

Abstract Title Page

Title:

An Empirically Based Statewide System for Identifying Quality Pre-Kindergarten Programs

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Abstract Body

Background/context:

There is increasing recognition of the importance of the early childhood period as a critical time for promoting children's learning (Bowman, Donovan, & Burns, 2001; DiPietro, 2000; author, 2001). As a result, early childhood programs for 3 and 4 year olds are becoming more prevalent across the United States as a method for assuring that children are school ready. However, definitions of "quality" preschool programs vary greatly. For example, some systems used for rating or measuring the quality of a classroom, emphasize aspects of the physical space and availability of materials (Harms, Clifford, & Cryer, 1998). Others emphasize the sensitivity and responsiveness of the teachers' talk with children (Smith, Dickinson, Sangeorge, & Anastasopoulos, 2002) and sometimes these variables are combined within rating systems (Harms et al., 1998; Pianta, LaParo, & Hamre, 2004). A recently developed and validated observation system also evaluates for cognitive readiness activities including early language, emergent literacy and math (author, 2007). However, to date, evaluation systems of program quality are not directly linked with the extent to which a preschool program has prepared children with the skills necessary for success in Kindergarten. Given heightened public awareness of the importance of early childhood programs working effectively to prepare children to be ready for kindergarten, there is interest in determining if this is, in fact, happening. The following describes the development of a statewide system for use in determining the quality of early childhood programs that, in addition to examining characteristics of the preschool environment, is grounded in children's kindergarten school-readiness.

Purpose/objective/research question/focus of study:

The primary study objective was to develop a statewide system that made use of information about the pre-kindergarten program in combination with kindergarten reading and social outcome measures in order to inform parents about the ability of early childhood programs to prepare children for formal schooling. In order to carry out this objective, multiple steps were undertaken including: 1) development of a web-based application system for pre-kindergarten programs, 2) tracking children from pre-kindergarten programs into kindergarten classrooms across Texas, 3) collection of screening data managed by school districts, and 4) determination of certification criteria that considers both quality of preschool programming and children's school readiness scores.

The School Readiness Certification System (SRCS) is not intended to replace other accreditation standards such as those offered by NAEYC or state licensing bodies. It is designed to provide specific information about how programs prepare children for school so that parents can make informed decisions about early childhood programs for their 3 and 4-year old children. In addition, it has the advantage of being available to all types of early childhood program providers allowing greater choice for parents. The focus of the SRCS is to be objective and evidence-driven combined with a concentration on indicators that predict school readiness.

Setting:

The setting included 1,225 preschool classrooms, housed in 538 preschools that were spread across Texas. Preschools were distributed across program types such that there were 258 childcare, 147 public school prekindergarten, and 133 Head Start settings. Of the 1,225 classrooms, 1024 participated in the TEEM project. The 231 classrooms that did not participate in TEEM, i.e., non-TEEM classrooms, were invited to participate to increase heterogeneity of the

sample. Non-TEEM classrooms were housed in for-profit childcare settings that primarily served middle income families.

Population/Participants/Subjects:

In the spring of 2006, early childhood education programs submitted an on-line application in hopes of obtaining certification (described below). In the fall of 2006, approximately 11,000 children from these early childhood education programs were located in public kindergartens across Texas. School readiness scores from approximately 8,000 of these children were obtained from school districts across Texas. Of the 8,000 children who were successfully located and for whom screening data were supplied, 51% were boys and 49% were girls. The average age of these children on the first day of Kindergarten was 5.5 years ($SD = .30$). Approximately 67% of children were eligible for free and reduced lunch. Approximately 69% of children were Hispanic, 17% Caucasian, 13% African American, and 1% American Indian, Asian, or Pacific Islander. Approximately half of the children, i.e., 48%, had limited proficiency in English. The number of days children attended preschool ranged from 1 to 250, with an average of 156 days ($SD = 35.5$).

Intervention/Program/Practice:

The approach taken was to build a valid research-based web application through which early childhood education programs could voluntarily apply to be certified as a School Ready Program. The application is focused yet comprehensive in its inquiry of early childhood education practices. The application inquires about characteristics of preschool programs and practices that prior research has shown to be associated with positive outcomes. These included characteristics of the classroom environment (Crosser, 1992; Dunn, Beach, & Kontos, 1994), instructional practices (Bowman et al., 2001; Raver & Knitzer, 2002), curriculum (author, 2007; Whitehurst, Epstein, Angell, Payne, Crone, & Fischel, 1994), assessment approaches (McConnel, 2000; Phaneuf & Silberglitt, 2003), and professional development (Elmore, 2002; National Commission on Teaching & America's Future, 1996).

Research Design:

Certification criteria were based on correlational data from a longitudinal study.

Data Collection and Analysis:

During the 2005/2006 school year, 538 preschools provided information about their facility, teachers, classrooms, and students. The following year, 8,000 of these children were assessed with the *Social Competence and Behavior Evaluation* (SCBE-30; Dumas, Martinez, & LeFreniere, 1998; Kotler & McMahon, 2002; LaFreniere & Dumas, 1996) and were administered either the *Texas Primary Reading Inventory* (TPRI; Texas Primary Reading Inventory, 2003) or the *Tejas Lee* (Tejas Lee, 2003) early literacy assessment.

Overarching analysis strategy. Analysis proceeded in three stages. First, the 300+ variables collected as part of the preschool application were reduced through exploratory factor analysis (EFA). Second, factor scores reflecting preschool characteristics were correlated with kindergarten screening data. Third, latent class analysis identified groups of preschool classrooms that varied in quality of programming and amount of children's school readiness.

Data inspection. All variables were examined for evidence of non-normality, and in cases in which only mild to moderate skewness was observed, model parameters were estimated using maximum likelihood with robust standard errors. In some instances, values of one or more of the

variables in the analysis had to be collapsed due to low response frequency. These variables were modeled as ordinal, rather than interval, and parameters were estimated using mean- and variance-adjusted weighted least squares estimation (Muthén, du Toit, & Spisic, 1997).

Exploratory factor analyses. Items from the application and coded data from photographs of classrooms were subjected to separate exploratory factor analyses. Varimax or promax rotation was used, based on size of factor correlations. In order to optimize interpretability of factor scores, confirmatory factor analysis with no crossloadings was used to generate factor scores for each factor retained in the EFAs.

Correlations of preschool factors with kindergarten outcomes Because kindergarten school readiness was considered a primary outcome of interest that should inform the SRCS, the final step in reducing the number of variables for analysis was to exclude any preschool factor score that was not correlated with at least one of the kindergarten school readiness indicators.

Latent class analyses. Our ultimate goal was to determine criteria for certifying or not certifying classrooms that had entered the SRCS. In other words, based on the results of the analyses, each classroom would have to be assigned to either a certified group or a not-certified group. Therefore, we decided that a clustering approach, in which classrooms were grouped into different categories based on the pattern of their responses, was most appropriate. Alternative models were compared using two criteria: the BIC (Schwarz, 1978), a measure of absolute model fit, and the Lo-Mendell-Rubin (LMR) adjusted likelihood ratio test, which tests the hypothesis of k vs. $k-1$ latent classes (Lo, Mendell, & Rubin, 2001). A significant LMR test indicates that the current model fits the data better than the more parsimonious model with one less latent class estimated.

Findings/Results:

Data reduction.

Teacher Self-Report survey. Analysis of the 54 teacher survey items yielded a 6-factor solution (RMSEA=.04), labeled Shared Reading, Math Instruction, Assessment, Intentional Instruction, Early Literacy Instruction, and Lesson Planning. The inter-factor correlations ranged from .01 to .57. (See Table 1 for reliabilities of all factors.) Only two of the factors were retained for subsequent analysis (i.e., Intentional Instruction and Early Literacy Instruction) because they significantly correlated with the kindergarten outcomes.

Classroom pictures. EFA of classroom picture codes resulted in a 2-factor solution (RMSEA=.06). The Visual Supports and Center Quality factors were correlated at .45. However, neither factor predicted kindergarten school readiness, so both were dropped.

Professional development. EFA of the professional development section of the application yielded three correlated factors (RMSEA = .06), labeled Professional Development, Teaching Techniques, and Health & Safety Training. Interfactor correlations ranged from .49 to .59. Only the Professional Development factor predicted kindergarten outcomes.

Assessment routines. The assessment section of the application included 18 items that inquired about the frequency that organizations administered six different methods of assessment to assess children's language, literacy, mathematics, and social/emotional/behavioral competence. EFA of all 18 items yielded six factors, that corresponded to the six assessment methods. Thus, there were separate factors for Standardized tests, Progress Monitoring with PDA, Work Sampling, Checklists, Curriculum-Based measures, and Organization Developed measures. None of these factors predicted kindergarten school readiness outcomes.

Latent class analyses.

The two kindergarten outcomes and the three preschool factor scores that were related to them (Intentional Instruction, Early Literacy Instruction, and Professional Development) were entered into the latent class models. The first model we ran was a two-class model, analogous to a straight pass-fail criterion. The LMR test of this model was highly significant ($LMR = 248.1$, $p < .0001$) and the profiles of the two classes were non-parallel, confirming the appropriateness of the latent class approach. Standardized estimated means for the two classes are plotted in Figure 1. Although the profiles for the preschool variables are roughly parallel in the two classes, the mean differences on these variables are accompanied by substantially different average outcomes in kindergarten.

To ensure that we had adequately captured the complexity of the data, we explored a three-class model. The LMR test was highly significant ($LMR = 144.0$, $p < .0001$), indicating that the three-class model fit better than the two-class model, and comparison of the BICs was consistent with this conclusion ($BIC_{\text{three-class}} = 11523$, $BIC_{\text{two-class}} = 11546$). Inspection of the profiles of the three classes (see Figure 2) showed that the pattern found in the two-class model was almost exactly replicated by two latent classes in the three-class model. However, the three-class model included a new latent class with a very different pattern. Specifically, whereas the kindergarten outcomes in this third class resembled those of the high-performing class, the preschool quality indicators were substantially lower than those in the low-performing class. This new, mixed-performing group comprised 11% of the classrooms and was drawn primarily from the high-performing group in the two-class analysis, whose proportion dropped from 78% of classrooms to 67% of classrooms in the three class solution. The percentage of classrooms in the low-performing group dropped from 22% to 21%. Table 2 shows class sizes and average kindergarten outcomes for the 3-class model.

Because certification by definition requires a pass-fail criterion or criteria, we had to decide whether or not to certify the mixed-performing group. On the one hand, the kindergarten performances of the children in these classrooms resembled those of the high-performing group. In other words, the children from these classrooms were school ready based on their kindergarten literacy scores and kindergarten social scores. On the other hand, these preschool classrooms did not possess the characteristics that are generally associated with positive kindergarten outcomes. Given the common goal of the Texas Education Agency and the Texas State Center for Early Childhood Development to promote both school readiness and high quality early childhood education, only those classrooms empirically assigned to the group with high scores on all indicators were ultimately certified as school ready. Thus, in this first year of the Texas School Readiness Certification System, “Texas School Ready!™” certification was awarded to 497 preschool classrooms across Texas, which represented 67% of classrooms eligible for consideration for certification.

Conclusions:

This project was initiated by a state mandate to develop a system that informed parents as to which early childhood programs were preparing preschool age children for school. One objective was to take into account evidenced based indicators of quality in the prekindergarten programs in combination with indicators of school readiness in early Kindergarten. Such an approach has not been a common practice for state quality rating systems, as when there are such systems they use only indicators of the prekindergarten program without links to kindergarten readiness.

Results of the latent class analyses showed that three constructs in the pre-kindergarten environment provided the best information for discriminating classrooms into distinct groups. These indicators were: 1) the teacher professional development; 2) teacher intentional instructional approaches that promote achievement; and 3) literacy oriented instructional activities especially early writing activities. Together these aspects of the pre-kindergarten environment discriminated those classrooms whose children had higher vs. lower early kindergarten social and reading outcomes. These findings have important implications for the debate concerning whether the incorporation of intentional cognitive activities compromise social development. They suggest that classrooms that provide playful cognitive activities such as early literacy carried out in intentional ways may also promote children's social competence. At the very least, it demonstrates that classrooms can incorporate practices that promote both social and cognitive competence.

More generally, the development of the SRCS demonstrates how an empirically based approach can result in an effective means for informing parents, state policy, and educators about the quality of early childhood programs. It will be important to remember that such a system is a dynamic process that will require ongoing attention to new research findings and examination of the sensitivity of the quality indicators targeted.

Appendixes

Not included in page count.

Appendix A. References

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Appendix B. Tables and Figures
Not included in page count.

Table 1.
Reliabilities of factors

Section	Factor	Number of items	Cronbach's alpha
Assessment	Checklists	3	0.88
Assessment	Organization-developed	3	0.93
Assessment	Curriculum-based	3	0.91
Assessment	Handheld / PDA	3	0.74
Assessment	Standardized tests	3	0.87
Assessment	Work sampling	3	0.84
Professional development	Core training	4	0.76
Professional development	Health and safety	5	0.85
Professional development	Teaching techniques	3	0.64
Teacher Survey	Lesson planning	6	0.41
Teacher Survey	Assessment	3	0.49
Teacher Survey	Early literacy	8	0.76
Teacher Survey	Math instruction	7	0.87
Teacher Survey	Intentional instruction	9	0.57
Teacher Survey	Shared reading	4	0.53
Classroom pictures	Center quality	6	0.59
Classroom pictures	Visual supports	4	0.50

Table 2.
Class sizes and average kindergarten outcome scores (in original units) from 3-class model.

Class	<i>n</i>	Classroom TPR-TJL pass-fail	Classroom Social Screener
High	497 (67.3%)	80%	4.2
Mixed	84 (11.4%)	77%	3.9
Low	157 (21.3%)	25%	3.5

Table 3.
Frequency (%) of latent classes by facility type.

Facility type	Latent class		
	High	Low	Mixed
Childcare	87 (52%)	30 (18%)	50 (30%)
Head Start	111 (59%)	64 (34%)	13 (7%)
Public School	273 (83%)	40 (12%)	16 (5%)

Table 4.
Frequency (%) of latent classes by TEEM status.

TEEM status	Latent class		
	High	Low	Mixed
Not TEEM	21 (42%)	4 (8%)	25 (50%)
TEEM	472 (69%)	151 (22%)	58 (9%)

Figure Caption

Figure 1. Latent class profiles for 2-class models

Figure 2. Latent class profiles for 3 class models



