Is Self-Confidence in Teaching Multidimensional or Unidimensional? An Exploratory Study

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Abstract

This study examined the factor structure of a 12-item Self-Confidence in Teaching Scale. Two samples of teacher candidates participated: 1,176 students (80% females) entering a teacher preparation program and 861 candidates (77% females) completing their final semester in the program. Even though the scale was deliberately designed to assess candidates' self-confidence in executing 12 distinct teaching roles (as confirmed by a panel of judges), principal axis factor analyses yielded only one factor with an eigenvalue greater than 1.0. Also, similar patterns of factor loadings were found across all subsample contrasts that were considered (e.g., females vs. males; entry- vs. exit-level candidates). These results suggest that the measure of self-confidence in teaching considered in this investigation is a unidimensional rather than a multidimensional scale.

Teacher educators generally assume that self-confidence is a necessary condition for success in teaching (see, for example, Maeroff, 1989; Cecil, 1991). This implicit assumption is bolstered by a growing body of research which indicates that improvements in self-confidence promote positive changes in attributes related to teaching performance. One line of inquiry suggests that teachers who have relatively high levels of self-confidence are likely to think about teaching in more positive ways than those who lack self-confidence (see, for example, Pigge & Marso, 1987; Kalaian & Freeman, 1989; Solliday & Jacko, 1986). Other studies suggest that teachers may devalue even the most critical tasks in teaching if they lack confidence in their abilities to successfully execute those tasks. For example, Solliday and Jacko (1986) have shown that candidates' ratings of the importance of various teaching tasks are directly related to their self-confidence in performing each task.

Even though teacher educators agree that self-confidence is a critical attribute in teaching and a growing body of research has supported this assumption, none of this work to date has centered on the development of adequately defined measures of self-confidence in teaching. This investigation attempted to address this need. Its basic purposes were: (a) to explore the factor structure of the items in a Self-Confidence in Teaching Scale developed at Michigan State University (MSU), and (b) to examine the extent to which the self-confidence factor structure differs for males and females or among teacher candidates at different points in their professional development.

Michigan State University Self-Confidence in Teaching Scale

The 12-item Self-Confidence in Teaching Scale was designed by teacher education faculty at MSU and has been used in several other research studies (e.g., Kalaian & Freeman, 1989). Each item asks candidates to describe the level of confidence they have in their ability to perform one of twelve different teaching roles (e.g., assessing student learning and development). Responses to each item are recorded on a four-point scale ranging from "little or no confidence" to "complete confidence." Each item was deliberately designed by the faculty panel to depict a distinct aspect of teaching. The set of 12 roles was also selected to provide a representative sample of the full range of major teaching responsibilities (Table 1 lists each of the 12 items in the scale).

Related Research

Although studies of the factor structure of measures of constructs that may be directly related to self-confidence have been reported in the literature, the authors are not aware of any comparable studies of scales that assess self-confidence in teaching. Researchers examining the factor structure of self-esteem or self-concept scales have nearly always concluded that these constructs are multidimensional (see, for example, Byrne & Shavelson, 1987; Marsh, Smith & Barnes, 1985; Marsh, Smith, Barnes & Butler, 1983; Marsh & Shavelson, 1985). Only on rare occasions have researchers concluded that self-concept is a unidimensional construct and should not be broken into distinct subparts or facets (e.g., Marx & Winne, 1978). Drawing on this literature, the authors speculated that the factor structure of responses to the MSU Self-Confidence in Teaching Scale would be multidimensional, particularly since the MSU scale was deliberately designed to focus on 12 distinct aspects of teaching.

Gender and Developmental Differences

Interest in potential differences between the factor structures of the self-confidence scale for male and female respondents stems from the growing body of research literature that consistently indicates that males and females express different levels of self-confidence in their abilities as teachers. Kalaian and Freeman (1989), for example, provided evidence that female teacher candidates enter teacher preparation programs with lower levels of confidence than males and that this differential persists to program completion. In a similar vein, Pigge and Marso (1987),

reported that the student teaching experience reduces anxieties about one's role as a teacher to a greater extent for females than for males.

Studies examining gender differences in the factor structures of measures of self-esteem and self-concept have yielded inconsistent findings (see, for example, Byrne & Shavelson, 1987; March, Smith & Barnes 1985; Lerner & Brackney, 1981; Norem-Hibeisen, 1976; Skaalvik, 1986). Byrne and Shavelson (1987), for example, concluded that the factor structures and subscale reliabilities of measures of self-concepts differed as a function of gender. In contrast, Marsh, Smith and Barnes (1985) found that the factor structures of self-concept measures were invariant for males and females. Given these inconsistencies and the lack of a direct parallel between measures of self-concept and measures of self-confidence in teaching, the authors wanted to determine if the factor structure and patterns of factor loadings across individual items of the MSU Self-Confidence in Teaching Scale would be similar or different for male and female teacher candidates.

Finally, the authors also wanted to determine if the factor structure and patterns of factor loadings would vary among experienced and inexperienced teacher candidates (i.e., among those just entering an undergraduate teacher preparation program and those who are completing the program). Although there was no research literature to draw upon, we conjectured that these two factor structures would probably vary since those completing the teacher education program have considerably more experience in executing each teaching role than is true for those who are just entering the program.

Methodology

Samples

The two groups of teacher candidates who participated in this study will be referred to as the entry and exit samples:

1. The "entry sample" included 1,176 undergraduate teacher candidates (80% females; less than 4% minorities). Members of this sample completed the MSU Self-Confidence in Teaching Scale during the first week of the first required education course. Most members of this sample (66%) were college juniors.

2. The "exit sample" included 861 preservice candidates (77% females) who completed the MSU Self-Confidence Scale during the final weeks of student teaching, the final education requirement for most students. Most members of this sample (81%) were college seniors.

Analyses

The SPSS/PC version of principal axis factoring method (PA2) was used to examine the factor structure of the self-confidence scale. In this factoring method, squared multiple correlation coefficients between a given item and the rest of the items in the MSU self-confidence scale were entered as initial communality estimates. Then, factors were extracted through an iterative procedure utilizing a convergence criterion of .001. Factors with a minimum eigenvalue of 1.0 were retained.

The series of factor analyses that were ultimately conducted began with an analysis of responses to the self-confidence scale for all members of the entry sample (males and females combined). The analysis was then repeated for the exit sample. Then, the data for males and females in each sample were independently analyzed.

Results

Internal Consistencies

The inter-item correlations among the 12 items in the self-confidence scale were consistently high, ranging from 0.34 to 0.70 for the entry sample and from 0.29 to 0.62 for the exit sample. The corresponding coefficient alphas were 0.92 for both the entry and exit data. Coefficient alphas were also computed separately for males and females in each of the samples. Once again, high levels of internal consistency were found. For the entry sample, the alphas for males and females were 0.91 and 0.93 respectively. The coefficient alphas were 0.92 for both males and females in the exit sample.

Factor Analyses of Responses to the Self-Confidence Scale

The results of principal axis factor analysis of the MSU Self-Confidence in Teaching Scale are presented in Table 1 for both the entry and exit samples. As these results indicate, both sets of data yielded only one factor with an eigenvalue of greater than 1.0. This general factor accounted for 57.5% of the

Table 1
Factor Loadings for Factor 1 (Overall Level of Confidence in Oneself as a Teacher): Entry vs. Exit Samples [1]

Item	Entry Sample	Exit Sample
1. Making instructional decisions in a sound and defensible manner.	.82	.73
2. Maximizing student understanding of the subject matter.	.81	.75
3. Providing instruction that addresses individual needs and achievements.	.80	.74
4. Assessing student learning and development.	.76	.70
5. Motivating students to participate in academic tasks.	.76	.73
6. Establishing a classroom environment in which students actively take responsibilty for themselves and for others in the group.	.74	.74
7. Designing lessons, units, and courses of study.	.73	.71
8. Applying effective methods of teaching specific subjects such as reading and mathematics.	.71	.76
9. Deciding what content to teach and what not to teach.	.69	.58

Self-Confidence (continued)

(Table 1 continued)

Item	Entry Sample	Exit Sample
10. Analyzing and improving your own teaching performance.	.69	.62
11. Establishing effective working relationships with students from diverse cultural and academic backgrounds (e.g., students whose ethnic backgrounds are different from your own; gifted students; students with learning problems).	.63	.57
12. Responding appropriately to disruptive student behaviors.	.62	.69

[1] Each item in this table is presented as it appears in the MSU Self-Confidence in Teaching Scale. However, items in Table 1 are listed in descending order of factor loadings and not in the order in which they appear in the Scale.

total entry data variance (eigenvalue = 6.7) and 52.7% of the total exit data variance (eigenvalue = 6.5).

As might be expected, the loadings for Factor 1 were fairly uniform across all 12 items in the entry and exit samples. For the entry sample, factor loadings ranged for 0.62 to 0.82. The corresponding figures for the exit sample ranged from 0.57 to 0.76.

Gender Differences

Entry Sample. For the entry sample, the principal axis factor analysis for male respondents yielded only one factor with an eigenvalue greater than 1.0. This factor had an eigenvalue of 6.12 and accounted for 51.0% of the total variance. Similarly, only one factor was extracted from the data provided by entry-level female candidates. This factor accounted for 58.5% of the total variance and had an eigenvalue of 7.1. As shown in Table 2, the factor loadings on the first factor ranged from 0.61 to 0.83 for females in the entry sample; and from 0.52 to 0.82 for males. The pattern of loadings across items was also similar for males and females.

Table 2

Factor Loadings for the Factor 1: Male-Female Contrasts

Item	Entry Sample Male	Entry Sample Female	Exit Sample Male	Exit Sample Female
1. Making sound instructional decisions	.82	.81	.71	.77
2. Maximizing student understanding	.74	.83	.77	.72
3. Individual instruction	.75	.82	.74	.76
4. Assessing student learning and development	.73	.77	.70	.70
5. Motivating students	.72	.76	.72	.77
6. Promoting student responsibility.	.67	.74	.73	.76

(continued)

(Table 2 continued)

Item	Entry Sample Male	Entry Sample Female	Exit Sample Male	Exit Sample Female
7. Designing lessons, units and courses of study	.73	.73	.70	.73
8. Applying effective methods of teaching specific subjects	.60	.73	.77	.74
9. Deciding what to teach	.61	.71	.58	.57
10. Analyzing own teaching performance	.67	.69	.61	.68
11. Establishing relations with students from diverse backgrounds	.52	.65	.57	.59
12. Responding to disruptive student behaviors	.58	.61	.68	.67

Exit Sample. The results of principal axis factor analyses for males and females in the exit sample were similar to those reported for the entry sample. Analyses of data provided by male respondents yielded only one factor that had an eigenvalue greater than 1.0. This factor had an eigenvalue of 6.4 and accounted for 52.1% of the variance. Likewise, exit data provided by females yielded only one interpretable factor which accounted for 54.2% of the total variance and had an eigenvalue of 6.5. As shown in Table 2, factor loadings on Factor 1 ranged from 0.57 to 0.77 for both males an females in the exit sample.

Discussion

A Closer Look at the Unidimensionality of the MSU Scale
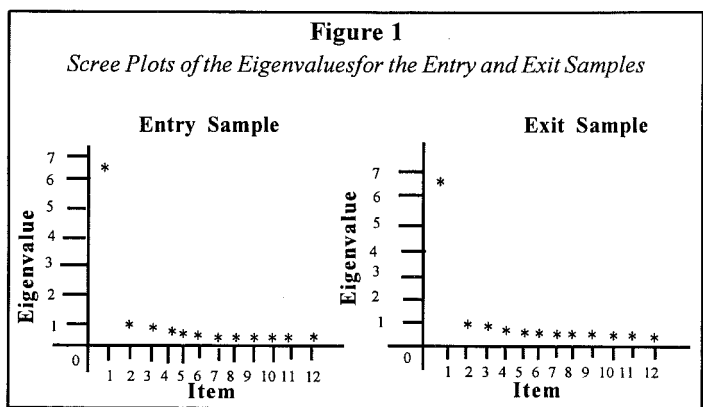
Cooper (1983) has shown that the use of the "eigenvalue-less-than-1.0" decision rule to determine the number of intelligible factors in a given factor matrix may mask factors that would be identified if the matrix were rotated. As a further test of the unidimensionality of the factor structure of the MSU Self-Confidence in Teaching Scale, the authors therefore conducted a scree test to determine if the only significant drop in eigenvalues occurred between the first and second factors and if all subsequent decreases in these values gradually trailed off across additional factors. The results of the scree analyses for the entry and exit samples are shown in Figure 1.

Figure 1
Scree Plots of the Eigenvalues for the Entry and Exit Samples

As this figure illustrates, eigenvalues for the entry sample dropped from 6.7 to .97 from Factor 1 to Factor 2, then .65, .61, .56, .55, .47, .40, .38, .34, .32, and .29 across Factors 3 through 12. The corresponding eigenvalues for the exit sample were 6.5, .79, .68, .63, .56, .53, .47, .45, .42, .38, .36, and .33 for Factors 1 through 12. Although not shown in Figure 1, similar patterns of eigenvalues occurred for each of the other four subsamples that were considered in the study (e.g., male students at exit). These consistent patterns across all analyses suggest that Factors 2 through 12 are largely measuring random error. It is therefore reasonable to conclude that there is only one meaningful and interpretable factor within the factor structure of the MSU Scale.

Conclusion

The results of this exploratory study suggest that measures of self-confidence in teaching are likely to be unidimensional, rather then multidimensional scales. Likewise, it is reasonable to hypothesize that this unidimensionality will hold for both males and females and for those who are completing teacher preparation programs as well as for those who are just beginning their studies in education. However, given that this study considered only one self-confidence measure and only one institutional context, there is a clear need to determine the generalizability of these findings across alternative measures of self-confidence (e.g., scales that include additional items) and other institutional contexts. Further research focusing on alternative measures of teachers' self-confidence may yield different factor structures and different inferences about the self-confidence in teaching construct.

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