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

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Abstract: This study presents an empirically-based statewide system that links information about pre-kindergarten programs with children's school readiness scores to certify pre-kindergarten classrooms as promoting school readiness. Over 8,000 children from 1,255 pre-kindergarten classrooms were followed longitudinally for one year. Pre-kindergarten quality indicators of intentional instruction, an early literacy focus, and professional development were key predictors of kindergarten outcomes. A latent profile analysis identified pre-kindergarten classrooms that were high on pre-kindergarten quality indicators and high on kindergarten outcomes (67.3%), low on pre-kindergarten quality and kindergarten outcomes (21.3%), or low on quality but high on outcomes (11.4%). The last group of classrooms was likely to serve middle-class children and not use the state program model. This project demonstrates how a scientific approach can inform stakeholders and parents about the effectiveness of early childhood programs.

Keywords: preschool; kindergarten; emergent literacy; social development; school readiness; quality rating system; state policy.

Sistema estatal basado en datos empíricos para identificar programas de educación pre-escolar de calidad

Resumen: El presente estudio presenta un sistema estatal de bases empíricas que vincula la información de los programas de pre-kínder con los resultados de la preparación preescolar para certificar que los salones de pre-kínder promueven las habilidades básicas para la escuela primaria. Más de 8,000 niños de 1,255 salones de pre-kínder fueron monitoreados longitudinalmente por un año. Tres indicadores de la calidad en pre-kínder: instrucción intencional, foco en alfabetización temprana y desarrollo profesional, fueron claves para predecir los resultados en kínder. Un análisis de perfil latente identificó los salones de pre-kínder con buenos resultados en los indicadores de calidad y en los resultados de kínder (67.3%), a los salones bajos en la calidad de pre-kínder y en los resultados de kínder (21.3%), y a los salones bajos en calidad pero altos en resultados (11.4%). Este último grupo de salones eran los más probables de atender a niños de clase media y de no usar el programa modelo del estado. Este proyecto demuestra cómo un enfoque científico puede dar información a los padres y a las partes interesadas sobre la efectividad de los programas de educación preescolar.

Palabras clave: pre-escolar; kindergarten; alfabetización emergente; desarrollo social; adecuación para escolaridad; sistema de medición de calidad; política de estado.

Sistema estatal com base em dados empíricos para identificar programas de qualidade pré-escolar

Resumo: Este trabalho apresenta um sistema de base empírica estatal que liga informações de programas de pré-escola com os resultados de preparação para a escola para certificar que as salas de aula do jardim de infância promovem as competências básicas para a escola primária. Mais de 8.000 crianças de pré-jardim em 1.255 salas de aula foram monitorados longitudinalmente por um ano. Três indicadores de qualidade da instrução pré-K: instrução intencional, foco em alfabetização, e desenvolvimento profissional, foram fundamentais para prever os resultados no jardim de infância. A análise do perfil latente identificou pré-escola salas de aula com bons resultados nos indicadores de qualidade e resultados na educação infantil (67,3%), as salas de resultados de baixa qualidade pré-jardim de infância e creche (21,3 %) e baixa salas de aula de qualidade, mas alta no desempenho (11,4%). Este último grupo de salas tinham maior probabilidade de servir as crianças de classe média e não usar o programa do estado do modelo. Este projeto demonstra como uma abordagem científica pode fornecer informações para os pais e as partes interessadas sobre a eficácia dos programas pré-escolares.

Palavras-chave: infância, pré-escolar, desenvolvimento da alfabetização, o desenvolvimento social, aptidão para o ensino, sistema de medição de qualidade, política de estado.

Introduction

There is increasing recognition of the importance of the early childhood period as a critical time for promoting children's learning in order to assure readiness for success in school (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; DiPietro, 2000; National Research Council, 2001). To reach this goal early childhood programs are provided through a variety of service delivery models. Public school pre-kindergarten in most states is funded primarily for children from lower income backgrounds and federally funded Head Start programs also primarily target very low-income families. Childcare programs serve children from all income levels and typically provide longer hours of service to meet the needs of working families. Given heightened public awareness of the importance of early childhood programs in preparing children to be school ready and the multiple service delivery models in which this occurs, systems are needed to determine if, in fact, children are school ready after leaving these programs. Recent reports describe how quality rating

systems may need to target the performance of programs to advance children's learning so that school ready goals are assured (e.g., foundation skills necessary for reading and social competence; Gallagher, Clifford, & Maxwell, 2004; Kagan & Rigby, 2003; Kauerz, 2008).

States are faced with a number of challenges as they strive to develop early childhood education systems that meet the social and academic needs of children, particularly those from low income backgrounds, using current funding streams (Kauerz, 2008). As children from low income backgrounds are known to have less exposure to rich vocabulary, fewer experiences with books, and less parental responsiveness to children's interests (Evans, 2004; Hart & Risley, 1995; Landry, Smith, Swank, Assel & Vellet, 2001), there is increasing belief in the United States that high quality preschool programs should be utilized as a means of assuring that children from low socioeconomic (SES) backgrounds are prepared to start school in kindergarten. In addition, irrespective of how early childhood programs are funded, parents are in need of evidenced-based information regarding the extent to which an early childhood program prepares a child to be school ready.

Shortcomings of Current Quality Rating Systems

National organizations like the National Association for the Education of Young Children (NAEYC, 2008) and the National Association of Early Childcare Professionals (NAECP, 2008), conduct evaluations of childcare programs to determine if they meet a broad range of quality indicators that, in turn, result in accreditation. Many of the indicators included in these evaluation systems are conceptually derived and/or based on long-standing beliefs in the field of early childhood, such as the quality of conversations between teachers and children and availability of materials for children's exploration. Accreditation from these national organizations can provide important information to families about quality indicators of a program. However, many preschool programs are not able to apply for accreditation because of the costs involved. For example in many states, only a small percentage of childcare and Head Start programs seek these accreditations. Additionally, few public school programs seek accreditation by national organizations. In light of this, state education leaders and policy makers are looking for cost-effective approaches to document whether early childhood programs from various service delivery models are adequately preparing children for kindergarten.

Several states across the nation (Colorado, Washington, Pennsylvania, Oklahoma, North Carolina, and Ohio; Zellman & Perlman, 2008) have implemented quality rating systems for early childhood education. (e.g., Zellman, Perlman, Le, & Setodji, 2008) However, although recent reports emphasize the need for outcome-based accountability and information about program effectiveness (Kaurtz, 2008; Zellman, Brandon, Boller, & Kreader, 2011), only two systems (Colorado's Qualistar Rating System and Washington's Seeds to Success) directly link accreditation to the extent to which a preschool program has actually provided children with the skills necessary for success in kindergarten. To do that, an evaluation system must assess characteristics of program quality and relate those characteristics to children's learning. Current accreditation procedures that do not consider this link may involve a great deal of time and financial resources in the process of capturing program, classroom, and teacher characteristics that are not meaningfully related to children's school readiness. In the initial development phase of the Texas School Ready system described here, policy makers prohibited the use of child-level outcome data during the preschool year due to concerns about high-stakes testing of preschool children. However, schools in Texas are required to administer an approved literacy screener within the first six weeks of children's entry into kindergarten. No current evaluation system considers the link between preschool quality and children's school readiness when they are actually entering school.

Rationale for Development of a New Quality Rating System

There are many reasons for identifying which early childhood programs are effective in preparing young children for school. While recent large scale reports indicate that high quality early childhood centers can be as cognitively stimulating as home care in middle-class families, working parents of lower income have less access to such high quality centers (Phillips, Voran, Kisker, Howes, & Whitebook, 1994). Moreover, it is high quality, early childhood programs that have demonstrated a positive influence on children's school readiness (e.g., Bierman, Domitrovich, Nix, Gest, Welsch, Greenberg, et al., 2008; Hindson, Byne, Fielding-Barnsley, Newman, Hine, & Shankweiler, 2005; Reynolds, Ou, & Topitzes, 2004). Thus, one of the most important reasons for identifying effective programs is to provide parents with information that they can use to guide their decisions regarding selection of the best program for their child. Of concern is that families at poverty levels are more likely to rely on center-based programs that accept federal subsidy (Center for the Childcare Workforce, 2004) and such programs tend to have very limited funding earmarked for quality enhancement. Thus, programs that accept federal subsidy tend to suffer from underpaid and poorly trained staff and a dearth of appropriate learning materials (e.g., books, puzzles, blocks). As a result, young children from low SES homes, who are at greatest risk for developmental difficulties and scholastic unpreparedness, are spending time in early childhood centers that may be less likely to provide high quality stimulation and responsiveness as part of their instructional practices.

A second compelling reason to develop quality rating systems for early childhood programs that are linked to child outcomes is for accountability and program development. Legislators and others responsible for funding are beginning to insist on evaluative information in order to sustain or increase program funding. Additionally, those responsible for program management and implementation (e.g., director, principal, teacher) could use evaluative information to inform their educational practices. While self-assessment is often conducted, the extent to which this is used to enhance program quality is not well established. This often occurs because it is not collected in a form that can be used to inform and guide programmatic changes. An optimal quality rating system would provide programs that are in need of improvement with an individualized training and technical assistance plan.

While there are numerous reasons for using quality rating systems, there are also many challenges. For example, funding for rating systems on a statewide basis is often restricted, and therefore, approaches need to be efficient. Efficiency means finding methods that are reliable and valid but at the same time cost-effective. For example, whereas direct observations of preschool programs and classrooms over multiple visits are currently the norm, these methods are costly with respect to travel and personnel time. If programs must bear these costs then the expense is often not feasible for small programs and those whose operations are dependent upon federal subsidy. Also, rating systems that evaluate program quality need to be equally applicable across all types of service delivery systems (e.g., public school, Head Start, childcare). For example, a good quality rating system must not be biased for or against programmatic differences that exist institutionally as a function of service delivery systems. Otherwise, the quality rating system would not be fully endorsed or implemented, which would negate the potential benefit of being able to compare preschool programs that function under different auspices.

Sociopolitical Context of the Present Study

The goal of the present study is to describe the development of an empirically-based quality rating system for early childhood programs, an effort directed by a state legislated request to first integrate delivery of early childhood education services for preschool-age children from economically disadvantaged families. This 2003 request first encouraged early childhood education

programs (i.e., child care, school districts, Head Start) to come together in a seamless mixed delivery model and adopt similar standards and practices, and a second legislative request (2005) was to develop quality rating systems. Approximately 1000 pre-kindergarten classrooms in Texas voluntarily participated in the integrated service delivery model during the time of the present study. The three types of early childhood programs have differences in policies about service focus in areas such as education, health, and social services (Gallagher et al., 2004). However, the emphasis in this new integrated service delivery model, called the Texas Early Education Model (TEEM; Landry, Swank Anthony & Assel, 2011), is on preparing children to be school ready upon entrance into kindergarten by providing them with the foundational language, literacy, mathematics, and social skills necessary to succeed in kindergarten. Programs enrolled in TEEM share a common set of supports, including professional development, provision of curricular materials, training in a research-based curriculum, a system for assessing children's progress in cognitive and social skills, a set of state learning standards, and classroom mentors. A recent paper described this integration model and its efficacy in terms of both changes in preschool teachers' instructional practices and children's school readiness (Landry et al, 2011).

Purpose of the Present Study

The primary objective of this report is to describe the development of a scientifically-based and empirically-derived system that is being used across Texas to rate the quality of pre-kindergarten classrooms. The School Readiness Certification System (SRCS) is not intended to replace other accreditation standards, such as those offered by NAEYC or state licensing bodies. Instead, it was designed to provide specific information about how programs prepare pre-kindergarten children for school so that parents can make informed decisions about early childhood education programs. The SRCS also was designed to provide information to guide technical assistance for those programs that do not meet certification criteria. In addition, the SRCS was designed to have the advantage of being equally available to all types of early childhood program providers, adding to its utility and provision of greater choice to parents. Finally, the SRCS was developed under the guiding notions that the rating system should be objective and evidence-driven and that it should maintain a concentrated focus on indicators that predict school readiness.

The theoretical, conceptual, and practical underpinnings of the SRCS were developed in conjunction with state educational leadership, national experts in early childhood, and community-based stakeholders (e.g., directors, teachers, parents). The agreed upon objective was that the SRCS should be a statewide system, applicable across service delivery systems, that incorporates information about the quality of pre-kindergarten programs in combination with children's early reading and social competencies, which are assessed by the public schools when children are in kindergarten. For the SRCS to be feasible for implementation across a large state with funding constraints, it had to be cost-effective yet still reliable and valid. These aims and constraints required that the development of the SRCS involve multiple steps, including (a) development of a web-based application system for pre-kindergarten programs, (b) documentation of the reliability and validity of data provided by early childhood program staff, (c) determining the feasibility of various procedures for tracking children from pre-kindergarten into kindergarten, (d) determination of which pre-kindergarten variables reliably predict kindergarten school readiness in this population, and (e) use of statistical models to ascertain the best criteria for certifying classrooms as "School Ready". The present report briefly summarizes the development stage and two pilot studies for the sake of completeness, while it fully details the scientific underpinnings used to establish the certification criteria.

Methods

Pilot Studies

Development and validation of the Teacher Self-Report survey. The first pilot study was conducted during the 2004/2005 academic school year for the purpose of developing and validating a set of survey questions that teachers could answer as part of a web-based application for certification. A pool of 74 items was generated based on current research and best practices in the pedagogy of promoting early childhood learning across social, language, literacy, and math domains. Included were questions about responsive teaching practices, classroom arrangement and organization, daily routines, lesson planning, monitoring progress of children's learning, use of small vs. large group activities, and classroom curriculum and materials. The broad item content required individual items to vary in scaling metric, and no scale structure was presumed because of the newness of the survey. Ninety-nine teachers completed the survey online.

Given that certification would be based, in part, on teachers' self-report of their teaching practices and characteristics of their classrooms, it was imperative to validate data gathered from the Teacher Self-Report survey with independent observations. Trained research assistants observed the 99 teachers who completed the Teacher Self-Report. Following the standardized procedures prescribed for the *Teacher Behavior Rating Scale* (TBRS; Landry, Crawford, Gunnewig & Swank, 2002), observations lasted approximately two and one half hours during the time of the day that was devoted to instruction aimed at cognitive and school readiness skill acquisition. The TBRS is a 101 item, standardized classroom observation system that has been used in a number of state and national program evaluation projects (e.g., national evaluation of Early Reading First). Observers rate the quality and frequency of occurrence of specific teaching behaviors known to predict children's school readiness. The teacher behaviors that are rated fall into twelve conceptual categories, namely oral language, print & letter knowledge, phonological awareness, written expression, book reading, centers, mathematics, lesson planning, team teaching, progress monitoring, portfolios, and classroom management and responsive teaching practices that are not content specific. Observers rate the frequency of occurrence of each target behavior (i.e., 0-1 occurrence, 2-3 occurrences, or 4 or more occurrences). Observers also rate the quality of each target behavior as low, medium, or high. Thus, there are separate quality and frequency summary scores for each of the twelve scales of the TBRS. Inter-rater reliability using generalizability coefficients (Mitchell, 1979) range from .80 to .98, and internal consistency, for the measure as a whole, using Cronbach's alpha is = .96 (Landry et al., 2002).

Zero-order correlations of TBRS scales with questions from the Teacher Self-Report were tested for significance. In general, questions from the Teacher Self-Report were more highly correlated with conceptually similar TBRS scales than with conceptually dissimilar TBRS scales. Those survey questions that had three or more significant correlations above $r = .25$ with conceptually overlapping TBRS scales were retained and left unchanged. Survey questions that yielded significant but small correlations with conceptually overlapping TBRS scales were reviewed for possible sources of confusion and if the source was obvious then they were reworded and retained. Survey items not reliably correlated with any like TBRS scale were dropped. Most constructs measured by the Teacher Self-Report were indexed by a number of survey items that did demonstrate good convergent validity with similar TBRS scales. There were two exceptions. None of the Teacher Self-Report items that inquired about responsiveness to children's needs (learning, emotional, or otherwise) or behavioral management of the classroom demonstrated convergent validity with like TBRS scales. Thus, in general, results provided preliminary validation that teachers were accurately reporting their instructional and classroom practices in ways that could be corroborated by an independent observer.

Feasibility of procedures for tracking children and obtaining assessment data. Feasibility studies were conducted during the 2005/2006 school year. Given the many possible challenges to linking pre-kindergarten school data with children's kindergarten outcome data, it was necessary to examine the practical and fiscal feasibility of various procedures. For example, a variety of methods of tracking children through their pre-kindergarten and kindergarten years were tested. This often involved children transferring among multiple schools. To accomplish tracking of children, coordination of efforts were required among the Texas Education Agency, regional education service centers, independent school districts, early childhood education agencies, and Head Start grantees. We also piloted a variety of methods aimed at collecting kindergarten assessment data from kindergarten teachers, elementary schools, independent school districts, and third party vendors. Examples of different methods included sharing of electronic data, development and sharing of protected Excel templates, testing of individual children by research staff, and a third party secured web-based application. Ultimately, kindergarten assessment data were gathered from 774 children who attended 20 public school districts across the state.

The feasibility studies revealed that state legislation was needed to increase schools' compliance with Texas Education Agency's recommendation to provide kindergarten assessment data. It was also determined that a web-based application was optimal for gathering kindergarten assessment data. For example, restrictions could be programmed in a web-based system to require uniform reporting of assessment data, which was determined necessary given that schools around the state were recording the assessment data in different ways (e.g., item level scores, subtest raw scores, categories of competency across the entire screening measure). Finally, the feasibility studies demonstrated that it would be more cost effective to have the state education agency perform a large scale matching of pre-kindergarten children's demographic data with those of enrolled kindergarteners the next year than to have regional education service centers explore matches individually.

Participants in the Main Demonstration Project

Participants included 538 preschool sites, 1,326 pre-kindergarten classrooms, and 12,585 preschool-age children. Preschools were distributed across three types of service delivery systems; 258 childcare, 147 public school and 133 Head Start schools. In each community partnership there was representation of classrooms from each type of delivery system. The lead agency in the community partnership (i.e., public school, Head Start) held regular meetings to inform the participating programs about the application process. The Head Start programs represented all types of federally funded grantees, including Community Action, school district, and State Region Service Center programs. The childcare programs included for-profit and not-for-profit and ranged from small centers to large YMCA programs. Of the 1,255 classrooms from which data were gathered, 1,024 were participating in the voluntary, state integration program model that focused on programs serving low-income children. The 231 classrooms that did not participate in this model were invited to participate in the current study to increase the heterogeneity of the sample, as these 231 pre-kindergarten classrooms served children from middle-income families.

In the spring of 2006, the preschool programs submitted an on-line application that included information detailed in the Procedures section. Programs were aware that though this was a demonstration year, their participation would result in a decision about their certification status. In the fall of 2006, school readiness scores (reading and social screening measures) were obtained from kindergarten classrooms for approximately 8,000 (73%¹) of the children from these preschool

¹ Many children attended kindergarten in districts where an assessment other than the Texas Primary Reading Inventory (TPRI) or Tejas LEE (TJL) was administered so these children's data could not be used, and some children's data did not contain enough information for a definitive match.

classrooms. Fifty-one percent of the children followed were boys. Children's average age on the first day of kindergarten was 5.5 years ($SD = .30$). The number of days children attended preschool ranged from 1 to 250, with an average of 156 days ($SD = 35.5$). The sample of children was ethnically diverse; 69% Hispanic, 17% Caucasian, 13% African American, and 1% American Indian, Asian, or Pacific Islander. A large percentage of children (i.e., 67%) were eligible for free and reduced lunch and 48% had limited proficiency in English.

Procedures

e-School Plus

The web-based application had three components: (a) preschool facility report, (b) manage my school and students, and (c) teacher self-report. Information gathered in the three components included characteristics of the preschool program and preschool classroom, teaching practices, and teaching beliefs, based on empirical research that has identified components associated with high quality programs (National Early Literacy Panel, 2008). For example, information was gathered concerning aspects of the classroom environment (e.g., availability of small group learning areas, space for children to gather for a large group activities, literacy richness) (Crosser, 1992; Dunn, Beach, & Kontos, 1994), instructional practices (e.g., intentional language and literacy instruction as well as time for children to explore and practice for mastery; National Research Council, 2001; Raver & Knitzer, 2002), curriculum (e.g., availability of research based scope and sequence for cognitive and social learning; Assel, Landry, Swank, & Gunnewig, 2007; Whitehurst, Epstein, Angell, Payne, Crone, & Fischel, 1994), assessment approaches (reliable and valid information about children's learning across the year with feedback to teachers to direct instruction; Phaneuf & Silbergitt, 2003), and professional development (e.g., small group, learning across time, support for opportunities to practice in the classroom; Elmore, 2002; National Commission on Teaching & America's Future, 1996). The application included the following components.

Preschool facility report. The director of a child care or Head Start program or principal of a public school pre-kindergarten program provided information on key areas of their program including: (a) accreditation/ licensing, staffing patterns (i.e., teacher education, number of teachers and teaching assistants), (b) staff credentials (i.e., state certified, bilingual, early childhood, English as a second language, reading specialist, child development associate-CDA), (c) program/classroom characteristics (i.e., full vs. half day, language of instruction, number of books), (d) curriculum used for literacy, math and social/emotional development, (e) methods and frequency of assessing children's academic knowledge (e.g., standardized, work sampling, checklist, Personal Digital Assistance), (f) professional development practices, and (g) community integration. This component required about 15 minutes to complete.

Manage my school and students. Each preschool program was asked to provide information on their classroom teachers and those children who would be going to kindergarten the following year (e.g., number of preschool classrooms, length of program day, and language of instruction). Demographic information was entered for each child (e.g., age, gender, home language) as well as information related to the educational experience (e.g., eligibility for free/reduced lunch, special education, English language learners).

Teacher Self-Report survey. Each pre-kindergarten teacher was asked to provide information on highest level of education and credentials as well as respond to a series of questions regarding practices related to the following: (a) best practices, (b) classroom arrangement, (c) lesson planning, (d) child monitoring and assessments, (e) social skills development, (f) book reading, (g) phonological awareness, (h) print and letter knowledge, (i) written expression, (j) math, and (k) oral language instruction. For example, the teacher was asked to respond to a group of questions

regarding techniques for monitoring children's progress and teaching practices for book reading, phonological awareness, letter knowledge, and written expression. Other questions required the teacher to choose from an array of pictures those that were similar to activities they used for promoting early literacy skills, early mathematics skills, and classroom organization. In addition, teachers' beliefs regarding children's needs for standardized classroom practices versus individualized instruction were included. Such questions inquired about the extent to which individualization of lesson plans and behavior management techniques were used. Completion of the Teacher Self-Report required about 20 minutes.

Teachers also submitted examples of their daily schedules and lesson plans via US Postal Services. The daily schedules and lesson plans that teachers submitted varied tremendously in amount of detail and intelligibility. As could be expected, teachers approached lesson planning and labeling of daily schedules very differently. For example, while some teachers specified learning objectives and correlated activities in their lesson plans, other teachers' lesson plans resembled daily schedules that simply listed a time of day and vague classroom activities (e.g., circle time). In short, our coding team concluded these data were not amenable to coding for potential inclusion in the certification criteria.

Each teacher submitted 12 photographs of their classroom, either via uploading of digital photographs or via mailing of disposable cameras. Specifically, teachers submitted photographs of 4 walls, 4 corners, and 4 areas of their choice. A 15-item coding system was developed based on the Preschool Classroom Environment Checklist (CIRCLE, 2001). Using two- or three-point rating scales, research assistants determined the presence, amount, and quality of the classroom arrangement, centers, themes, children's books, writing materials, labels, children's names and work samples, samples of modeled writing, letter wall, daily schedule, helper chart, and props for group instruction (a description and scoring examples can be found in Appendix A). Research assistants received two days of training, and were certified for coding once an average agreement with an expert coder exceeded 92% for each item. Raters then attended bi-weekly coding meetings to discuss scoring questions and prevent coder drift. Ten percent of the pictures were randomly selected for recoding by a different rater to ensure inter-rater reliability throughout the coding period with reliability exceeding 0.80 (Mitchell, 1979).

Kindergarten School Readiness Outcomes

To identify each child's kindergarten teacher, the first step was to fund the 22 state regional education service centers to perform a series of searches in which children's information from e-School Plus was matched to children's information included in the Texas Education Agency's centralized databases. Information used to match children's data included social security number, when available, and children's demographic data, including name, gender, ethnicity, birthday, free/reduced lunch status, etc. When this matching process yielded a partial match, decisions were made on a case-by-case basis. When a student's information matched two records in the TEA's database equally well (i.e., partial match with both records), neither was used. Matches yielded the name of a school that a given child was believed to attend. Next, a unique identifier was assigned to each "matched" child who attended public or charter schools in the state.

Schools that included children "matched" through this process were sent a letter and asked to provide the names and contact information of the child's kindergarten teacher. These teachers were contacted via the US Postal Service, email, and telephone and provided with a password and instructions for how to login to e-School Plus and how to enter children's school readiness data. School readiness data included scores from the district administered reading screenings (see below) and kindergarten teachers' responses to a social competence screener (see below). Kindergarten teachers' access to e-School Plus was restricted in such a way that they only saw a list of names of

children who attended their particular kindergarten classroom. Finally, because preschool classroom was the unit of analysis for school readiness certification (see below), the kindergarten outcome scores for all children within a given preschool classroom were averaged to create classroom-level pass-rates (Snijders & Bosker, 1999).

Texas Primary Reading Inventory. About 90% of school districts and charter schools in the state of Texas administer the Texas Primary Reading Inventory (TPRI; Texas Educational Agency, 1998) two to three times per school year during kindergarten, first grade, and second grade. This measure has strong reliability and validity and has been demonstrated to predict end of second grade reading (Texas Educational Agency, 2002). For each progress monitoring wave, the inventory includes a screener and a more comprehensive inventory. The kindergarten screener consists of two subtests that permit rapid determination of whether or not students are at-risk for reading problems at the end of first grade. Specifically, the Graphophonemic Knowledge subtest requires children to provide the sounds associated with each of ten letters. The Phonemic Awareness subtest requires children to (a) blend onset and rime units into real words and to (b) blend up to three individual phonemes into real words. Standard administration procedures dictate that if a child scores “Developed” on the Graphophonemic Knowledge subtest, then the child is classified as “Developed” on the screener and the Phonemic Awareness subtest is not administered. However if a child does not score “Developed” on the Graphophonemic Knowledge subtest, then he or she is administered the Phonemic Awareness subtest, and if the child achieves a score of “Developed” on the Phonemic Awareness subtest then he or she is classified as “Developed” on the screener as a whole. In the present study, children’s classification status on the screener was used as the reading outcome because only the screener is administered to all children. Because some schools in the state did not administer the TPRI as part of their standard operating procedures, research staff individually administered the TPRI to approximately 600 children. In total, 76% of the sample followed took the TPRI, and the average preschool classroom pass-rate was 65%.

Tejas Lee. Most children in Texas who speak Spanish in their homes and who are provided classroom instruction in Spanish are administered the Tejas Lee (TJL; Texas Educational Agency, 2002) instead of the TPRI. The TJL, like the TPRI, is used to monitor children’s learning of literacy skills two to three times per school year during kindergarten, first grade, second grade and third grade. The TJL is not a Spanish translation of the TPRI, however it does assess similar literacy component skills. Additionally, the TJL was developed following procedures that closely resembled those used to develop the TPRI. Because the 2006/2007 TJL did not include a screener, a scoring routine that conceptually paralleled that of the TPRI was used to classify children. Specifically, priority was given to the letter sounds subtest such that if children scored “Developed” on this subtest then children were classified as “Developed”. If not, then children were still classified as “Developed” if they achieved a score of “Developed” on the subtests that involved blending of syllables and segmentation of syllables. In total, 24% of the sample followed took the TJL, and the average preschool classroom pass-rate was 82%.

From the TPRI and TJL scores, a single classroom-level Literacy pass-rate was constructed by first taking each child’s score, regardless of measure, and then calculating the classroom average. Although there are difficulties with aggregating scores from different measures, this was necessary to avoid running two sets of certification analyses, which could have potentially created different certification criteria for the classrooms serving English- and Spanish-speaking populations. In addition, because children from the same preschool classroom could be assessed with different reading screeners in Kindergarten, conducting separate analyses could have resulted in different certification decisions for the same classroom.

Social competence and behavior screener. The social competence subscale from the Social Competence and Behavior Evaluation (SCBE-30; Dumas, Martinez, & LeFreniere, 1998; Kotler &

McMahon, 2002; LaFreniere & Dumas, 1996) was used to evaluate children's social skills with peers and teachers in early kindergarten. Specifically, this 10-item, teacher-report checklist measures children's social behavior, such as social integration, tolerance, and cooperation (e.g., comforts or assists other children in difficulty, works easily in a group). Each item utilizes a six-point scale (1=almost never occurs to 6=almost always occurs). The SCBE-30 has demonstrated high inter-rater reliability (.83-.87) and good test-retest reliability (.82). The SCBE-30 has been successfully validated and used in numerous studies for monolingual as well as for children learning English as a second language (e.g., LaFreniere & Dumas, 1996; LaFreniere, Masataka, Butovskaya, Chen, Dessen, Atwanger, et al., 2002).

Results

Analysis proceeded in three stages. Stage One involved reducing the number of variables from the various components of e-School Plus. This was necessary because the facility report, teacher self-report, and classroom picture data comprised over 100 variables. Exploratory and confirmatory factor analyses were performed to yield a more manageable number of variables. In Stage Two, the resultant factors were combined with the kindergarten outcome data (i.e., classroom-level reading and social screener averages) and a latent profile analysis was conducted to identify classroom characteristics that were associated with children's school readiness as assessed in kindergarten. Because not all classrooms in a facility entered data into the system, classroom was deemed to be the most appropriate unit of analysis in order to prevent certifying a school based on partial information. Finally in Stage Three, follow-up analyses were conducted to examine the composition of the latent profiles in terms of service delivery systems (i.e., Head Start, public school, child care) and participation in the state's integration model (i.e., TEEM).

Data Reduction

Overall strategy. Items from e-School Plus and items from the coding system that described the photograph data were subjected to separate exploratory factor analyses. Prior to factor analysis, 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, in press). Varimax or Promax rotation was used, based on the size of factor correlations. Once the best exploratory model had been determined, confirmatory factor analysis was used to generate factor scores for each factor retained in the EFAs. This procedure was used to optimize interpretability of factor scores, by permitting no crossloadings.

Teacher Self-Report survey. Eight items from the teacher survey were dropped because they did not correlate with any other variables (four items about book & print awareness, one about classroom arrangement, one about lesson planning, one about print and letter knowledge, and one about the number of teacher aides) and an additional four items were dropped because they failed to produce unique loadings that exceeded .30 on any factor. Exploratory factor analysis² of the remaining 37 items yielded eight correlated factors with eigenvalues greater than 1.0. The scree plot was consistent with either a three factor solution or a six factor solution. The six factor solution was

² For these and all other analyses of teacher and classroom variables, multilevel analyses (teacher/classroom nested within school) were attempted. However, due to the preponderance of schools for which only one teacher or classroom existed in the data (49%), these models consistently failed to converge or had problems with the parameter estimation. Therefore, traditional, single-level analyses were conducted.

judged interpretable, and yielded a root mean square error of approximation (RMSEA) of .04, which reflects a good fit when considering the complexity of the model (see Table 1 for factor reliabilities and Table 2 for description of the six survey factors).

Table 1
Factor Reliabilities

Section	Factor	Number of items	Cronbach's alpha
Teacher Survey	Shared reading	4	0.53
Teacher Survey	Math instruction	7	0.87
Teacher Survey	Assessment	3	0.49
Teacher Survey	Intentional instruction	9	0.57
Teacher Survey	Early literacy	8	0.76
Teacher Survey	Lesson planning	6	0.41
Classroom pictures	Center quality	6	0.59
Classroom pictures	Visual supports	4	0.50
Professional development	Core training	4	0.76
Professional development	Health and safety	5	0.85
Professional development	Teaching techniques	3	0.64
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

Classroom pictures. Three items from the photograph-based Preschool Environment Checklist were dropped because of low inter-rater reliabilities (classroom labels, presence of educational posters/wall materials, and organized classroom theme). Two additional items were dropped because they failed to produce unique loadings in excess of .30 on any factor (children's work displayed and samples of modeled writing). Kappa statistics for the remaining 10 items ranged from .56 to .94. Exploratory factor analysis yielded three correlated factors with eigenvalues greater than 1.0. However, the scree plot was consistent with a 2-factor solution, the 3-factor solution included a one-item factor, and the two-factor solution yielded a reasonable fit (RMSEA=.06). Therefore, two factors were retained.

The six items that comprised Factor 1 inquired about the presence of labels, children's names, and other visual supports used for group instruction or classroom management (e.g., calendar, weather chart, daily news, letter wall, helper chart, daily schedule). Therefore, Factor 1 was labeled Visual Supports. The four items that formed Factor 2 asked about the quality of centers and how well supplied these were with literacy materials (e.g., books, writing supplies). Factor 2 was therefore labeled Center Quality. The two factors were correlated at .45.

Facility-report - Professional development. The Facility Report of e-School Plus included fourteen items that inquired about the kinds of professional development provided at a given facility. One of these items was dropped because it failed to produce unique loadings in excess of .30 on any factor. Exploratory factor analysis of the 13 remaining items yielded three correlated factors with eigenvalues over 1.0. This three-factor solution was the most interpretable among alternative models, and it fit the data well (RMSEA = .06).

The first factor included five items that inquired about professional development that was focused on teaching of core subjects (e.g., language, math). Factor 1, therefore, was labeled Professional Development in Core Subjects. The second factor was comprised of three items that inquired about professional development that was focused on teaching methods/techniques (e.g., classroom management) and was labeled Teaching Techniques. Finally, the five remaining items (e.g., CPR training, nutrition, health & safety) formed the third factor, labeled Health & Safety Training. Inter-factor correlations ranged from .49 to .59.

Facility-report - Assessment. The Facility Report of e-School Plus also included 18 items that inquired about the frequency that organizations administered different types of assessments to assess children's language, literacy, mathematics, and social/emotional/behavioral competence. Exploratory factor analysis of all 18 items yielded six factors with eigenvalues greater than 1.0. Each factor was comprised of three items. The six factor structure mapped perfectly onto 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. Substantively, these results suggest that organizations tended to use the same assessment method across domains of school readiness and across the age range of preschool children. Correlations among the six assessment factors ranged from .04 to .58 (median = .34). Although the six-factor solution was readily interpretable, residual variances were substantial, as indicated by a relatively high RMSEA (.16). This is likely due to the very high correlations among assessment methods increasing the power of the analysis. However, the Root Mean Square Residual was reasonable (.04).

Correlation of factor scores 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 the latent profile analysis was to check the zero-order correlations of the school readiness outcomes with all the factor scores generated above and any remaining variables from e-School Plus that were not part of the data reduction thus far (e.g., average number of books in the classroom). Any preschool variable that was not correlated with at least one of the kindergarten school readiness outcomes was excluded from subsequent analyses. School readiness outcomes were based on children's social screener scores and their classification status obtained on the literacy screeners. Children's school readiness outcomes were aggregated to the level of preschool classroom so that they could be correlated with classroom level indicators of preschool quality. Thus, kindergarten variables were the percent of children in a given pre-kindergarten classroom who scored "Developed" on literacy screeners and the average social screener score among children from a given pre-kindergarten classroom. Three indicators of preschool quality were significantly correlated with at least one indicator of school readiness: Intentional Instruction from the Teacher Self-Report, Early Literacy Instruction from the Teacher Self-Report, and Professional Development in Core Subjects from the Facility Report.

Identification of Latent Profiles of Classrooms

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. Specifically, latent profile analysis (LPA) was used. Similar to factor analysis, LPA is a latent variable approach in which the relations among observed variables are explained in terms of an unobserved (latent) variable. Unlike factor analysis, the latent variable in LPA is discrete, rather than continuous, and the focus of the analysis is the classification

of cases (in this case, classrooms) into latent profiles based on their pattern of means on the dependent (endogenous) variables (Magidson & Vermunt, 2004).

Table 2

Summary of Factors from the Teacher Self-Report Survey

Factor	Type of items	Number of Items	Factor label
1	Strategies used to promote oral language development during shared book reading.	4	Shared Reading
2	Materials used to teach mathematics concepts.	7	Math Concepts
3	Frequency and kinds of child assessments administered and how they are used.	3	Assessment
4	Intentional teaching strategies that crossed content areas.	9	Intentional Instruction
5	Frequency that teachers employed various strategies that promote early literacy (e.g. writing and print awareness.	8	Early Literacy Instruction
6	Relative importance of teacher directed instruction/lesson planning versus child initiated play/following children's interests; frequency that teachers used their own ideas, district standards, agency guidelines, and state standards to guide their lesson planning.	6	Lesson Planning

The three classroom-level factor scores and the two kindergarten outcome variables, which were aggregated to classrooms, were entered into the latent profile analysis. Of the original 1,225 classrooms in the system, 1,185 classrooms had data on at least one of these factors or kindergarten outcome variables, and 447 were missing at least one data point. The most common pattern of missing data (69%) was missing both the facility report and kindergarten outcome data. As long as the data are missing at random (MAR), maximum likelihood estimation techniques using full information will produce unbiased estimates (Baraldi & Enders, 2010; Little & Rubin, 1987). For the kindergarten outcome data, the state of Texas allows a variety of measures to be used for the kindergarten reading screen (e.g., DIBELS) so data were missing because we only collected data for the two most common assessments (i.e., TPRI and TejasLee). For the facility report data, it is possible that the pattern of missingness is related to the school's training practices (i.e., not missing at random, MNAR). However, because those same schools completed the rest of the application and required their teachers to complete the teacher self-report, we considered it unlikely. Therefore, in order to retain the variability in the teacher self-report, we decided to include the observations with missing data in our final analyses. However, to be eligible for certification, complete data was required. Of the 1,185 classrooms that had at least partial data, 738 had complete data and were eligible for certification.

In order to avoid convergence to local maxima, the model was run with 100 random initial starts, and parameters were estimated using maximum likelihood with robust standard errors due to some mild to moderate non-normality among the five indicators. Alternative models were compared using two criteria: the BIC (Schwarz, 1978), which is 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 profiles (Lo, Mendell, & Rubin, 2001). A significant LMR test indicates that the current model, with k latent profiles, fits the data better than the more parsimonious model with one less latent profile estimated.

Two-class model results. The first model examined was a two-class model, analogous to a straight pass-fail criterion. For this model, the LMR test was used to assess the necessity of modeling two latent profiles versus one latent profile. A non-significant LMR test in this case would indicate that there was no variation in the pattern of means among the five indicators. However, the LMR test was highly significant, $LMR = 248.1, p < .0001$ (see Table 3), and examination of the model-estimated means demonstrated that the profiles of the two classes were not parallel, confirming the necessity of a classified structure. 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. The first class, with above-average scores on both the preschool and kindergarten indicators, composed 78% of the sample, whereas 22% of the sample demonstrated below-average scores on the preschool indicators and much lower scores on the kindergarten indicators, especially the literacy outcome. Although no strict criterion was set a priori for the number or percentage of classrooms that would pass or fail certification, the 78% of classrooms that fell into the higher-performing class was considered an acceptable pass rate.

Table 3

Model information and fit statistics for Latent Profile Analyses.

Model	BIC	LMR	Conditional probabilities of class membership			
			Class 1	Class 2	Class 3	Class 4
2-class	11546	248.1**	75%	25%	---	---
3-class	11523	144.0**	61%	21%	18%	---
4-class	11486	77.5*	60%	17%	13%	10%

Note: BIC=Bayesian information criterion,

LMR =Lo-Mendell-Rubin adjusted likelihood ratio test.

* $p < .05$, ** $p < .001$

Three class model results. To ensure that we had adequately captured the complexity of the data, we also explored a three-class model. The LMR for the three class model 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 assessment, $BIC_{\text{three-class}} = 11523$; $BIC_{\text{two-class}} = 11546$ (see Table 3). Inspection of the profiles of the three classes showed that the pattern found in the two-class model was almost exactly replicated by two latent profiles in the three-class model (see Figure 2). However, the three-class model included a new latent profile with a very different pattern. Specifically, whereas means on the kindergarten indicators in this third class resembled those of the high-performing class, means on two of 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 4 shows classification status and average kindergarten outcomes for the 3-class model.

Table 4

Latent Profile Classification and Average Kindergarten Outcome Scores (in original units) from 3-class model.

Class	<i>n</i>	Classroom Reading Category Percent "Developed"	Classroom Social Screener
High	497 (67.3%)	80%	4.2
Mixed	84 (11.4%)	77%	3.9
Low	157 (21.3%)	25%	3.5

Four class model results. The final model explored was a four-class model. This model fit the data better than the three-class model, $BIC = 11486$, $LMR = 77.5$, $p = .034$ (see Table 3). The differences between this model and the three-class model centered around distinctions among the newly-created mixed-performance group. In other words, the percentages of classrooms assigned to the high- and low-performing groups did not change with the addition of a fourth class, and the mixed-performance group was about evenly divided into two new groups in the four class solution. However, since this finer-grained distinction did not add to our ability to dichotomize classrooms into certified or not certified groups, we opted for the three-class model in the interest of parsimony.

Issues regarding mixed-performing classrooms certification. 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 preschool classrooms resembled those of the high-performing group. In other words, the children from these preschool 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 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 School Readiness Certification System, school ready certification was awarded to 497 preschool classrooms across Texas, which represented 67% of classrooms eligible for consideration for certification (i.e., with complete data).

Validity of the three class model results. In order to examine the validity of the three-class model, several follow-up analyses were performed. Common practice dictates that follow-up analyses aimed at identifying differences among latent classifications be performed in an effort to validate the model selected. First, ANOVA was used to compare the three groups' means on the indicators of the latent profiles. Because this involved three simple contrasts for each of the five indicators, a Bonferroni correction was made to the alpha, $p = .05 / 3$, so that $p = .0167$, was considered significant. With this conservative alpha, twelve of the fifteen contrasts were still statistically significant, t 's = 2.99-34.83, p 's < .01, indicating that the three latent profiles indeed reliably differed on almost every indicator. However, the mixed performance group's mean on the Professional Development in Core Subjects indicator did not differ significantly from either the low-performing group, $t = 1.90$, $p = .057$, or the high-performing group, $t = 2.02$, $p = .044$. The low- and high-performing groups did differ significantly on Professional Development in Core Subjects, $t = 5.36$, $p < .0001$. Additionally, as suspected, the means on the literacy outcome did not differ between the mixed-performing group and the high-performing group, $t = 1.90$, $p = .094$. We also compared the average attendance of the three groups. The low-performing group averaged significantly fewer days than both the high- or mixed-performing groups (147 vs. 156 and 154, respectively, p s < .05).

Finally, we extended our examination of the validity of the classification scheme to include comparing classrooms that were ultimately certified (i.e., the high-performing group) to those classrooms that were ultimately not certified (i.e., the mixed- and low-performing groups).

Classrooms certified as “School Ready” had 55% more classmates score “developed” on the state mandated kindergarten reading screeners than classrooms that were not awarded certification, $t = 18.92, p < .001$. Similarly, children who attended “School Ready” classrooms had significantly higher scores on the measure of social adjustment, $t = 9.82, p < .001$. Finally, children in “School Ready” certified classrooms had higher attendance than children in non-certified classrooms, $t = 3.24, p < .01$.

Follow-up Analyses Addressing the Composition of the Latent Profiles

Because the goal of the certification system was to identify characteristics of programs that promoted school readiness, independent of the type of service delivery model (i.e., public school pre-kindergarten, Head Start, childcare), service delivery model and variables confounded with service delivery model were explicitly precluded from the analysis used to inform the certification criteria. That is, systematically making certification more or less difficult to obtain for particular types of programs would undermine the objective of a statewide certification system. Nonetheless, it was of interest to the Texas Education Agency to discover how likely classrooms from different service delivery models were to become certified. In addition, the Texas Education Agency was interested in examining the rate of certification of classrooms in the state’s integration model. Therefore, two sets of follow-up analyses were conducted that examined the relation of latent classification with facility type and the relation of latent classification with whether or not a program was enrolled in the Texas Early Education Model (TEEM). Finally, two analyses were conducted in order to examine the distribution of at-risk children into certified classrooms.

Association between certification and service delivery system. For analyses that examined the extent to which latent classification was associated with type of preschool facility (i.e., public school based pre-kindergarten, Head Start, or childcare; see Table 5), a 3 x 3 contingency table analysis was conducted and found significant, $\chi^2 (4, n = 684) = 113.7, p < .001$.

Table 5
Frequency (%) of Latent Profiles by Facility Type.

Facility type	Latent profile		
	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%)

Examination of cell frequencies revealed that public school pre-kindergarten classrooms were overrepresented in the high-performing group and were underrepresented in the low-performing and mixed-performing groups. Head Start classrooms were overrepresented in the low-performing group. Finally, childcare classrooms were overrepresented in the mixed-performing group and were underrepresented in the high-performing group.

Because service delivery system only varied among classrooms that were enrolled in the state integration program, a restricted analysis was performed in which we examined the relation of facility type and latent classification only among classrooms enrolled in the state integration program. The results of this restricted analysis were largely the same as those performed with the entire sample of classrooms. The only exception was that when childcare classrooms that served higher income children (i.e. classrooms that were not enrolled in the state integration program) were removed from the analysis, childcare classrooms were no longer underrepresented in the high-performance group.

Association between certification and participation in state integration model. Two sets of follow-up analyses were conducted to examine the extent to which latent classification was associated with enrollment in the state integration program. First, a 3 (Latent profile: High, Low, Mixed) x 2 (State program model: Participating or Non-participating) contingency table analysis was conducted on the full sample. However, in light of the fact that all of the classrooms in our sample that did not participate in the state integration model were classrooms in childcare centers, we conducted a second, restricted analysis on a sample that only included childcare settings.

For the full analysis, there was a significant association between classification into the three types of latent classrooms and enrollment status in the state integration program, $\chi^2 (2, n = 731) = 80.2, p < .001$ (see Table 6). Specifically, TEEM classrooms were slightly underrepresented in the mixed-performing group. The opposite was true of classrooms that did not participate in TEEM, which were overrepresented in the mixed group and were underrepresented in both the high- and low-performing groups.

Table 6
Frequency (%) of Latent Profiles by Program Status.

Program Status	Latent profile		
	High	Low	Mixed
Not State Program	21 (42%)	4 (8%)	25 (50%)
State Program	472 (69%)	151 (22%)	58 (9%)

For the restricted analyses, the only significant deviation from expected cell frequencies was an overrepresentation of classrooms that were not enrolled in TEEM in the mixed-performing group, $\chi^2 (2, n = 167) = 13.8, p < .01$. These results indicate that for-profit child care programs that served middle income families were more likely than childcare programs enrolled in TEEM to evidence poor quality preschool programming but still graduate children who were ready for kindergarten in terms of academic and social preparedness.

Association between certification and at-risk populations. We also examined the association between classroom certification and children's free/reduced lunch status, an indicator of economic disadvantage. No differences were found in the distribution of disadvantaged children into certified classrooms, $\chi^2 (1, n = 10,137) = .86, ns$ (see Table 7), indicating that economically disadvantaged children were equally likely to be in a certified classroom as their more affluent peers. The second analysis compared certification status between native English speakers and English-language learners. Results indicate that English-language learners were more likely than expected to be in a not-certified classroom, whereas native English speakers were more likely than expected to be in a certified classroom, $\chi^2 (1, n = 5,376) = 75.0, p < .001$.

Table 7
Percentage of free/ reduced lunch and English language learners by certification status.

Class	<i>n</i>	Free or reduced lunch percent	English language learner percent
Certified	7,435 (73.4%)	74.3%	44.3%
Not certified	2,702 (26.6%)	75.2%	59.4%

Discussion

This project was initiated by a state mandate to develop a system that would inform parents about which early childhood programs were preparing preschool-age children for school. Key stakeholders agreed that the resultant quality rating system should take into account both scientifically-based indicators of quality pre-kindergarten programs and indicators of children's school readiness. To our knowledge, this is a unique approach that has not been implemented by any other state or national quality rating systems, as most quality rating systems only consider characteristics of the pre-kindergarten program and classroom environment without linking these to kindergarten outcomes. A goal of the system was to ensure applicability of the criteria to the full range of early childhood service delivery types and thus, characteristics that were unique to a specific type of program were not included in the certification criteria.

Advantages and disadvantages of the certification system

Working within the fiscal constraints of Texas, this approach was only possible through capitalizing on the situation that the public schools already performed kindergarten screenings to identify children potentially at risk for reading problems. Constraints on development of the certification system included: (a) a need for cost-effectiveness, (b) reliability and validity of self-report data, (c) inclusion of indicators of quality of pre-kindergarten program and indicators of children's school readiness, and (d) development of an unbiased system that could be used by all early childhood education service delivery systems. Thus, the School Readiness Certification System (SRCS) strives for a balance between good science and the financial and political realities faced by a new state-wide program.

Advantages of the SRCS are that it is a web-based application that allows input from the teachers, program directors, and/or principal. While input on a web-based system is cost-effective, a challenge is assuring that the information collected is valid in that it reflects actual classroom practices and the classroom environment. In a pilot study, reliability and validity of teacher-self-report data was corroborated through observations of classrooms by external evaluators. Whereas annual on-site visits to all programs is cost prohibitive in a large state with thousands of early childhood education programs, randomly selected observations by external evaluators to verify validity of data in applications is feasible for future years. Additional support for the validity of the data entered into the web-based application comes from the fact that these data were related to children's school readiness in ways expected from prior research.

Determination of the preschool factors. Decisions about items to include in the web-based application were based on indicators of quality obtained from research studies that include classroom environment, instructional practices in social and cognitive skill domains, curriculum, assessment approaches used to monitor children's progress and professional development (e.g., National Research Council, 2001; Whitehurst et al., 1994). With this broad range of information in combination with children's outcomes in early kindergarten, it was possible to determine the most important pre-kindergarten factors to emphasize in a quality rating system. The results show that it was possible to refine the information such that a set of unique indicators from the pre-kindergarten period could be identified as most important in terms of relations with reading and social competence in early kindergarten. However, it is recognized that the development of this system does not allow for causal inferences as there were too many unobserved intervening variables that cannot be ruled out.

Results of the latent profile analyses showed that three constructs in the pre-kindergarten environment provided the best information for discriminating classrooms into distinct groups. These indicators were: (a) teacher professional development, particularly core training in school-

readiness (e.g., rich language input, early literacy, social competence); (b) teacher intentional instructional approaches that promote achievement; and (c) literacy oriented instructional activities especially early writing activities. Together these aspects of the pre-kindergarten environment discriminated, or predicted, those classrooms whose children had higher vs. lower early kindergarten social and reading outcomes. What is particularly interesting is that kindergarten social and reading scores and the three pre-kindergarten quality indicators were positively correlated. These findings have implications for efforts to understand how intentional cognitive activities during the pre-kindergarten years may support a range of school readiness skills including social competence (Duncan, Dowsett, Claessens, Magnuson, Huston, Klebanov, et al., 2007; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996). 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. While the indicators have a focus on building learning in language and literacy areas, the professional development and intentional instruction areas included responsive interaction styles between teacher and children as well as support for children's efforts. This included rich language input such as the use of rare vocabulary words, providing explanations and expanding children's utterances. Taken together, these indicators suggest that classroom teachers can incorporate practices that promote both social and cognitive competence and that the two areas of development do not involve a tradeoff.

Validity of the certification system. Another key finding was that children from poverty backgrounds who were in well implemented integration classrooms got similar reading and social pass rates to children from higher income backgrounds in terms of their early kindergarten screening scores. Moreover, they demonstrated better social competence, on average, including the ability to regulate their behavior in social situations. One explanation for improved social regulation for these children could be the emphasis on TEEM teachers providing predictable routines and engaging learning activities. This may provide children with the support they need to learn to more independently organize their behavior in activities that require cooperating with others and taking initiative. The formula for certification provide support that children living in poverty, whether enrolled in child care, Head Start or public school classrooms can enter kindergarten with the reading and social skills necessary to learn what is required in kindergarten. This finding is consistent with a conclusion reached regarding twins raised in different environments, where 60% of the variance in cognitive skill was related to environment with genetic influence being essentially zero (Turkheimer, Haley, Waldron, D'Onofrio, & Gottesman, 2003). These results counter the arguments that children from poverty backgrounds cannot reach similar levels of achievement with that of more affluent peers when given the right environment for learning. It is encouraging that exposure to high quality classroom-based program that emphasize cognitive readiness (e.g., language, literacy building) in ways that supported social competence may be able to place children from low SES backgrounds on an equal footing with more economically advantaged children. However, it is also possible that the classrooms in the mixed class that mostly served middle-income children were not supporting these higher SES children's learning adequately.

It is important to note that classrooms from each of the service delivery programs were classified as high quality, albeit classrooms from public school programs showed the highest rate of certification. This might be expected as public school requires a college degree though the results show that this alone did not assure 100% certification status. The results of the certification of the Head Start classrooms was somewhat lower than that of public school classrooms, and this may be due, in part, to the diversity of performance standards, or goals to which such programs attend as well as a lower income criteria that often means children in Head Start programs are from particularly disadvantaged backgrounds. This said, subsidized childcare and Head Start classrooms showed greater than 50% certification rates in spite of serving very low income children.

Secondary benefits of the certification system. While the goal of the School Readiness Certification System was to identify classrooms that prepare children for entering kindergarten, it also has the potential to serve as a guided self-assessment. Technical assistance for programs that did not meet the certification criteria was available and considered a key component of the system. Thus, it serves a supportive rather than a punitive role. For those not certified in the present study, a profile of strengths and weaknesses was developed from the data base and after each program received this report, they were offered the opportunity to discuss a technical support plan with the State Center for Education and Child Development, who developed the SRCS. Specifically, state-funded early childhood support staff in each community partnership are trained to interpret this profile and to prioritize a sequence of steps for supporting the classroom to improve weak areas. The advantage of the technical assistance is that the support is tailored to the needs of individual programs so that resources have a high likelihood of being used effectively. This better assures that when a program reapplies, it is more likely to achieve certification.

Given the voluntary nature of the certification system, a question arises as to what the incentive is for programs to participate? For school districts, a strong advantage of a comprehensive quality rating system is that it has the potential through market forces to encourage more children to arrive at kindergarten ready to succeed in public school. This would allow for better use of resources in kindergarten and beyond, since fewer children would require referral to special education or need remedial services. Also, less of the initial part of the kindergarten year would be spent by regular education teachers getting lower achieving children up to speed with the rest of the class. For stakeholders, such as directors of large child care agencies or Head Start agencies, feedback provided through a comprehensive quality rating system would allow for an increased awareness of which individual programs were more or less effective. This information can serve functions of accountability as well as guide program development. For individual centers and programs, receipt of a high rating or certification at minimal investment cost would allow positive advertisement within a community of program effectiveness. For example, private for-profit childcare programs need to remain competitive for continued funding. One means to demonstrate a competitive edge would be to market oneself as a program that has been independently determined to promote school readiness.

Limitations and future directions

Practical considerations that need to be addressed through ongoing research with this system include the issue of how to classify programs with multiple classrooms where some reach certification criteria and others do not. Ideally, all classrooms at a given school would be assessed and certification would be awarded to schools rather than individual classrooms. Within the current context of classroom-level certification, a possible solution would be to certify a program as Texas School Ready if a majority of classrooms reach certified status. This could be combined with the criteria that the minority of non-certified classrooms within a program reach certification within a specified period of time. An important policy implication includes the need for states to find sustainable funding for such a system so that no program is excluded due to lack of financial resources.

There are some important limitations to the current study that are noteworthy. Data from a group of classrooms could not be included in analyses that informed the certification criteria because these classrooms had incomplete applications. Additionally, it is important to note that if a group of children scored developed in reading and social skills in kindergarten, but the preschool classroom that they attended did not have scientifically-based best practices in place, then those classrooms were not certified. This practice allowed the system to stay true to its purpose; identifying programs that have teaching practices in place that scientific research has demonstrated

promotes learning. To only base certification on kindergarten outcomes could introduce a SES bias into the certification process. That is, a large body of research shows that low-income children often score below middle income children on measures of academic achievement (e.g., Zill & West, 2001). This occurs, in part, because higher family income is strongly related to higher levels of parent education, a predictor of children's academic achievement. Also, had we certified solely based on kindergarten outcomes then we would have certified classrooms in the mixed-group that did not provide children with the learning experiences that would have allowed their children to reach their optimal potential. That is, as many children in the mixed group were from middle class backgrounds, they might be expected to achieve even higher in kindergarten if they were provided with an optimal learning environment. In sum, we believe that the best approach to rating early childhood education classrooms or programs is one that takes into account both quality of preschool programming and children's school readiness outcomes.

An important aspect of this system is that the items in the Teacher Self-Report represent constructs that teachers can report in a reliable manner. Contrary to expectations, two areas that did not show good reliability between observation and teacher self-report was responsiveness to children's needs and behavioral management. While these are considered quite important in descriptions of best practices, the ability to reliably capture this information could not be demonstrated with this system. Given that major goals of the system were that criteria had to be captured reliably and empirical methods needed to be used rather than beliefs regarding best practices, it was necessary to drop these items. Future checks on the sensitivity of the system will allow for consideration of additional items and measurement methods.

Given the emphasis on self-report from program administrators and teachers, the desire of a school to be certified could result in a "high stakes" climate that would promote responses based on presenting the classroom in the best possible light. There also was concern that incorporating end-of-the-year testing in pre-kindergarten would be experienced by teachers as a "high stakes" type of testing, which may lead teachers to be overly concerned with the end-of-the-year assessment and they may "teach to the test" rather than attend to the whole child. This contributed to the decision to use the state kindergarten screening mechanism already in place rather than testing at the end of the pre-kindergarten year. The same concern may be applicable to specific self-reported teaching behaviors where, to ensure reliable reporting, the system may need to identify additional item sets that can be used in a random rotation approach to avoid response bias. Finally, the state's ability to promote participation of pre-kindergarten programs in the SRCS will be dependent upon an emphasis of the usefulness of the system for program evaluation and improvement and avoidance of using the system in a punitive manner.

Finally, at present the SRCS system lacks a more comprehensive set of school readiness outcomes. The combination of a limited set of school readiness outcomes and a data reduction process that excluded pre-kindergarten classroom characteristics that were unrelated to kindergarten outcomes may have oversimplified our characterizations of pre-kindergarten classrooms. For example, the Math Instruction factor was not used to help classify classrooms because it was unrelated to kindergarten outcomes, which was not surprising given the absence of a mathematics outcome. As early mathematics skills are receiving a great deal of attention from researchers and educators, the inclusion of a math screener as a kindergarten outcome in the system will be an important addition in the future. On the other hand, an asset to the SRCS is the inclusion of both an academic outcome (i.e., reading readiness) and a measure of social competence in its conceptualization of school readiness. Staying true to this whole-child conceptualization of school readiness was no small feat, as the social screener was not a state mandated kindergarten screener. Instead, collecting these data required enormous efforts and cooperation among school districts, principles, and teachers. While many districts were willing to have their kindergarten teachers

complete the social competence measure, a more seamless approach would be to legislate a common social screener across the state.

In summary, school readiness for young children is promoted through a classroom focus on literacy, language, and social skills through the implementation of a core curriculum, professional development for teachers specific to the area of school/cognitive readiness; and intentional high quality, school readiness instruction. The development of the SRCS demonstrates how an empirically based approach can result in an effective means for informing parents, state policy makers, 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 and revisions that are responsive to new research findings, the continued sensitivity of the quality indicators, and expansion of early kindergarten outcomes (e.g., math). To assure knowledge about whether programs can sustain quality over time, the system will require re-certification on an annual or bi-annual basis.

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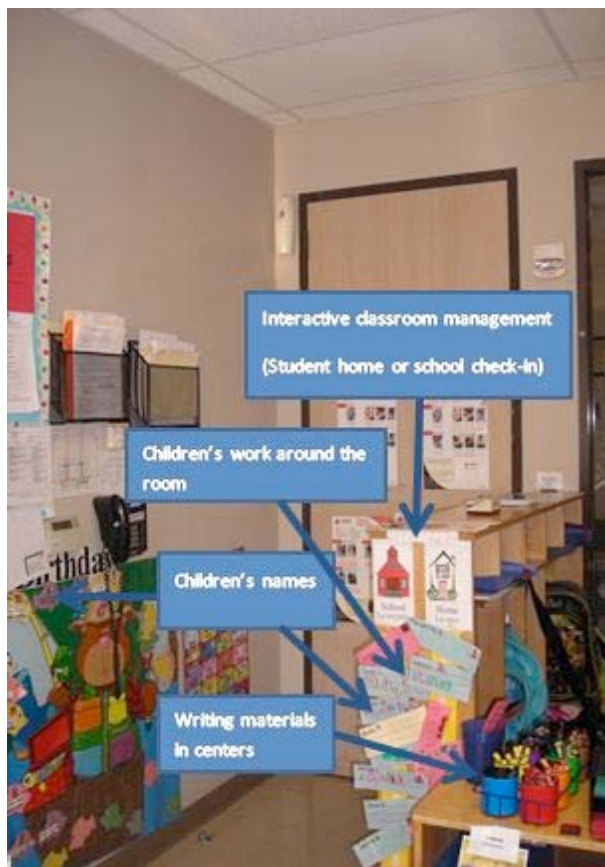
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Appendix

This section provides a description and photograph scoring examples for two classrooms. While 12 photographs per classroom were considered when scoring the Preschool Environment Checklist, only 6 photographs that best represent key distinctions in scoring criteria were selected for the purposes of this illustration. Classroom 1 embodies many of the characteristics consistent with high scores, whereas Classroom 2 represents an environment receiving low scores.

Classroom 1

Central to the scoring system is the presence of several key visual supports, including a daily schedule, jobs chart, daily news, center management systems, rules chart, letter walls, and read aloud charts. With the exception of the read aloud chart, each of these elements is visible in Classroom 1. Once identified, coders consider the quality of these supports (e.g., at eye level, interactive, linked with learning objectives), which in this case fall into the high range. This classroom also receives high scores on a series of items connected with the richness of the learning environment, including access to a variety of books and writing materials, as well as a centers-based room arrangement that supports peer interaction and exploration in a variety of content areas. See Classroom 1 photographs below for specific examples.





Classroom 1

Classroom 2

This classroom is characterized by a lack of stimulating materials, print and interactive management systems. For example, several key visual supports captured with the measure are absent, including a daily schedule, rules chart, jobs chart, letter wall, and daily news. While evidence of a center management system can be seen (e.g., construction center label with space for children's names), the management chart appears inaccessible in the dramatic play center. In such cases the center management ratings would fall in the mid-range, allowing high scores to be reserved for those management systems that apply to several learning areas and appear to be used routinely. Classroom 2 also receives low scores on the series of items reflecting the richness of the learning environment as evidenced by a lack of books, print, and variety in centers-based learning opportunities. See Classroom 2 photographs below for specific examples.



Print is too high to be meaningful to children

Room arrangement provides few defined areas for exploration in specific areas or topics of interest

Writing Materials at tables but not supporting center objectives



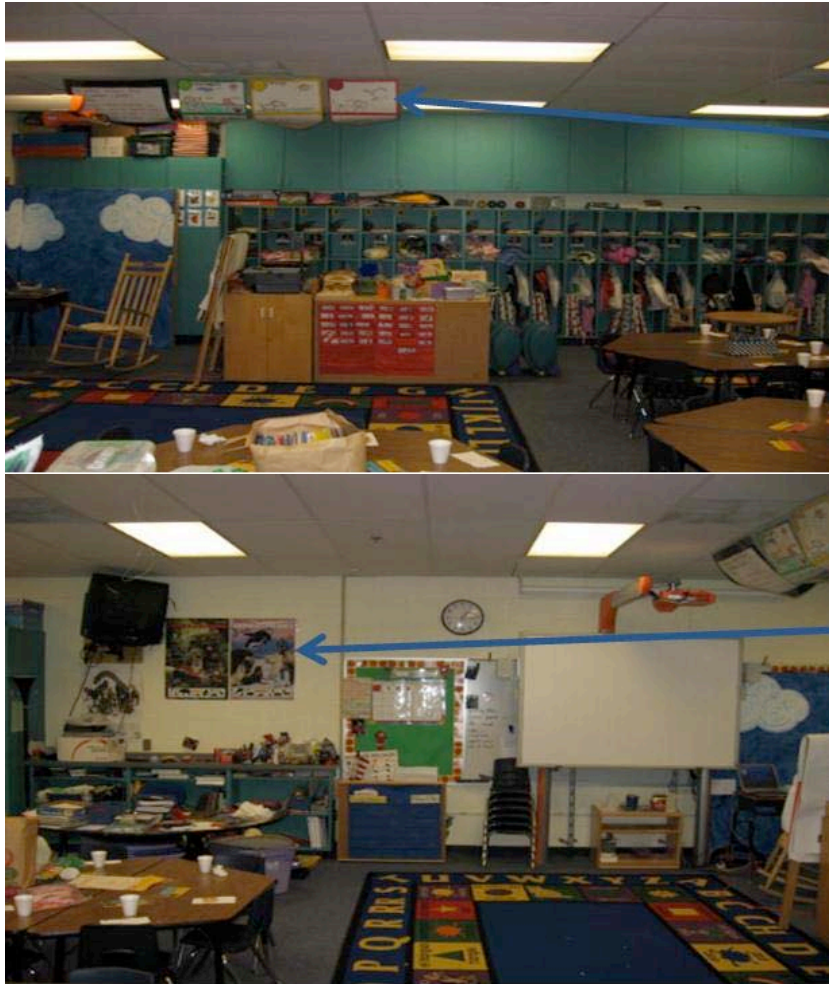
Center materials are not labeled

Missing meaningful print connections (e.g., books, posters, charts)

Center management chart







Lack of meaningful print
Nursery rhymes too high
(decorative)
No evidence of interactive
daily schedule
No evidence of books or read
aloud chart in whole group
area

Lack of meaningful print
Posters too high to provide
meaningful print samples
No evidence of interactive
daily schedule
No evidence of books or read
aloud chart in whole group
area

Classroom 2

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