
- Pre-test (3 weeks prior to the summer PD)
- Post-test (8 months after the summer PD)
- Cohen's Kappa: 0.918

For each of 3 purposes

Software
Online Learning Management Systems (e.g., Blackboard)
Math Apps
Websites
PowerPoint (Teacher use)
PowerPoint (Student use)
Hardware
Interactive Whiteboard (to project materials)
Interactive Whiteboard (for interactive activities)
Document Camera
Computer (to view materials)
Computer (for interactive activities)
Tablet Computer
Calculators
Student Response System
Digital Camera/ Video Recorder
GPS
Usefulness of Technology

Pre & Post



23 of technology-use items were rated between 0-never and 1-sometimes

Change

					Paired Differences							
								95% C.I.				
Survey	Mean	N	S.D.	S.E.	Mean (gain)	S.D.	S.E.	Lower	Upper	*t*	Sig.	Effect size
Pre	1.06	140	0.41	0.05								
					0.18	0.38	0.04	0.09	0.27	5.57	0.00	0.47
Post	1.24	140	0.46	0.05								

RICE Change in specific areas

Technology	Planning	Instructional	Assessment
Software			
Online Learning Management Systems (e.g., Blackboard)	***	***	***
Math Apps	–	–	–
Websites	–	–	–
PowerPoint (Teacher use)	–	–	–
PowerPoint (Student use)	–	–	–
Hardware			
Interactive Whiteboard (to project materials)	–	–	–
Interactive Whiteboard (for interactive activities)	–	–	–
Document Camera	*	–	***
Computer (to view materials)	*	–	*
Computer (for interactive activities)	–	–	–
Tablet Computer	***	**	*
Calculators	–	–	–

Beliefs about usefulness

Purpose	Pre-Survey			Post-Survey		
	Mean	S.D.	S.E.	Mean	S.D.	S.E.
Planning	2.63	.822	.093	2.63	.440	.050
Instructional	2.59	.648	.073	2.68	.342	.039
Assessment	2.17	.987	.112	2.15	.252	.029

*** No significant changes occurred in teachers' beliefs.**

Conclusion

- Teachers believe that technology is important and useful to fulfill teaching responsibilities
- Teachers significantly increased their technology use after technology-rich PD

Significance

Results are alarming because despite substantial investments in hardware, software, and infrastructure schools, teachers reported low levels of technology-use.

Unless appropriate ongoing support and development are offered to teachers, these investments will be a waste of time, effort, and resources.

Future Steps

- Barriers for technology use
- Technology-enhanced Pedagogical Content Knowledge (TPCK)

(Bauer & Kenton, 2005; Niess, 2006; Smerdon et al.,2000)

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THANK YOU !

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