

EARLY LEARNING QUICK ASSESSMENT KINDERGARTEN (ELQA-K) LITERACY



Technical Manual

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Section 1: Background and Overview

ELQA History and Development

From 2001 to 2009, The University of Oklahoma (OU) received four federal Early Reading First grants to 1) enhance teacher effectiveness by providing high-quality, meaningful, and intentional professional development, including instructional coaching; 2) create centers of educational excellence; 3) improve child outcomes by preparing young children to enter kindergarten with the necessary language and literacy skills for school success; and 4) close achievement gaps. Through the duration of the grants, approximately 3,200 children and 600 teachers/childcare providers participated in Early Reading First activities.

The Center for Early Childhood Professional Development (CECPD) and the Educational Training, Evaluation, Assessment, and Measurement (E-TEAM) departments at OU developed the first iteration of the Early Learning Quick Assessment (ELQA) in 2003 for teachers participating in the Starting Right Early Reading First grant. The original paper-and-pencil assessment was implemented in hundreds of classrooms in Head Start programs, private childcare centers, and public preschools across Oklahoma. Initially, instructional coaches in the programs administered the ELQA to students to model the process for teachers. Then as the teachers gained experience with the ELQA, they took over administration of the ELQA to do progress monitoring of children in their classrooms. The formative progress monitoring data became part of each child's assessment portfolio, which was integrated with children's work samples to provide a broader picture of each child's progress. More precision in classroom instruction was achieved by implementing regular progress monitoring and differentiating instruction to meet the individual needs of each student. Teachers began using the ELQA data to determine when more intense or targeted instruction was needed to help a child move forward (The University of Oklahoma, 2009).

Toward the end of the Starting Right Early Reading First grant, the hard copy ELQA assessment tool was used as a starting point to build a software program to assist teachers in assessing and using the results to differentiate their instruction. The ELQA software was developed during the 2009–2010 school year, and version one of the ELQA web application was launched in August 2014. Version two of the ELQA web application, developed in conjunction with the OU Outreach CCE-IT, was released in August 2018.

During 2022–23, the Early Childhood Education Institute (ECEI) at OU-Tulsa was contracted by CECPD to collaborate on studies to examine the psychometric properties of the ELQA-K Literacy. The results obtained by the ECEI are summarized in this Manual.

About the ECEI

The ECEI is an applied research group on the University of Oklahoma–Tulsa campus. We are focused on early childhood, specifically research on young children from birth to age 8 and the teachers who care for and teach them in group settings. Our team of researchers and data collectors specialize in longitudinal studies, understanding early childhood workforce characteristics, and piloting measures and data strategies to examine early childhood practice leading to improved child outcomes. We work in partnership with community agencies and researchers from affiliated fields to infuse multiple and interdisciplinary perspectives. We are focused on equity in early childhood and are dedicated to increasing equity through our research. Early Childhood Equity means that all children have opportunities to realize their developmental potential. In our applied research, we aim to document and understand four mechanisms underlying inequity in early childhood: prevention of adverse childhood experiences (ACES); buffering of consequences resulting from experienced adversity; promotion of opportunities that support resilience, growth, and healthy development; and reducing the presence of inequitable educational experiences.

ELQA Kindergarten Literacy

The ELQA Kindergarten (ELQA-K) Literacy is a screening and progress monitoring tool for early literacy skills. The ELQA-K consists of 13 subtests measuring different literacy skills that align with the Oklahoma Academic Standards for Kindergarten Reading Foundational Skills: Phonological Awareness, Print Concepts, Phonics and Word Study, Fluency, Vocabulary, and Comprehension. The 13 subtests are:

- **Alliteration**
 - Ten items that measure the child's ability to isolate and pronounce the same initial sounds in a set of spoken words (e.g., pokey puppy pounces)
- **Comprehension**
 - Eight items that measure the child's ability to retell major events from a read-aloud, recognize the main idea, discriminate between fiction and nonfiction, and answer basic questions (e.g., who, what, where, and when)
- **Expressive Vocabulary**
 - Twenty items that measure the child's oral vocabulary
- **Fluency**
 - Ten items that measure the child's ability to read their first and last name and common high frequency grade-level words by sight (e.g., was, you, she)
- **Letter Sounds**
 - Twenty-six items that measure the child's knowledge of letter sounds
- **Lowercase Alphabet**
 - Twenty-six items that measure the child's knowledge of the lowercase letter names
- **Phoneme Blending and Segmenting**
 - Ten items that measure the child's ability to blend and segment phonemes
- **Phoneme Deletion and Substitution**
 - Ten items that measure the child's ability to delete and substitute phonemes
- **Phonics**
 - Ten items that measure the child's ability to blend letter sounds to decode simple vowel/consonant words (e.g., at, in, up) and consonant/vowel/consonant words (e.g., pat, hen, lot)
- **Print Concepts**
 - Eleven items that measure the child's knowledge of pre-reading skills (e.g., parts of a book, difference between letters and words, which direction to read)
- **Rhyming**
 - Ten items assessing the child's ability to recognize and produce rhyming words
- **Syllable Segmentation**
 - Ten items that measure the child's ability to pronounce, segment, and delete syllables in spoken words
- **Uppercase Alphabet**
 - Twenty-six items that measure the child's knowledge of the uppercase letter names

Section 2: Administration and Scoring

The ELQA–K, including the Literacy assessment, is administered one-on-one to students, usually by the classroom teacher, using a computer, laptop, or tablet. Assessment administrators should ensure all learners are provided with the basic accommodations to which they are entitled during instruction and testing: comfortable seating/ventilation, adequate lighting, and minimized distraction. ELQA–K is designed to be administered three, four, or five times per school year. Collecting data multiple times throughout the year helps address the variability in children’s development and provides a clear picture of the child’s abilities and growth over time.

Prior to each task, a screen appears that provides assessors with information regarding materials required for that task and task instructions. Practice items for sub-assessments allow students the opportunity to understand what they will be doing before the assessment begins. Assessors are provided with the exact wording they should use to ask the questions in the assessment. Though many students complete the entire assessment in approximately 30 minutes, the amount of time required to administer the assessment may vary, and there is no time limit.

ELQA–K Reports

All versions of the ELQA–K, including the Literacy assessment, generate reports at the individual, classroom, school, and organization levels. Individual student reports, available in English and Spanish, help teachers determine instructional goals and plan instruction, facilitate transitions from one classroom to another, and aid parent–teacher conferences. The classroom reports illustrate class progression, provide recommended flexible groupings according to the ELQA–K scores, provide information on what proportion of the class has mastered each item on a specific assessment, and graphically display class performance compared to target scores for each assessment period. The ELQA–K classroom reports can help teachers determine the instructional focus for whole group instruction, create small groups, and plan individualized learning experiences to meet each child’s instructional needs. The school and organization level reports provide essential information that can be used by administrators for planning as part of a broader assessment system. The ELQA–K Literacy additionally uses empirical cut-scores and standard scores to help inform teachers if a referral or additional help is necessary.

Section 3: Overview of Psychometric Studies

During 2022–23, the ECEI collected data and conducted analyses to estimate various psychometric properties of the ELQA–K Literacy. Specifically, the following psychometric properties were investigated:

- Reliability
 - Test–Retest
 - Inter–Rater
 - Both of these types of reliability were based on analyses conducted on Sample 1
- Validity
 - Content Validity
 - Four expert reviewers critiqued the comprehensiveness and scope of the ELQA–K Literacy
 - Construct Validity
 - Based on analyses conducted on Sample 2: Subsample A
 - Discrimination and Predictive Validity
 - Based on analyses conducted on Sample 2: Subsample B
 - Concurrent Validity
 - Based on analyses conducted on Sample 3

The following sections of this Manual address each of these topics and provide details about the samples and analyses.

Section 4: Reliability

Reliability is an assessment's ability to produce consistent results (AERA, APA, & NCME, 2014; NRC, 2008). Two common methods to determine reliability include:

- Test-Retest Reliability – the consistency of scores attained by an individual on repeated administrations of the assessment; when the same test is administered to the same individual or group more than once and the test results are compared
- Inter-Rater Reliability – the consistency with which different raters score the same responses; when the test results produced by two independent raters or scorers are compared

Test-Retest Reliability

In a study of 115 OK kindergarten students from two sites (see Sample 1), the ELQA-K Literacy demonstrated a **high level of test-retest reliability at $r = .97$** . Values above .90 are considered to have great reliability (Cicchetti, 1994).

Children were assessed individually in fall 2022 by trained research staff on all 13 subtests of the ELQA-K Literacy. Children were then assessed a second time 10–14 days later to examine the reliability with a Pearson correlation. Results, means, and standard deviations for each subtest at each time point are in the table below.

Subtest Name	Test-Retest Reliability Coefficient	Time 1		Time 2	
		Mean	SD	Mean	SD
Alliteration	.87	5.75	4.17	5.85	4.19
Comprehension	.96	6.30	1.87	6.78	2.18
Expressive Vocab	.98	10.84	3.93	11.39	4.31
Fluency	.98	2.10	2.29	2.36	2.45
Letter Sounds	.95	17.65	8.03	18.68	7.81
Lowercase Alphabet	.96	20.35	6.26	20.66	6.92
Phoneme Blending	.93	3.01	3.10	3.46	3.08
Phoneme Deletion	.92	4.69	3.70	5.13	3.79
Phonics	.70	1.95	2.98	2.36	3.25
Print Concepts	.94	5.78	2.60	6.75	2.49
Rhyming	.99	7.43	2.65	8.24	2.66
Syllable Segmentation	.92	6.81	3.04	7.50	3.03
Uppercase Alphabet	.87	22.13	6.09	22.51	5.91

The average test-retest reliability across the subtests is .97. The table provides means and SDs at Time 1(pretest) and Time 2(posttest) for each subtest.

Inter-Rater Reliability

The ELQA K Literacy demonstrated **strong inter-rater reliability**, with **overall accuracy at 98% and a Cohen's Kappa coefficient = .959**. Cohen's Kappa above .90 are said to have "almost perfect" agreement (McHugh, 2012).

Inter-rater reliability was established with a subset of 55 children from four classrooms at Site A of Sample 1. For each child, a trained research staff member administered the ELQA-K Literacy and recorded the answers privately as another trained staff member observed and independently scored the test. Accuracy and Cohen's Kappa were calculated using Classical Test Theory reliability analysis.

The frequency table below shows the number of times that Rater 1 judged an observation as correct or incorrect and Rater 2 judged an observation as correct or incorrect. As shown on the table, the two independent raters typically agreed when independently rating an item as correct or incorrect. A relatively small number of mismatches were demonstrated by the two independent raters when judging items as correct or incorrect. These tabulations demonstrate consistency across independent raters or scorers.

Two independent raters simultaneously scoring items as correct or incorrect		Rater 1	
		Incorrect	Correct
Rater 2	Incorrect	3447	73
	Correct	103	5281

Sample 1: 2022–2023 Sample for Test–Retest and Inter–Rater Reliability (115 OK kindergarteners)

CECPD and ECEI staff conducted ELQA–K assessments in the late fall of 2022 in 2 schools, Site A, a public Oklahoma elementary school and Site B, a private K–12 school.

	Site A (N=80)	Site B (N=35)	Overall (N=115)
Gender			
Female	47 (58.8%)	22 (62.9%)	69 (60.0%)
Male	33 (41.3%)	13 (37.1%)	46 (40.0%)
Race/Ethnicity			
American Indian or Alaskan Native	9 (11.3%)	5 (14.3%)	14 (12.2%)
Black or African American	7 (8.8%)	1 (2.9%)	8 (7.0%)
Hispanic or Latino	0 (0%)	1 (2.9%)	1 (0.9%)
Other	0 (0%)	1 (2.9%)	1 (0.9%)
White	64 (80.0%)	27 (77.1%)	91 (79.1%)
Language			
English	78 (97.5%)	35 (100%)	113 (98.3%)
Spanish	2 (2.5%)	0 (0%)	2 (1.7%)
Age			
Mean (SD)	5.81 (0.336)	5.74 (0.331)	5.79 (0.334)
Median [Min, Max]	5.83 [5.20, 6.77]	5.73 [5.16, 6.38]	5.79 [5.16, 6.77]

Section 5: Validity

Validity is the extent to which an assessment measures what it purports or claims to measure (AERA, APA, & NCME, 2014; NRC, 2008). There are several common methods to estimate validity including:

- **Content Validity** – addresses if the content of an assessment matches what the test is trying to measure; experts judge if an assessment measures all aspects of the construct being assessed, in this case, early literacy at the kindergarten level
- **Construct Validity** – addresses the extent to which an assessment measures the intended construct through statistical analyses
- **Discrimination** – this is also referred as classification accuracy and addresses how well scores on an assessment accurately identify students at risk versus those not at risk
- **Predictive Validity** – addresses if the scores on a test administered at time 1, for example kindergarten, can predict later performance on a test of the same construct (for example at Grade 3)
- **Concurrent Validity** -- addresses if the scores on two tests designed to measure the same construct or content produce similar results when administered at the same time

The following sections of this Manual address each of these types of validity and provide details about the samples, analyses, and results.

Content Validity

Content validity addresses if an assessment measures all aspects of the construct being assessed, in this case, early literacy at the kindergarten level. To produce valid results, the content of a test must cover all relevant aspects or components of the subject matter. If some aspects are missing from the measurement, the content validity is threatened.

Four content areas experts were asked to review the ELQA-K Literacy in the fall of 2022 and comment on the content validity of the assessment. Two of the external reviewers were nationally recognized researchers who specialize in early literacy development and assessment and two were educational leaders in Oklahoma who have used the ELQA-K Literacy in diverse school settings across the state. Brief bios for reviewers are appended below.

The reviewers were asked questions relevant to the content validity of the ELQA-K Literacy. Specifically, they were asked to judge content coverage by addressing the following three questions:

1. Does the ELQA-K Literacy assess the 5 reading areas (phonemic awareness, phonics, reading fluency, vocabulary, and comprehension) required by Oklahoma's Reading Sufficiency Act (RSA)?
2. Does the ELQA-K Literacy align with Oklahoma Academic Standards or national standards for English Language Arts (ELA)?
3. Comment on the scope and comprehensiveness of the ELQA-K Literacy relative to early literacy.

The chart below summarizes the independent responses of the four reviewers. As detailed on the chart, the expert reviewers **were in 100% agreement** that the ELQA-K Literacy assesses the five RSA literacy areas, aligns with Oklahoma standards, and addresses the scope and comprehensiveness of early literacy development.

Does the ELQA-K Literacy assess the areas of:	Expert 1	Expert 2	Expert 3	Expert 4	% agreement across the 4 reviewers	Kappa coefficient
• Phonemic awareness	Yes	Yes	Yes	Yes	100%	1.00
• Phonics	Yes	Yes	Yes	Yes	100%	1.00
• Reading fluency	Yes	Yes	Yes	Yes	100%	1.00
• Vocabulary	Yes	Yes	Yes	Yes	100%	1.00
• Comprehension	Yes	Yes	Yes	Yes	100%	1.00
Align with state standards?	Yes	Yes	Yes	Yes	100%	1.00
Assess the expected scope and comprehensiveness of early literacy development?	Yes	Yes	Yes	Yes	100%	1.00

Listed below are example narrative comments made by the external content reviewers:

Comments by nationally recognized early literacy researchers:	<ul style="list-style-type: none"> The ELQA-K is a comprehensive literacy-focused assessment that should provide substantial literacy related knowledge on the child.
	<ul style="list-style-type: none"> It is clear the design team has taken great care to identify important content for early reading and to generate items that align with State Standards. In addition, the development team has been innovative in the creation of items that elicit the content accurately.
	<ul style="list-style-type: none"> The ELQA-K does align with the expected scope and comprehensiveness of early reading development.
Comments by Oklahoma educational leaders:	<ul style="list-style-type: none"> The ELQA-K assesses what our kindergarten students should know and be able to do at this level to become a literate citizen.
	<ul style="list-style-type: none"> The ELQA-K aligns exactly with what teachers/schools are required to teach by the Oklahoma Academic Standards.
	<ul style="list-style-type: none"> The ELQA-K implementation in my school was a positive experience for teachers and administrators. Teachers were able to quickly administer assessments after students were enrolled. Valuable insight has been gained through the use of this assessment. Our school has been able to use the data from ELQA-K to determine appropriate intervention for students. Parents have also provided positive feedback regarding information that they have received from the assessments.

Reviewer bios

Expert Reviewer 1 is currently a professor of Early Childhood and Elementary Education at a major state university located in the southeastern part of the US. Reviewer #1 has served as a governing board member of the Institute of Education Sciences (IES) Southeast Regional Education Laboratory (REL–Southeast) and as a steering committee member of a state-level research initiative on the challenges of acquiring language and literacy. A central focus of Reviewer 1’s research is designing developmentally appropriate, meaningful, culturally relevant, and intentional literacy experiences for young children who have been historically marginalized and underserved. Foundational to this work is the development, validation, and utilization of literacy assessments that support teachers’ instructional decision making.

Expert Reviewer 2 is currently a professor in the Department of Teaching, Learning, and Culture at a major state university located in the southwest US. Reviewer 2 has extensive expertise in young children’s writing development and the environmental and instructional supports to enhance literacy in early childhood classrooms. Reviewer 2 has led the development of both classroom-level and child-

level measures of early writing and reading including developing elicitation materials and coding systems for early writing and print concepts as well as observational measures of supports for early writing, phonological awareness, print concepts and alphabet knowledge. Reviewer 2 is currently funded by the U.S. Department of Education's Institute of Education Sciences (IES) to enhance and validate these measures.

Expert Reviewer 3 has been working in the areas of early childhood and literacy for over 42 years, has a Bachelor of Science in Elementary Education, Masters in Elementary Education, Early Childhood Certificate, is an Academic Language Therapist, and facilitates literacy workshops for teachers, parents, and administrators in Oklahoma and across the nation. Reviewer 3 has used the ELQA as an educator and as an instructional leader in four different school districts, including inner city metro schools with very diverse populations, suburban schools with less diverse populations, rural schools, and a charter school with 98% Hispanic population.

Expert Reviewer 4 is a National Board-Certified Teacher and currently serves as an elementary school principal in a district with a high population of special education and English Language Learner students. Reviewer 4 has a Bachelor of Science in Education (Early Childhood and Elementary Education), Master of Education (Elementary Principal), is certified as a DIBELS trainer, manages literacy data collection at her site, and uses the data from ELQA to plan literacy groups for a schoolwide intervention program.

Construct Validity

Construct validity addresses the extent to which an assessment measures the intended construct. The construct validity of the ELQA-K Literacy was demonstrated using factor analysis.

A Second Order Confirmatory Factor Analysis (CFA) confirmed that each item in each subtest was significantly related to the subtest construct (e.g., Phonics question 1, Phonics question 2 are related to Phonics), **all at $p < 0.01$** (see Appendix 1). Appendix 1, Table 1, shows that each item is significantly related, and Betas (standardized) can be interpreted as item correlations with the construct. Additionally, each subtest was significantly related to a single 2nd Order Factor (i.e., Literacy skill; **each at $p < 0.01$**) and had good model fit criteria (**$CFI = .993$, $TLI = .993$, $RMSEA = .030$, $SRMR = .079$**). Again, the Beta column can be considered as construct correlations with the overall construct. These indicate that the ELQA-K Literacy has strong construct validity. The CFA was completed with full item and subtest ELQA-K Literacy data from 1226 Oklahoma kindergartners from the middle of school year 2017 (Sample 2: Subsample A).

Sample 2: 2017–2022 Sample for Construct Validity; Discrimination and Predictive Validity (1,800 OK Kindergarteners)

Both samples were drawn from a larger sample of 1,800 Oklahoma kindergarteners collected by CECPD. CECPD collected ELQA–K subtest scores for these children in their kindergarten year (2017) and later requested their 3rd grade (2022) Oklahoma State Testing Program–English Language Arts score, as well as if they had been flagged for the Reading Sufficiency Act. ECEI cleaned and merged the data to create two analytical datasets to conduct construct validity and predictive validity.

For construct validity, all children that had any complete subtest of ELQA–K Literacy scores at the third time point were used for the Confirmatory Factor Analysis as Full Information Maximum Likelihood was used for estimation. Demographic variables were missing from 83 students in this analysis. This resulted in a total sample of 1226 Oklahoma kindergarteners through 3rd grade and can be seen in Sample 2: Subsample A.

For Discrimination and Predictive Validity of the ELQA–K Literacy, a smaller subset of 729 students were used due to missing any subtest on the third time point ELQA–K Literacy or having missing demographics or variables of interest (OSTP ELA). Then, multivariate outliers were detected and removed that had Cook's Distances greater than $4/n$. This sample can be seen in Sample 2: Subsample B.

Sample 2: Subsample A for Construct Validity (1226 Oklahoma kindergarteners in 2017 through 3rd grade in 2022)

	Overall (N=1226)
Gender	
Female	525 (42.8%)
Male	618 (50.4%)
Missing	83 (6.8%)
Race/Ethnicity	
American Indian	137 (11.2%)
Asian	11 (0.9%)
Black	29 (2.4%)
Hispanic/Latino	147 (12.0%)
Pacific Islander	3 (0.2%)
Two or more	108 (8.8%)
White	708 (57.7%)
Missing	83 (6.8%)
English Language Learner	
No	1060 (86.5%)
Yes	83 (6.8%)
Missing	83 (6.8%)
Economically Disadvantaged	
No	544 (44.4%)
Yes	599 (48.9%)
Missing	83 (6.8%)
IEP	
No	904 (73.7%)
Yes	239 (19.5%)
Missing	83 (6.8%)
RSA Flag	
Yes	288 (23.5%)
No	855 (69.7%)
Missing	83 (6.8%)
2021–2022 OSTP ELA Scale Score	
Mean (SD)	284 (30.0)
Median [Min, Max]	287 [204, 378]

Discrimination and Predictive Validity

The ELQA-K Literacy identifies students who are at risk of reading failure by 3rd grade by employing an empirical cut score and has **great discrimination** (AUC = .908; Hosmer, Lemeshow, & Sturdivant, 2013). The ELQA-K Literacy with this cut-off has **Sensitivity at 80.56%** and **Specificity at 81.37%**. The empirical cut-off scores were derived from a longitudinal study of 729 Oklahoma students from kindergarten (2017) to 3rd grade and their mid-year (time 3) ELQA-K Literacy score and Reading Sufficiency Act Status in 2021 (Sample 2: Subsample B). This analysis was conducted in early 2023 using data acquired from the Oklahoma State Department of Education (OSDE).

Predictive validity for the ELQA-K Literacy is good, with a **Positive Predictive Value of .78** and a **Negative Predictive Value of .84**. These values indicate that the ELQA-K Literacy performs strongly in accurately identifying students who are at risk of reading deficiency in 3rd grade while also not categorizing students at risk when they are likely to be reading on grade level by 3rd grade.

The predictive validity values are provided from the longitudinal sample of 729 Oklahoma kindergarteners. Predictive validity calculations used an estimate of 45% (the average of 2020 2nd and 3rd grader risk) for the percentage of 2021 3rd graders flagged as at-risk by the Reading Sufficiency Act based on historical data of students at risk (OSDE-Reading Sufficiency Act Study, 2020, Table 2).

Sample 2: Subsample B for Discrimination and Predictive Validity (longitudinal sample of 729 Oklahoma kindergarteners 2017 through 3rd grade 2022)

	Flagged for RSA (N=144)	Not Flagged for RSA (N=585)	Overall (N=729)
Gender			
Female	57 (39.6%)	289 (49.4%)	346 (47.5%)
Male	87 (60.4%)	296 (50.6%)	383 (52.5%)
Race/Ethnicity			
American Indian	20 (13.9%)	68 (11.6%)	88 (12.1%)
Asian	1 (0.7%)	9 (1.5%)	10 (1.4%)
Black	5 (3.5%)	12 (2.1%)	17 (2.3%)
Hispanic/Latino	32 (22.2%)	58 (9.9%)	90 (12.3%)
Pacific Islander	1 (0.7%)	2 (0.3%)	3 (0.4%)
Two or more	12 (8.3%)	55 (9.4%)	67 (9.2%)
White	73 (50.7%)	381 (65.1%)	454 (62.3%)
ELL			
No	119 (82.6%)	559 (95.6%)	678 (93.0%)
Yes	25 (17.4%)	26 (4.4%)	51 (7.0%)
Economically Disadvantaged			
No	44 (30.6%)	318 (54.4%)	362 (49.7%)
Yes	100 (69.4%)	267 (45.6%)	367 (50.3%)
IEP			
No	65 (45.1%)	518 (88.5%)	583 (80.0%)
Yes	79 (54.9%)	67 (11.5%)	146 (20.0%)
2021-2022 OSTP ELA Scale Score			
Mean (SD)	243 (18.9)	297 (20.2)	286 (29.5)
Median [Min, Max]	246 [205, 279]	297 [260, 378]	289 [205, 378]

Concurrent Validity

To confirm the concurrent validity of ELQA-K Literacy, we tested correlation between ELQA-K and NWEA MAP (NorthWest Evaluation Association, Measure of Academic Progress) scores from the same children across academic year 2021-2022 (Sample 3). Children who were assessed on both ELQA-K and NWEA MAP in 2021-2022 were included as the final sample for analysis. Before conducting correlation analysis, ELQA raw scores were converted to percentage scores.

Because each subscale has different numbers of items, a raw score of a subscale which has more items can be overweighted in the total score. Thus, percent corrected scores were created for all 13 subscales and averaged the scores to reflect children's overall skills across the multiple aspects of literacy.

Spearman correlations between the ELQA-K percent correct score and NWEA MAP RIT score for each time point (beginning of year (BOY), middle of year (MOY), and end of year (EOY)) were done with the Sample 3 data. The results demonstrate strong concurrent validity and are shown below.

Concurrent Validity	P1 & BOY	P3 & MOY	P5 & EOY
ELQA-K & NWEA MAP	.723 (n = 137)	.750 (n = 143)	.705 (n = 202)

CECPD conducted ELQA-K assessments in the academic year, 2021-2022 and provided 5 time-period ELQA-K literacy data to ECEI. In addition, CECPD provided NWEA MAP data including three-time points (BOY, MOY, and EOY). ECEI selected children who completed all subsets of ELQA-K in the first, third, and fifth time periods and matched them with NWEA MAP data. In other words, we selected children who completed both ELQA-K and NWEA MAP at three-time points across the year. Thus, ECEI can compare the literacy skills measured by two different tools at the same time for each child. In addition, we deleted outliers (P1: 6, P3: 6, and P5: 10) given the Cook's test in each time point. The total sample is 208 kindergarteners but at each time point, we had slightly different numbers who completed both assessments.

Sample 3: 2021–2022 Sample for Concurrent Validity (208 OK kindergarteners)

	Site A (N=85)	Site B (N=57)	Site C (N=66)	Overall (N=208)
Gender				
Female	41 (48.2%)	35 (61.4%)	37 (56.1%)	113 (54.3%)
Male	44 (51.8%)	22 (38.6%)	29 (43.9%)	95 (45.7%)
Race/Ethnicity				
American Indian or Alaskan Native	1 (1.2%)	(0%)	1 (1.5%)	2 (1.0%)
Hispanic or Latino	82 (96.5%)	55 (96.5%)	61 (92.4%)	108 (95.2%)
White	2 (2.4%)	1 (1.8%)	4 (6%)	7 (3.4%)
Missing		1 (1.8%)		1 (.5%)
Language				
English	36 (42.4%)	23 (40.4%)	28 (42.4%)	87 (41.8%)
Spanish	38 (44.7%)	15 (26.3%)	37 (45.1%)	90 (43.3%)
Missing	11 (12.9)	19 (33.3%)	1 (1.5%)	31 (14.9)
Age (month)				
Mean (SD)	73 (3.5)	74 (3.9)	74 (3.7)	73. (3.7)
Median [Min, Max]	73 (68 – 81)	74 (68 – 84)	74 (68 – 84)	74 (68 – 84)

Section 6. Summary and Conclusions

The Early Learning Quick Assessment – Kindergarten Literacy is a screening and progress monitoring tool for early literacy skills. The ELQA-K consists of 13 subtests measuring different literacy skills that align with the Oklahoma Academic Standards for Kindergarten Reading Foundational Skills and the five areas required by Oklahoma’s Reading Sufficiency Act (RSA).

Based on the psychometric analyses completed by the ECEI in 2022–23 and reported in this Technical Manual, the ELQA-K Literacy displays good reliability and validity. It is a sensitive and accurate screening tool with good discrimination for identifying students in kindergarten who may need additional assistance with literacy or reading skill development. Further, it has good content validity, as judged by experts, and has good social validity, judged as easy to use for teachers and practitioners.

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Appendix A

Factor Loadings for Individual Items on Each Subtest and Each Subtest on Literacy Skill

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Print Concepts	Print Concepts 1	1.000	0.000	NA	NA	0.623
Print Concepts	Print Concepts 2	1.156	0.112	10.296	0.000	0.720
Print Concepts	Print Concepts 3	1.458	0.138	10.596	0.000	0.908
Print Concepts	Print Concepts 4	1.311	0.121	10.832	0.000	0.817
Print Concepts	Print Concepts 5	1.259	0.117	10.789	0.000	0.785
Print Concepts	Print Concepts 6	1.267	0.120	10.559	0.000	0.789
Print Concepts	Print Concepts 7	1.007	0.107	9.416	0.000	0.627
Print Concepts	Print Concepts 8	0.768	0.091	8.443	0.000	0.479
Print Concepts	Print Concepts 9	1.417	0.141	10.017	0.000	0.883
Print Concepts	Print Concepts 10	1.390	0.145	9.614	0.000	0.866
Expressive Vocab	Expressive Vocab 1	1.000	0.000	NA	NA	0.505
Expressive Vocab	Expressive Vocab 2	0.871	0.125	6.949	0.000	0.440
Expressive Vocab	Expressive Vocab 3	1.040	0.145	7.199	0.000	0.526
Expressive Vocab	Expressive Vocab 4	1.278	0.158	8.082	0.000	0.646
Expressive Vocab	Expressive Vocab 5	0.500	0.115	4.335	0.000	0.253
Expressive Vocab	Expressive Vocab 6	1.182	0.179	6.595	0.000	0.597
Expressive Vocab	Expressive Vocab 7	1.045	0.144	7.235	0.000	0.528
Expressive Vocab	Expressive Vocab 8	0.392	0.118	3.320	0.001	0.198
Expressive Vocab	Expressive Vocab 9	1.221	0.169	7.227	0.000	0.617
Expressive Vocab	Expressive Vocab 10	1.155	0.165	6.980	0.000	0.584
Expressive Vocab	Expressive Vocab 11	0.831	0.118	7.038	0.000	0.420
Expressive Vocab	Expressive Vocab 12	1.539	0.208	7.381	0.000	0.778
Expressive Vocab	Expressive Vocab 13	0.805	0.261	3.085	0.002	0.407
Expressive Vocab	Expressive Vocab 14	1.011	0.159	6.363	0.000	0.511
Expressive Vocab	Expressive Vocab 15	1.041	0.247	4.221	0.000	0.526
Expressive Vocab	Expressive Vocab 16	0.534	0.114	4.695	0.000	0.270
Expressive Vocab	Expressive Vocab 17	1.099	0.155	7.093	0.000	0.556
Expressive Vocab	Expressive Vocab 18	1.121	0.158	7.097	0.000	0.567
Expressive Vocab	Expressive Vocab 19	0.834	0.138	6.050	0.000	0.421
Expressive Vocab	Expressive Vocab 20	1.467	0.156	9.426	0.000	0.741

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Expressive Vocab	Expressive Vocab 21	1.369	0.159	8.614	0.000	0.692
Expressive Vocab	Expressive Vocab 22	1.016	0.181	5.625	0.000	0.513
Expressive Vocab	Expressive Vocab 23	0.763	0.146	5.234	0.000	0.385
Expressive Vocab	Expressive Vocab 24	0.991	0.177	5.605	0.000	0.501
Expressive Vocab	Expressive Vocab 25	0.895	0.142	6.323	0.000	0.452
Uppercase Alphabet	Uppercase Alphabet 1	1.000	0.000	NA	NA	0.927
Uppercase Alphabet	Uppercase Alphabet 2	0.963	0.046	20.912	0.000	0.893
Uppercase Alphabet	Uppercase Alphabet 3	0.946	0.052	18.288	0.000	0.877
Uppercase Alphabet	Uppercase Alphabet 4	0.971	0.047	20.790	0.000	0.900
Uppercase Alphabet	Uppercase Alphabet 5	1.003	0.049	20.539	0.000	0.930
Uppercase Alphabet	Uppercase Alphabet 6	1.023	0.041	24.746	0.000	0.948
Uppercase Alphabet	Uppercase Alphabet 7	0.965	0.046	21.104	0.000	0.895
Uppercase Alphabet	Uppercase Alphabet 8	0.976	0.046	21.052	0.000	0.905
Uppercase Alphabet	Uppercase Alphabet 9	0.967	0.049	19.718	0.000	0.897
Uppercase Alphabet	Uppercase Alphabet 10	0.974	0.045	21.539	0.000	0.903
Uppercase Alphabet	Uppercase Alphabet 11	0.955	0.046	20.925	0.000	0.886
Uppercase Alphabet	Uppercase Alphabet 12	1.035	0.043	24.127	0.000	0.960
Uppercase Alphabet	Uppercase Alphabet 13	0.909	0.043	21.049	0.000	0.843
Uppercase Alphabet	Uppercase Alphabet 14	1.019	0.046	22.315	0.000	0.945
Uppercase Alphabet	Uppercase Alphabet 15	0.960	0.058	16.616	0.000	0.890
Uppercase Alphabet	Uppercase Alphabet 16	1.000	0.040	24.745	0.000	0.927
Uppercase Alphabet	Uppercase Alphabet 17	0.971	0.045	21.728	0.000	0.901
Uppercase Alphabet	Uppercase Alphabet 18	0.998	0.048	20.791	0.000	0.925
Uppercase Alphabet	Uppercase Alphabet 19	0.962	0.053	18.018	0.000	0.893
Uppercase Alphabet	Uppercase Alphabet 20	1.012	0.046	22.071	0.000	0.938
Uppercase Alphabet	Uppercase Alphabet 21	0.974	0.047	20.715	0.000	0.903
Uppercase Alphabet	Uppercase Alphabet 22	0.961	0.044	21.810	0.000	0.891
Uppercase Alphabet	Uppercase Alphabet 23	0.869	0.046	18.768	0.000	0.806
Uppercase Alphabet	Uppercase Alphabet 24	0.632	0.100	6.291	0.000	0.586
Uppercase Alphabet	Uppercase Alphabet 25	0.911	0.043	21.377	0.000	0.845
Uppercase Alphabet	Uppercase Alphabet 26	0.919	0.044	20.884	0.000	0.853
Lowercase Alphabet	Lowercase Alphabet 1	1.000	0.000	NA	NA	0.975
Lowercase Alphabet	Lowercase Alphabet 2	0.675	0.035	19.315	0.000	0.659
Lowercase Alphabet	Lowercase Alphabet 3	0.881	0.035	24.916	0.000	0.859

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Lowercase Alphabet	Lowercase Alphabet 4	0.797	0.031	25.933	0.000	0.777
Lowercase Alphabet	Lowercase Alphabet 5	0.953	0.026	36.958	0.000	0.929
Lowercase Alphabet	Lowercase Alphabet 6	0.961	0.027	35.234	0.000	0.937
Lowercase Alphabet	Lowercase Alphabet 7	0.910	0.026	34.492	0.000	0.887
Lowercase Alphabet	Lowercase Alphabet 8	0.932	0.026	35.779	0.000	0.909
Lowercase Alphabet	Lowercase Alphabet 9	0.860	0.035	24.642	0.000	0.838
Lowercase Alphabet	Lowercase Alphabet 10	0.872	0.029	30.456	0.000	0.850
Lowercase Alphabet	Lowercase Alphabet 11	0.919	0.026	34.698	0.000	0.896
Lowercase Alphabet	Lowercase Alphabet 12	0.804	0.032	25.108	0.000	0.784
Lowercase Alphabet	Lowercase Alphabet 13	0.935	0.030	31.400	0.000	0.911
Lowercase Alphabet	Lowercase Alphabet 14	0.935	0.026	36.368	0.000	0.912
Lowercase Alphabet	Lowercase Alphabet 15	0.909	0.045	19.979	0.000	0.886
Lowercase Alphabet	Lowercase Alphabet 16	0.930	0.029	32.198	0.000	0.907
Lowercase Alphabet	Lowercase Alphabet 17	0.894	0.028	31.676	0.000	0.872
Lowercase Alphabet	Lowercase Alphabet 18	0.937	0.029	31.870	0.000	0.914
Lowercase Alphabet	Lowercase Alphabet 19	0.850	0.038	22.466	0.000	0.829
Lowercase Alphabet	Lowercase Alphabet 20	0.914	0.029	32.038	0.000	0.891
Lowercase Alphabet	Lowercase Alphabet 21	0.900	0.029	31.441	0.000	0.878
Lowercase Alphabet	Lowercase Alphabet 22	0.944	0.024	38.741	0.000	0.921
Lowercase Alphabet	Lowercase Alphabet 23	0.839	0.033	25.636	0.000	0.818
Lowercase Alphabet	Lowercase Alphabet 24	0.751	0.058	12.931	0.000	0.733
Lowercase Alphabet	Lowercase Alphabet 25	0.858	0.031	27.719	0.000	0.837
Lowercase Alphabet	Lowercase Alphabet 26	0.906	0.032	28.210	0.000	0.883
Letter Sounds	Letter Sounds 1	1.000	0.000	NA	NA	0.904
Letter Sounds	Letter Sounds 2	0.735	0.040	18.586	0.000	0.664
Letter Sounds	Letter Sounds 3	1.009	0.033	30.882	0.000	0.911
Letter Sounds	Letter Sounds 4	0.887	0.032	28.056	0.000	0.801
Letter Sounds	Letter Sounds 5	0.840	0.032	26.211	0.000	0.759
Letter Sounds	Letter Sounds 6	1.056	0.030	34.761	0.000	0.954
Letter Sounds	Letter Sounds 7	0.997	0.035	28.800	0.000	0.901
Letter Sounds	Letter Sounds 8	1.017	0.030	34.464	0.000	0.919
Letter Sounds	Letter Sounds 9	0.935	0.031	30.117	0.000	0.844
Letter Sounds	Letter Sounds 10	0.972	0.030	32.887	0.000	0.878
Letter Sounds	Letter Sounds 11	1.035	0.032	31.995	0.000	0.935

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Letter Sounds	Letter Sounds 12	0.919	0.029	31.716	0.000	0.831
Letter Sounds	Letter Sounds 13	0.975	0.035	27.769	0.000	0.881
Letter Sounds	Letter Sounds 14	1.021	0.032	32.313	0.000	0.923
Letter Sounds	Letter Sounds 15	0.971	0.031	31.424	0.000	0.877
Letter Sounds	Letter Sounds 16	1.031	0.033	31.651	0.000	0.931
Letter Sounds	Letter Sounds 17	0.913	0.031	29.756	0.000	0.825
Letter Sounds	Letter Sounds 18	1.013	0.034	30.235	0.000	0.915
Letter Sounds	Letter Sounds 19	0.906	0.054	16.907	0.000	0.818
Letter Sounds	Letter Sounds 20	1.006	0.033	30.060	0.000	0.909
Letter Sounds	Letter Sounds 21	0.818	0.035	23.643	0.000	0.739
Letter Sounds	Letter Sounds 22	1.011	0.032	31.559	0.000	0.913
Letter Sounds	Letter Sounds 23	0.981	0.035	28.218	0.000	0.887
Letter Sounds	Letter Sounds 24	0.810	0.040	20.487	0.000	0.732
Letter Sounds	Letter Sounds 25	0.910	0.033	27.415	0.000	0.822
Letter Sounds	Letter Sounds 26	1.043	0.032	32.280	0.000	0.942
Rhyming	Rhyme 1	1.000	0.000	NA	NA	0.709
Rhyming	Rhyme 2	1.214	0.099	12.224	0.000	0.860
Rhyming	Rhyme 3	0.978	0.093	10.551	0.000	0.693
Rhyming	Rhyme 4	1.305	0.111	11.753	0.000	0.925
Rhyming	Rhyme 5	1.125	0.102	10.998	0.000	0.797
Rhyming	Rhyme 6	1.330	0.102	13.004	0.000	0.943
Rhyming	Rhyme 7	1.285	0.094	13.659	0.000	0.911
Rhyming	Rhyme 8	1.361	0.100	13.581	0.000	0.965
Rhyming	Rhyme 9	1.327	0.099	13.423	0.000	0.941
Rhyming	Rhyme 10	1.231	0.095	12.933	0.000	0.872
Alliteration	Alliteration 1	1.000	0.000	NA	NA	0.940
Alliteration	Alliteration 2	1.022	0.017	60.024	0.000	0.961
Alliteration	Alliteration 3	1.043	0.018	58.881	0.000	0.981
Alliteration	Alliteration 4	1.023	0.018	58.399	0.000	0.962
Alliteration	Alliteration 5	1.053	0.018	59.915	0.000	0.990
Alliteration	Alliteration 6	0.943	0.023	41.438	0.000	0.887
Alliteration	Alliteration 7	1.037	0.018	58.591	0.000	0.975
Alliteration	Alliteration 8	0.843	0.026	32.862	0.000	0.793
Alliteration	Alliteration 9	1.010	0.019	51.898	0.000	0.949

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Alliteration	Alliteration 10	1.029	0.017	59.330	0.000	0.968
Syllable Segmenting	Syllable Segmenting 1	1.000	0.000	NA	NA	0.900
Syllable Segmenting	Syllable Segmenting 2	1.078	0.028	38.400	0.000	0.970
Syllable Segmenting	Syllable Segmenting 3	1.089	0.027	40.104	0.000	0.979
Syllable Segmenting	Syllable Segmenting 4	1.062	0.028	37.530	0.000	0.955
Syllable Segmenting	Syllable Segmenting 5	1.121	0.029	38.742	0.000	1.008
Syllable Segmenting	Syllable Segmenting 6	0.914	0.029	31.189	0.000	0.822
Syllable Segmenting	Syllable Segmenting 7	1.041	0.030	35.052	0.000	0.937
Syllable Segmenting	Syllable Segmenting 8	1.072	0.028	38.613	0.000	0.964
Syllable Segmenting	Syllable Segmenting 9	0.997	0.030	32.994	0.000	0.897
Syllable Segmenting	Syllable Segmenting 10	1.022	0.030	34.303	0.000	0.920
Phoneme Blending	Phoneme Blending 1	1.000	0.000	NA	NA	0.948
Phoneme Blending	Phoneme Blending 2	0.860	0.031	28.074	0.000	0.815
Phoneme Blending	Phoneme Blending 3	0.788	0.031	25.801	0.000	0.747
Phoneme Blending	Phoneme Blending 4	1.023	0.029	35.864	0.000	0.969
Phoneme Blending	Phoneme Blending 5	0.671	0.040	16.604	0.000	0.636
Phoneme Blending	Phoneme Blending 6	0.848	0.033	25.426	0.000	0.803
Phoneme Blending	Phoneme Blending 7	0.871	0.033	26.028	0.000	0.826
Phoneme Blending	Phoneme Blending 8	0.852	0.037	23.239	0.000	0.808
Phoneme Blending	Phoneme Blending 9	1.006	0.032	31.637	0.000	0.953
Phoneme Blending	Phoneme Blending 10	0.771	0.037	20.969	0.000	0.731
Phoneme Deletion	Phoneme Deletion 1	1.000	0.000	NA	NA	0.912
Phoneme Deletion	Phoneme Deletion 2	1.044	0.017	61.781	0.000	0.952
Phoneme Deletion	Phoneme Deletion 3	1.056	0.018	58.624	0.000	0.963
Phoneme Deletion	Phoneme Deletion 4	1.050	0.018	58.995	0.000	0.958
Phoneme Deletion	Phoneme Deletion 5	1.056	0.017	60.782	0.000	0.964
Phoneme Deletion	Phoneme Deletion 6	1.003	0.021	47.049	0.000	0.915
Phoneme Deletion	Phoneme Deletion 7	1.011	0.020	51.199	0.000	0.923
Phoneme Deletion	Phoneme Deletion 8	1.018	0.021	48.952	0.000	0.928
Phoneme Deletion	Phoneme Deletion 9	1.050	0.019	54.412	0.000	0.958
Phoneme Deletion	Phoneme Deletion 10	1.037	0.022	48.230	0.000	0.946
Fluency	Fluency 1	1.000	0.000	NA	NA	0.818
Fluency	Fluency 2	1.128	0.036	30.970	0.000	0.923
Fluency	Fluency 3	1.114	0.037	30.256	0.000	0.911

Latent Factor	Indicator	B	SE	Z	p-value	Beta
Fluency	Fluency 4	1.202	0.048	25.092	0.000	0.983
Fluency	Fluency 5	1.106	0.038	29.422	0.000	0.905
Fluency	Fluency 6	1.075	0.038	28.267	0.000	0.880
Fluency	Fluency 7	1.024	0.038	26.791	0.000	0.838
Fluency	Fluency 8	1.006	0.040	25.230	0.000	0.823
Fluency	Fluency 9	0.899	0.040	22.652	0.000	0.736
Fluency	Fluency 10	0.905	0.064	14.062	0.000	0.741
Comprehension	Comprehension 1	1.000	0.000	NA	NA	0.665
Comprehension	Comprehension 2	1.211	0.140	8.667	0.000	0.805
Comprehension	Comprehension 3	0.910	0.098	9.245	0.000	0.605
Comprehension	Comprehension 4	1.249	0.158	7.923	0.000	0.830
Comprehension	Comprehension 5	1.239	0.121	10.274	0.000	0.823
Comprehension	Comprehension 6	1.436	0.142	10.097	0.000	0.955
Comprehension	Comprehension 7	1.425	0.145	9.809	0.000	0.947
2nd Order CFA of Literacy Skill						
Literacy	Print Concepts	1.000	0.000	NA	NA	0.820
Literacy	Expressive Vocab	0.664	0.096	6.940	0.000	0.672
Literacy	Uppercase Alphabet	1.782	0.177	10.088	0.000	0.982
Literacy	Lowercase Alphabet	1.860	0.184	10.096	0.000	0.975
Literacy	Letter Sounds	1.636	0.156	10.495	0.000	0.926
Literacy	Rhyming	1.001	0.115	8.709	0.000	0.722
Literacy	Syllable Segmenting	1.430	0.134	10.653	0.000	0.813
Literacy	Alliteration	1.582	0.150	10.520	0.000	0.860
Literacy	Phoneme Blending	1.437	0.143	10.080	0.000	0.775
Literacy	Phoneme Deletion	1.470	0.144	10.210	0.000	0.824
Literacy	Fluency	1.352	0.132	10.275	0.000	0.845
Literacy	Comprehension	0.778	0.094	8.296	0.000	0.599

Note. The first item of each subtest and the first item for the 2nd Order factor are automatically set to 1.00 with an SE of 0. Those items have NA for both their Z and p-value columns.



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