

Preservice teacher efficacy and contributing factors

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Jamie Pyper

Phd research

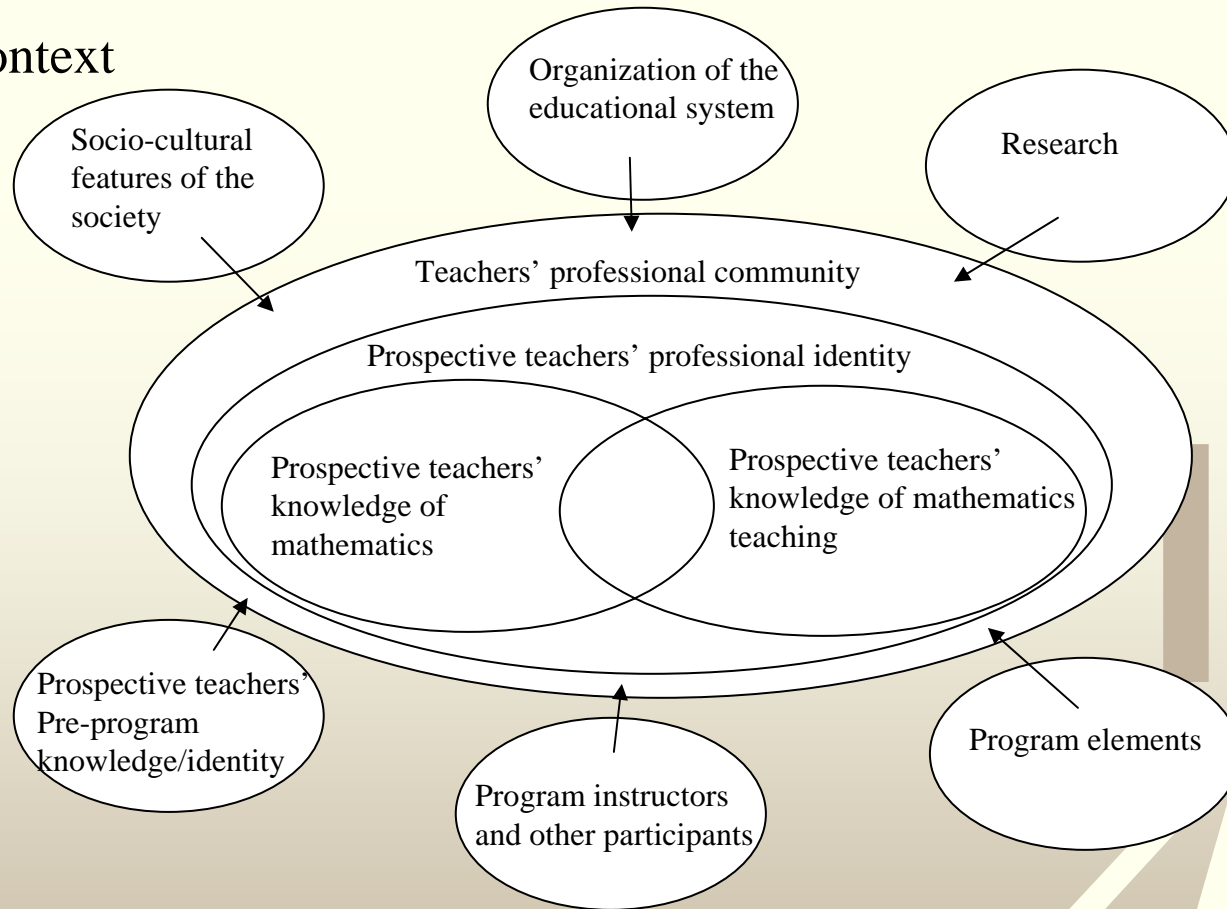
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Preservice teacher efficacy and contributing factors

Research Context



Landscape of preservice mathematics teacher education.

Ponte, J. P., & Chapman, O. (2008). Preservice mathematics teachers' knowledge and development. In L. D. English (Ed.), *Handbook of International Research in Mathematics Education* (2nd ed., pp. 223-261). New York: Routledge.

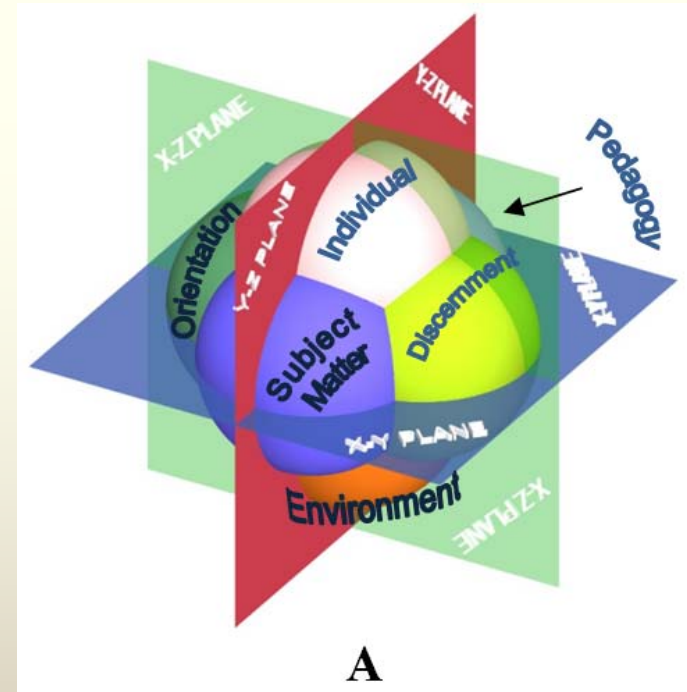
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Research Context

Field – Subject Matter and Pedagogy
(X-Y plane)

Mode – Orientation and Discernment
(X-Z plane)

Context – Individual and Environment
(Y-Z plane)



Ronau, R. N., Taylor, P. M., Dougherty, B. J., Pyper, J., Wagener, L. L., & Rakes, C. R. (2009). *A Comprehensive Framework for Teacher Knowledge of Mathematics: A Lens for Examining Research*. Paper presented at AMTE 2009, and accepted at AERA 2009.

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Research Questions

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1. What is the teacher efficacy for secondary school preservice mathematics teachers?
2. What are some common factors and influences to mathematics teacher preparation, and what support is there for the existing theoretical constructs of teacher concern and teacher orientation?
3. How well do the instruments measure teacher efficacy?

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Research Questions

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Teacher Efficacy

1. Teachers' Sense of Efficacy Scale (TSES), Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.
From Bandura's (1997) social cognitive theory.
2. Teachers' Efficacy Scale (TES), Guskey, T. R., & Passaro, P. D. (1994). Teacher efficacy: A study of construct dimensions. *American Educational Research Journal, 31*(3), 627-643.
From Rotter's (1966, 1982) social learning theory.

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Research Questions

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Teacher Concern

Self Concerns – survival, adequacy, class control, being liked by pupils, about supervisors' opinions, about being observed, evaluated, praised, and failed.

Task Concerns – knowing and presenting of the mathematics content, lesson timing issues, and other instructional duties.

Impact Concerns – being aware of the learner and his or her needs, the evaluation of learning, fairness, etc.

Fuller, F. F., & Bown, O. H. (1975). Becoming a teacher. In K. Ryan (Ed.), *Teacher Education (74th yearbook of The National Society for the Study of Education, Part II)* (pp. 25-52). Chicago: University of Chicago Press.

Borich, G. D., & Tombai, M. L. (1997). *Educational Psychology: a contemporary approach* (2nd ed.). New York: Longman.

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Research Questions

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Teacher Orientation

“I am a good teacher because...”

Practical: “...I am the teacher in the classroom with students and it is being in the situation that makes me a good teacher.”

Technical: “... there are a defined set of steps and procedures to follow, and following them will ensure my teaching success.”

Academic: “... I know my mathematics. Knowing the math is all that is needed to be a good math teacher.”

Personal: “... my own, and my students, personal and emotional growth, and learning and knowing this of my students makes me a good teacher.”

Critical/Social: “...we work to enhance a social justice perspective, and the principles of democracy and equity and social activism are what make good teaching and learning.”

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Research Questions

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Teacher Efficacy

Teacher Concern

Teacher Orientation



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Methodology

Worldviews from Complexity Theory,

As a world view (Waldrop, 1992, Mainzer, 2007)

Patterns (McGuire, 2007)

Low Complexity to ordered and random systems,

high complexity to those systems in between (Adami, 2002)

Nested and embedded, complex, systems (Davis & Sumara, 2002; 2006)

And from Mixed Methods,

Pragmatic approach to social science (Morgan, 2007)

Mixed methods for research (Johnson & Onwuegbuzie, 2004)

Therefore;

Two-phase sequential design (Creswell & Plano Clark, 2007)

With complementarity (Greene, Caracelli, & Graham, 1989)

Integrated analytic strategy,

cross track analysis (Li, Marquart, & Zercher, 2000)

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Method

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1. Web-based survey (UWO Survey-in-a-box)

Two short answer questions

(1. Concerns, 2. Contributions)

TSES survey (12 questions)

TES survey (20 questions)

Demographic information

Contact information (for interview)

2. Interviews

Teacher concern paragraphs

Teacher orientation paragraphs

Conversation



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Results with whole sample

001 TSES (Teacher efficacy) and Subscales:

Instructional Strategies, Classroom Management, Student Engagement

Significant between TSES and each subscale $p=.000$

Significant between pairs of subscales, $p=.01$

Moderate correlations.

TES (Internal efficacy and External efficacy)

Internal efficacy and External efficacy means significantly related,
but small coefficient of determination, 32%

Paired samples t-test indicated Internal efficacy mean ($M=4.50$, $SD = 0.57$)
significantly greater than External efficacy mean ($M=3.85$, $SD=0.85$).

TSES (and three subscales) with TES (Internal efficacy minus External efficacy value) → Pearson correlation found no significant relationship.

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Results with whole sample

001 Teacher Concern

Teacher Concerns evident in responses to question 1

Self	Self/Task	Task	Task/Impact	Impact	Impact/Self
13	10	8	1	3	1

A Spearman correlation was performed; between teacher concern and the Internal efficacy minus External efficacy values.

No comparison was determined to be significant at $p=.001$, two tails.

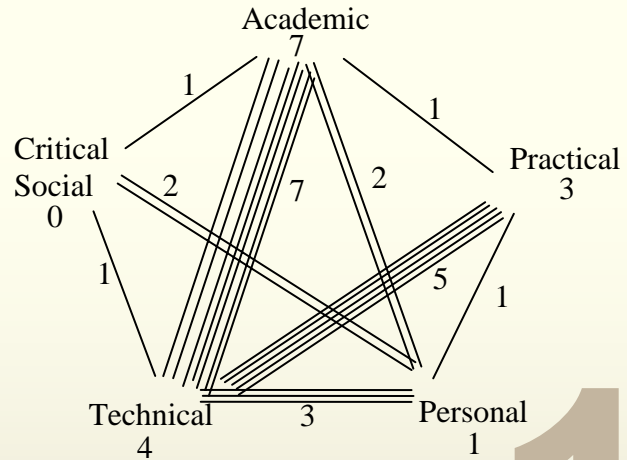
Significant only with a one tail calculation, $r = .317$, $n = 36$, $p = .05$.

Marginal sense that greater Internal efficacy aligns with greater TSES.

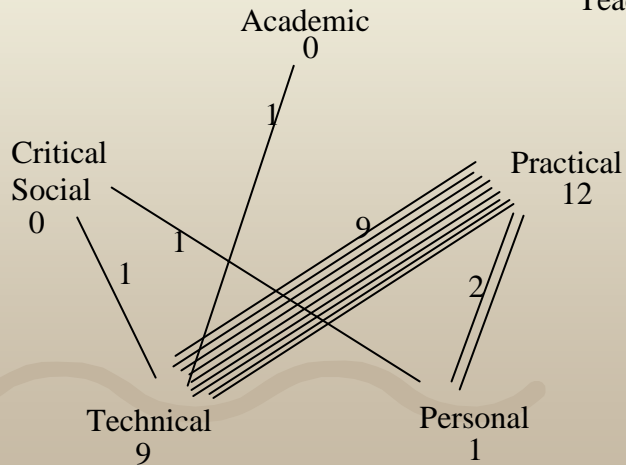
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Results with whole sample

001 Teacher Orientation



Teacher Orientation graphic about concerns



Teacher Orientations about contributions.



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Results with eleven interviews

001 Teacher Concern

Teacher concerns from surveys and interviews.

R	TC-Survey	TC-Interview Selected	TC-Interview
PTF1	Self	Impact	Impact/Task/(Self)
PTF4	Task	Self	Task/Self
PTF6	Task	Impact	Impact/Task
PTM7	Self	Self	Self/Impact
PTM17	Task	Impact	Task/Self/Impact
PTF25	Self/Task	Task	Impact/(Task)
PTF27	Self/Task	Self	Self/Task
PTM28	Task	Self	Self/Task
PTF32	Self/Task	Task	Task/(Self)/(Impact)
PTM33	Self/Task	Self & Task	Task/(Self)
PTF35	Self	Task	Impact

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Results with eleven interviews

001 Teacher Orientation

Teacher orientation from surveys and interviews.

R	<i>TO-s1</i>	<i>TO-s2</i>	TO-Interview Selected	TO-Interview
PTF1	<i>T-A</i>	<i>T-Prac</i>	P	P-(Prac)-(CS)
PTF4	<i>Prac</i>	<i>T-Prac</i>	Prac	Prac-(P)-(T)
PTF6	<i>P</i>	<i>Prac-T</i>	P	T-P-(Prac)
PTM7	<i>P-T</i>	<i>T-Prac</i>	P	A-P-(Prac)
PTM17	<i>Prac-T</i>	<i>Prac-T</i>	P-Prac	Prac-T-(A)
PTF25	<i>T-Prac</i>	<i>T</i>	A-P	P-(Prac)
PTF27	<i>A-T</i>	<i>A-T</i>	P	P-Prac-A
PTM28	<i>T-Prac</i>	<i>T</i>	Prac	A-T
PTF32	<i>A-T</i>	<i>Prac</i>	Prac	Prac-A-(T)
PTM33	<i>A-T</i>	<i>T</i>	T	T-A
PTF35	<i>A</i>	<i>Prac</i>	P	P-Prac-(A)

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Results with four case studies

	TSES And Subscales	CM	Internal efficacy minus External efficacy	Orientation paragraph selected	Orientation expressed in Interview conversation	Concern paragraph selected	Concern expressed in Interview conversation	Greatest contribution
		SE						
		IS						
PTF1	8.00	8.00	1.49	Personal	Personal (Practical) (Critical Social)	Impact	Impact Task (Self)	Preservice mathematics education instructor.
		8.00						
		8.00						
The Practica was a more important contribution to teacher efficacy, but only as it was a place to try out what was learned in the Faculty of Education. The preservice course instructor needed field experience. Teaching and learning as; empowering, an ongoing process, a profession. Impact concerns are dominant, teaching and learning is all about 'people'.								
PTF4	7.83	7.89	0.23	Practical	Practical (Personal) (Technical)	Self	Task Self	Practicum
		7.82						
		7.90						
Some External efficacy due to Associate Teacher influences. The Practicum is the greatest contributor to teacher efficacy. Coursework is important as opportunities for technical skill development. Will learn math in the classroom as a teacher. Self concerns are dominant, feels she has to prove herself to Associate Teacher, relationships important to success, often nervous.								
PTF25	5.67	5.78	-1.10	Academic & Personal	Personal (Practical)	Task	Impact (Task)	Coursework and Practicum
		5.64						
		5.80						
External efficacy influences due to cultural acclimatization. Learns from on mathematics coursework (increase in teacher efficacy) and experiences decreases in teacher efficacy from Associate teacher interactions. Practicum & Course-work equivalent contributors. Impact concerns dominant -- attention to resources with purpose of student learning.								
PTM33	4.67	4.67	-0.04	Technical	Technical Academic	Self then Task	Task (Self)	Practical elements of coursework
		4.73						
		4.80						
The Practical elements of coursework. Wants the steps to successful classroom teaching and classroom management. Tries to enact Impact concerns but has strong Task concerns. Idealizes a Personal Orientation but cannot visualize his own								

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Major Findings

1. What is the teacher efficacy for secondary school preservice mathematics teachers?

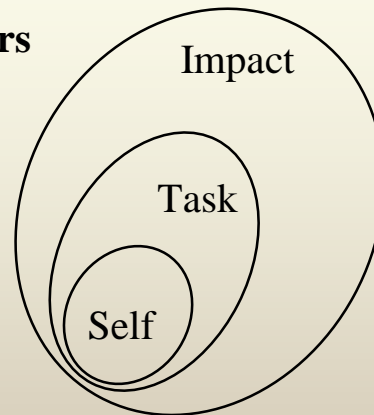
TSES scores appear higher with higher Internal efficacy scores and TSES scores appear lower with higher External efficacy scores. With relatively equal Internal and External efficacies, teacher orientations appear relatively stable across contexts. With unequal Internal and External efficacies, teacher orientations appear more variable. Teacher efficacy appears to respond with context factors.

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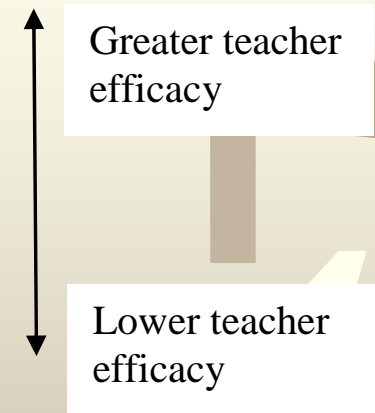
Major Findings

- 001 2. What are some common factors and influences to mathematics teacher preparation, and what support is there for the existing theoretical constructs of teacher concern and teacher orientation?

Concerns of teachers



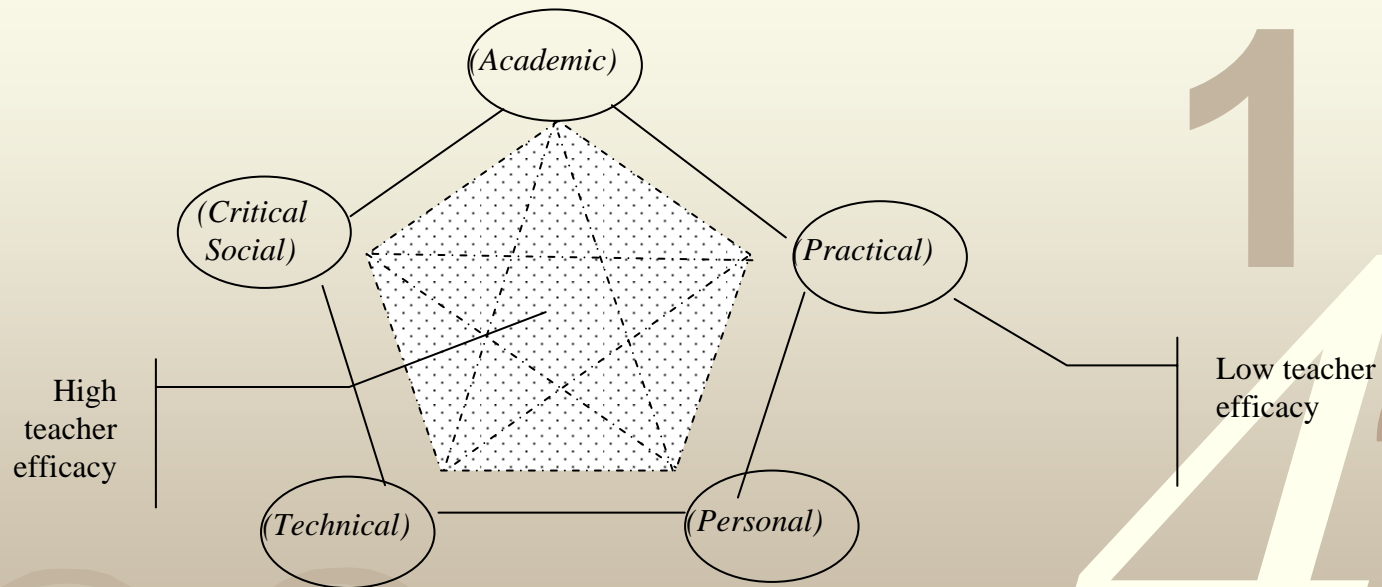
Nested concerns of teachers.



Preservice teacher efficacy and contributing factors

Major Findings

- 001 2. What are some common factors and influences to mathematics teacher preparation, and what support is there for the existing theoretical constructs of teacher concern and teacher orientation?



Teacher orientation and teacher efficacy

Preservice teacher efficacy and contributing factors

Major Findings

2. What are some common factors and influences to mathematics teacher preparation, and what support is there for the existing theoretical constructs of teacher concern and teacher orientation?

From the survey;

26 identified practicum as the greatest contributor to their teacher efficacy.
10 identified coursework alone – these preservice teachers also had higher Internal efficacy.

From the interviews;

Teacher orientation and contributing component.

R	<i>TO-s1</i>	<i>TO-s2</i>	TO-Interview	Greatest contribution
PTF1	<i>T-A</i>	<i>T-Prac</i>	P-(Prac)-(CS)	Coursework (Instructor) with Practicum
PTF4	<i>Prac</i>	<i>T-Prac</i>	Prac-(P)-(T)	Practicum
PTF6	<i>P</i>	<i>Prac-T</i>	T-P-(Prac)	Practicum
PTM7	<i>P-T</i>	<i>T-Prac</i>	A-P-(Prac)	Practicum
PTM17	<i>Prac-T</i>	<i>Prac-T</i>	Prac-T-(A)	Practicum
PTF25	<i>T-Prac</i>	<i>T</i>	P-(Prac)	Practicum & Coursework equally
PTF27	<i>A-T</i>	<i>A-T</i>	P-Prac-A	Practicum
PTM28	<i>T-Prac</i>	<i>T</i>	A-T	Coursework (applicability)
PTF32	<i>A-T</i>	<i>Prac</i>	Prac-A-(T)	Coursework with Practicum
PTM33	<i>A-T</i>	<i>T</i>	T-A	Coursework (practicality)
PTF35	<i>A</i>	<i>Prac</i>	P-Prac-(A)	Practicum

Preservice teacher efficacy and contributing factors

Major Findings

3. How well do the instruments measure teacher efficacy?

Teacher Efficacy instrument

Preservice teacher efficacy measured using the TSES (Tschannen-Moran & Woolfolk Hoy, 2001) provides a rich and contextual measure of preservice mathematics teachers' efficacy. Teacher efficacy as measured by the TSES matched the teacher efficacy expressed in conversation during the interviews.

Other Findings

Teacher efficacy and Internal and External efficacy

Preservice teachers' sense of Internal efficacy and External efficacy as measured by TES (Guskey & Passaro, 1994) matched the results of the interview data. In combination with preservice teachers' sense of self as individuals and their particular lived experiences, preservice teachers' Internal efficacy and/or External efficacy align with teacher efficacy as measured by the TSES (Tschannen-Moran & Woolfolk Hoy, 2001), Internal efficacy more often aligns with higher teacher efficacy than with External efficacy.

Teacher concern

Teacher concern is a nested construct related more to teacher efficacy than to time. High teacher efficacy relates to expressions of impact concern in combination with self and task concerns. Low teacher efficacy relates to expressions that consist mostly of self concerns. As teacher efficacy increases, teacher concerns change from primarily self concerns to a blend of self, task, and impact concerns.

Teacher orientation

Teacher orientation is a complex construct that aligns with teacher efficacy. Low teacher efficacy relates to expressions of single orientations, more often the Technical and Academic orientations. High teacher efficacy relates to combinations of orientations, more often including the Critical Social, Personal, and Practical orientations in combination with the other orientations.

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Further Research

001 Preservice program evaluation with teacher efficacy, teacher concern, teacher orientation as a framework.

Longitudinal inquiry into teacher practice from preservice year(s) into inservice years – for reflection back into the preservice program, and consideration ahead to inservice professional development.

More research on the relationship between field experience (practicum) and preservice coursework.

Deeper inquiry into the nature of locus of control and teacher concern, teacher orientation, and teacher efficacy.

Preservice teacher efficacy and contributing factors

Thank you.

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Preservice teacher efficacy and contributing factors

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