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Confirmatory Factor Analysis of the Educators' Attitudes Toward Educational Research Scale

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Abstract

This article reports results of a confirmatory factor analysis performed to cross-validate the factor structure of the Educators' Attitudes Toward Educational Research Scale. The original scale had been developed by the author and revised based on the results of an exploratory factor analysis. In the present study, the revised scale was given to 564 PreK-12 in-service educators (teachers, school counselors, administrators, etc.) working at schools in a big mid-Western city in the US. The scale had 29 Likert-type items intended to measure eight dimensions of the variable (at least three items per dimension). Obtained fit indices indicated a good fit between the data and the hypothesized factor structure. All parameter estimates were acceptable. Since there were no established variables in the literature to serve as criterion variables in the measurement of educators' attitudes toward educational research, data were collected on three variables (years of experience as an educator, research methods courses taken, and use of sources to learn about research findings) predicted to be correlates of this construct. To examine which ones might serve as criterion variables, analyses were performed to correlate these variables with subscale scores from the Educators' Attitudes Toward Educational Research Scale. Regarding the results of these correlational analyses, there was a high level of agreement between the present study and the previous exploratory factor analytic study which also looked at the same correlations, measuring the related variables in the same way as the present study did.

Key Words

Educational Research, Teacher Attitudes, Factor Analysis, Scale Development.

Educational research and attitudes toward it has always been a source of discussion due to a number of reasons. The first reason is that the methodology used in educational research makes it a complicated science. For example, contrary to natural sciences, many variables in education cannot be studied under strict control. This generates limited generalizability of educational research findings due to unique effects of the participants and the context of the study (Berliner, 2002). Second, limited utilization of research findings in educational practice has been a concern (Bracey, 1998; Levine, 2007). Third, practitioners' perceptions of educational research have generally been negative (Isakson & Ellsworth, 1978; Levine). Fourth, in educational research classes, students have usually had negative attitudes toward educational research (Isakson & Ellsworth, 1979; Onwuegbuzie, Slate, Paterson, Watson, & Schwartz, 2000). In addition to these reasons, the No Child Left Behind Act of 2001 and legislation thereafter appear as a more recent and powerful reason. No Child Left Behind has emphasized the importance of doing scientifically based research and employing evidence-based practices in schools (Levine). Such language implies that educational research will have more weight in daily practices of educators and that educators should be informed consumers of educational research. From

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the perspective of educators, this means increased responsibility to make oneself knowledgeable in research methods and to apply these methods in their own schools/classrooms to improve their practices.

All of the issues above highlight the importance of educators' attitudes toward educational research as a variable. Accordingly, effective investigation of the issues mentioned above necessitates reliable and valid measurement of attitudes toward educational research. Yet, there has not been much theoretical or empirical work in this area. Even though there have been a number of instruments that were intended to measure practitioners' or students' attitudes toward educational research, which were developed by researchers for their specific studies and/or relatively small populations (e.g., Papanastasiou, 2005; Richardson & Onwuegbuzie, 2002; West & Rhoton, 1994), only one instrument intended for a larger group of educators could be located. For example, West and Rhoton limited their study to school district administrators and only studied their perceptions of the utility of educational research done by researchers, keeping the attitudes toward educators' doing their own research out of the scope of the study. Likewise, Richardson and Onwuegbuzie selected African American graduate students as their target group and explicitly stated that the instrument used in the study had been developed specifically for their own research. The only instrument that could be identified to have been designed for a larger group of educators was Attitudes Toward Educational Research Scale. This scale was developed by Isakson and Ellsworth (1979) to measure teachers' attitudes toward educational research. After their work, which was around thirty years ago, there has not been any published research on either developing a new instrument or revalidating/revising the existing ones for the current conditions in the world of education.

The present article reports part of a line of research aimed at developing a scale intended to measure educators' attitudes toward educational research. The scale that would come out of this line of research has been intended to provide reliable and valid measurement of different aspects of educators' attitudes toward educational research. Such a scale could be used by policymakers, educational administrators, and researchers to assess attitudes of individuals or groups of educators. These assessments could provide critical information in identifying educators' misperceptions of or incorrect approaches to educational research, or their complaints about practices around educational research that hinder their use of educational research. Based on this information, a variety of policies and practices could be developed to improve educators' attitudes toward educational research or to increase their use of educational research. These policies and practices might include, but are not limited to, providing (more) time, resources, and incentives for practitioners to get involved in educational research and to look for research findings they could use in their practices; offering in-service training programs for educators and mentoring programs for the newly hired. The scale has been designed for all PreK-12 in-service educators such as teachers, administrators, and school counselors, with the thinking that all these educators are potential producers and/or consumers of educational research.

This article is a report of the confirmatory factor analysis of the Educators' Attitudes Toward Educational Research Scale, which has originally been developed by the author. Exploratory factor analysis of the original scale has been done in a previous study and revisions have been made based on the results (Ozturk, 2010). The purpose of the study reported in the present article has been to cross-validate the factor structure of the revised scale on a new and larger sample. In addition, the relationship of educators' attitudes toward educational research with a number of career-related variables has also been investigated.

Method

Measurement Instruments

Educators' Attitudes Toward Educational Research Scale: Since the construction of the original scale has been discussed in a previous article (Ozturk, 2010), details about the approach employed in the process of deciding on the subscales and the items to be included in the scale will not be provided here. Before the exploratory factor analysis, the scale had five items for each of the following eight dimensions of educators' attitudes toward educational research. After the deletion of some items based on results from the exploratory factor analysis, there remained a total of 29 items in the scale. Number of items remained in the scale for each dimension is given on the list below.

1. Degree to which educators value training in educational research (5 items)
2. Degree to which educators believe that those who keep up with research are better educators (3 items)

3. Degree to which educators value doing research in their classrooms/schools (3 items)
4. Degree to which educators believe that research findings are applicable to real life contexts (3 items)
5. Degree to which educators believe that research reports are understandable (4 items)
6. Degree to which educators believe that they have time and resources to make use of research findings (5 items)
7. Degree to which educators incorporate doing their own research in their practices (3 items)
8. Degree to which educators invest time and effort in learning about research findings (3 items)

The items were on a Likert scale, with five choices ranging from 'strongly agree' (coded as 1) to 'strongly disagree' (coded as 5). 20 of the remaining 29 items were positively phrased and 9 were negatively phrased. Besides, sequencing of items was mixed; that is, items measuring the same dimension were not placed one after another (see Appendix for the complete list of items).

Measurement of Career-Related Variables: Beside administration of the scale mentioned above, several career-related variables have also been measured. The variables on which data were collected only for descriptive purposes in this study were employment status (full-time/part-time/substitute), type of school at which the respondent worked (public/private/charter), area (e.g., mathematics teacher, science teacher) and grade span (e.g., middle school, high school, K-8) of respondent's teaching/school services responsibility.

Data were collected on three more variables to examine whether they might serve as criterion variables in criterion-related validity of measurement of educators' attitudes toward educational research. In scale validation studies such as the present one, criterion-related validity is also presented as evidence of the validity of the scale under study. Criterion-related validity of a scale is typically provided in the form of significant correlations of scores from the scale with variables that are well-established correlates of the variable that the scale is supposed to measure (Pedhazur & Schmelkin, 1991). However, no variables could be found in the literature that could be used as criterion variables to examine the criterion-related validity of the Educators' Attitudes Toward Educational Research Scale. Although relationships between this variable and a number of other variables have been investigated [e.g., knowledge of educational research (Isakson & Ellsworth, 1978; Napier, 1978-1979)], no well-established correlations could be located in the literature to serve as a measure of validity of the scale under study.

In the absence of such well-established correlations, data were collected on three variables that were thought to be correlated with educators' attitudes toward educational research to see if they might serve as criterion variables. Again, this was done not for the purpose of examining the criterion-related validity of the scale; rather, as preliminary work to test whether these variables could be good candidates for criterion variables in the measurement of educators' attitudes toward educational research.

Two of these three variables were years of teaching/school services experience and the number of research methods courses taken in education and in other social sciences (such as psychology). Finally, respondents were asked to rate themselves on a five-point scale from 1 (not at all) to 5 (very much) in terms of how much they use books, academic journals, and Internet sites of well-established institutions/organizations to learn about educational research findings. Separate ratings were requested for these three sources of educational research findings. The third variable was the sum of these three ratings. While there are other sources from which one can learn about educational research findings, such as TV/radio or in-service training programs, the selected three sources require that the individual deliberately seek and explore them with his/her free will, which may really be associated with positive attitudes toward educational research. To contrast, one might simply come across research findings on TV while having dinner, without having to put any effort to learn about these findings. Or, educators might be required - regardless of their will - to attend in-service training programs, where they can learn about research findings. These haphazard or mandatory encounters with educational research findings might be difficult to relate to positive attitudes toward educational research. In other words, if there is any correlation to be found between attitudes toward educational research and intensity of use of sources to learn about educational research findings, then these three sources might be the best to look at.

Table 1.
Number of Educators in the Sample by Grade Span of Teaching/School Services Responsibility

PreK	Kinder garten	Elementary School	Middle School	High School	K-8	PreK-3	K-12	Other	Missing
16	33	75	106	41	166	72	16	32	7

Sample

Data were collected from a total of 564 educators of grades PreK-12 who worked at a school at the time of data collection. The term 'educator' was used to include teachers as well as school services personnel, such as school counselors, administrators, speech and hearing specialists, and school psychologists. Actually, the respondents were from 22 different areas of teaching/school services responsibility. They were educators in public (n=445), charter (n=85), and private (n=34) schools in a big Midwestern city in the U.S. Almost all of these educators were full-time (n=550). There were only 9 part-time and 3 substitute educators. Table 1 below gives the choices that the respondents were provided to specify the grade span in which their primary teaching/school services responsibility lies and the number of educators who chose each of these choices.

The number of years of teaching/school services experience of respondents ranged from 1 to 45 with a mean of 14.84 and a standard deviation of 9.37. Among the 361 valid responses for the number of research methods courses taken in education and in other social sciences (such as psychology), 17.2 % indicated no research methods courses taken at all, 18 % only one course, 24.4 % two courses, 14.7 % three courses, 16.9 % four courses, and 8.9 % five courses. Regarding the sum of three separate ratings for the intensity of use of books, academic journals, and Internet sites of well-established institutions/organizations to learn about educational research findings, the mean was 9.77 (min=3; max=15) with a standard deviation of 2.67.

The sample of the study was sufficiently large according to any sample size recommendations in the literature for confirmatory factor analysis. For example, Bentler and Chou (1987) recommend a minimum of five cases per model parameter to be estimated with the maximum likelihood method (which is the estimation method used in this study). A total of 86 parameters have been estimated in the measurement model in the present study, which, according to Bentler and Chou, requires a minimum sample size of 430 (86x5). Gagne and Hancock (2006), on the other hand, make minimum sample size recommendations based on number of indicator variables per factor and the magnitude of factor loadings. With three indicator variables per factor and homogeneous factor loadings of .4 (which are the minima in this study), they recommend a minimum sample size of 400 for satisfactory results in confirmatory factor analysis. According to either suggestion, the sample size of this study (n=564) exceeds the minimum recommended in the literature.

Procedure

Data were collected in April through June of 2008 after the approval of the Institutional Review Board of the university at which the author worked at the time of data collection. To maintain anonymity, respondents were asked not to put any personally identifiable information on the scale. Whenever possible, the author went to the school and administered the scale to the educators in person during staff meetings. When it was not an option, copies of the scale were provided to the school administrators and the administrators administered the scale to their staff.

Data Analysis

There were no non-responses for any of the 29 items. Some of the items were reverse-coded so that higher scores indicated a more positive attitude/perception for all of the items (see Appendix for reverse-coded items). All items were treated as continuous variables since all were on the same Likert scale with five choices ranging from 'strongly agree' to 'strongly disagree'. SPSS 16.0 (SPSS Inc., 2007) was used to calculate the means and the standard deviations of items and the correlation matrix to be used in LISREL 8.80 (Jöreskog & Sörbom, 2007) to perform the confirmatory factor analysis.

In the confirmatory factor analysis, covariance matrix was analyzed with the maximum likelihood estimation method. To resolve the scale indeterminacy problem of factors, the value of the loading of one reference variable per set of indicator variables (items) assigned to each factor was constrained to be 1.0 in the LISREL syntax (Byrne, 1998). As

recommended by Byrne, these reference variables in each set of items were the ones with the highest corrected item-total correlation in the reliability analyses performed in SPSS 16.0 (SPSS Inc., 2007). Correlations between the error terms of items were constrained to be zero, since there would not be any theoretically sound interpretations of these parameter estimates for the measurement model under study. All other parameters were free to take on any value in the estimation. Reliability coefficients for the factors and for the whole scale were also calculated using SPSS 16.0 (SPSS Inc., 2007).

To examine whether the three variables (number of years of teaching/school services experience, number of research methods courses taken in social sciences, and the intensity of use of books, academic journals, and Internet sites of well-established institutions/organizations to learn about educational research findings) might serve as criterion variables in criterion-related validity of the measurement of educators' attitudes toward educational research, averages of points on sets of items measuring each of the eight factors were calculated. Then, the relationships between each factor and the three variables were examined.

Results

Confirmatory Factor Analysis

To begin with, fit indices indicated that the data fit the hypothesized measurement model well. Among a large number of fit indices available, Sun (2005) suggests using Standardized Root Mean Square Residual (SRMR), Tucker-Lewis Index (TLI) which is the same as Non-normed Fit Index (NNFI), McDonald's Centrality Index (Mc), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI) in a stand-alone evaluation of the model fit for the purpose of construct validity evaluation. LISREL 8.80 (Jöreskog & Sörbom, 2007) reports all of the above fit indices, except Mc. When maximum likelihood is used as the estimation method, Hu and Bentler (1999) recommends using the (maximum) cutoff value of .08 for SRMR and .06 for RMSEA, and the (minimum) cutoff value of .95 for TLI (NNFI) and CFI to conclude that there is a good fit. All of the four fit indices obtained in the confirmatory factor analysis had desirable magnitudes (SRMR=.05; RMSEA=.05; NNFI=.96; CFI=.96), indicating a good fit between the model and the data.

The magnitudes of factor loadings ranged from .41 to .83, and all were statistically significant at the

Table 2.
Completely Standardized Factor Loadings and Reliability Coefficients

Factor	Item No.	Loading	Reliability coefficient (Cronbach's alpha)
Degree to Which Educators Value Training in Educational Research	1	.73	.827
	9	.76	
	15	.70	
	19	.68	
	26	.64	
Degree to Which Educators Believe That Those Who Keep Up with Research Are Better Educators	2	.60	.650
	16	.65	
	20	.65	
Degree to Which Educators Value Doing Research in Their Classrooms/Schools	3	.49	.496
	10	.63	
	17	.41	
Degree to Which Educators Believe That Research Findings Are Applicable to Real Life Contexts	4	.63	.620
	11	.52	
	21	.65	
Degree to Which Educators Believe That Research Reports Are Understandable	6	.77	.825
	12	.78	
	23	.59	
	28	.80	
Degree to Which Educators Believe That They Have Time and Resources to Make Use of Research Findings	7	.55	.815
	13	.59	
	18	.83	
	24	.82	
	29	.62	
Degree to Which Educators Incorporate Doing Their Own Research in Their Practices	5	.68	.679
	22	.52	
	27	.77	
Degree to Which Educators Invest Time and Effort in Learning about Research Findings	8	.70	.775
	14	.75	
	25	.75	

.05 level (see Table 2 for completely standardized factor loadings). A comparison between the loadings obtained from the exploratory factor analysis performed earlier on a different sample and reported in a previous article (Ozturk, 2010) and the ones in the present confirmatory factor analysis revealed that the sets of items measuring the factors had similar relative standings in terms of their magnitudes. For example, the set of items with the lowest loadings in the exploratory factor analysis also had the lowest loadings in the confirmatory factor analysis.

Internal consistency reliability coefficients (Cronbach's alphas) for the factors ranged from .827 to .496 (see Table 2 for reliability coefficients of sets of items measuring each factor). While four of the eight reliability coefficients were above the most commonly used acceptability threshold of .70, three were around .65, and only one had a value of .496. Cronbach's alpha for the whole scale was .860. Nunnally (1967) states that "In the early stages of research on predictor tests or hypothesized measures of a construct, one saves time and energy by working with instruments that have only modest reliability, for which purpose reliabilities of .60 or .50 will suffice" (p. 226). Admitting that this line of research is at an early stage, even the reliability coefficients below .70 can be seen as acceptable in this study. In addition, it was encouraging to see that there was a very high level of match between the reliability coefficients obtained in a previous study with the same items on a different sample (Ozturk, 2010) and those obtained in the present study. The ranking of reliability coefficients for sets of items measuring the factors was the same in the two studies, with the exception that two factors switched places. For example, the set of items that had the highest reliability coefficient in one study also had the highest in the other study.

Correlations between factors were also estimated in the confirmatory factor analysis. While all but two of the correlations between factors were statistically significant at the .05 level, some of the statistically significant correlations were not high enough to signify a meaningful relationship (see Table 3 for completely standardized factor correlations). Even though there were no a priori hypotheses in this study about the strength of relationships between factors, the correlations that can be considered high enough signal relationships that can be expected. However, holistic and meaningful interpretation of relationships among the dimensions of educators' attitudes toward educational research is only possible within a theoretical framework where the hypothesized relationships (including the mediating and/or moderating variables) between dimensions are spelled out and tested.

Table 3.
Completely Standardized Factor Correlations

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
2	.98*						
3	.51*	.56*					
4	.66*	.73*	.60*				
5	.21*	.30*	.27*	.55*			
6	.29*	.32*	.05	.15*	.04		
7	.32*	.44*	.51*	.29*	.13*	.34*	
8	.50*	.61*	.40*	.21*	.21*	.41*	.60*

* significant at the .05 level (2-tailed).

Correlations of Eight Factors with Career-Related Variables

As explained before, correlations of eight factors with three variables that were predicted to be correlated with educators' attitudes toward educational research were also examined. Please keep in mind that this has not been done for the purpose of providing evidence of the criterion-related validity of the Educators' Attitudes Toward Educational Research Scale, since no variables – including the ones examined in this study – could be identified in the literature as well-established correlates of educators' attitudes toward educational research. Therefore, these correlational analyses were performed to provide future researchers with some preliminary findings about possible correlates of attitudes toward educational research.

The first variable examined was the number of years of teaching/school services experience, and four of the eight bivariate correlations between this variable and the eight factors were statistically significant (see Table 4 for correlations). However, none of these statistically significant correlations had large enough magnitudes to warrant substantive interpretation. While this study fails to identify this variable as a potential criterion variable, it was good to see that there was consistency between the findings from the present study and those from a previous one (Ozturk, 2010). The previous study that used the same scale as the measurement instrument and looked at the same correlations also

failed to find meaningful relationships between this variable and the eight factors.

The second variable was the number of research methods courses taken in social sciences, and six of the eight bivariate correlations were statistically significant (see Table 4 for correlations). As was the case with the first variable, none of the correlations were high enough to lead to any meaningful interpretation. Therefore, this variable, too, did not exhibit any potential to serve as a criterion variable. Fortunately, the consistency between the present study and a previous one (Ozturk, 2010) was also there for this variable, because the previous study also could not find any interpretable correlations between this variable and the eight factors.

The third variable was the intensity of use of three sources to learn about research findings. This variable was measured as the sum of the respondent's self-ratings on a five-point scale from 1 (not at all) to 5 (very much) in terms of the intensity of his/her use of 1) books 2) academic journals, and 3) Internet sites of well-established institutions/organizations. All the correlations with this variable were statistically significant and relatively larger in magnitude compared to the correlations with the first two variables examined (see Table 4 for correlations). While none were high enough to indicate a strong relationship, they can still be evaluated in terms of their relative standing. In this respect, it was good to see that the highest correlation (.635) was with the most relevant factor (the factor measuring the degree to which the respondent invests time and effort in learning about research findings). It was also encouraging to see that the correlation with the factor measuring the degree to which the respondent values training in educational research (.395) was stronger than the ones with three factors that can be perceived and/or presented by educators as excuses to not put any effort to learn about research findings. These three factors and correlation coefficients are 1) the degree to which the respondent believes that research findings are applicable to real life contexts (.221) 2) the degree to which the respondent believes that research reports are understandable (.182) 3) the degree to which the respondent believes that s/he has time and resources to make use of research findings (.224). Especially as a professor of educational research, it is hopeful to see that the value assigned to training in educational research was related to use of sources to learn about research findings more strongly than were the above three issues that can be seen as barriers to look for and make use of research findings. Results from a previous study (Ozturk, 2010) that used the same scale to measure attitudes and looked at the same correlations also yielded similar interpretations as the ones provided in this paragraph, again exhibiting consistency between the findings of the two studies.

As pointed out before, there are a number of sources to learn about research findings other than the three used in this analysis. Therefore, it should be borne in mind that the correlations presented for the third variable reflect the relationship of the factors with the intensity of use of only these three specific sources. In conclusion, in light of the low-to-moderate correlation coefficients, it is difficult to claim that the third variable exhibits much potential to serve as a criterion variable in the measurement of the dimensions of educators' attitudes toward educational research, at least when this variable and the dimensions are measured the way presented in this article.

Table 4.
Correlations of Eight Factors with Career-Related Variables

Factor	Number of years of teaching/ school services experience	Number of research methods courses taken in social sciences	Intensity of use of sources to learn about research findings
1	-.073	.149*	.395*
2	-.011	.114*	.434*
3	-.079	.081	.211*
4	-.088*	.129*	.221*
5	.045	.115*	.182*
6	.120*	.101	.224*
7	.135*	.184*	.432*
8	.106*	.120*	.635*

* significant at the .05 level (2-tailed).

Discussion

Regarding the confirmatory factor analysis part of the study, the scale can be said to be successfully cross-validated. First, all the fit indices recommended to be examined in this type of research indicate a good fit between the measurement model tested and the data. Second, while statistically inadmissible parameter estimates (such as negative variances) are not uncommon in confirmatory factor analytic studies (Bollen, 1989), all of the es-

timates in the present study were statistically admissible and in the expected direction. Third, the factor structure and the factor loadings obtained in a previous exploratory factor analysis with the same scale and items (Ozturk, 2010) showed resemblance to those obtained in the present confirmatory factor analysis, exhibiting consistency across the two studies, thus, providing additional evidence for cross-validation of the scale.

As for the reliability coefficients, only one out of the eight was significantly lower than the commonly used acceptability threshold of .70. As indicated before, reliability coefficients below .70 (down to .50) are still acceptable in a study at its early stages as the present one (Nunnally, 1967). Moreover, it is important to point out here that all the reliability coefficients which were below .70 in this study belonged to sets of three items. It is well-known that, when everything else is kept constant, the larger the number of items, the higher the internal consistency reliability coefficient (Cronbach's alpha) for a set of items (Pedhazur & Schmelkin, 1991). Therefore, the relatively low reliability coefficients might be reflecting this small number of items rather than malfunctioning of the items measuring their respective factors. In future studies, an obvious solution to this problem might be to add items that successfully reflect these factors. Finally about the reliability coefficients, there was a very high level of match between the reliability coefficients obtained in a previous study with the same items on a different sample (Ozturk, 2010) and those obtained in the present study. The ranking of reliability coefficients for sets of items measuring the factors was the same in the two studies, with the exception that two factors switched places. Such consistency across samples can also be seen as evidence of the stability of the reliability estimates, a desirable phenomenon in cross-validation studies.

Furthermore, results of this confirmatory factor analysis should be evaluated in light of several facts. To begin with, despite the fact that eight is large as the number of factors to be differentiated from each other in factor analysis, satisfactory results have been obtained. Second, while factor structure of many measurement instruments obtained in exploratory factor analysis cannot be confirmed by confirmatory factor analysis in a subsequent study (Van Prooijen & Van Der Kloot, 2001), this has been accomplished in this study. Third, the wording of the items was longer than that of many other scales, some of which have items made up of three or four words. Such short wording makes it much easier to reach desirable statistical results in terms of validity and reliability at the expense of not receiving thoughtful responses from the respondents. Fourth, the scale had both negatively and positively worded items that avoided response set bias. Having all items worded positively can easily cause response sets where the respondent tends to give the same response to all or most items without giving much thought (Cronbach, 1946). This may generate artificially high measures of validity and/or reliability. In other words, the ability of the scale in this study to elicit quality responses from respondents was not sacrificed to artificially high measures of validity and/or reliability. All in all, while there is room for improvement for the scale, results can be seen as success for an initial product of this line of research. Needless to say, there is no end to the improvement of measurement instruments in social sciences through adding or deleting subscales and/or items or revising the wording of items. The scale in this study is no exception.

Regarding the correlational analyses, none of the variables examined exhibited potential to serve as criterion variables in the measurement of educators' attitudes toward educational research. These three variables were 1) number of years of teaching/school services experience 2) number of research methods courses taken in social sciences 3) intensity of use of books, academic journals, and Internet sites of well-established institutions/organizations to learn about research findings. While some of the correlations between factors and the first two variables were statistically significant, they were not large enough to deserve any interpretation. Correlations of factors with the third variable were relatively higher than those with the first two variables; however, they, too, were not high in magnitude to warrant any interpretation. On the other hand, there was at least consistency between the findings from the present study and those from a previous study (Ozturk, 2010) that used the same scale to measure attitudes and examined the correlations with the same variables. Such consistency implies the need to identify other variables to examine as potential criterion variables.

While one might think that the first two variables (years of experience and research methods courses taken) would influence educators' attitudes toward educational research, findings showed that these variables were not interpretably related to attitudes. Similarly, intensity of use of sources to learn about research findings might be thought to be considerably influenced by attitudes toward educational

research. Yet, this study could not find a strong relationship. Even though this study failed to identify any variables that might serve as criterion variables, findings can still be seen to have added to our knowledge base on the topic with scarce previous research. Please remember that these correlational analyses were not for the purpose of providing evidence of criterion-related validity of the Educators' Attitudes Toward Educational Research Scale. In the absence of well-established correlates to serve as criterion variables, these analyses were undertaken as exploratory work to provide future researchers with some preliminary findings that related attitudes toward educational research to several variables.

Since this research was mainly a measurement study, developing and testing theories or hypotheses about the nature of relationships between dimensions of attitudes toward educational research or about this variable's relationship with some other variables was beyond the scope of this study. Hence, the correlational analyses reported in this article should be seen as preliminary work for such theoretical research. There is much room for future research in the area of educators' attitudes toward educational research. Following are four topics which ask for further research: 1) the relationships between dimensions of attitudes toward educational research 2) the mechanisms through which these attitudes influence actual practices around research 3) the interaction among attitudes, actual practices, the demographic characteristics of educators, and the conditions in schools or other educational settings, and 4) stability of these attitudes over time or their potential for change through educators' activities, such as attending professional development on research and data use. If educational research is to become an influential part of practice in the world of education, all of the above topics will have to be studied. Obviously, these research endeavors will have to be holistic, trying to understand the big picture. For this purpose, much qualitative work will be needed – perhaps in the form of focus groups or interviews with educators and administrators – to understand the complicated nature of the interaction among all the factors involved. Such research may yield successful theorizations of relationships. Once explanations around these relationships and interactions are formulated, statistical testing of these formulations can be performed through advanced methods such as structural equation modeling and hierarchical linear modeling.

Along with the kind of research suggested above, a parallel line of research should continue on the measurement of educators' attitudes toward educational research. Needless to say, successful measurement of this variable is a prerequisite for the study of the issues listed in the previous paragraph. And, as stated before, there is no end to the improvement of measurement of most variables in social sciences, including the one under study in this research. As a line of research specifically related to the Educators' Attitudes Toward Educational Research Scale, researchers may consider examining the generalizability of this scale to various groups of educators. These groups may include educators from different states in the U.S. or even other countries in the world. These generalizability studies can also be extended to groups of educators with different responsibilities. For example, there may be room for alignment of the scale specifically for mathematics teachers or for special education teachers. By the same token, variables that might serve as criterion variables may be field-specific, depending on the nature of the expectations from educators in various fields. All in all, the Educators' Attitudes Toward Educational Research Scale is now available as an instrument that measures eight different dimensions of educators' attitudes toward educational research at an acceptable level of validity and reliability. From this point on, there can be different ways of adopting and adapting this scale for various purposes. In this respect, this research was only a first step – but an important and successful one – toward digging into a key phenomenon in the world of education.

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Appendix

Factors and Items Measuring These Factors

Note. To align this appendix with the tables in the text, the factors and items are listed in this appendix in the order they appear in Table 2, Table 3, and Table 4. (R) at the end of an item indicates that the item was reverse-coded for statistical analysis. To show the mixed sequencing of items in the scale, original item numbers in the scale have been used below.

Factor 1 –	Degree to Which Educators Value Training in Educational Research
Item 1	Training in educational research can help educators improve their practice. (R)
Item 9	Training in educational research may help educators make more informed decisions in their practices. (R)
Item 15	Training educators in research methods is one way to improve the quality of education in schools. (R)
Item 19	Educators can achieve a better understanding of research findings through training in research methods. (R)
Item 26	Training in educational research can improve educators' skills to do research in their fields.(R)
Factor 2 –	Degree to Which Educators Believe That Those Who Keep Up with Research Are Better Educators
Item 2	Educators who keep up with research in their fields tend to be better educators than those who do not. (R)
Item 16	Reading research is an effective means to become a successful educator. (R)
Item 20	Reading research can provide insight into issues regarding one's practice. (R)
Factor 3 –	Degree to Which Educators Value Doing Research in Their Classrooms/Schools
Item 3	Educators can learn very little by doing their own research in their classrooms/schools.
Item 10	Careful analysis of their own classroom/school experiences is an important learning experience for educators. (R)
Item 17	Observations made in classrooms/schools are of little use to shape one's practice.
Factor 4 –	Degree to Which Educators Believe That Research Findings Are Applicable to Real Life Contexts
Item 4	Most educational research findings are not applicable in schools.
Item 11	Professors/researchers who do research do not really know the conditions in schools.
Item 21	Recommendations made in research reports are not realistic.
Factor 5 –	Degree to Which Educators Believe That Research Reports Are Understandable
Item 6	Research reports are often too difficult to understand.
Item 12	Research terminology makes research reports too technical.
Item 23	I would read more research reports if they were easier to understand.
Item 28	Research reports present their findings in a confusing manner.
Factor 6 –	Degree to Which Educators Believe That They Have Time and Resources to Make Use of Research Findings
Item 7	Administrators in my school put money aside for research-related activities. (R)
Item 13	My school provides me with easy access to academic journals. (R)
Item 18	My administrators encourage me to engage in research-related activities. (R)
Item 24	My school administration encourages me to read research. (R)
Item 29	My administrators provide me with the time and the resources for research. (R)
Factor 7 –	Degree to Which Educators Incorporate Doing Their Own Research in Their Practices
Item 5	I systematically collect and record data in my classroom/school. (R)
Item 22	I keep a log for my observations in my classroom/school. (R)
Item 27	I collect my own data in my classroom/school to assess/revise my practice. (R)
Factor 8 –	Degree to Which Educators Invest Time and Effort in Learning about Research Findings
Item 8	I regularly read academic journals in my field. (R)
Item 14	I use every means to update myself about research in my field. (R)
Item 25	I regularly visit professional websites to learn about latest developments in my field. (R)

Ek.

Faktörler ve Bu Faktörleri Ölçen Maddeler

Not. Bu eki, metin içindeki tablolarla uyumlu halde sunmak için, aşağıdaki listede faktörler ve maddeler, Tablo 2, Tablo 3 ve Tablo 4'te kullanılan sırayla sunulmuşlardır. Bir maddenin sonundaki (R), o maddenin istatistiksel analiz için ters kodlandığını göstermektedir. Ölçekteki maddelerin karışık sıralandığını göstermek için, aşağıdaki listede, ölçekteki orijinal madde numaraları kullanılmıştır.

Faktör 1 – Eğitimcilerin Eğitim Araştırmalarıyla İlgili Eğitim Almayı Ne Derece Değerli Buldukları

Madde 1 Eğitim araştırmalarıyla ilgili eğitim almaları, eğitimcilere mesleki uygulamalarını geliştirmede yardımcı olabilir. (R)

Madde 9 Eğitim araştırmalarıyla ilgili eğitim almaları, eğitimcilere mesleki uygulamalarıyla ilgili daha bilgilenmiş bir şekilde karar almalarında yardımcı olabilir. (R)

Madde 15 Eğitimcileri araştırma yöntemleri konusunda eğitmek, okullardaki eğitim kalitesini artırmanın bir yoludur. (R)

Madde 19 Eğitimciler, araştırma yöntemleriyle ilgili eğitim almaları sayesinde araştırma bulgularını daha iyi anlayabilirler. (R)

Madde 26 Eğitim araştırmalarıyla ilgili eğitim almaları, eğitimcilerin kendi alanlarında araştırma yapma becerilerini geliştirebilir. (R)

Faktör 2 – Eğitimcilerin Eğitim Araştırmalarını Takip Eden Meslektaşlarının Daha İyi Eğitimciler Olduğuna Ne Derece İnandıkları

Madde 2 Kendi alanlarındaki araştırmaları takip eden eğitimciler, takip etmeyenlere göre genellikle daha iyi eğitimcilerdir. (R)

Madde 16 Araştırmalarla ilgili okumalar yapma, başarılı bir eğitimci olmanın etkili bir vesilesidir. (R)

Madde 20 Araştırmalarla ilgili okumalar yapma, kişinin mesleki uygulamalarıyla ilgili sorunlarına ışık tutabilir. (R)

Faktör 3 – Eğitimcilerin Kendi Sınıf/Okullarında Araştırma Yapmayı Ne Derece Değerli Buldukları

Madde 3 Eğitimciler, sınıf/okullarında kendi araştırmalarını yaparak çok az şey öğrenebilirler.

Madde 10 Kendi sınıf/okul deneyimlerinin dikkatlice analizi, eğitimciler için önemli bir öğrenme deneyimidir. (R)

Madde 17 Sınıf/okullarda yapılan gözlemler, kişinin mesleki uygulamalarını şekillendirmesinde az yarar sağlar.

Faktör 4 – Eğitimcilerin Araştırma Sonuçlarının Gerçek Yaşamdaki Ortamlarda Uygulanabilirliğine Ne Derece İnandıkları

Madde 4 Eğitim araştırma bulgularının çoğu, okullarda uygulanabilir değildir.

Madde 11 Araştırma yapan öğretim üyeleri/araştırmacılar, okullardaki koşulları gerçekten bilmiyorlar.

Madde 21 Araştırma raporlarında yapılan öneriler gerçekçi değiller.

Faktör 5 – Eğitimcilerin Araştırma Raporlarının Anlaşılabilirliğine Ne Derece İnandıkları

Madde 6 Araştırma raporlarının anlaşılması çoğu kez çok zordur.

Madde 12 Araştırma terminolojisi, araştırma raporlarını çok teknik bir hale getiriyor.

Madde 23 Daha kolay anlaşılabilselerdi daha fazla araştırma raporu okurdum.

Madde 28 Araştırma raporları, bulgularını kafa karıştırıcı bir şekilde sunuyor.

Faktör 6 – Eğitimcilerin Araştırma Sonuçlarından Yararlanmak İçin Zaman Ve Kaynağa Sahip Olduklarına Ne Derece İnandıkları

Madde 7 Okulumdaki yöneticiler, araştırmayla ilgili etkinlikler için bütçeden para ayırırlar. (R)

Madde 13 Okulum, akademik dergilere kolayca ulaşmamı sağlar. (R)

Madde 18 Yöneticilerim, araştırmayla ilgili etkinliklere katılmam konusunda beni teşvik ederler. (R)

Madde 24 Okul yönetimim, araştırmalarla ilgili okumalar yapma konusunda beni teşvik ederler. (R)

Madde 29 Yöneticilerim, araştırma için bana zaman ve kaynak sağlarlar. (R)

Faktör 7 – Eğitimcilerin Kendi Araştırma Gayretlerini Mesleki Uygulamalarına Ne Derece Dahil Ettikleri

Madde 5 Sınıf/okulumda sistematik olarak veri toplar ve kaydederim. (R)

Madde 22 Sınıf/okulumdaki gözlemlerim için bir günlük tutarım. (R)

Madde 27 Mesleki uygulamalarımı değerlendirmek/revize etmek için sınıf/okulumda kendim veri toplarım. (R)

Faktör 8 – Eğitimcilerin Araştırma Sonuçlarını Öğrenmek İçin Ne Derece Zaman Ve Çaba Harcadıkları

Madde 8 Kendi alanımdaki akademik dergileri düzenli olarak okurum. (R)

Madde 14 Kendi alanımdaki araştırmalar hakkında kendimi güncellemek için her vesileyi kullanırım. (R)

Madde 25 Kendi alanımdaki en son gelişmeleri öğrenmek için profesyonel İnternet sitelerini düzenli olarak ziyaret ederim. (R)