



RICE

RICE UNIVERSITY SCHOOL MATHEMATICS PROJECT
(RUSMP) - <http://rusmp.rice.edu/>

**Results from Rice University WeTeach_CS:
A Computer Science Teaching Collaborative
Serving Teachers with Different Needs
through Variety of Pathways**

Adem Ekmekci
Rice University

Richard Parr
Rice University

Alice Fisher
Houston ISD

**29th Annual Meeting of the
SITE Conference
March 26-30, 2018
Washington, DC**





Introduction

- 4.4 million computer and information technology jobs in the U.S. by 2024
- Underrepresentation of certain populations in CS
- Increasing demand for CS courses
- Critical shortage of teachers
- Issues with training and developing CS teachers



CS Professional Development

Three core features of effective professional development (Desimone, 2009; Loucks-Horsley et al., 2010):

1. Rigor in the subject matter
2. PD content alignment with teachers' local/state standards
3. Active, hands-on learning opportunities for teachers



Self-efficacy

- Extent to which teachers believe they can successfully execute teaching-related tasks within a particular context (Tschannen-Moran & Hoy, 2001)
- Connection to instructional practices and students' motivation and achievement (Clark et al., 2014; Stipek et al., 2001)



Teachers' Technological Pedagogical Content Knowledge (TPACK)

- Teacher's knowledge of how to coordinate the use of subject-specific activities with topic-specific representations using emerging technologies to facilitate student learning" (Cox, & Graham, 2009, p. 64)
- Complex, multi-faceted, integrative, and/or transformative (Mishra & Koehler, 2006)



TPACK (cont.)

Three technology-specific knowledge dimensions:

- Technological content knowledge
- Technological pedagogical knowledge
- Technological pedagogical content knowledge



The Rice University School Mathematics Project (RUSMP) WeTeach_CS Collaborative

Goals

1. To increase CS content and technological pedagogical content knowledge of teacher participants
2. Provide support for teacher participants as they embark on teaching the first CS course on their respective campuses



RUSMP WeTeach_CS Collaborative (cont.)

Participants:

- 18 middle school teachers
- 2 high school teachers

Required 60 hours of work



RUSMP WeTeach_CS Collaborative (cont.)

Pathways:

1. Attended face-to-face institutes
2. Attended a statewide computer science conference
3. Selected online courses and were to complete these courses at their own pace
4. Pathway 1 + Pathway 4



Methods

- Pre-survey
- Post-survey
- Post-interview



Methods

Instrument:

1. CS self-efficacy (8 items; Kolar, Carberry, & Amresh, 2013)
2. CS teaching self-efficacy (instructional strategies; 4 items; Klassen et al., 2009)
3. CS teaching self-efficacy (general; 12 items; Enochs, Smith, & Huinker, 2000)
4. Computational thinking self-efficacy (6 items; Angeli et al., 2016);
5. TPACK (14 items; Schmidt et al. (2009)



Results

Paired Samples *t*-Tests of Teacher Beliefs and Knowledge

Measure	N	Paired differences			Cohen's d
		Mean Gain (post-pre)	S.D.	t-value	
CS Self-efficacy	20	0.37	0.65	2.59*	0.59
Computational Thinking Self-efficacy	20	0.23	0.62	1.62	0.37
CS Teaching Self-efficacy (instructional strategies)	20	0.75	0.84	3.98**	0.91
CS Teaching Self-efficacy (general)	20	0.75	0.61	5.50***	1.26
Content Knowledge	20	0.62	0.62	4.42***	1.01
Pedagogical Content Knowledge	20	0.80	0.72	4.95***	1.13
TPACK	20	0.58	0.75	3.41**	0.78

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.



Results (cont.)

- Professional, friendly, prompt, and helpful communication with teachers
- All pathways informative, well-planned, engaging, and to-the-point
- Collaboration among participants
- Deeper understanding of the subject matter (CS)
- Administrative buy-in



Results (cont.)

“The collaborative has presented a wide diversity of CS applications that are interesting and relevant. It has also provided good preparation and support for the certification test.”

“Just discovered so many resources. The sessions were very helpful. Learned lots of different methods.”



Conclusions

- The success of a CS collaborative with its key components aligned with the important features of the effective PD
- Differentiated pathways based on the needs of the teachers served their interests well
- A community of learners



RICE

RICE UNIVERSITY SCHOOL MATHEMATICS PROJECT
(RUSMP) - <http://rusmp.rice.edu/>

THANK YOU !

Adem Ekmekci

ekmekci@rice.edu

Richard Parr

rparr@rice.edu

Alice Fisher

alice.fisher@houstonisd.org

The studies herein are based, in part, on a project partially funded by Teacher Quality Grants Program at the Texas Higher Education Coordinating Board under Grant #3065, and by Code.org.

