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**Development, Validity, and Reliability of the Preservice Teachers' Attitude Toward Educational Research (P-TATER) Scale**

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ABSTRACT

While there is a growing emphasis on the use of data in educational decision making and research to select educational interventions, there is still limited research on the attitudes of teachers toward research and even less research on preservice teachers' attitudes. Additionally, there are few quantitative instruments designed to measure teachers' attitudes toward research and no instruments to measure preservice teachers' attitudes toward research. The instruments that do exist are of questionable quality. The purpose of the present study was to develop and measure of preservice teachers' attitudes called the Preservice Teachers Attitudes Toward Educational Research (P-TATER) scale.

*Keywords:* Attitudes, Educational Research, Preservice Teachers, Scale Development

## Development, Validity, and Reliability of the Preservice Teachers' Attitude Toward Educational Research (P-TATER) Scale

Over the past several decades, researchers and policy makers have been increasingly emphasizing the use of research to inform K-12 teaching practices. At the same time there has been a growing awareness that teachers may not view education or educational research in the same way as researchers (Bulterman-Bos, 2008). Research investigating in-service and preservice teachers' attitudes toward educational research has not kept pace with this increasing awareness of the possible gap between researcher, policy maker, and teacher views. The research that has been conducted on teachers' attitudes tends to be sporadic and use inconsistent methods (Isakson & Ellsworth, 1979; Papatotiriou & Hannan, 2006; Short & Szabo, 1974).

Some studies have taken a qualitative approach, such as interviews (DeCorse, 1997; Papatotiriou & Hannan, 2006) and constructed response surveys (Galton, 2000; Hannan, Enright, & Ballard, 1998), while others have focused on quantitative scales (Eaker & Huffman, 1981; Isakson & Ellsworth, 1979; Short & Szabo, 1974). This lack of consistency makes it difficult to test the validity of these studies and impossible to gauge a change in teachers' attitudes over time. In order to address this gap in the research, valid and reliable instruments need to be developed to measure both preservice and in-service teachers' attitudes toward educational research across time, sample, and setting. The purpose of the present study was to develop a measure of preservice teachers' attitudes toward educational research in an effort to address this gap.

### Review of Literature

Understanding teachers' attitudes toward research is becoming essential because of the need to train teachers in instructional techniques based on research such as response-to-intervention (RTI). Further, research on the impact of preservice teachers' beliefs indicates that these early beliefs have a significant impact on future teaching practice. Pajares (1992) conducted a comprehensive review of the literature on teachers' beliefs and found empirical support for the early formation of beliefs (i.e. prior to becoming teachers), the low likelihood of changing beliefs in adulthood, the persistence of beliefs even when confronted with strong scientific evidence that those beliefs are incorrect, and the significant impact of beliefs on teachers' perception, cognition, and behavior.

While our need to understand teachers' receptiveness to research based practices is increasing, our knowledge of teachers' attitudes toward research remains sparse and disjointed. The semi-structured qualitative interviews (DeCorse, 1997; Papatotiriou & Hannan, 2006) and constructed response surveys (Galton, 2000; Hannan, Enright, & Ballard, 1998) used in some studies can be informative, but lack generalizability. Adding to the difficulty of developing a comprehensive understanding of teachers' views of educational research is the small sample sizes of many of the most recent studies (DeCorse, 1997; Hannan, Enright, & Ballard, 1998; Papatotiriou & Hannan, 2006).

Quantitative scales can be generalized and allow for comparisons across samples and time, but only if they are valid, reliable, and used in multiple studies with diverse populations. However, in the past researchers developed new scales for each study, which were subsequently replaced by the next researcher with their own scale

making such comparisons impossible (Eaker & Huffman, 1981; Isakson & Ellsworth, 1979; Short & Szabo, 1974). Additionally, many of these surveys have been of questionable quality with little support for the validity of the individual items. For instance, Short and Szabo based their instrument on the ‘research literature,’ but never extrapolate on the type of literature or topics addressed by the literature. Isakson and Ellsworth and Eaker and Huffman developed their scales based on their personal knowledge/experiences.

A slight deviation from this trend was the scale developed by Ozturk (2011), who modified Isakson and Ellsworth’s (1979) scale. However, Ozturk’s method had several limitations. First, Ozturk’s measure was developed by conducting an exploratory factor analysis on the measure developed by Isakson and Ellsworth. While this may appear to support the validity of the final measure, the lack of rigorous procedures in the development of the original instrument undermines the validity of the final instrument. Isakson and Ellsworth based their original instrument on their personal knowledge and experiences and not on any actual data on teachers’ attitudes. In order for researchers to develop a comprehensive knowledge of teachers’ views of research, an instrument grounded in these views needs to be developed. Additionally, an instrument needs to be developed that addresses the attitudes of teachers earlier in their careers. The present study develops an instrument based on a qualitative survey of preservice teachers’ attitudes toward research.

### Research Questions

In order to develop the instrument the following research questions were posed for each stage of the study. Stage 1: What are the major themes in preservice teachers’ attitudes toward research? Stage 2: What is

the underlying structure (i.e. factors) of preservice teachers’ attitudes toward research? Which items, based on the stage 1 thematic analysis, load most highly on each factor? Is the new scale valid and reliable? Stage 3: Can the validity and reliability of the *Preservice Teachers’ Attitude Toward Educational Research Scale* be supported using a different sample?

### Method Design

The present study used a 3 stage design. Stage 1 involved administering an 8-item constructed response survey to undergraduate education majors. A thematic analysis of responses was conducted using a consensual qualitative approach as detailed by Barbara, Thompson, and Williams (1997). The coding team consisted of 1 education faculty member and 3 undergraduate education majors. All coding was audited by a different education faculty member to ensure the validity of the codes. In stage 2, representative statements of students’ responses to the stage 1 survey were constructed based on the identified themes. These statements were used to construct a 49 item Likert-type questionnaire, which was administered to a sample of education majors, and subjected to an exploratory factor analysis. The factor structure identified in stage 2 was evaluated in stage 3 using a second exploratory factor analysis and a separate sample of undergraduate education majors.

### Participants

All three stages used samples of preservice undergraduate education students. The sample used in stage 1 consisted of 46 juniors (n = 24) and seniors (n = 22) enrolled in core education classes. The majority were female (n = 36) and they had

a median age of 21 years. The stage 2 sample consisted of 215 sophomore, junior, and senior students enrolled in core education classes. The participants were predominately Caucasian (n = 203), female (n = 167), elementary education majors (n = 138), with a mean age of 20 years. The sample in the third stage included 255 sophomore, junior, and senior students enrolled in core education classes. They were primarily Caucasian (n = 240) and female (n = 192). There were approximately equal numbers of elementary (n = 138) and secondary (n = 115) education majors. Participants had a mean age of 21. All education students at the college are exposed to a discussion of the connection between educational research and teaching practice in their introductory level education courses. Over 90% of students in all three samples reported remembering discussing research in their education courses.

### Instruments

Three questionnaires were used in the present study. The stage 1 questionnaire consisted of 8 constructed response items (See Tables 1-3). These items addressed preservice teachers' attitudes concerning the usefulness of educational research, their competence in understanding and conducting educational research, and the role teachers should play in educational research. Students were first asked to answer yes or no to each question and then provide a written explanation of their answer. The stage 2 questionnaire consisted of demographic questions and 49 Likert-type items developed from the themes identified in the thematic analysis of the stage 1 questionnaire (See Table 4). The Likert-type items were rated on a 6-point scale ranging from strongly agree to strongly disagree. For stage 3, the questionnaire consisted of demographic questions and the 33 Likert-

type items that were selected for inclusion in the final scale in stage 2 (See Table 4).

### Results

The responses to the stage 1 questionnaire were analyzed using a thematic analysis and a total of 44 themes were identified. Between 4 and 6 themes were identified for each question. The 8 questions, associated themes, and the number of comments that addressed each theme can be found in tables 1-3. Most themes aligned with comments from students who answered yes or no. However, 3 of the themes include comments from people who answered yes and no. These 44 items were used to generate 49 statements, which were the basis for the *Preservice Teachers Attitudes' Toward Educational Research (P-TATER) Scale*. All themes were used to create statements, including those reported by a small number of participants in order to ensure that the final list of questions addressed all possible aspects of preservice teachers' attitudes toward research.

\*\*\*Insert Tables 1-3 About Here\*\*\*

The 49 items developed based on the stage 1 results were analyzed using an exploratory factor analysis in stage 2. The principal factor method was utilized. Costello and Osborne (2005) propose that a true factor analysis method is better than principal components analysis because true factor analysis methods separate shared and unique variance, principal components analysis does not. The principal factor extraction method was chosen over other extraction methods because of the non-normal distribution of some of the items. Some authors indicated that the principal factor method of extraction is a more robust method when dealing with non-normality of variables (Costello and Osborn, 2005;

Fabrigar, Wegener, MacCallum, & Strahan, 1999). The factor analysis was first run without rotation and then with an oblimin rotation. However, there were no significant differences in factor loadings, so only the unrotated results are reported. The Catell scree test was used to identify the number of underlying factors (Cattell, 1966) and using this method two underlying factors were identified.

The factor correlation matrix shows that 33 of the items had factor loadings of .40 or above on one of the 2 factors (See Table 4). Any item with a factor loading of .40 or above was included in the factor. Two items (43 & 44) had factor loadings of .40 or above for both factors. These items were included in the scale for which they had the higher loading; the attitude scale. A factor loading of .40 was chosen based on de Winter, Dodou, and Wieringa's (2009) estimates of necessary sample sizes and factor loadings for satisfactory factor recovery. Using de Winter et al.'s estimates for analyses with 2 factors, at least 24 variables, and minimum factor loadings of .40 the minimum estimated samples size is 134.

The first factor, the attitude scale, consisted of 25 questions relating to perceptions of the value and usefulness of educational research for teachers. The second factor, the perceived competence scale, consisted of 8 questions relating to the preservice teachers' perceptions of their ability to understand and conduct research.

\*\*\*Insert Table 4 About Here\*\*\*

Both scales are cumulative, with each item scored from 1 (Strongly Disagree) to 6 (Strongly Agree). Items with negative factor loadings were reverse scored. The attitude scale has 5 inverse items, while the

perceived competence scale has 1. A reliability analysis of both scales using coefficient alpha indicated high reliability for both the attitude scale ( $\alpha = .93$ ) and the perceived competence scale ( $\alpha = .82$ ).

In stage 3, the 33 items selected for inclusion in the *P-TATER* were analyzed using a second exploratory factor analysis. The principal factor method of extraction was used again without rotation with a 2 factor structure specified. All of the items loaded most strongly on their original factor. All but one of the factor loadings were above .4 (See Table 5). Similarly, the alpha reliabilities of the attitude and perceived competence scales were higher than in stage 2,  $\alpha = .94$  and  $\alpha = .85$  respectively. The two factors account for 41% of the variance in the items' variance-covariance matrix.

\*\*\*Insert Table 5 About Here\*\*\*

### Discussion

The data indicate that the *Preservice Teachers' Attitude Toward Research (P-TATER) Scale* has potential as a measure of preservice teachers' perceptions of research. In contrast to previous measures (Eaker & Huffman, 1981; Isakson & Ellsworth, 1979; Short & Szabo, 1974), the *P-TATER's* items are grounded in preservice teachers' comments about research. This inductive development of items, in conjunction with the high factor loadings and conceptually consistent grouping of items into the 2 scales, supports the validity of the *P-TATER* as a measure of teachers' attitudes toward research. The Cronbach's alpha reliability coefficients for *P-TATER* are similar to those of Isakson & Ellsworth (1979) and greater than those reported by Ozturk (2011), the only other two studies to report reliability coefficients.

Given the lack of agreement on how to determine appropriate minimum sample size (de Winter et al, 2009), the relatively small size of the present sample is a limitation. The present study applied the minimum sample size estimate identified by de Winter et al (2009) through their Monte Carlo analysis using varying factor loadings, number of factors, and number of variables. The present study's samples were greater than the minimum identified by de Winter et al. given the present study's parameters. However, the sample sizes were below the rule of thumb participant per item estimates given by other authors (Schreiber, Stage, King, Nora, & Barlow, 2006). Future research should use larger sample sizes in line with participants per item estimates to confirm the stability of the factor structure.

The composition of all three samples used in this study were consistent with the demographics of the undergraduate education students at the college used in this study and the current composition of P-12 teachers in the United States (i.e. predominately female and Caucasian) (United States Department of Education, National Center for Educational Statistics, 2010). Despite this being the case, the instrument should be evaluated with a more diverse sample to determine whether or not it can be used with all preservice teachers. Further, the factor structures' stability between different types of education students (e.g. elementary vs. secondary or science education vs. English education) should also be evaluated.

In order to avoid past cycles of continual redevelopment of teacher attitude scales,

researchers need to conduct further analyses of the P-TATER's validity and reliability, as well as its generalizability across time and population. Additionally, the efficacy of using the P-TATER, or a derivative of the P-TATER, to evaluate in-service teachers' views of educational research should be investigated. To further these efforts, the P-TATER should be made available for broad evaluation by educational researchers and use by teacher education faculty.

The two subscales (Attitudes and Perceived Competence) can provide useful information for teacher education faculty. These two subscales are particularly relevant given Pajares (1992) conclusions concerning the low likelihood of changing beliefs in adulthood, the persistence of beliefs even when confronted with strong scientific evidence that those beliefs are incorrect, and the significant impact of beliefs on teachers' perceptions, cognition, and behavior. Based on Pajares' conclusions, students' general attitudes toward the usefulness and importance of educational research (Attitudes scale) and competence (Perceived Competence scale) are likely to predict students' likelihood of evaluating teaching methods based on research evidence and adopting those methods. Further, Pajares' conclusions would suggest that it is unlikely for students to change their attitudes based on "evidence" provided in class, and that education faculty would need to convince students who have a low score on the Attitude Scale that the gestalt of the education community supports the use of empirically based methods in order to create a change in belief.



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Table 1

*Do preservice teachers perceive themselves as having the skills necessary to understand and apply research?*

	Yes	No
<b>Have you discussed research in your teacher preparation course work?</b>		
brief class mention	11	0
class discussion	11	0
did research/ used research for project or paper	7	0
example/ support lecture	4	0
no discussion	0	13
<b>Do you feel confident in your ability to read and understand educational research articles?</b>		
confusing jargon/ stats	0	9
if you read/ analyze carefully	7	0
lack of practice	0	4
previous experience/ learn in class	13	0
depends on ease of article	3	0
want more confidence	0	5
<b>Do you feel confident in your ability to apply information you read in educational research articles to your teaching?</b>		
amount of time required	4	1
lack of experience/ability	0	14
need to be more comfortable	0	2

research is to theoretical/ Impractical	0	2
Relevance	1	1
prior knowledge/ ability/ practice	11	0

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Table 2

*What role do preservice teachers believe educational research has in their classroom?*

	Yes	No
Should teachers stay up-to-date on current educational research findings?		
avoid misinformation	2	0
changing research	7	0
continuous learning	3	0
improve teaching/ classroom practice	22	0
stay informed	19	0
Should teachers modify their teaching practices based on recent education research findings?		
improvement/ continuous learning	5	0
effective teaching	15	0
valid & relevant	23	0
some old methods work	0	9
Is educational research useful for classroom teachers?		
keep up to date	7	0
only use valid research	4	0
provide solutions	2	0
test current methods	4	0
improve teaching/ classroom practice	3	0
useful in class/ to students	11	0

Table 3

<i>Do preservice teachers believe that classroom teachers should be involved in conducting research?</i>		
	Yes	No
Should teachers be involved in conducting educational research?		
Biased	0	2
if they have time	7	0
if interested	8	0
experience/ expertise	16	0
lack of time	0	5
give teachers useful information	13	0
Should teacher preparation programs include a course on conducting educational research?		
learn beneficial skills	23	0
other things are more important	0	5
identify good research	3	0
Optional	1	3
graduate programs only	0	2
not a separate class	0	6

Table 4

*Stage 2 Factor Analysis of Initial P-TATER Questions*

Item (Item number on final P-TATER scale)[mean(standard deviation)]	A	P. C.
1. It is important for teachers to stay up-to-date on educational research in order to stay informed of new findings related to teaching and learning. (1)* [5.6(.56)]	.53	.05
2. Teachers shouldn't be involved in conducting educational research because their professional practice has made them biased. [2.75(1.14)]	-.23	.08
3. Reading educational research is a waste of a teacher's time. (2)* [1.64(.65)]	-.59	.05
4. Teachers should only be involved in conducting educational research if it personally interests them. [2.76(1.26)]	-.27	-.12
5. Teachers should stay up-to-date on current educational research in order to avoid misinformation about teaching and learning. (3)* [5.28(.71)]	.59	.04
6. Conducting research distracts teachers from other more important activities. (4)* [2.57(1.06)]	-.41	.07
7. Teachers can learn more about new teaching practices from in-service trainings, seminars, and conferences than they can by reading educational research. [4.53(1.16)]	-.02	.01
8. Teachers don't have enough time to be involved in conducting research. [2.80(1.04)]	-.38	-.06
9. Teachers should read current educational research because it promotes continuous learning. (5)* [5.29(.72)]	.65	.06

10. Teachers' firsthand experience in the classroom is a valuable asset to educational research studies. [5.36(.77)]	.33	-.01
11. Reading educational research can help teachers improve their teaching. (6)* [5.21 (.75)]	.70	-.07
12. Conducting educational research provides teachers with valuable information/experiences that will help improve their classroom practices. (7)* [5.04(.79)]	.68	-.07
13. Teachers should <i>not</i> change teaching practices because some old methods may be more effective. [3.19(1.19)]	-.24	.03
14. Educational research classes can teach preservice teachers valuable skills. (8)* [4.96(.72)]	.60	.12
15. Teachers should change their teaching based on research that investigates students similar to their own. [3.97(.94)]	.31	.01
16. Educational research classes should be optional for education students.[3.66(1.29)]	-.32	.01
17. Teachers should make changes to their teaching based on action research. [4.12(.92)]	.36	-.06
18. Educational research instruction should be imbedded in other education classes. (9)* [4.46(.94)]	.60	-.12
19. Practical experience is a better guide to effective teaching methods than research. [4.48(1.01)]	-.34	.18
20. Teacher preparation programs should include an educational research class. (10)* [4.32(1.02)]	.58	-.02
21. Teachers should <i>not</i> attempt to apply theoretical research to their teaching. [2.92(1.05)]	-.32	.03
22. Educational research courses should be required for education graduate students. (11)* [4.23(1.16)]	.51	-.17
23. Teachers should make changes in their classroom based on applied educational research. (12)* [4.30(.82)]	.49	-.03
24. Undergraduate teacher education programs should <i>not</i> include a course on conducting educational research. (13)*	-.53	.07



[3.11(1.15)]			
25. Teachers should modify their teaching based on recent educational research because they need to continue to improve their practice. (14)* [4.39(.95)]	.54	.08	
26. Teachers should <i>only</i> modify their teaching based on current educational research if they believe their current methods are not working. [3.95(1.23)]	-.27	.03	
27. There are classes that are more important than research methods in teacher preparation programs. [4.73(1.05)]	-.26	.11	
28. Educational research helps teachers stay up-to-date on effective teaching methods. (15)* [5.05(.75)]	.73	.01	
29. I do not have enough practice reading and interpreting research articles to do it effectively. (16)** [3.91(1.26)]	.13	-.57	
30. Educational research is too theoretical to be useful. (17)* [2.80(.96)]	-.55	-.07	
31. Teachers can gain new knowledge from educational research. (18)* [5.26(.61)]	.67	.00	
32. I feel confident in my ability to apply action research findings in my classroom. (19)** [4.09(1.07)]	.12	.69	
33. Educational research helps teachers improve their practice. (20)* [4.85(.75)]	.76	.07	
34. Any teacher can understand research if they read it carefully. [3.71(1.18)]	.11	.38	
35. I can successfully apply research I read to my teaching. (21)** [4.20 (.90)]	.17	.70	
36. Educational research can help teachers meet their students' needs. (22)* [4.75(.82)]	.63	.17	
37. Research articles are straight forward and easy to understand. (23)** [2.57(.95)]	.03	.40	

38. I feel confident in my ability to apply theoretical research findings in my classroom. (24)** [3.73(.96)]	.20	.79
39. Educational research can provide solutions to classroom problems. (25)* [4.57(.80)]	.49	.17
40. I would need to take a class on educational research before I would feel confident reading educational research articles. [4.08(1.28)]	.20	-.38
41. I feel confident in my ability to use applied research findings to modify my instruction. (26)** [3.90(.93)]	.10	.72
42. Research can help teachers by testing methods teachers use in the classroom. (27)* [4.81(.71)]	.54	.09
43. I would like to become more confident in my ability to read educational research. (28)* [4.76(1.09)]	.54	-.41
44. I need to be more experienced in applying research to my classroom. (29)* [4.79(1.01)]	.46	-.41
45. Summaries that interpret and integrate research are more useful than research articles for teachers. [4.11(1.03)]	-.11	-.06
46. I am confident in my ability to understand research jargon. (30)** [3.11(1.11)]	.07	.52
47. I have lots of experience applying research findings to my teaching. (31)** [2.34(1.07)]	-.04	.52
48. Students benefit when their teachers are up-to-date on current educational research. (32)* [4.99(.89)]	.65	-.01
49. I <i>do not</i> plan on applying research findings in my classroom. (33)* [2.20(.96)]	-.54	.00

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A = Attitude

P.C. = Perceived Competence

\* Item included in the final Attitude Scale

\*\* Item included in the final Perceived Competence Scale

Table 5

*Stage 3 Exploratory Factor Analysis of Items for the P-TATER Scale*

	Attitudes	Perceived Competence
1.*	.58	-.04
2*†	.57	-.04
3*	.61	.03
4*†	.48	-.07
5*	.72	.00
6*	.70	.07
7*	.72	.00
8*	.64	-.09
9*	.60	.01
10*	.66	-.10
11*	.59	-.16
12*	.59	-.11
13*†	.62	-.17
14*	.60	-.12
15*	.68	-.06
16**†	.13	.47
17*†	.50	-.08
18*	.65	-.15
19**	.36	.70

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20*	.75	-.09
21**	.31	.62
22*	.72	-.09
23**	.21	.35
24**	.35	.74
25*	.59	-.07
26**	.32	.79
27*	.59	-.06
28*	.50	-.29
29*	.49	-.38
30**	.23	.55
31**	.09	.53
32*	.62	-.05
33*†	.63	-.07

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\* Included in the Attitude Scale

\*\* Included in the Perceived Competence Scale

† Reverse Coded Item (Items were reverse coded before factor analysis)