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ABSTRACT

This study examined the factorial invariance of scores from the Attitudes and Beliefs on Classroom Control Inventory (ABCC) (Martin and others, 1998) for 243 undergraduate preservice teachers. Although the original ABCC was developed with inservice teachers, use of the instrument to study the classroom beliefs of preservice teachers had not been studied. Confirmatory factor analyses were conducted to test competing hypothesized models concerning score structure. Results indicate overall poor fit of the data across models, calling into question the usefulness of the ABCC with preservice teachers. (Contains 1 figure and 28 references.) (Author/SLD)

A Confirmatory Factor Analysis of Preservice Teachers' Responses to the Attitudes and Beliefs on Classroom Control Inventory

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Abstract

The present study examined the factorial invariance of Attitudes and Beliefs on Classroom Control Inventory (ABCC) scores from preservice teachers. Although the original ABCC was developed with inservice teachers, use of the instrument to study the classroom management beliefs of preservice teachers has not been tested. Confirmatory factor analyses were conducted to test competing hypothesized models concerning score structure. Results indicated overall poor fit of the data across models, thereby questioning the utility of the ABCC with preservice teachers.

A Confirmatory Factor Analysis of Preservice Teachers' Responses to the Attitudes and Beliefs on Classroom Control Inventory

Classroom management issues are generally high on the list of teachers' concerns about education (Johns, MacNaughton, & Karabinus, 1989; Woolfolk, 1998). Managing student behavior and the classroom context is critical in establishing an effective learning environment. Many researchers have examined classroom management dynamics (cf. Emmer, Evertson, Clements, & Worsham, 1997; Evertson, Emmer, Clements, & Worsham, 1997) and established some general rules for facilitating a positive classroom context.

Beyond specific rules, however, "the literature generally defines classroom management as a broader, umbrella term that describes all teacher efforts to oversee the activities of the classroom including learning, social interaction, and student behavior" (Martin, Yin, & Baldwin, 1998, p. 6). Furthermore, Martin et al. (1998) argued that "there is no general consensus regarding the specific facets of the construct" (p. 6).

Accordingly, Martin et al. (1998) attempted to develop an instrument, called the Attitudes and Beliefs on Classroom Control (ABCC), that could be used to assess classroom management beliefs about control from a multi-faceted perspective. Drawing on the work of Glickman and Tamashiro

(1980) and Wolfgang (1995), classroom management beliefs were framed in terms of desired levels of control over external events. A combination of psychological interpretations was used to create a theoretical continuum that describes teachers who focus on the external environment and behavior modification (interventionists) versus those who focus on what the individual does to alter the environment (non-interventionists). Somewhere between these extreme types are the interactionalists, who combine the other belief systems.

According to Martin et al. (1998), the interventionist's perspective is grounded in traditional behavioral modification, and emphasizes "what the outer environment does to the human organism to cause it to develop in its particular way" (p. 6). Canter (1992), Jones (1987), and Dobson (1992) were listed as examples of this theoretical orientation. On the other end of the continuum lies the non-interventionist who "presupposes the child has an inner drive that needs to find its expression in the real world" (p. 6). The orientations of Berne (1964), Harris (1967), Ginott (1972), and Gordon (1974) were presented as examples of non-interventionism. Finally, the interactionalist lies between the extremes and strives "to find solutions satisfactory to both teacher and students, employing some of [the] same techniques as non-interventionists and interventionists" (p. 7). Several researchers and theorists were listed as examples of this perspective, including Adler, Dreikurs, Glasser (see Wolfgang, 1995), Albert (1989), and Gathercoal (1990).

Using this continuum, Martin et al. (1998) developed the 26-item ABCC that purports to measure three orthogonal dimensions of classroom management along the interventionist continuum: Instructional Management (14 items), People Management (8 items), and Behavior Management (4 items). This multi-dimensional framework was intended to broadly capture the classroom management activities of teachers, rather than focus solely on disciplinary issues.

According to Martin et al. (1998), Instructional Management assesses activities related to instruction, such as monitoring seatwork or allocating materials. People Management focuses on "what teachers believe about students as persons and what teachers do to develop teacher-student relationships" (p. 7). Behavior Management emphasizes "preplanned means of preventing misbehavior rather than the teacher's reaction to it" (p. 7). Therefore, the behavioral dimension does not measure discipline orientation, but teaching elements such as rule development and implementation.

Initial Development of the ABCC

Development of the ABCC occurred in several stages. First, possible items were developed based on the literature and the authors' experience. This led to a 48-item instrument containing the anticipated dimensions: Instructional (24 items), People (9 items), and Behavior (15 items). A four-point Likert scale was used and anchored at "describes me very well" (4), "describes me usually" (3), "describes me somewhat" (2), and "describes me not at all" (1). After reverse scoring of some items, high scores were presumed to be indicative of interventionist beliefs on the three dimensions. The 48-item instrument was administered to 282 public school teachers across elementary and secondary levels.

Second, an exploratory factor analysis was conducted using principal components analysis for extraction and the eigenvalue-greater-than-one rule for factor retention. The scree plot was also examined. The authors reported only three eigenvalues above unity and a clear break point on the scree. Three factors were therefore extracted and rotated to the varimax criterion, although no rational for orthogonality was given (cf. Henson & Roberts, in press). Using at cut-off of .35 for factor pattern/structure coefficients, only 26 items were retained. These factors were defined as Instructional (14 items), People (8 items), and Behavior (4 items) Management.

Examination of the factor pattern/structure matrix, however, indicated that some items did not associate with expected factors. Nevertheless, the anticipated dimensions were used for factorial definition. The authors did not report the variance explained by the three factors. Furthermore, the factor pattern/structure matrix only included 38 items, rather than the full 48 or retained 26, so it is not possible to manually calculate the strength of the factors in terms of variance explained. (Note: Assuming the full matrix is reported for an orthogonal solution, the variance explained by a factor equals the sum of the squared pattern/structure coefficients for a factor.) Martin et al. (1998) also conducted reliability and item analyses to further examine their data.

Finally, Martin et al. (1998) correlated the three dimensional scores with several personality variables from the 16 Personality Factor Questionnaire (16PF) Form A. The authors argued that the results provided support for the construct validity of the three classroom management dimensions.

In their summary, Martin et al. (1998) claimed the ABCC is a "reasonably short and easily administered scale that intends to measure teachers' perspectives regarding classroom management styles" (p. 13). However, because factor structure, validity, and reliability are functions of scores, and not tests per se (cf. Henson, 2000; Henson & Roberts, in press; Thompson & Daniel, 1996), it is important to examine the factorial invariance of tests' scores across varied samples. It is highly possible that factor structure for the same test varies across samples. This is particularly true when the new sample differs to some degree from the validation sample.

Purpose

Accordingly, the purpose of the present study was to examine the factorial invariance of ABCC scores from preservice teachers. Although the original ABCC was developed with inservice teachers, use of the instrument to study classroom management beliefs of preservice teachers may prove useful in understanding the beliefs systems of teachers before they begin their critical induction years into teaching. Confirmatory factor analyses (CFA) were conducted to test competing hypothesized models concerning the structure of the obtained scores (Kieffer, 1999). CFA allows for specific hypothesis testing of factor structure, and therefore is theoretically superior to exploratory methods.

Method

Participants

Participants were 243 undergraduate preservice teachers enrolled in a required educational psychology course at a large university in the Southwest. The 26-item ABCC was administered along with two other instruments as part of a larger study. Participation in the study was voluntary and had no effect on the students' course grade.

Participants could be characterized as traditional teacher education students. They were largely female (90.5%) and in the final year of their undergraduate education (seniors, 86.5%; juniors, 11.1%). All teaching levels were represented (elementary, 58.7; secondary, 24.6%; early childhood, 11.1%; other, 5.6%). Ethnicity was predominately Caucasian (90.5%; Hispanic, 6.3%) and their mean age was 21.6 (SD = 1.6).

Data Analysis and Model Development

Data screening indicated 13 missing values across 10 items. The missing values were random in nature and replaced with the variable mean. Competing theoretical models were examined through confirmatory factor analysis using AMOS 4.01 (Arbuckle, 1999). This methodology employs covariance structure analysis to test whether the observed data fit a hypothesized factorial structure. Importantly, several plausible models were constructed and tested against each other.

Results

Model #1 (see Figure 1) reflected the original structure hypothesized by Martin et al. (1998), which included three uncorrelated factors as measured uniquely by multiple items. Model #2 tested an oblique solution and allowed the factors to correlate. Model #3 hypothesized a higher order latent factor that accounted for the other three first order factors. Table 1 presents fit indices for these models. Importantly, several indices were examined to provide a global picture of the data's fit to the proposed models.

INSERT TABLE 1 AND FIGURE 1 ABOUT HERE

Looking at Table 1, it is clear that neither the hypothesized three-factor model nor the correlated three-factor model evidenced reasonable fit, using a .90 or better criterion for GFI, NFI, and TLI (Byrne, 1998; Thompson, 1998a). The RMSEA indices were more encouraging, but still greater than the expected .05 for model fit. The second order analysis (Model #3) yielded the same results as the correlated three factor model, thereby illustrating the conceptual unity between these structures. Second order factors potentially emerge to the degree that first order factors are correlated and simply redistribute variance from a correlated model to the higher order factor.

Explained variance estimates (R^2), or communalities, were low for many of the items, suggesting that they may not be measuring the construct to the same degree as stronger items. Modification indices also suggested that several items contributed to more than one factor. Additionally, modification indices suggested that the factors may be correlated to a some degree, as evidenced by the improved fit for Model #2.

Because of the moderate correlation between the People and Behavior Management Factors (r = .55), Model #4 collapsed these factors into one factor. Therefore, Model #4 examined the plausibility of a two-factor solution where the factors were constrained to be uncorrelated. Additionally, Model #5 allowed the two factors described in Model #4 to be correlated to test an oblique solution. Results in Table 1 indicate that, while comparable to the previous solutions, the two-factor models did not evidence reasonable fit. Therefore, either a two or three factor solution remained plausible for the current data. As with prior models, several items had low squared multiple correlations and some contributed to more than one factor.

Because the original hypothesized and slightly altered structures failed to display fit to the data, the items' squared multiple correlations and modification indices were consulted to guide changes to the hypothesized structure. Critical ratios were not examined for possible changes as they are unduly influenced by sample size, as with all statistical significance tests (cf. Cohen, 1990, 1994; Henson & Smith, 2000; Thompson, 1996, 1998b).

Model #6 was developed and retained the correlated two-factor orientation of Model #5, but items with squared multiple correlations less than 10% were deleted unless the modification indices suggested that the items should be associated with another factor. Accordingly, two items with low communalities on People Management were shifted to Instructional Management based on modification indices.

Model #7 was constructed from the correlated three-factor orientation of Model #2, but again items were deleted if they had an R^2 less than .10. Table 1 results again indicate that even these corrections to the structures failed to warrant reasonable model fit. However, the corrected three-factor oblique model was superior to any previously tested structure.

Because none of the competing models evidenced fit to the data, the confirmatory methods were abandoned and a post hoc exploratory factor analysis (EFA) was conducted on the data. The 26-item correlation matrix was submitted to principal components analysis. Eight eigenvalues greater than one emerged but the scree plot suggested three factors. However, the eigenvalue rule has been shown to overestimate the number of factors in most cases (Zwick & Velicer, 1986) and the scree plot, although typically more accurate, may also overestimate. Parallel analysis tends to be a more accurate factor retention method (Henson & Roberts, in press; Zwick & Velicer, 1986). Three non-random eigenvalues were observed in the parallel analysis results, thereby confirming a three-factor solution.

Three factors were extracted and rotated to the promax (kappa = 4) criterion. Factor intercorrelations were small (r =

.384 or less) so a varimax rotation was used. Several items did not have substantial factor pattern/structure coefficients on any factor and some had large coefficients across factors. In the interest of simple structure (Gorsuch, 1983), items without coefficients of at least .40 on any factor (1, 9, 17, 25) and with coefficients greater than .40 on more than one factor (6, 8) were deleted from further analysis.

Principal components analysis was again conducted, yielding five eigenvalues greater than one. However, the scree and parallel analysis again confirmed presence of three factors. One additional item (18) was deleted due to substantial pattern/structure coefficients on two factors. The analysis was rerun and again three factors were present and extracted based on the scree plot and parallel analysis. The varimax-rotated factors explained 38.72% of the correlation matrix variance and interfactor correlations (using promax, kappa = 4, rotation) were minimal ($\underline{r}$ = -.123, .350, -.214).

After item deletions and factor definition via the EFA, the remaining 19-item structure was tested with CFA methodology on two levels. Model #8 tested the three-factor solution but the interfactor correlations were constrained to be zero. Because prior models showed some evidence that the factors may be related, Model #9 removed this constraint and estimated the interfactor covariances. Looking at Table 1 CFA results, it is clear that even the post hoc EFA did not sufficiently improve the hypothesized item structure to yield strong data fit, although again the factors were observed to be slightly correlated (r = -.33, -.36, .47).

Discussion

In sum, the current findings question the utility of the ABCC for use with preservice teachers. None of the hypothesized models, including the structure presented by Martin et al. (1998), yielded reasonable fit to the observed data. Across models, several items tended to have low squared multiple correlations, suggesting they may be measuring constructs other than those assessed by the factor.

It is important to highlight that factorial invariance is most likely when subsequent samples resemble the original validation sample (Henson, 2000). The present study tested whether the ABCC can be generalized for use with preservice teachers in addition to practicing inservice teachers. The lack of invariance should perhaps not be too surprising, however, given the notable differences between these populations. For example, preservice teachers have yet to fully encounter the realities of teaching and managing a classroom for the full day, full week, and full year. Their responses, then, may reflect constructs different from those found in the responses of practicing teachers.

In light of the present results, it is recommended that if the ABCC is used with preservice teachers, it should be used with caution, and only in conjunction with factor analytic procedures to confirm factor structure for the obtained scores. Future research should examine more parsimonious solutions of the ABCC that may yield better fit to preservice teacher responses. However, it is more likely that the theoretical formulations of classroom management beliefs for preservice teachers differs from that of inservice teachers. Therefore, new instrumentation may be warranted that better assesses the relevant constructs with teacher education students. Several important questions deserve investigation. What are the salient classroom management constructs for preservice teachers regarding their beliefs about control? How are these beliefs developed? How do these beliefs evolve as the teacher education student becomes a novice teacher and eventually an experienced veteran? The present results suggest that the constructs observed in inservice teachers are not replicated in less experienced preservice teachers and may change with time.

Classroom management issues remain in the forefront as one of teachers' primary concerns in education. Research examining the dynamics of classroom management issues in both preservice and inservice teachers continues to increase. Such research efforts, however, would be fostered by instruments with strong psychometric properties for their scores. The present results question the use of the ABCC with preservice teachers, and point to the need to future instrument development with this important population.

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Table 1

Fit Indices for Hypothesized Models

Model #	χ^2(df)	p	GFI	NFI	TLI	CFI	RMSEA
1	610.496(299)	<.001	.837	.570	.691	.715	.066
2	536.581(296)	<.001	.849	.622	.759	.780	.058
3	536.581(296)	<.001	.849	.622	.759	.780	.058
4	618.366(299)	<.001	.833	.564	.683	.708	.066
5	583.120(298)	<.001	.836	.589	.716	.739	.063
6	462.968(229)	<.001	.850	.634	.745	.769	.065
7	344.242(186)	<.001	.874	.705	.813	.835	.059
8	305.193(152)	<.001	.883	.625	.732	.762	.065
9	262.384(149)	<.001	.897	.677	.797	.823	.056

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