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The Development Continuum Assessment System for Ages 3 to 5: The Assessment Component of the Creative Curriculum® for Preschool

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The Developmental Continuum Assessment System for Ages 3 to 5:

The Assessment Component of *The Creative Curriculum*® *for Preschool*

Technical Report

Richard Lambert, UNC Charlotte

The Creative Curriculum® *for Preschool* (*CC*) is the leading curricular model used by Head Start programs, according to a survey by the National Head Start Association (2000). *CC* is used by 39.1% of the programs, the High/Scope curriculum is used by 20%, and the remaining programs use a variety of other curricula (McKey, Pai-Samant, & Sorongon, 2002). In addition, many school districts nationwide have adopted *CC* for their preschool classrooms. *CC* is a comprehensive and integrative curricular model for early childhood programs. It offers multiple examples of how teachers can craft challenges that enable children to progress in their learning. It offers teachers a range of teaching approaches, showing them how to talk with children about what they are doing, ask questions, and challenge children's thinking, all directed toward extending children's language and guiding their learning. Explicit guidance about how to teach content in literacy, math, science, social studies, the arts, and technology shows teachers that content learning can occur all day long.

There are multiple ways in which *CC* can be considered comprehensive, particularly when it is implemented in concert with the appropriate training and technical assistance. It incorporates opportunities for teachers to integrate multiple content areas into the early childhood classroom. It offers teachers guidance regarding a wide range of

quality practices including arrangement of the room, schedule, and learning environment. It also includes all the elements of a comprehensive curriculum: curricular goals, instructional strategies, and assessment. The focus of this report is on the third component, assessment.

CC, when fully implemented by a trained teacher, encourages children's developmental progress and their mastery of content knowledge and skills. *CC* focuses on child outcomes in language development, emergent literacy, emergent numeracy, cognition, general knowledge, and social competence through the use of The Developmental Continuum Assessment System. The Continuum is a teacher assessment tool and addresses four areas of development: social/emotional, physical, cognitive, and language. It outlines the progression of development in each of the four areas with 10 broad curricular goals.

These goals have been translated into 50 observable and measurable objectives and are represented by 50 specific items on the Continuum. Teachers make ratings of each child three times during the school year: fall, winter, and spring. Teachers are encouraged to maintain portfolios of student work along with anecdotal records, accumulating multiple sources of evidence that can inform the ratings. The process of completing the ratings requires the teacher to identify the developmental level of a specific child on a specific item according to a four-point scale. Each item is phrased in terms of specific behaviors and functional areas, and each of the four levels on the accompanying rating scale is anchored to descriptions of specific examples of these behaviors. The four levels have been identified as Forerunner, Step I, Step II, and Step III. The Forerunner level represents behaviors that may indicate a developmental delay

or that a child has not previously been exposed to that skill. Still, this level represents strengths of the child upon which both future development and instructional strategies can build. Step III represents complete mastery of a particular goal while Steps I and II indicate the phases of development through which a child will pass on the way to mastery. The Continuum is therefore organized to facilitate, for teachers and families, an understanding of both child development and the progress of specific classrooms and children.

The Continuum was introduced in 2001 and was developed to replace the Child Development and Learning Checklist (1992), a part of the 3rd edition of *CC*. The Continuum was designed as an integral part of the 4th edition of *CC* and reflects the expansions and refinements of the newer edition. There are two data management systems for use with The Developmental Continuum offered by Teaching Strategies: *The Creative Curriculum Developmental Continuum Assessment Toolkit,* accompanied with pencil and paper forms and a teacher's guide and CreativeCurriculum.net, a web-based data logging and processing program. CreativeCurriculum.net facilitates online data entry, generation of various summary reports, suggestions for grouping children according to their developmental progress toward the *CC* objectives, activities, and instructional strategies that are linked to the assessment information. These resources, the Toolkit and the CreativeCurriculum.net, each offer the teacher an assessment system that is linked with a curriculum and can be used for several instructional and reporting purposes. The teacher can use the information they provide to:

- Plan instructional experiences
- Group children

- Communicate with parents

- Understand how children are learning and developing.

The purpose of this report is to begin the process of accumulating evidence about the reliability and validity of the information that the assessment system provides. It is important to note that all of the reports and suggestions to teachers provided by the teacher's guide and website are based on information from single items. The website does not provide, or utilize, scale scores in any of its processing and suggestions, and is intended for formative assessment, formative evaluation, and instructional planning purposes. This report is an attempt to further facilitate the proper use of the information that can be provided by the Continuum for other purposes such as program planning and quality improvement, monitoring the implementation of the curriculum, and teacher development. In addition, researchers may choose to use the information the Continuum provides for more summative purposes such as research and program evaluation. This report presents evidence that can be useful to program administrators, researchers, and evaluators who desire to use the information provided by the Continuum by offering guidance about the formation of scale scores and their measurement properties.

Sampling Strategies

The first step in constructing the sample for this study was to identify Head Start programs throughout the country that met specific criteria. The identified programs needed to:

- Adopt the 4th edition of *CC*

- Receive *CC* training

- Demonstrate a reasonably complete implementation of *CC*

- Use the Continuum as suggested

- Record the Continuum data in an electronic format.

A total of 29 sites met the listed criteria. Data from 4 sites were omitted due to insufficient data. The remaining 25 sites resulted in total of 7963 children. Winter checkpoint data were extracted in early February 2003. Generally, programs collect winter checkpoint data in January and February of each year. In many cases, teachers collect the data in pencil and paper form and enter into the online recording system at a later date. As a result, a number of cases were missing data on the winter checkpoint (4927 cases). Child demographic data were missing in 403 cases and were therefore omitted. The remaining number of complete cases was 2631.

Once the data from the total sample had been examined and verified using exploratory data analysis techniques, and any data entry issues had been addressed, the sample was examined for similarity to the composition of the national Head Start population. As the Continuum is not intended for use with children younger than three years old, this component of the national Head Start program was not considered in the sample design. The total original sample of 2,631 was reduced to 1,590 in order to closely approximate the demographic breakdown of the national Head Start population (excluding Early Head Start) with respect to ethnicity, gender, and age. These demographic variables were completely crossed to form a matrix. Random samples were taken from cells that were over-represented in the original sample. Table 1 describes the characteristics of the sample of 1,590 as compared to the national program. The "Other" ethnicity group was under-represented in the original sample and therefore all of these subjects were retained in the final sample. The central task in the sampling process

involved randomly sampling from the Hispanic, African-American, and White ethnic without respect to gender or age as these larger ethnic groups were approximately balanced with respect to gender, and approximately representative with respect to age.

Demographic Background Characteristics of the Sample

The sampling strategy was successful at resulting in an approximately representative sample with respect to ethnicity. All four categories, Hispanic, African-American, White, and Other were represented in approximately their respective proportions in the national program. The "Other" category, 6.6% of the sample, is comprised of Native American and Alaskan Native (1.0%), Asian (2.0%), and those families identifying themselves as other (3.8%). Boys (51.40%) and girls (48.60%) were represented by approximately equal groups in the sample. Most of the families (76.50%) reported that English was the primary language in their home while 20.30% reported Spanish. The remaining 3.10% reported other languages were used in the home.

The available characteristics of the national program, reported in Table 1, describe its characteristics at enrollment time. The winter Continuum assessment data was used for this study. Therefore the sample children were approximately four to six months older than they were at enrollment. This accounts for the slightly older composition of the sample as compared to the age statistics of the national program. The largest portion of the sample (55.79%) was four year olds at the time of the winter assessment. Three year olds comprised 25.09% of the sample while five year olds comprised 19.12% of the sample.

With respect to region, the initial admissibility criteria for program participation in the study did not result in a completely representative sample. There were no

programs that could contribute to the study from Head Start regions I, VI, and X, and very few from region VIII. It should be noted that region VI comprises 13.62% of the national program and was not represented in the sample. However, regions I, VIII, and X are among the smallest regions in the Head Start program and none of them comprise more than approximately 3% of the program. Six of the Head Start regions were represented by a segment of the final sample that is within approximately three percentage points of their representation in the national program. For seven regions, the sample was within approximately six percentage points and regions V and IX were somewhat over-represented in the sample. While the sample did not completely replicate the regional distribution of the national program, it was approximately representative of those regions that participated.

Normative Information for Individual Items

Tables 2, 3, 4, and 5 display the percentage of children in the sample who were rated by their teachers as falling within each of the four categories of the Continuum rating scale. Given the approximate representativeness of the sample, these results can be used as an estimate of the information that would be obtained had the entire Head Start population been rated on the Continuum during the middle of the Head Start year. From this information, teachers are able to understand how an individual child is progressing on specific items relative to a normative sample of the Head Start population. In addition, teachers and administrators may be able to compare the composition of their classrooms, centers, and programs on specific items with an estimate of the mixture of developmental levels in the Head Start population. The Winter assessment was selected for this study because it was felt that it would be most helpful to teachers, administrators,

and researchers to begin with data that most clearly reflects the development of Head Start children during the course of the year as opposed to the beginning or end of the year. Future research will focus on the development of norm tables for the fall and spring assessments.

Table 2 reports the results for the entire sample. For 35 of the 50 items, the largest percentage of children was rated as Level III. For 13 of the items, the largest percentage of children was rated as Level II. These items could be considered more difficult in a psychometric sense, in that fewer children were given mastery and Level III ratings by their teachers at the time of the winter assessment. These results may suggest that Head Start children develop relatively slower on these items than they do in other areas. Items 11 and 13 relate to advanced social functioning while the remaining items relate to cognitive development. In contrast, for two items the largest percentage of children was given mastery ratings making these items relatively easy in a psychometric sense. These items are 16 and 17 and relate to gross motor development. These results may suggest that Head Start children develop in these areas relatively faster than they do in other areas.

Tables 3, 4, and 5 separate the sample into three, four, and five year olds respectively. Teachers may use these tables to help understand the developmental progress of specific children relative to other Head Start children of their similar age. They may also be able to compare their classrooms to the Head Start population as a whole should they teach age-specific classrooms. For the three-year normative table, the largest percentage of children was rated at either Forerunner or Level I, reflectively their younger age and relative position in development. The four-year-old results most closely

reflect those of the overall sample, as they comprise the majority of the sample. Table 5 contains the five year old results and reflects their age and more advanced development by the number of the items for which the largest percentage of children were given ratings of Level III.

Construct Validity

Construct validity refers to the extent to which an instrument measures the theoretical constructs it is intended to measure. The Continuum was designed to provide teachers with formative assessment information in four broad areas: Social / Emotional, Physical, Cognitive, and Language development. However, little statistical evidence exists that can inform researchers about the constructs that are measured by the Continuum. Therefore, an exploratory factor analysis was conducted to begin the process of identifying the underlying dimensions of child development that are measured by the Continuum.

Principal axis factoring, a multivariate statistical technique, was used to extract the most salient underlying dimensions to the Continuum. SPSS statistical software was used to perform these analyses. This process can be thought of as organizing items into batches according to how well they relate to each other, or more specifically, yield information that correlates with the other items in the batch. Initial results suggested that three items, 21, 24, and 40, did not fit neatly into a single dimension. Item 21, "Uses tools for writing and drawing", related to items that measure physical, cognitive, and language related development. This item probably taps into elements of both fine motor development and emergent literacy. Item 24, "Shows persistence in approaching tasks", related to items that measure social and cognitive development, and probably measures

both the way the child approaches tasks and the success the child has in mastering them. Item 40, "Understands and follows oral directions", related to items that measure social, cognitive, and language related development. This item asks the teacher to rate an area of functioning that transcends all types activity probably involves a child's ability to comprehend oral instruction and respond positively and appropriately to social situations. Therefore, given the content of all three items, these results fit within an understanding of child development. While these items provide teachers with important information and fit within the goals of *CC,* the statistical results suggest that they measure components of multiple constructs, or areas of development. While these items were retained as part of the instrument, they were dropped from the subsequent analyses.

The results of subsequent principal axis factoring analyses without these items suggested that there are four underlying dimensions to the Continuum. Specifically, examination of the scree plot and initial eigenvalues suggested a four-factor solution. Once four factors were retained, the solution accounted for 69.3% of the variance in the data across the 47 items entered into the analysis. Direct oblimin rotation with Kaiser normalization was used to enhance interpretation. Table 6 shows that the rotation method resulted in what is referred to as simple structure. This means that each item loaded on only a single factor with loadings, or weights, of .40 or greater. After a careful examination of the content of the items in each of the four sets, it became clear that the first factor measures Social development. Item 9, "Follows classroom rules", had the highest factor loading illustrating some of the most important behaviors to teachers within this construct. The second factor contains all of the items that relate to Physical

development. Item 16, "Climbs up and down", has the highest loading on this factor and helps define the competencies it measures.

The third factor contained all of the items related to cognitive development and the fourth factor contained all of the items related to Expressive Language development. The highest loading item of the cognitive competencies is item 30, "Recognizes patterns and can repeat them", and this helps define the underlying construct of cognitive development. The Expressive Language items had relatively similar loadings. This solution does vary slightly from the proposed organization of the items as reported by the authors of the Continuum. Specifically, items 38, and 44 through 50, related more to the other cognitively oriented items that they did to the Expressive Language items. Similarly, the Expressive Language items related more to each other than they did to the cognitively oriented items. These results suggest that the remaining emergent literacy items when used as teacher ratings, tap into the overall cognitive development of the child.

The information that teachers record when making their ratings of children on specific items is essentially ordinal, or rank order, in nature and the ordinal scaling used has only four levels. Therefore it will often violate the assumptions of normality inherent in the use of Pearson correlation coefficients by the Principal axis factoring algorithm in SPSS statistical software. In order to be assured that the factor solution was not hampered by the distributional nature of the item level information, an additional solution was pursued that recognizes the ordinal nature of the data. The PRELIS statistical software was used to calculate polychoric between item correlation coefficients. Then the accompanying variance covariance matrix was used by the LISREL software to

conduct a factor analysis using maximum likelihood estimation and promax rotation. This procedure produced identical results to the solution described earlier with respect to number of factors extracted, placement of items on factors, and relative strength of item loadings within factors. Therefore the distributional properties of the item level information were not seen as a limitation to the solution found in SPSS.

These results are promising while representing only one type of evidence for the validity of the Continuum. Future research could build upon these findings with additional types of validity evidence. For example, concurrent validation could examine the relationship between the scale scores of the Continuum and other well-recognized measures of child developmental progress, including those collected by outside observers and assessors. Content validation of both the items and the language used to describe the behavioral anchors for the ratings scale could also be useful.

Reliability and Normative Information for Scale Scores

Reliability refers to the consistency and stability of the information that is obtained through the use of the Continuum. Consistency refers to the extent to which the information from items within factors agrees with itself. Stability refers to the extent to which the same information remains stable over measurements across time. The data from this study were used to determine estimates of the internal consistency reliability of the factor scores of the Continuum. Table 7 displays these results. Each of the factor scores yielded good reliability coefficients. All of the coefficients were above .92 and reliabilities of .80 or greater are considered acceptable. This is particularly encouraging with respect to the Expressive Language factor considering that it has only four items.

The item level information was used to form scale scores by calculating the mean rating across each set, or factor, of items for each child. Table 7 reports the mean, standard deviation, minimum and maximum scores, and quartile boundaries for each of the factor score distributions. This information can be used by teachers, researchers, and program administrators to determine the approximate position of specific children relative to the norm sample of Head Start children. The quartile boundaries can be used for this purpose as they identify where the bottom 25% of children, the children between the 25th and 50th percentile, the children between the 50th and 75th percentiles, and the upper 25% of children scored on each of the dimensions of child development measured by the Continuum. In addition, the relative position of the typical scores for groups of children can be placed into their approximate relative position within the Head Start population.

The authors of the Continuum are interested in whether a sub-scale within the Cognitive factor can be created that would address the emergent literacy dimension of cognitive development. Items 38 and 44 through 50 were used, based on both theory and their content, to form this sub-scale score. The reliability and distributional properties of this sub-scale are reported in Table 7. The internal consistency reliability was good at .950. Table 8 shows the correlations between the factor and the sub-scale scores. The Emergent Literacy sub-scale is highly correlated (.946) in this sample with the Cognitive factor score. This is due in part to the presence of the same eight items in both scores, but also implies that the Emergent Literacy area of development is related to the overall cognitive development of Head Start children.

Future research will need to examine the stability, or test-retest reliability, of the scale scores. Future research will also need to focus on agreement between raters, an additional type of reliability. It will be important to document the extent to which several teachers, equal in experience with particular children, agree in their ratings of those children when using the items of the Continuum.

Conclusion

This report presents evidence that the Continuum, when properly used in the context of a program that has taken advantage of the proper training and curriculum implementation strategies, can provide information that has adequate measurement properties. Factor analysis results are reported that demonstrate construct validity, and norm tables have been constructed using an approximately nationally representative sample. Potential users of the information in this report should be cautious about generalizing these results beyond the Head Start population or other very similar populations of predominantly low-income children.

Scoring strategies to form scale scores have been developed in accordance with the factor analysis results and these scale scores demonstrate adequate reliability. Program administrators, researchers, and evaluators who are interested in using the information the Continuum provides, are urged to do so in accordance with widely accepted standards of practice regarding the assessment of young children. In general, it is important to consider several broad principles:

- The reliability and validity of the information provided by assessments for young children tends to increase with the age of the children being assessed.

- No source of information should be used as the sole source for decision-making purposes.

- Teacher ratings are only one source of information about children, and reflect the unique perspective of the teacher and the teacher's experience of the child within the classroom context.

- Multiple sources of information (informants, methods, and measures) provide a more complete picture of the child's developmental progress.

Several sources for standards regarding early childhood assessments, and general information regarding working with young children, along with links to their locations on the web are listed below:

Standards for Educational and Psychological Testing
http://www.aera.net/products/standards.htm

NAEYC Position Statement on *Standardized Testing of Young Children 3 Through 8 Years of Age*
http://www.naeyc.org/resources/position_statements/pstestin.htm

NAEYC Position Statement on *Guidelines for Appropriate Curriculum Content and Assessment in Programs Serving Children Ages 3 Through 8*
http://www.naeyc.org/resources/position_statements/pscuras.htm

National Education Goals Panel's *Principles and Recommendations for Early Childhood Assessments*
http://www.negp.gov/Reports/prinrec.pdf

References

Table 1

Demographic characteristics of the sample.

Characteristic	Category	Norm Sample	Head Start Program Nationally
Age in Years	<3	0.00%	7.00%
	3	25.09%	35.00%
	4	55.79%	54.00%
	5	19.12%	4.00%
Age in Months	Mean	53.23	
	SD	7.06	
Ethnicity	Hispanic	29.90%	29.70%
	Black	33.30%	33.80%
	White	30.20%	29.90%
	Other	6.60%	6.50%
Head Start Region	I	0.00%	3.37%
	II	11.80%	11.24%
	III	13.90%	7.55%
	IV	18.60%	18.21%
	V	27.00%	16.67%
	VI	0.00%	13.62%
	VII	2.80%	4.23%
	VIII	0.80%	2.78%
	IX	25.20%	13.19%
	X	0.00%	2.55%
Gender	Female	48.60%	
	Male	51.40%	
Primary Language in the Home	English	76.50%	
	Spanish	20.30%	
	Other	3.10%	

Table 2
Percentage of Children in the Norm Sample at each Developmental Level on the Winter Assessment.

Item		Forerunner	Level I	Level II	Level III
1	Shows ability to adjust to new situations	3.30%	20.70%	42.50%	33.50%
2	Demonstrates appropriate trust in adults	3.70%	25.50%	47.10%	23.70%
3	Recognizes own feelings and manages them appropriately	16.00%	30.10%	37.00%	17.00%
4	Stands up for rights	8.60%	34.50%	43.70%	13.30%
5	Demonstrates self-direction and independence	4.90%	31.60%	44.20%	19.30%
6	Takes responsibility for own well-being	5.10%	32.30%	43.50%	19.20%
7	Respects and cares for classroom environment and materials	6.30%	33.80%	38.60%	21.30%
8	Follows classroom routines	5.80%	33.60%	37.60%	23.00%
9	Follows classroom rules	7.60%	35.80%	37.00%	19.60%
10	Plays well with other children	6.50%	25.90%	40.50%	27.10%
11	Recognizes the feelings of others and responds appropiately	11.40%	37.10%	32.10%	19.40%
12	Shares and respects the rights of others	8.00%	31.30%	44.10%	16.60%
13	Uses thinking skills to resolve conflicts	14.70%	39.90%	36.00%	9.40%
14	Demonstrates basic locomotor skills (running, jumping, hopping, galloping)	2.80%	19.00%	42.80%	35.50%
15	Shows balance while moving	3.40%	22.90%	44.70%	29.00%
16	Climbs up and down	1.90%	13.70%	34.00%	50.30%
17	Pedals and steers a tricycle (or other wheeled vehicle)	9.50%	22.70%	32.10%	35.60%
18	Demonstrates throwing, kicking, and catching skills	6.40%	31.80%	41.60%	20.20%
19	Controls small muscles in hands	4.40%	23.00%	43.90%	28.70%
20	Coordinates eye-hand movement	3.40%	23.30%	40.80%	32.50%
21	Uses tools for writing and drawing	7.60%	26.30%	36.70%	29.30%
22	Observes objects and events with curiosity	12.90%	32.00%	42.00%	13.10%
23	Approaches problems flexibly	12.80%	39.80%	36.90%	10.50%
24	Shows persistence in approaching tasks	9.00%	33.70%	46.20%	11.10%
25	Explores cause and effect	16.80%	40.30%	34.90%	8.00%
26	Applies knowledge or experience to a new context	10.20%	39.00%	39.00%	11.80%
27	Classifies objects	10.50%	40.70%	36.50%	12.30%
28	Compares/measures	17.40%	33.00%	40.80%	8.80%
29	Arranges objects in a series	19.30%	36.70%	34.30%	9.70%
30	Recognizes patterns and can repeat them	22.70%	36.20%	31.60%	9.50%
31	Shows awareness of time concepts and sequence	20.00%	32.30%	34.70%	13.10%
32	Shows awareness of position in space	12.60%	32.00%	43.80%	11.60%
33	Uses one-to-one correspondence	9.40%	31.60%	44.20%	14.80%
34	Uses numbers and counting	8.90%	26.40%	40.30%	24.40%
35	Takes on pretend roles and situations	10.60%	31.00%	35.70%	22.70%
36	Makes believe with objects	7.00%	33.20%	36.60%	23.20%
37	Makes and interprets representations	12.70%	32.10%	39.20%	16.00%
38	Hears and discriminates the sounds of language	13.90%	41.70%	32.00%	12.40%
39	Expresses self using words and expanded sentences	7.70%	24.10%	41.80%	26.40%
40	Understands and follows oral directions	3.60%	23.90%	42.30%	30.20%
41	Answers questions	6.70%	29.10%	38.80%	25.50%
42	Asks questions	10.10%	32.00%	39.50%	18.30%
43	Actively participates in conversations	10.60%	29.60%	33.50%	26.40%
44	Enjoys values reading	8.60%	31.60%	42.60%	17.20%
45	Demonstrates understanding of print concepts	17.10%	39.20%	32.50%	11.20%
46	Demonstrates knowledge of the alphabet	24.10%	34.40%	30.50%	11.00%
47	Uses emerging reading skills to make meaning from print	21.00%	45.90%	26.60%	6.50%
48	Comprehends and interprets meaning from books and other texts	17.00%	41.70%	31.20%	10.10%
49	Understands the purpose of writing	19.80%	39.10%	32.10%	8.90%
50	Writes letters and words	20.90%	31.10%	39.20%	8.80%

Note - n=1590.

Table 3

Percentage of Three Year Old Children in the Norm Sample at each Developmental Level on the Winter Assessment.

Item		Forerunner	Level I	Level II	Level III
1	Shows ability to adjust to new situations	8.30%	34.50%	43.00%	14.20%
2	Demonstrates appropriate trust in adults	8.50%	38.70%	43.60%	9.30%
3	Recognizes own feelings and manages them appropriately	28.20%	43.00%	23.30%	5.40%
4	Stands up for rights	16.80%	48.90%	30.80%	3.40%
5	Demonstrates self-direction and independence	11.10%	49.70%	31.90%	7.30%
6	Takes responsibility for own well-being	12.80%	47.90%	34.60%	4.70%
7	Respects and cares for classroom environment and materials	14.20%	50.80%	26.80%	8.20%
8	Follows classroom routines	12.90%	50.70%	28.10%	8.40%
9	Follows classroom rules	16.10%	50.50%	26.80%	6.50%
10	Plays well with other children	13.40%	42.90%	33.90%	9.80%
11	Recognizes the feelings of others and responds appropiately	24.10%	49.60%	21.20%	5.00%
12	Shares and respects the rights of others	18.70%	44.70%	31.80%	4.70%
13	Uses thinking skills to resolve conflicts	29.20%	51.50%	17.40%	1.90%
14	Demonstrates basic locomotor skills (running, jumping, hopping, galloping)	8.00%	35.30%	43.00%	13.80%
15	Shows balance while moving	8.90%	41.00%	38.30%	11.90%
16	Climbs up and down	6.40%	29.40%	38.20%	26.00%
17	Pedals and steers a tricycle (or other wheeled vehicle)	20.30%	41.00%	26.60%	12.10%
18	Demonstrates throwing, kicking, and catching skills	15.10%	53.50%	25.50%	5.90%
19	Controls small muscles in hands	10.90%	40.30%	40.60%	8.30%
20	Coordinates eye-hand movement	8.00%	43.80%	39.30%	9.00%
21	Uses tools for writing and drawing	18.40%	48.30%	27.00%	6.30%
22	Observes objects and events with curiosity	26.90%	44.60%	24.80%	3.70%
23	Approaches problems flexibly	25.70%	54.40%	18.00%	1.90%
24	Shows persistence in approaching tasks	18.40%	51.10%	29.00%	1.60%
25	Explores cause and effect	34.10%	50.30%	13.80%	1.90%
26	Applies knowledge or experience to a new context	21.20%	58.20%	18.80%	1.90%
27	Classifies objects	25.10%	56.10%	15.60%	3.20%
28	Compares/measures	35.30%	45.60%	17.80%	1.30%
29	Arranges objects in a series	37.10%	46.40%	15.40%	1.10%
30	Recognizes patterns and can repeat them	45.20%	40.30%	13.40%	1.10%
31	Shows awareness of time concepts and sequence	41.70%	42.50%	14.60%	1.10%
32	Shows awareness of position in space	31.00%	47.60%	20.40%	1.10%
33	Uses one-to-one correspondence	21.60%	49.60%	26.70%	2.10%
34	Uses numbers and counting	23.10%	45.40%	26.20%	5.20%
35	Takes on pretend roles and situations	22.40%	47.70%	24.00%	5.90%
36	Makes believe with objects	14.30%	54.30%	25.20%	6.20%
37	Makes and interprets representations	28.20%	48.70%	18.90%	4.30%
38	Hears and discriminates the sounds of language	25.80%	55.60%	15.70%	2.90%
39	Expresses self using words and expanded sentences	17.00%	40.70%	34.20%	8.10%
40	Understands and follows oral directions	9.10%	45.60%	36.50%	8.80%
41	Answers questions	16.70%	46.90%	28.40%	8.00%
42	Asks questions	21.00%	47.30%	26.30%	5.40%
43	Actively participates in conversations	22.50%	47.50%	22.00%	8.00%
44	Enjoys values reading	19.70%	48.00%	26.70%	5.60%
45	Demonstrates understanding of print concepts	38.60%	46.40%	12.90%	2.10%
46	Demonstrates knowledge of the alphabet	48.40%	37.90%	11.60%	2.20%
47	Uses emerging reading skills to make meaning from print	43.20%	47.00%	8.70%	1.10%
48	Comprehends and interprets meaning from books and other texts	33.20%	53.30%	12.80%	0.80%
49	Understands the purpose of writing	42.00%	46.10%	11.70%	0.30%
50	Writes letters and words	48.90%	39.40%	10.60%	1.10%

Note - n=399.

Table 4

Percentage of Four Year Old Children in the Norm Sample at each Developmental Level on the Winter Assessment.

Item		Forerunner	Level I	Level II	Level III
1	Shows ability to adjust to new situations	1.40%	17.60%	44.30%	36.60%
2	Demonstrates appropriate trust in adults	1.50%	23.30%	47.80%	27.40%
3	Recognizes own feelings and manages them appropriately	12.50%	28.80%	40.10%	18.70%
4	Stands up for rights	5.70%	32.40%	45.80%	16.10%
5	Demonstrates self-direction and independence	2.40%	28.60%	48.80%	20.10%
6	Takes responsibility for own well-being	2.10%	31.00%	44.80%	22.10%
7	Respects and cares for classroom environment and materials	3.40%	31.40%	42.80%	22.40%
8	Follows classroom routines	3.10%	30.40%	41.40%	25.20%
9	Follows classroom rules	4.30%	33.40%	41.00%	21.30%
10	Plays well with other children	4.10%	22.40%	43.50%	30.00%
11	Recognizes the feelings of others and responds appropiately	6.80%	36.10%	34.90%	22.10%
12	Shares and respects the rights of others	4.40%	29.80%	47.10%	18.60%
13	Uses thinking skills to resolve conflicts	10.50%	39.20%	38.60%	11.80%
14	Demonstrates basic locomotor skills (running, jumping, hopping, galloping)	0.80%	15.30%	44.70%	39.10%
15	Shows balance while moving	1.40%	19.70%	48.00%	31.00%
16	Climbs up and down	0.40%	9.70%	35.20%	54.80%
17	Pedals and steers a tricycle (or other wheeled vehicle)	5.50%	18.80%	36.50%	39.20%
18	Demonstrates throwing, kicking, and catching skills	4.00%	26.90%	47.90%	21.30%
19	Controls small muscles in hands	1.80%	20.10%	48.80%	29.40%
20	Coordinates eye-hand movement	1.60%	19.00%	43.90%	35.60%
21	Uses tools for writing and drawing	3.70%	22.60%	41.80%	31.90%
22	Observes objects and events with curiosity	7.70%	30.50%	47.50%	14.40%
23	Approaches problems flexibly	9.00%	37.60%	41.60%	11.90%
24	Shows persistence in approaching tasks	5.60%	31.60%	50.40%	12.40%
25	Explores cause and effect	11.30%	40.70%	38.60%	9.40%
26	Applies knowledge or experience to a new context	6.50%	34.80%	45.50%	13.20%
27	Classifies objects	6.00%	39.40%	41.70%	12.90%
28	Compares/measures	11.70%	32.70%	46.20%	9.40%
29	Arranges objects in a series	14.70%	35.70%	38.50%	11.10%
30	Recognizes patterns and can repeat them	16.90%	37.00%	35.10%	11.00%
31	Shows awareness of time concepts and sequence	13.50%	31.70%	41.00%	13.80%
32	Shows awareness of position in space	6.10%	30.10%	51.50%	12.30%
33	Uses one-to-one correspondence	6.00%	28.60%	50.70%	14.70%
34	Uses numbers and counting	4.10%	23.70%	47.80%	24.40%
35	Takes on pretend roles and situations	7.10%	27.00%	40.30%	25.60%
36	Makes believe with objects	4.30%	29.20%	41.20%	25.30%
37	Makes and interprets representations	8.00%	30.40%	44.50%	17.10%
38	Hears and discriminates the sounds of language	10.90%	38.30%	38.40%	12.50%
39	Expresses self using words and expanded sentences	4.70%	20.20%	47.20%	27.90%
40	Understands and follows oral directions	1.30%	18.70%	46.70%	33.30%
41	Answers questions	3.20%	25.20%	44.30%	27.30%
42	Asks questions	6.60%	29.20%	43.70%	20.60%
43	Actively participates in conversations	5.90%	27.80%	38.00%	28.30%
44	Enjoys values reading	4.70%	29.30%	46.60%	19.40%
45	Demonstrates understanding of print concepts	10.10%	39.80%	37.70%	12.30%
46	Demonstrates knowledge of the alphabet	17.70%	36.10%	35.80%	10.40%
47	Uses emerging reading skills to make meaning from print	14.40%	48.90%	29.90%	6.80%
48	Comprehends and interprets meaning from books and other texts	12.60%	40.60%	36.10%	10.80%
49	Understands the purpose of writing	13.10%	39.60%	37.40%	9.90%
50	Writes letters and words	12.80%	32.80%	45.50%	8.90%

Note - n=887.

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Table 5

Percentage of Five Year Old Children in the Norm Sample at each Developmental Level on the Winter Assessment.

Item		Forerunner	Level I	Level II	Level III
1	Shows ability to adjust to new situations	2.40%	11.30%	36.30%	50.00%
2	Demonstrates appropriate trust in adults	3.40%	14.50%	49.70%	32.40%
3	Recognizes own feelings and manages them appropriately	9.70%	16.60%	46.20%	27.60%
4	Stands up for rights	6.00%	21.00%	54.80%	18.10%
5	Demonstrates self-direction and independence	3.80%	16.20%	47.10%	33.00%
6	Takes responsibility for own well-being	3.40%	15.50%	51.40%	29.70%
7	Respects and cares for classroom environment and materials	4.10%	18.20%	41.90%	35.70%
8	Follows classroom routines	4.50%	20.50%	38.90%	36.10%
9	Follows classroom rules	5.90%	23.10%	38.80%	32.20%
10	Plays well with other children	4.50%	13.40%	40.90%	41.20%
11	Recognizes the feelings of others and responds appropiately	7.90%	22.90%	38.60%	30.70%
12	Shares and respects the rights of others	4.20%	17.70%	51.60%	26.50%
13	Uses thinking skills to resolve conflicts	7.50%	26.80%	53.20%	12.50%
14	Demonstrates basic locomotor skills (running, jumping, hopping, galloping)	1.40%	8.10%	36.80%	53.70%
15	Shows balance while moving	2.20%	8.20%	43.70%	45.90%
16	Climbs up and down	0.70%	4.60%	25.10%	69.60%
17	Pedals and steers a tricycle (or other wheeled vehicle)	7.00%	10.40%	26.70%	55.90%
18	Demonstrates throwing, kicking, and catching skills	1.80%	16.90%	45.00%	36.30%
19	Controls small muscles in hands	3.20%	8.10%	34.30%	54.40%
20	Coordinates eye-hand movement	2.80%	8.80%	33.80%	54.60%
21	Uses tools for writing and drawing	4.90%	8.00%	34.60%	52.40%
22	Observes objects and events with curiosity	8.70%	19.10%	49.80%	22.40%
23	Approaches problems flexibly	6.30%	25.80%	49.40%	18.50%
24	Shows persistence in approaching tasks	6.10%	16.40%	57.10%	20.40%
25	Explores cause and effect	9.60%	26.10%	52.10%	12.10%
26	Applies knowledge or experience to a new context	6.20%	25.40%	47.50%	21.00%
27	Classifies objects	3.60%	23.80%	49.80%	22.80%
28	Compares/measures	9.70%	16.70%	56.50%	17.10%
29	Arranges objects in a series	8.60%	26.50%	47.40%	17.50%
30	Recognizes patterns and can repeat them	9.40%	28.30%	45.70%	16.70%
31	Shows awareness of time concepts and sequence	9.20%	19.90%	43.50%	27.30%
32	Shows awareness of position in space	6.50%	16.90%	53.20%	23.40%
33	Uses one-to-one correspondence	2.60%	15.20%	49.40%	32.70%
34	Uses numbers and counting	3.60%	8.00%	37.70%	50.70%
35	Takes on pretend roles and situations	4.70%	19.90%	38.00%	37.30%
36	Makes believe with objects	4.40%	15.70%	39.10%	40.90%
37	Makes and interprets representations	5.00%	14.70%	51.40%	28.80%
38	Hears and discriminates the sounds of language	6.70%	32.60%	35.80%	24.80%
39	Expresses self using words and expanded sentences	4.00%	12.60%	36.30%	47.10%
40	Understands and follows oral directions	2.90%	9.70%	37.40%	50.00%
41	Answers questions	2.90%	15.60%	37.10%	44.40%
42	Asks questions	5.50%	19.60%	45.50%	29.50%
43	Actively participates in conversations	8.10%	11.20%	35.80%	44.90%
44	Enjoys values reading	4.60%	16.00%	52.70%	26.70%
45	Demonstrates understanding of print concepts	7.70%	27.60%	44.50%	20.20%
46	Demonstrates knowledge of the alphabet	10.20%	24.70%	40.60%	24.40%
47	Uses emerging reading skills to make meaning from print	9.60%	35.80%	41.30%	13.30%
48	Comprehends and interprets meaning from books and other texts	7.60%	28.50%	42.60%	21.30%
49	Understands the purpose of writing	8.80%	28.30%	44.90%	18.00%
50	Writes letters and words	6.90%	15.20%	59.20%	18.80%

Note - n=304.

Table 6

Factor Loadings for the Developmental Continuum Items.

Item		Social	Physical	Cognitive	Expressive Language
1	Shows ability to adjust to new situations	0.537			
2	Demonstrates appropriate trust in adults	0.511			
3	Recognizes own feelings and manages them appropriately	0.520			
4	Stands up for rights	0.587			
5	Demonstrates self-direction and independence	0.535			
6	Takes responsibility for own well-being	0.714			
7	Respects and cares for classroom environment and materials	0.806			
8	Follows classroom routines	0.908			
9	Follows classroom rules	0.978			
10	Plays well with other children	0.657			
11	Recognizes the feelings of others and responds appropiately	0.591			
12	Shares and respects the rights of others	0.751			
13	Uses thinking skills to resolve conflicts	0.639			
14	Demonstrates basic locomotor skills (running, jumping, hopping, galloping)		0.733		
15	Shows balance while moving		0.770		
16	Climbs up and down		0.845		
17	Pedals and steers a tricycle (or other wheeled vehicle)		0.571		
18	Demonstrates throwing, kicking, and catching skills		0.590		
19	Controls small muscles in hands		0.576		
20	Coordinates eye-hand movement		0.581		
22	Observes objects and events with curiosity			0.548	
23	Approaches problems flexibly			0.489	
25	Explores cause and effect			0.605	
26	Applies knowledge or experience to a new context			0.525	
27	Classifies objects			0.700	
28	Compares/measures			0.667	
29	Arranges objects in a series			0.800	
30	Recognizes patterns and can repeat them			0.840	
31	Shows awareness of time concepts and sequence			0.605	
32	Shows awareness of position in space			0.518	
33	Uses one-to-one correspondence			0.605	
34	Uses numbers and counting			0.569	
35	Takes on pretend roles and situations			0.417	
36	Makes believe with objects			0.418	
37	Makes and interprets representations			0.524	
38	Hears and discriminates the sounds of language			0.582	
39	Expresses self using words and expanded sentences				-0.576
41	Answers questions				-0.586
42	Asks questions				-0.585
43	Actively participates in conversations				-0.601
44	Enjoys values reading			0.447	
45	Demonstrates understanding of print concepts			0.780	
46	Demonstrates knowledge of the alphabet			0.906	
47	Uses emerging reading skills to make meaning from print			0.847	
48	Comprehends and interprets meaning from books and other texts			0.740	
49	Understands the purpose of writing			0.806	
50	Writes letters and words			0.792	

Note - n=1590. Only factor loadings greater than .4 are displayed.

Table 7
Properties of the Distribution of the Factor and Sub-Scale Scores.

Factors	Mean	SD	Min	Percentiles 25th	50th	75th	Max	Number of Items	Alpha
Social	2.7364	0.71248	1.00	2.2308	2.7692	3.2308	4.00	13	0.963
Physical	3.0234	0.71091	1.00	2.5714	3.0000	3.5714	4.00	7	0.926
Cognitive	2.4741	0.73530	1.00	1.9565	2.4783	3.0000	4.00	23	0.979
Expressive Language	2.7833	0.84815	1.00	2.0000	3.0000	3.5000	4.00	4	0.947
Sub-scale									
Emergent Literacy	2.3727	0.76514	1.00	1.8750	2.3750	3.0000	4.00	8	0.950

Note. n=1590.

Table 8
Correlations between factor scores.

Factor or Sub-scale	*Social Development*	*Physical Development*	*Cognitive Development*	*Expressive Language*
Physical Development	0.753			
Cognitive Development	0.841	0.758		
Expressive Language	0.769	0.683	0.834	
Emergent Literacy	0.774	0.686	0.946	0.793

Note. *p* <.001 for all coefficients.