

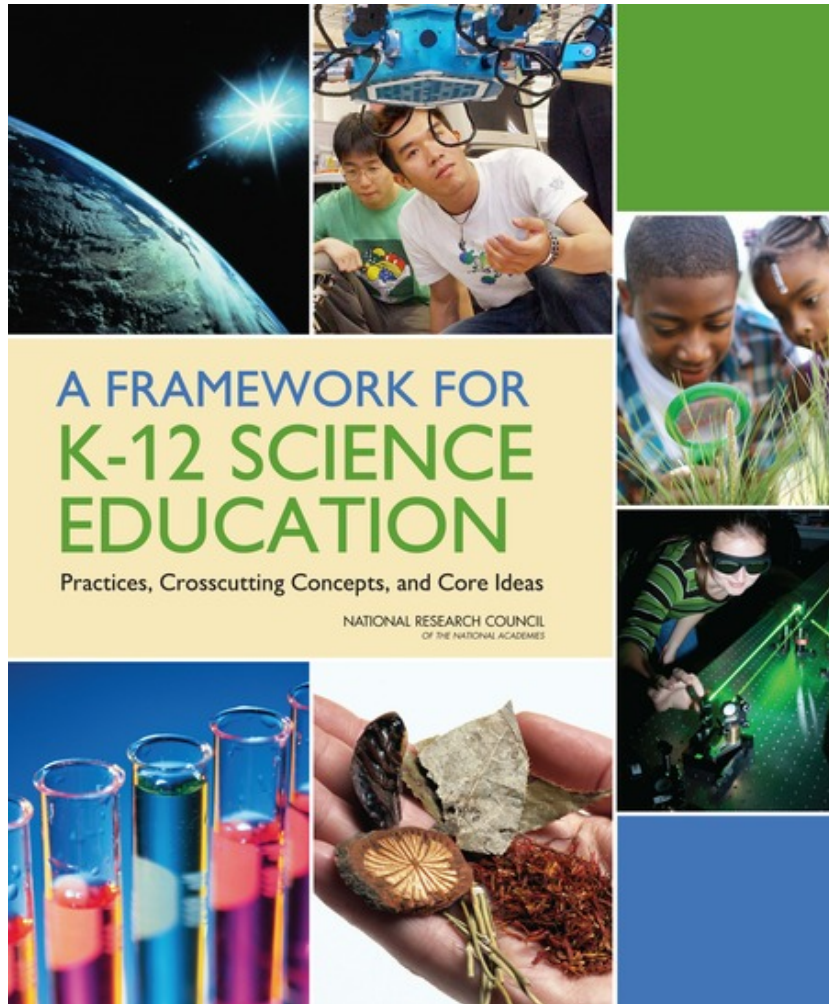
Learning Progressions in Environmental Science: The Impact of a Professional Development on Teacher Practice

By: Tobias Irish, Alan Berkowitz, Sylvia Parker, Jennifer Doherty, Michele Johnson, Nissa Yestness, Bess Caplan, Laurel Hartley, Neely Clapp, and John Moore



Conceptual Frame

- Practice as the cornerstone of the teaching profession and thus coherent and comprehensive implementation as a meaningful indicator of teachers' professional learning (Ball & Cohen, 1999)
- A variety of factors influence teacher learning, including the school, the learning activity, and personal factors related to the teachers themselves (Opfer & Pedder, 2011; Woodbury & Gess-Newsome, 2002)



“If mastery of a core idea in a science discipline is the ultimate educational destination, then well-designed **learning progressions** provide a map of the routes that can be taken to reach that destination.”

-A Framework for K-12 Science Education

Research Questions

1) To what extent did teachers implement the **Teaching Experiments (TEs)** and report using the **Key Pedagogies**?

2) What factors are correlated with the **variation in implementation** of the TEs and Key Pedagogies?

- Site? Strand? Grade level?
- Self reported supports and constraints?
 - Personal factors – Motivation; Self-efficacy, etc.
 - PD factors – Self reported impact of PD
 - School factors – Curriculum considerations; School support, etc.



Progress Variables

(Survey data from 92 participating Teachers)

1) Teaching Experiments (TEs)

- Water, Carbon, Biodiversity

2) Key Pedagogies (18 teaching techniques consolidated into 4 main pedagogies)

- Focus on big ideas
- Responding to student thinking
- Connect to the real world issues and local contexts
- Engage students in principle- and evidence-based reasoning

3) Supports and Constraints (15 fixed response items consolidated)

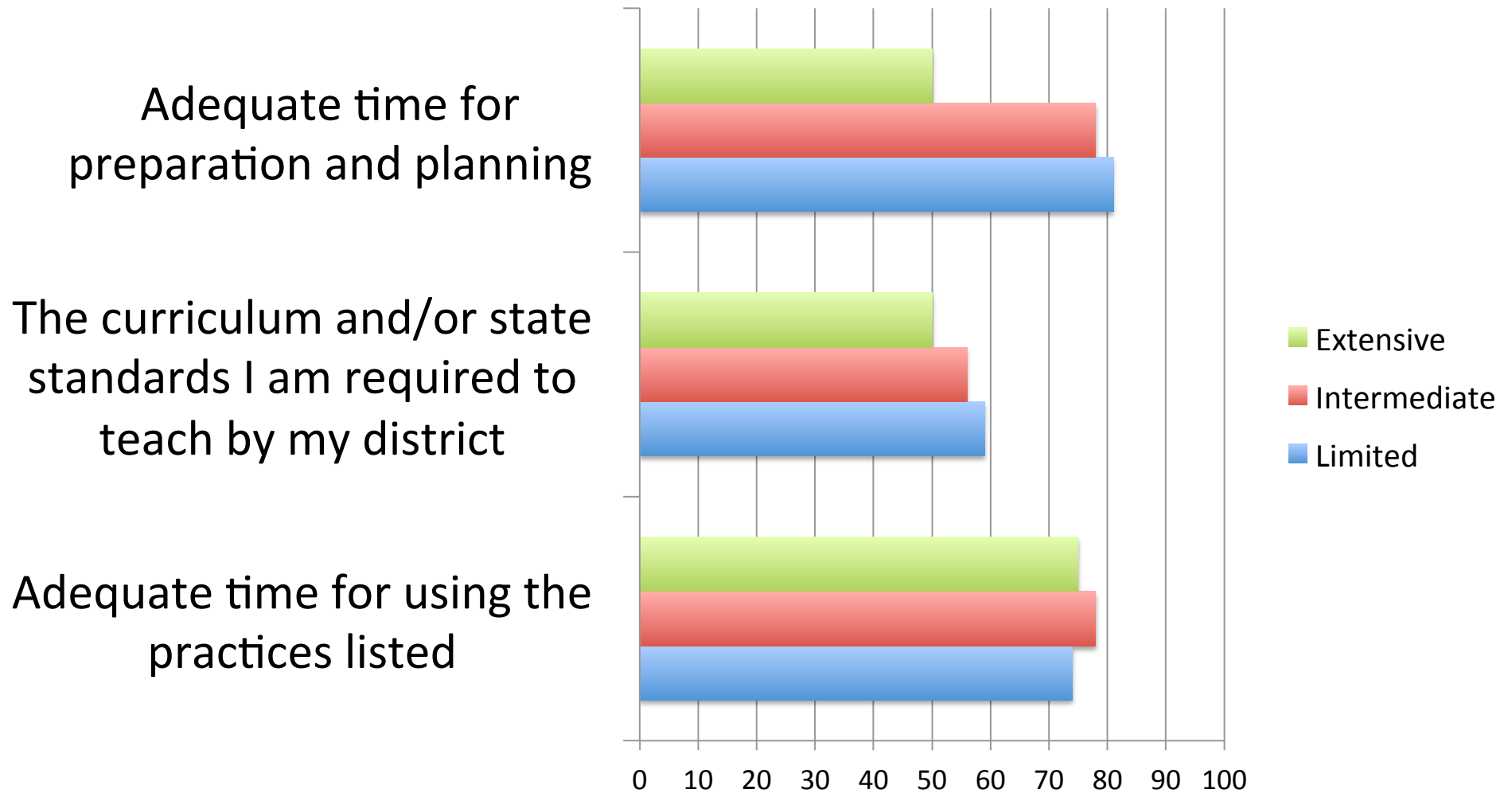
- School factors
- Personal factors
- Time

4) What's New? (Open response item)

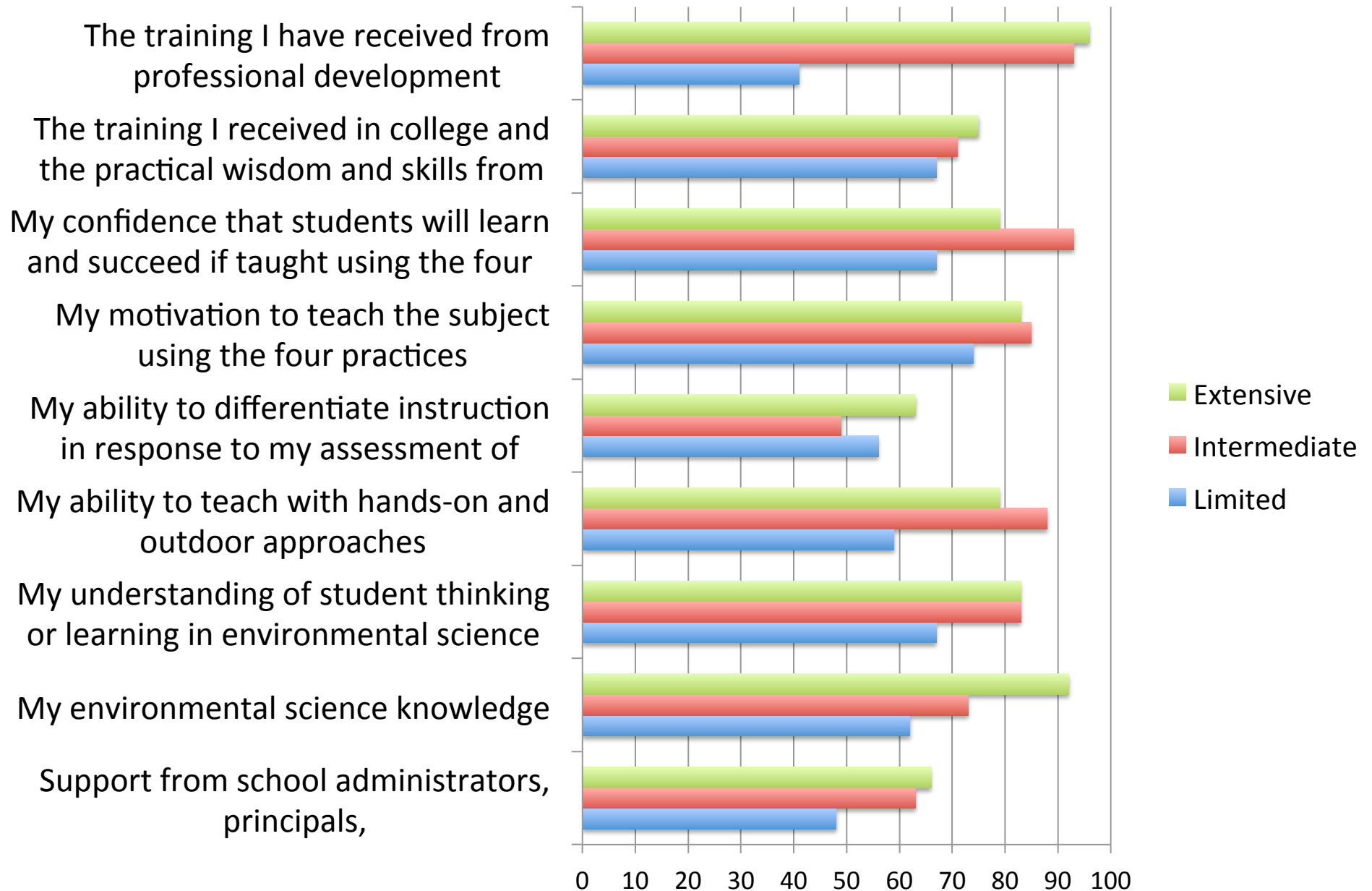
TE Implementation Groups

Implementation Groups	Number and Amount of TE's Taught	Number of Teachers
Extensive	Some of 3 or all of 2	24
Intermediate	All of 1 and/or some of 2	41
Limited	None, or some of 1	27

Constraints by TE Implementation Group

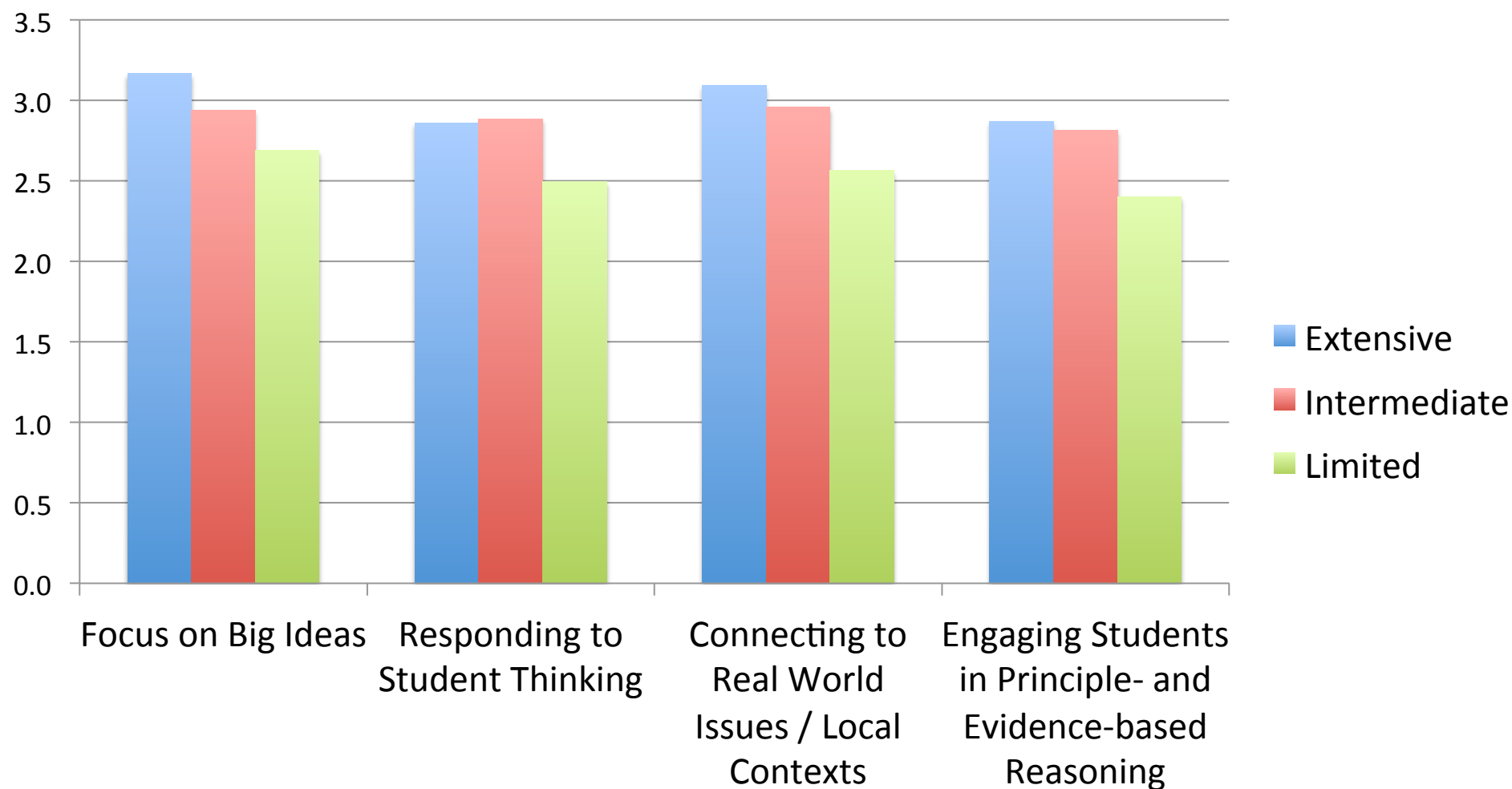


Supports by TE Implementation Group



Mean influence of PD on use of practices by TE implementation group

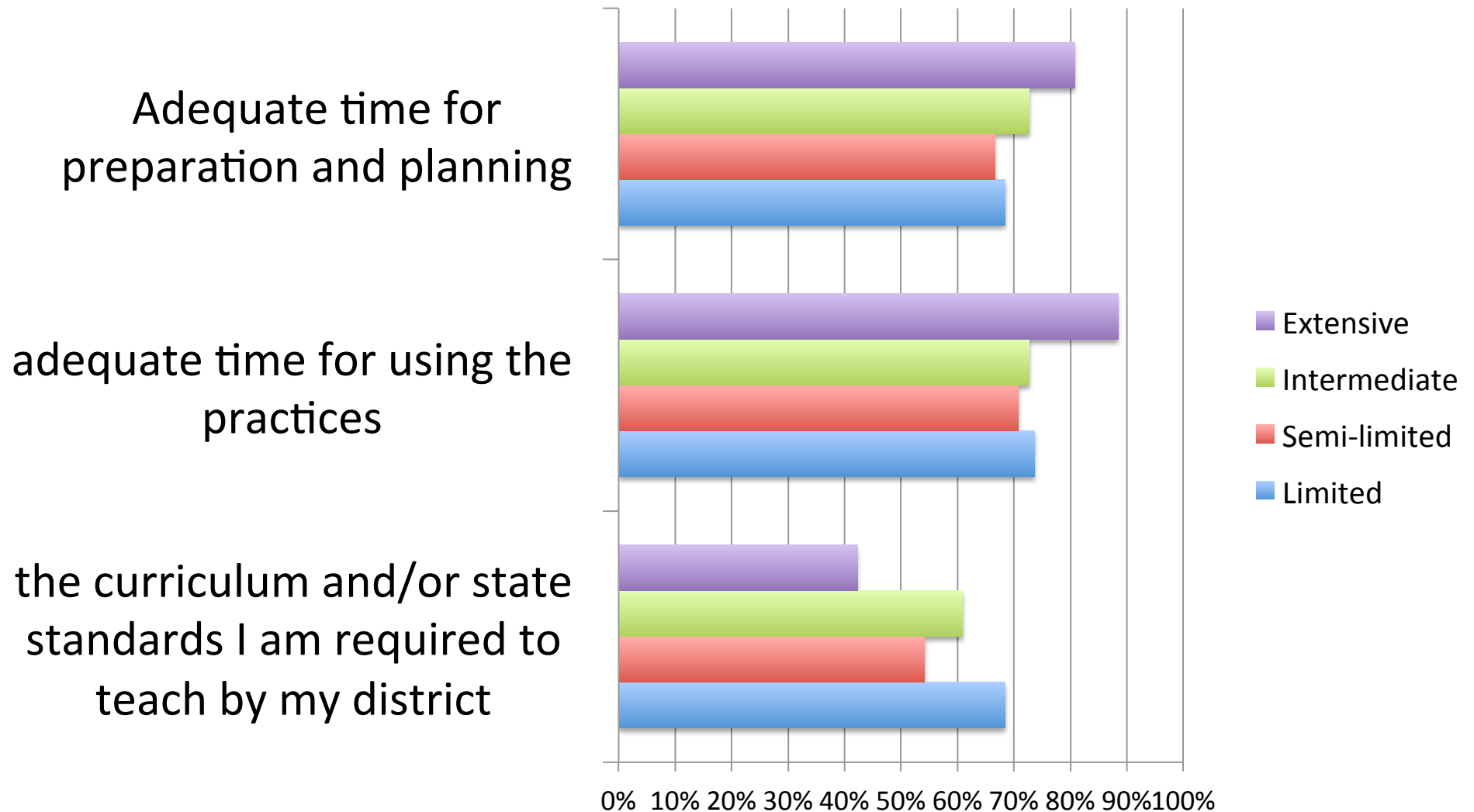
(1=not at all; 2=somewhat; 3=moderately; 4=a great deal of influence)



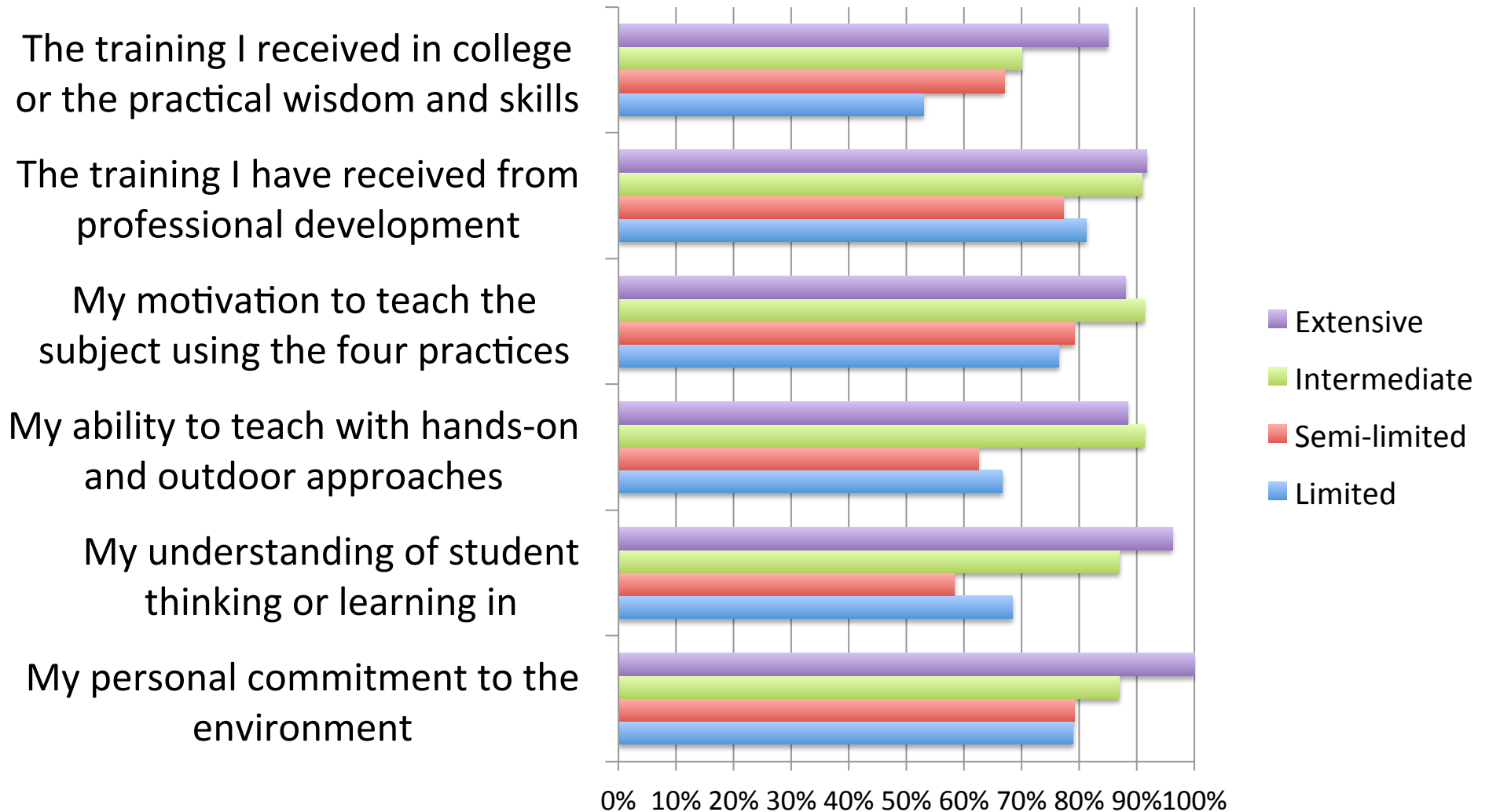
Key Pedagogy Use Groups

Use of Key Pedagogies	Mean Scores (1- never; 2-very rarely; 3-occasionally; 4-frequently; 5-very frequently)	Number of Teachers
Extensive	Mean score of 4.0 - 5.0	26
Intermediate	Mean score of 3.7 - 3.9	23
Semi-Limited	Mean score of 3.4 – 3.6	24
Limited	Mean score of 2.4 – 3.3	19

Constraints by Key Pedagogy Groups

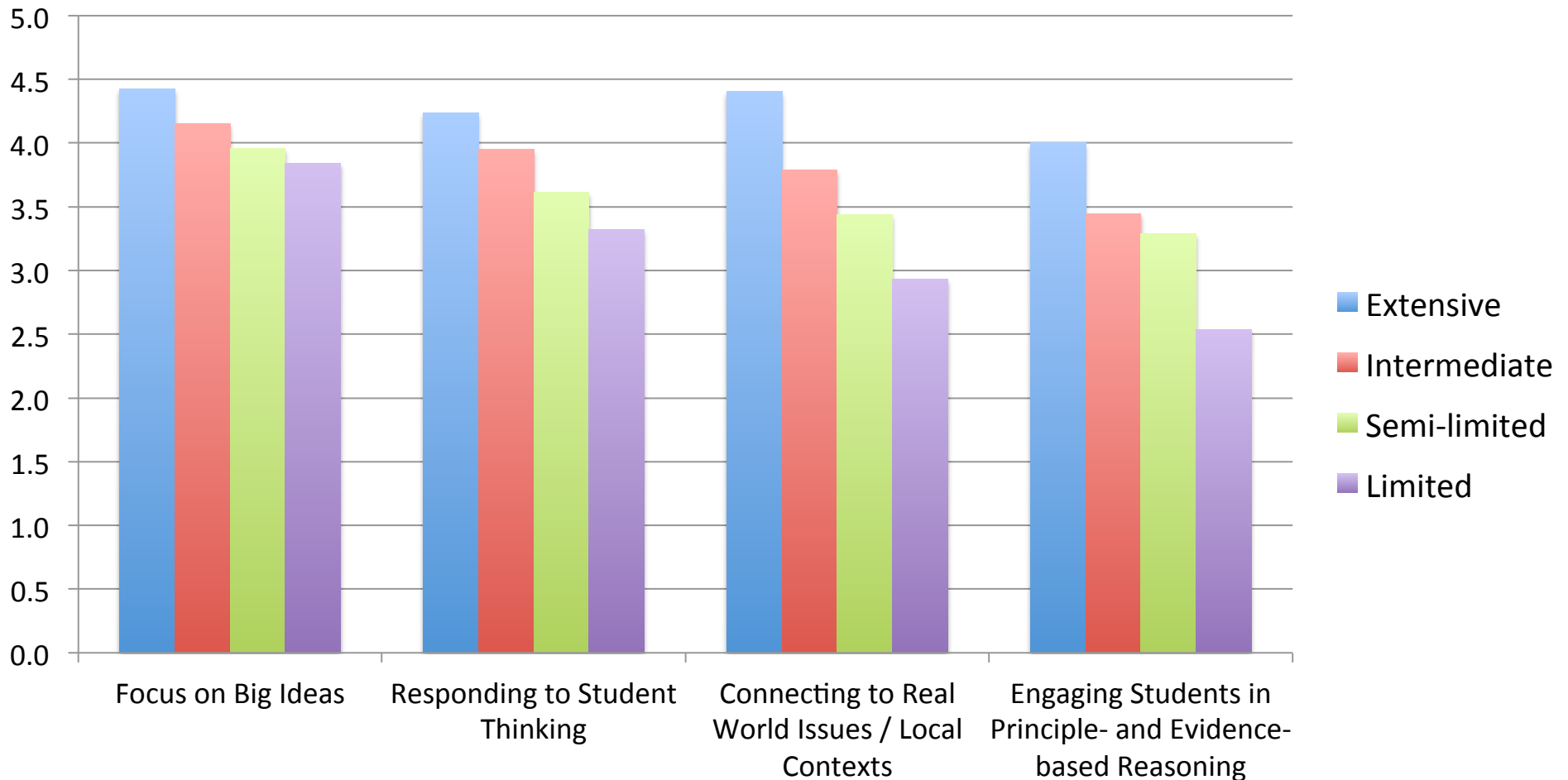


Supports by Key Pedagogy Group



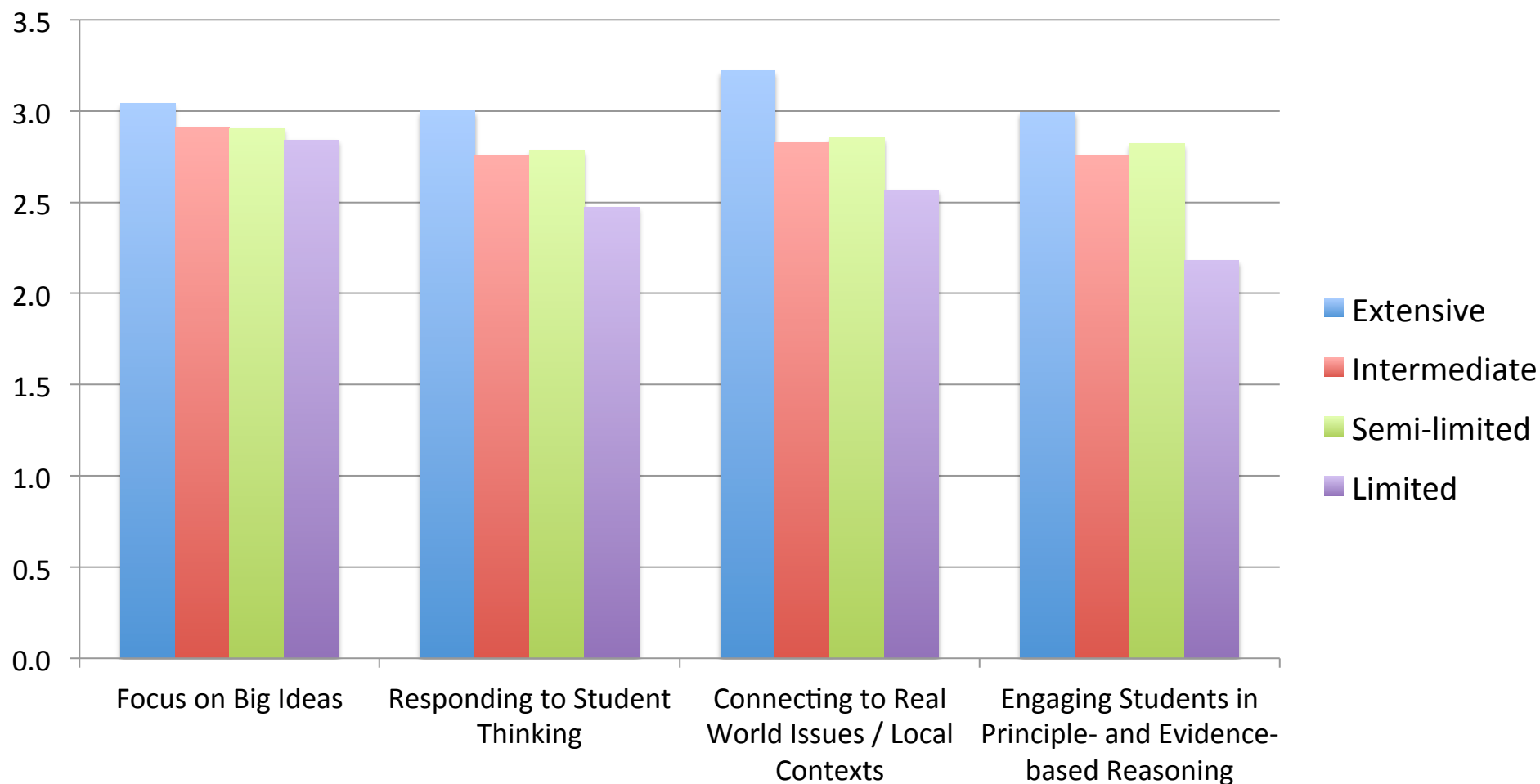
Mean use of practices by Key Pedagogy implementation group

(1- never; 2-very rarely; 3-occasionally; 4-frequently; 5-very frequently)

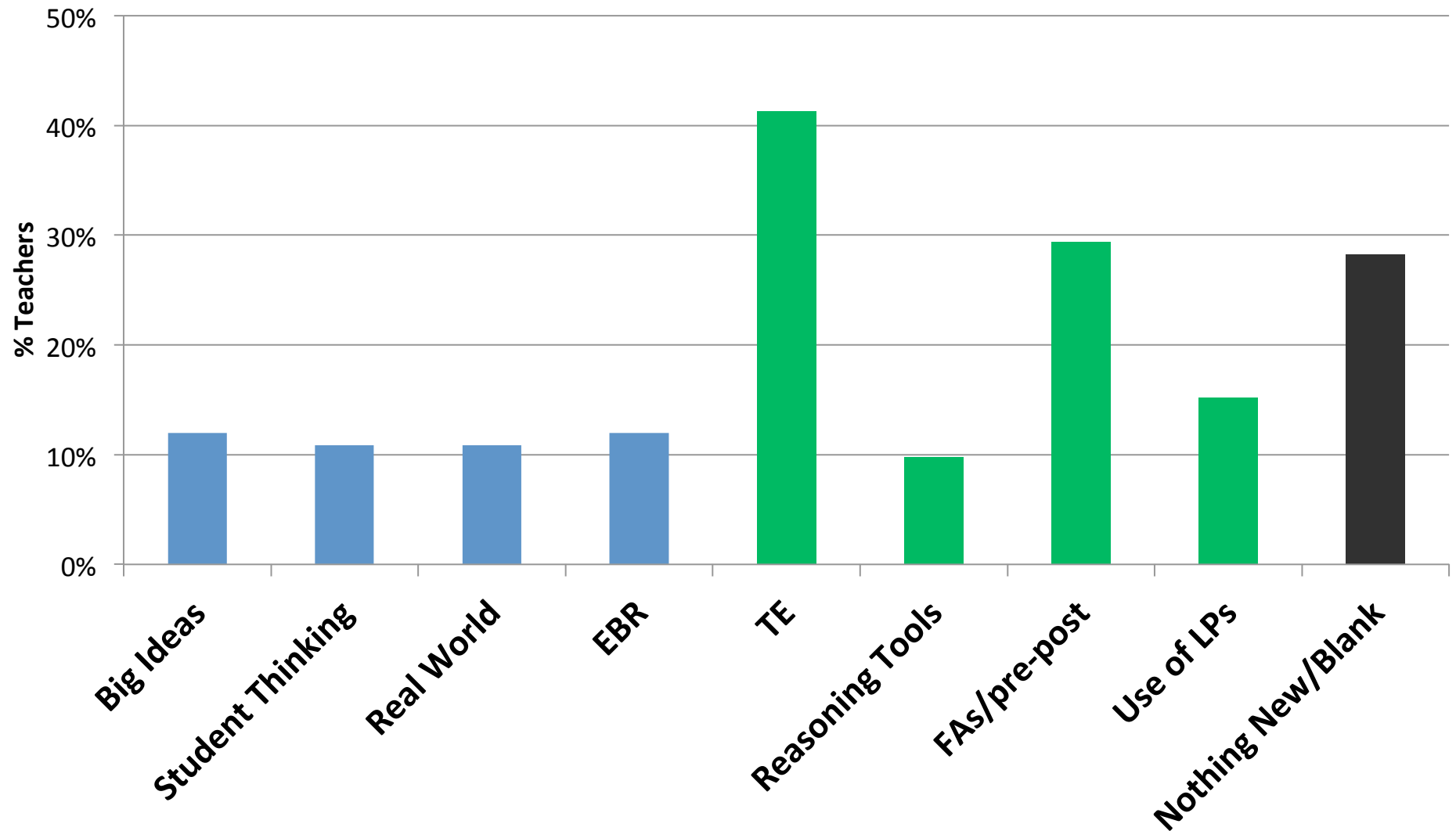


Mean influence of PD on use of practices by Key Pedagogy implementation group

(1=not at all; 2=somewhat; 3=moderately; 4=a great deal of influence)



% Teachers Mentioning Different Activities as **What's New**



		Use of Key Pedagogies Group				Total
		Limited	Semi-Limited	Inter-mediate	Extensive	
TE Implem-entation Group	low	5	10	5	7	27
	med	5	11	12	13	41
	hi	9	3	6	6	24
Total		19	24	23	26	92

Summary

1) What did the teachers do?

- There was a great deal of variety in what the teachers did with the TE and Key Pedagogies
- These two measures of teacher practice were independent, such that teachers in each TE implementation group showed similar ranges of pedagogy use

Summary

2) What factors correlated with differences in implementation?

- The factors that teachers reported as supporting their teaching were very similar across each of our measures, but there were slight differences in constraints across measures.
- Time was mentioned as a constraint more frequently by low TE implementers, but with an interesting difference for those reporting higher use of the key pedagogies.
- The teachers who used the key pedagogies most were less likely to be constrained by curriculum requirements

Discussion

- These findings are interesting because of the diversity of sites and PD providers.
- Because the trends hold up across contexts, the findings are generalizable and can provide PD providers with insights into how to best support teachers in assimilating new practices and materials into their current curriculum and thus insight into how PD efforts might be structured to more effectively support teachers in these endeavors.

Thank You!

www.pathwaysproject.kbs.msu.edu



This work was funded by the National Science Foundation (NSF) under grant number DUE-0832173. The views expressed here are those of the authors and do not necessarily reflect those of NSF.