FINAL EVALUATION REPORT

Cincinnati Museum Center

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1. Program Theory and Objectives

Cincinnati Museum Center (CMC) is home to the Cincinnati Museum Center's Duke Energy Children's Museum which has been serving the educational needs of young children, their caregivers and early childhood education providers for over 10 years. As part of their commitment to addressing educational needs in their community, CMC has joined local efforts to improve young children's school readiness and eventually meet goals for kindergarten assessments (85% of children meet or exceed cut-off scores for readiness by 2020: United Way 2010). Currently, roughly 40% of children in the region served by the ECSITE program (Cincinnati, OH, Newport and Covington, KY) have school readiness assessment scores below these benchmarks (Successby6 2010, United Way 2010).[1] Consistent with national trends (Wat 2008), children from lower-income families are unprepared at higher rates. The ECSITE program was designed with the intent to reach those children most at risk for falling short of readiness standards through the articulation of evidence-based practices for teachers, parents, their children, and the coordination of CMC and community resources with Head Start early childhood education classrooms.

To accomplish these aims, ECSITE relies on an approach often described as "sciencing" (e.g. Harlan & Rivkin, 2000; Neuman, 1972, 1992), which encourages the integration of science experiences across other curriculum domains through an enriched environment, planned lessons, and incidental conversations with children. This strategy has demonstrated long-term, beneficial impact on children's school readiness skills (Conezio & French 2002; Esach & Fried 2005; Greenfield, Jirout, Dominquez, Greenberg, et al. 2009). The potential of science inquiry approaches for accelerating preschool development and school readiness skills, particularly for children from economically disadvantaged households who attend Head Start programs, is also indicated by research (Peterson & French, 2008; French 2004).

Sciencing strategies rely foremost on teachers trained in this approach. Because preschool teachers may at first feel intimidated or overwhelmed by the idea of integrating science inquiry across classroom activities (PNC Banks, Grow Up Great with Science Teacher Survey 2009; Wat 2010), ECSITE works to actively educate, encourage, and support participating teachers. The centerpiece of the program therefore, is a year-long professional development program. This consists of an introductory seminar on science inquiry instructional practices followed by a series of workshops. At these workshops, teachers apply what they've learned and demonstrate science inquiry lessons to their peers and museum instructors who offer supportive feedback. These workshops include a Science Pot-Luck in which teachers meet to exchange lesson plans and provide feedback. The workshops and

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[1] The cut-off scores set by the community for school readiness include a result of 14 or greater on the Ohio state mandated Kindergarten Readiness Assessment – Literacy, and in Kentucky, a normal curve equivalent score of 50 or more on the Developmental Indicators for the Assessment of Learning 3 (DIAL 3).

trainings are supplemented with materials and other resources supplied by CMC including field trip opportunities and on-site visits from a mobile "Program-On-Wheels." Because classroom mentorship has been linked to more favorable child developmental outcomes (Epstein, 1993), teachers who successfully complete a year of training, are asked to continue as mentors in the program. These "teacher trainers" work together with CMC instructors/facilitators on-site, in the classrooms, to support new teachers trained by ECSITE, ensuring the continuity and sustainability of the program.

Because parent engagement is also crucial to classroom success and increased school readiness (e.g. Henderson & Mapp, 2002; Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005; Reynolds, Mavrogenes, Berzruczko & Hagemann, 1996), the ECSITE program extends CMC resources to children's families through open field-trip opportunities including Family Science Night and the Learning Through Play Conference. The Learning Through Play Conference (LTP) is unique in the region, bringing together families and teachers in workshops, interactive play opportunities and lectures, designed to enrich understanding of preschool development and school readiness. In addition, CMC provides ECSITE participating classrooms with take-home family activity packets which encourage parent-child interaction and discussion around science-inquiry based projects.
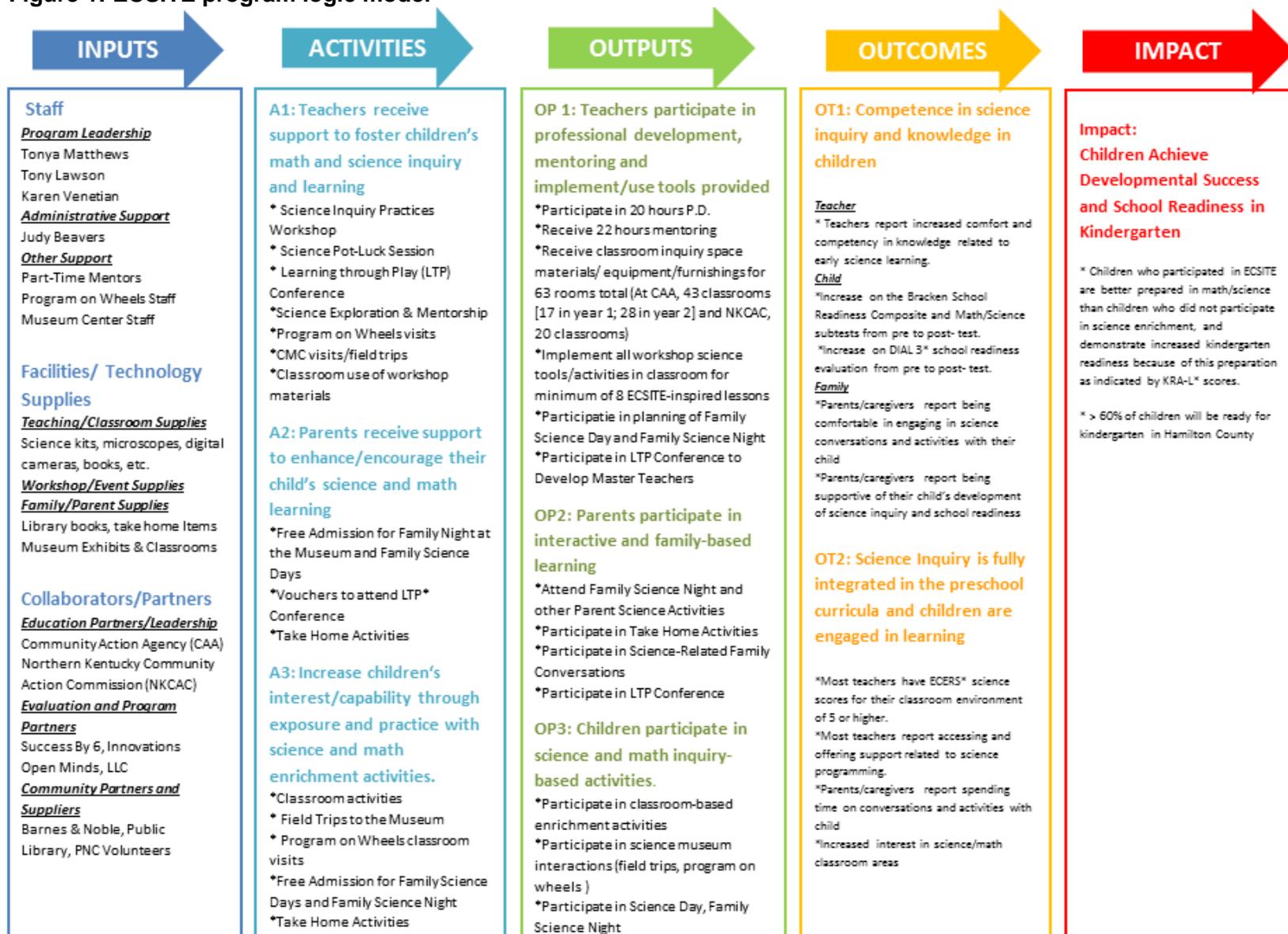
To strengthen the impact of preschool teacher professional development and parent engagement efforts on children's preschool development and school readiness, the ECSITE project provides tools, supports, and classroom supplies that sustain school readiness objectives. In their classrooms, and in their take-home materials, children access a variety of exploration tools. A range of science manipulatives including droppers, tongs, and graduated cylinders not only encourage fine motor skills, but invite children to test, measure, and investigate concepts of quantity, volume and cause and effect. Live animal habitats are also provided to encourage curiosity and observation skills. Children may encounter these materials throughout the classroom, but particularly at math and science centers improved through the ECSITE program. Presentations offered through Program-On-Wheels align with Ohio and Kentucky curriculum standards while the also emphasize science inquiry lesson objectives.

The relationship between ECSITE program components and their anticipated outcomes is summarized below in their program's logic model (Figure 1). By consistently meeting program implementation goals, the ECSITE program ultimately expects to: a.) improve teacher confidence and competency in science education and the classroom integration of science inquiry strategies, b.) increase levels of parent participation and family engagement in science and math based activities, c.) strengthen each child's pre-academic skills as indicated both by measures of preschool development and finally, d.) improve scores on kindergarten assessments of school readiness.

2.   Summary of Program Evaluation Methodology

Evaluation of the ECSITE program focuses on assessing both program implementation and its preliminary outcomes. Program activities and outputs outlined by the logic model describe the program's intended implementation. In academic years 2011-12 and 2012-13, the ECSITE program was led by CMC staff and is currently offered to preschool teachers, families and their children enrolled at Head Start classrooms with the Hamilton County Community Action Agency (CAA) and the Northern

Figure 1: ECSITE program logic model

INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES	IMPACT
Staff _Program Leadership_ Tonya Matthews Tony Lawson Karen Venetian _Administrative Support_ Judy Beavers _Other Support_ Part-Time Mentors Program on Wheels Staff Museum Center Staff **Facilities/ Technology Supplies** _Teaching/Classroom Supplies_ Science kits, microscopes, digital cameras, books, etc. _Workshop/Event Supplies_ _Family/Parent Supplies_ Library books, take home Items Museum Exhibits & Classrooms **Collaborators/Partners** _Education Partners/Leadership_ Community Action Agency (CAA) Northern Kentucky Community Action Commission (NKCAC) _Evaluation and Program Partners_ Success By 6, Innovations Open Minds, LLC _Community Partners and Suppliers_ Barnes & Noble, Public Library, PNC Volunteers	**A1: Teachers receive support to foster children's math and science inquiry and learning** * Science Inquiry Practices Workshop * Science Pot-Luck Session * Learning through Play (LTP) Conference *Science Exploration & Mentorship *Program on Wheels visits *CMC visits/field trips *Classroom use of workshop materials **A2: Parents receive support to enhance/encourage their child's science and math learning** *Free Admission for Family Night at the Museum and Family Science Days *Vouchers to attend LTP* Conference *Take Home Activities **A3: Increase children's interest/capability through exposure and practice with science and math enrichment activities.** *Classroom activities * Field Trips to the Museum * Program on Wheels classroom visits *Free Admission for Family Science Days and Family Science Night *Take Home Activities	**OP 1: Teachers participate in professional development, mentoring and implement/use tools provided** *Participate in 20 hours P.D. *Receive 22 hours mentoring *Receive classroom inquiry space materials/ equipment/furnishings for 63 rooms total (At CAA, 43 classrooms [17 in year 1; 28 in year 2] and NKCAC, 20 classrooms) *Implement all workshop science tools/activities in classroom for minimum of 8 ECSITE-inspired lessons *Participatie in planning of Family Science Day and Family Science Night *Participate in LTP Conference to Develop Master Teachers **OP2: Parents participate in interactive and family-based learning** *Attend Family Science Night and other Parent Science Activities *Participate in Take Home Activities *Participate in Science-Related Family Conversations *Participate in LTP Conference **OP3: Children participate in science and math inquiry-based activities.** *Participate in classroom-based enrichment activities *Participate in science museum interactions (field trips, program on wheels) *Participate in Science Day, Family Science Night	**OT1: Competence in science inquiry and knowledge in children** _Teacher_ * Teachers report increased comfort and competency in knowledge related to early science learning. _Child_ *Increase on the Bracken School Readiness Composite and Math/Science subtests from pre to post- test. *Increase on DIAL 3* school readiness evaluation from pre to post- test. _Family_ *Parents/caregivers report being comfortable in engaging in science conversations and activities with their child *Parents/caregivers report being supportive of their child's development of science inquiry and school readiness **OT2: Science Inquiry is fully integrated in the preschool curricula and children are engaged in learning** *Most teachers have ECERS* science scores for their classroom environment of 5 or higher. *Most teachers report accessing and offering support related to science programming. *Parents/caregivers report spending time on conversations and activities with child *Increased interest in science/math classroom areas	**Impact:** **Children Achieve Developmental Success and School Readiness in Kindergarten** * Children who participated in ECSITE are better prepared in math/science than children who did not participate in science enrichment, and demonstrate increased kindergarten readiness because of this preparation as indicated by KRA-L* scores. * > 60% of children will be ready for kindergarten in Hamilton County

Footnotes: Learning Through Play (LTP), Kindergarten Readiness Test – Literacy (KRA-L), Developmental Indicators of Assessment Learning (DIAL-IV), Preschool (PK), Early Childhood Environment Rating Scale (ECERS)

Developed based on the Kellogg Foundation's _Logic Model Development Guide_ (2004).

Kentucky Community Action Commission (NKCAC). This includes a total of 41 classrooms across two of CAA's locations (19 in academic year 2011-12 and 34 classrooms in academic year 2012-13) as well as a total of 20 classrooms at NKCAC. To obtain the necessary materials and training to deploy science inquiry strategies across the curriculum, the program requires that teachers participate in a minimum of 20 hours of professional development (PD) and receive 22 hours of classroom mentoring either from CMC facilitators or teacher trainers who have already completed ECSITE training. Hours of participation in PD are monitored by CMC facilitators. In addition, each teacher was asked to complete a survey at the beginning and end of their year-long PD participation to monitor changes in their level of comfort with science instruction and the integration of science inquiry strategies in their classrooms. The survey also gauges the frequency with which teachers access CMC and other community resources as a part of science inquiry lessons. CMC, in partnership with the Public Library of Cincinnati and Hamilton County, Barnes and Noble, and PNC bank, provide classroom supplies and family take-home packets to participating teachers over the course of their PD. These materials are deployed for a minimum of 8 ECSITE designed science inquiry based lessons. In addition, teachers help plan and participate in Family Science Nights and field trips and many attend the LTP conference. The utilization of these community and CMC resources, participation and planning of ECSITE events is tracked by CMC facilitators.

Families participate in take-home activities, receive free admission to CMC for family science events, and receive free vouchers to attend the LTP conference. Levels of family participation in ECSITE events will be monitored by CMC facilitators who will track receipts of vouchers and free exhibit passes. Families may also participate in an interest survey at ECSITE events to offer feedback on take-home activities and materials.

Near the beginning and end of each academic year, children attending CAA classrooms in Ohio are assessed to monitor changes in preschool development using the Bracken Basic Concepts Scale (BBCS) (Pearson, 2007). This testing occurs in October and March of each year to allow insight into changes in preschool development shaped by the ECSITE program. Children are administered a total of 8 subtests. This includes the first five subtests which make up the school readiness composite (SRC) and assesses concept awareness related to colors, letters, numbers and counting, sizes and comparisons, and shapes. Additional subtests relevant to science and math knowledge and awareness are also being administered. These are the subtests for texture and material (subtest 8), quantity (subtest 9), and time and sequence (subtest 10). The Bracken has well documented validity and reliability with high rates of intercorrelation with other measures of preschool development and school readiness, including the Kindergarten Readiness Assessment – Literacy (KRA-L). The KRA-L is the Ohio mandated assessment of school readiness that is administered to kindergarten students in October each year.

Children enrolled in NKCAC classrooms as assessed annually using the Developmental Indicators for the Assessment of Learning 3 (DIAL 3). This assessment evaluates developmental abilities across five domains including motor, language, concepts, self-help, and emotional skills. Although they are not directly comparable, the domains of knowledge evaluated with this tool, especially receptive concepts and language, overlap with those assessed by the Bracken. These areas include color and shape identification, counting, meaningful counting, concepts, and problem solving. Preschool results of the DIAL3 are frequently compared with results of the same test administered as a

school readiness assessment in many school districts in Northern Kentucky. A re-test using the DIAL 3 has been implemented in kindergarten classrooms in lieu of a state mandated school readiness assessment.

Where permitted by signed parental consent and appropriate data sharing agreements between school districts, children who participated in ECSITE classrooms were tracked into kindergarten and their preschool assessments were matched to the results of their school readiness assessment (in Ohio, the KRA-L, and in Kentucky, the DIAL 3).

The evaluation will employ both within and between group analyses to answer questions of program impact. There are two cohorts for each of the groups described in Table 1, corresponding to two separate years of SIF funding for the ECSITE program. Performance on preschool assessments will be compared within groups, between these cohorts to examine improvements in scores as a function of teacher's increased experience in the program. In addition, ECSITE participants' performance on assessments of school readiness will be compared with a similar group of at-risk children without program exposure, both with and without preschool experience. Descriptive details are offered for groups of parents and teachers, although currently, there is no access to a comparison group of non-ECSITE teachers and parents and so these cannot be incorporated into the evaluation plan.

Table 1: Groups Identified for Program Evaluation

Group Name	Cohort	Composition and Size
Group 1a	Cohort 1 (academic year 2011-12):	CAA (Ohio) teachers trained through the ECSITE program: **34** new teachers
	Cohort 2 (academic year 2012-13):	CAA (Ohio) teachers trained through the ECSITE program: **32** new teachers and **8** teachers as trainers with previous program experience.
Group 1b	Cohort 1 (academic year 2011-12):	NKCAC (Kentucky) teachers trained through the ECSITE program: **6** new teachers
	Cohort 2 (academic year 2012-13):	NKCAC (Kentucky) teachers trained through the ECSITE program: **6** new teachers and **6** teachers as trainers with previous program experience.
Group 2	Cohort 1 (academic year 2011-12):	Parents and families of children enrolled in ECSITE classrooms in both Ohio and Kentucky Total cohort sizes unknown.
	Cohort 2 (academic year 2012-13):	
Group 3a	Cohort 1 (academic year 2011-12):	**388** Children assessed in ECSITE participating CAA classrooms (Ohio) – Data source is the SuccessBy6® Database
	Cohort 2 (academic year 2012-13):	**576** Children assessed in ECSITE participating CAA classrooms (Ohio) – Data source is the SuccessBy6® Database
	Two-Year Participants	**91** Children assessed in ECSITE participating CAA classrooms (Ohio) – Data source is the SuccessBy6® Database
Group 3b	Cohort 1 (academic year 2011-12):	Children assessed in ECSITE participating NKCAC classrooms (Kentucky) – Data source is the Northern Kentucky Early Childhood

	Cohort 2 (academic year 2012-13):	Database. Information pending approval of data sharing agreement. Signed consent forms for **174** children in cohort 1.
	Two-Year Participants	
Group 4a	Cohort 1 (academic year 2011-12):	**122** Children graduated from ECSITE participating CAA classrooms (Ohio) who are enrolled in kindergarten and received a school readiness assessment (KRA-L) in academic year 2012-13. - Data Source is the Cincinnati Public Schools Database.
	Cohort 2 (academic year 2012-13):	Children graduated from ECSITE participating CAA classrooms (Ohio) who are enrolled in kindergarten and received a school readiness assessment (KRA-L) in academic year 2013-14: - Data pending, KRA-L not yet available. - Data Source is the Cincinnati Public Schools Database.
Group 4b	Cohort 1 (academic year 2011-12):	Children graduated from ECSITE participating NKCAC classrooms (Kentucky) who are enrolled in kindergarten and received a school readiness assessment (DIAL 3) in academic years 2012-13 and 2013-14: - Information pending approval of data sharing agreement – Data source is the Northern Kentucky Early Childhood Database.
	Cohort 2 (academic year 2012-13):	
Group 5a	Cohort 1 (academic year 2011-12):	**840** ECSITE eligible children from non-participating Head Start classrooms in Ohio who are enrolled in kindergarten and received a school readiness assessment (KRA-L) in academic year 2012-13. - Data Source is the SWELL Regional Survey.
	Cohort 2 (academic year 2012-13):	ECSITE eligible children from non-participating Head Start classrooms in Ohio who are enrolled in kindergarten and received a school readiness assessment (KRA-L) in academic year 2013-14: - Data pending, KRA-L not yet available. - Data Source is the SWELL Regional Survey.
Group 5b	Cohort 1 (academic year 2011-12):	ECSITE eligible children from non-participating Head Start classrooms in Kentucky who are enrolled in kindergarten and received a school readiness assessment (DIAL 3) in academic years 2012-13 and 2013-14: Information pending approval of data sharing agreement. – Data source is the Northern Kentucky Early Childhood Database.
	Cohort 2 (academic year 2012-13):	
Group 6a	Cohort 1 (academic year 2011-12):	**462** ECSITE eligible children with no documented preschool (Ohio) who are enrolled in kindergarten and received a school readiness assessment (KRA-L) in academic year 2012-13. - Data Source is the SWELL Regional Survey.
	Cohort 2 (academic year 2012-13):	ECSITE eligible children with no documented preschool (Ohio) who are enrolled in kindergarten and received a school readiness assessment in academic year 2013-14: - Data pending, KRA-L not yet available. - Data Source is the SWELL Regional Survey.
Group 6b	Cohort 1 (academic year 2011-12):	ECSITE eligible with no documented preschool (Kentucky) who are enrolled in kindergarten and received a school readiness assessment (DIAL 3) in academic years 2012-13 and 2013-14: Information pending approval of data sharing agreement. – Data source is the Northern Kentucky Early Childhood Database.
	Cohort 2 (academic year 2012-13):	

The 2011-12 academic year was CAA's inaugural year in the ECSITE program. Eight of the 32 teachers trained in the program this first year became teacher trainers in the 2012-13 academic year. NKCAC had participated in the ECSITE program since its inception in academic year 2009-2010. In academic year 2011-12, NKCAC had 6 new teachers enrolled in ECSITE professional development and 6 teacher trainers. In academic year 2012-13, NKCAC expanded their teacher trainers to 8. This means that across both academic years a total of 72 new preschool teachers received ECSITE professional development.

Our understanding of Group 2 (Parents and families of children enrolled in ECSITE classrooms) is evolving as we receive more information about their needs and interests through their voluntary participation in ECSITE events and interest surveys. A review of event receipts and a recent participation survey distributed at Family Science Day suggested a rate of parent participation of approximately 15% (n = 87) in academic year 2011-12. While this group, in theory, includes all of the families with children enrolled in ECSITE classrooms, in practice, this group is represented by those parents who either attended or provided responses to surveys solicited at ECSITE events. To preserve their anonymity on these surveys, the demographic composition and background experiences for this group have not been shared with the evaluators.

Data agreements with ECSITE classrooms at NKCAC are still pending at the time of this report. While NKCAC has now provided consent to the evaluator to access information for children with signed consent, the Northern Kentucky Early Childhood Database (NKECD) at Northern Kentucky University is still processing the data request. As a result, no demographic information or assessment data is available for children in Kentucky ECSITE classrooms at this time.

In addition, only limited demographic data is currently available for children currently enrolled in ECSITE classrooms. CAA is currently reviewing requests for additional data that can provide additional context for children's developmental assessment scores (Table 2).

Table 2: Available Demographics for Children Enrolled at CAA

Group	Cohort	No Gender Data	Females	Males	Total Number Assessed
Group 3a	1 (2011-12)	2.8% (11)	50.0% (194)	47.2% (183)	388
	2 (2012-13)	2.4% (14)	46.7% (269)	50.9% (293)	576
	Two-Year Participants	0.0% (0)	44.0% (40)	48.4% (44)	91

More extensive demographic information is available for graduates of ECSITE classrooms who have been matched with their KRA-L score and for preliminary comparison groups 5a and 6a extracted from blinded data available from the Cincinnati Public Schools database and SWELL regional survey database (Tables 3a – 3c).

Table 3a: Demographics for CAA ECSITE Graduates and Comparison Groups: Gender

Group	Cohort	No Gender Data	Females	Males	Total Number Assessed
Group 4a	1 (2011-12)	2.4% (3)	52.5% (64)	45.1% (55)	122
Group 5a	1 (2011-12)	1.5% (13)	48.3% (406)	50.1% (421)	840
Group 6a	1 (2011-12)	0.9% (4)	51.1% (236)	48.1% (222)	462

Table 3b: Demographics for CAA ECSITE Graduates and Comparison Groups: Race

Group	Cohort	No Data	African Am.	Asian	Hispanic/ Latino	Multi/ Other	Caucas.	Total
Group 4a	1	0.8% (1)	86.1% (105)	0.0% (0)	7.4% (9)	2.5% (3)	3.3% (4)	122
Group 5a	1	9.0% (76)	35.4% (297)	0.2% (2)	6.2% (52)	4.5% (42)	44.2% (371)	840
Group 6a	1	8.7% (40)	17.5% (81)	0.2% (1)	6.7% (31)	6.5% (30)	60.4% (279)	462

Table 3c: Demographics for CAA ECSITE Graduates and Comparison Groups: Language

Group	Cohort	No Data	English	Spanish	Other	Total
Group 4a	1 (2011-12)	77.0% (94)	19.7% (24)	2.5% (3)	0.8% (1)	122
Group 5a	1 (2011-12)	2.3% (20)	92.5% (777)	22.1% (27)	13.1% (16)	840
Group 6a	1 (2011-12)	1.5% (7)	95.9% (443)	2.6% (12)	0.0% (0)	462

3. Evaluation of Program Implementation

A summary of program implementation questions, their place within the logic model, and their findings are summarized in the chart below (Table 4). In most cases, implementation goals for high levels of teacher, parent and child participation, easy availability of materials and resources, and consistent replication in the integration of science inquiry approaches across multiple classroom domains were met.

In years one and two, all ECSITE teachers received an additional hour of training beyond the 20 hours originally planned for the program. In addition 66 classrooms received materials and furnishing through ECSITE, 3 classrooms more than originally anticipated. A high rate of parent participation in Family Science Night is noted in museum attendance records. Although only a small percentage of families voluntarily submitted a survey, a large majority (92%) indicated spending time with their children on take-home science projects, and most (85%) felt that it was either "very easy" or "somewhat easy" to engage in science conversations at home. All ECSITE teachers reported increased exploration of science centers within their classrooms by children.

ECSITE looks forward in the year ahead to increasing involvement by teachers in the Learning Through Play conference and finding new strategies for understanding the needs and interests of families with children enrolled in ECSITE classrooms.

Table 4: Summary of Program Implementation Questions and Findings	
1.) To what extent are teachers participating in program activities?	
Logic Model OP1: **Teachers participate in professional development, mentoring and implement/use tools provided.**	
Logic model Component	**Findings**
a.) Teachers participate in 20 hours of professional development.	CAA and NKCAC teachers each participated in a total of 21 hours of professional development at Cincinnati Museum Center (seven 3-hour workshops).
b.) Teachers receive 22 hours of mentoring in science inquiry techniques.	Both CAA and NKCAC teachers received at least 22 hours of mentoring from one of our three mentors.
c.) Teachers receive classroom inquiry materials/furnishings for 63 rooms total (43 at CAA 17 in year 1 and 28 in year 2 and 20 at NKCAC).	A total of 66 rooms received classroom inquiry materials/furnishings (CAA=46; 32 year one; 14 year two; NKCAC=20)
d.) Teachers implement workshop science tools for a minimum of 8 ECSITE lessons.	Teachers implemented considerably more than eight science lessons. Of the 22 CAA classrooms that returned their post-surveys this year, 21 classrooms presented AT LEAST one lesson from each of the 8 topics.
e.) Teachers participate in planning Family Science Day and Science Night.	Each CAA classroom at the two primary centers (excluding six remote home visitation classrooms) provided an activity at the Family Science Days. CAA Teacher Trainers collaborated on the take-home activity provided to families at the Science Night at Museum Center.
f.) Teachers participate in LTP conference.	Up to 26 teachers used a total of 95 available slots for professional development sessions at the Learning Through Play conference.
2.) To what extent are families participating in program activities?	
Logic Model OP2: **Parents participate in interactive and family based learning**	
a.) Parents receive free museum admission and attend family science night and other activities.	A total of 225 adults and 450 children participated in the Family Science Night at Museum Center, which provided free admission to Duke Energy Children's Museum and the Museum of Natural History & Science.
b.) Parents participate in Take-home activities.	100% of families attending Family Science Night received a dinosaur-related take-home activity. 92% of the 87 families returning our parent survey reported spending time with their children on at least one take-home activity.
c.) Parents participate in science related family conversations.	Of the 87 families who returned the parent survey, 85% noted that it was "very easy" or "somewhat

	easy" to participate in science conversations with their children.
d.) Parents receive free vouchers and participate in LTP conference.	50 vouchers were provided to families (good for up to five family members/session).

3.) To what extent are children participating in program activities?	
Logic Model OP3: **Children participate in science and math inquiry based activities**	
a.) Children participate in classroom-based enrichment activities.	100% of classrooms reported an increase in children's exploration of science content and participation in science enrichment activities.
b.) Children participate in science museum interactions.	450 children visited the Museum of Natural History & Science during Family Night, and all classrooms were offered Field Trips to visit Duke Energy Children's Museum and the Museum of Natural History & Science.
c.) Children participate in Family Science Day and Family Science Night.	Science activities were offered by all classrooms at the Family Science Day, and 450 children attended Family Science Night at Cincinnati Museum Center.

4.   Evaluation of Program Outcomes

A summary of program outcome questions, their place within the logic model, and their findings are summarized in the chart below (Table 5). In many cases, outcome goals for increased rates of teacher comfort and competency in the preparation of science and math lessons, high rates of parent involvement and participation in transition services, appropriate developmental progress for children, and enrollment in quality preschool were met or exceeded.

Of particular note, a large majority of parents participating in the survey (88%) reported that they believe science is either "very important" or somewhat important for their children's school readiness. In addition, there were significant increases in teacher's math and science confidence from the beginning to the end of each academic year. Detailed results for the confidence survey are listed in Table 6.

Assessments of preschool development for Group 3a indicated that many more than half of ECSITE participating children with both pre- and post- tests improved their performance on the school readiness composite across the school year. The largest increases in scores were observed for those children who were enrolled in ECSITE classrooms for two years. The Bracken assessment was administered to children according to planned project and evaluation methodology. The total number of children with both pre- and pots- tests is summarized in Table 7. A summary of their mean scaled scores for the School Readiness Composite and three additional subtests (Texture and Material, Quantity and Time and Sequence) is presented in Table 8. Statistical comparison of Bracken performance for Group 3a cohorts is described in Table 9.

Table 5: Summary of Program Outcome Questions and Findings	
1.) Do preschool teachers report increased comfort and competency related to early science learning?	
Logic Model OT1, Teacher: **Competence in science inquiry and knowledge in children**	
Logic model Component	**Findings**

	Increase in positive responses on teacher surveys from the beginning of training to the end of training. An increase in comfort and competency in both teachers in their first AND second years in the program was reported. For teachers in their first year of the program, pre-surveys indicated that 70% of them were "confident" or "very confident" in teaching early science learning. That number increased to 95% feeling "confident" or "very confident" on the post-survey (only one respondent listed him/herself as "a little unsure").
Teachers report increased comfort and competency in knowledge related to early science learning.	For teachers in their second year in the program, pre-surveys indicated that 84% of them were "confident" or "very confident" in teaching early science learning. That number increased to 94% feeling "confident" or "very confident" on the post-survey (only one respondent listed him/herself as "a little unsure).

2.) Do parents engage in age-appropriate science related activities with their children?

Logic Model OT1, Family: Competence in science inquiry and knowledge in children	
a.) Parents report being comfortable engaging in science conversations and activities with their child	Parents report greater comfort on survey. 85% of parents reported that it was "very easy" or "somewhat easy" to have conversations with their children about science.
b.) Parents report being supportive of their child's development of science inquiry and school readiness	Parents report increased awareness and support on survey. 88% of parents report that they believe that science is "very important" or "somewhat important" for their children's kindergarten readiness.

3.) Does increased preschool teacher competency in early childhood science inquiry and preschooler's increased contact with science and math curriculum improve these children's knowledge of math and science concepts on normed preschool assessments?

Logic Model OT1, Child: Competence in science inquiry and knowledge in children	
a.) Increase on the Bracken School Readiness Composite and other subtests for Hamilton County ECSITE participants.	In academic year 2011-12, 69.3% of children in Group 3a, cohort 1, maintained or surpassed their pre-test scaled score on the Bracken school readiness composite. In academic year 2012-13, 75.4% of children in Group 3a, cohort 2, maintained or surpassed their pre-test scaled score on the Bracken school

	readiness composite. 70.3% of two year participants in ECSITE, Group 3a, two years, saw positive gains in scaled scores across post-tests in both academic years.	
b.) Increase on the DIAL-3 for Northern Kentucky ECSITE participants	Awaiting approval of data sharing agreement.	

4.) Is science inquiry fully integrated in preschool curricula and are children engaged in learning?

Logic Model OT2:
Science inquiry is fully integrated in the preschool curricula and children are engaged in learning

a.) Most teachers receive ECERS science scores of 5 or higher for their classroom environment.	There was no site visit this past year from independent evaluator, Open Minds.
b.) Parents/caregivers report spending time on conversations and activities with child.	92% (N=87) of adults report participating in conversations with their children regarding science topics.
c.) Increased interest in science/math classroom areas.	100% of classrooms reported an increase in children's exploration of science content and participation in science enrichment activities.

Table 6: Pre/Post-Survey Data Comparison – Teacher Confidence Survey

Cohort	Rating and Percent Confident for Subject	Language	Arts	Science	Motor	Math	Soc/Emo	Literacy
Cohort 1 Pre	Average Rating	3.3	3.5	3.1	3.5	3.3	3.3	3.6
Cohort 1 Pre	% Fairly or Confident	95%	95%	84%	95%	89%	95%	95%
Cohort 1 Post	Average Rating	3.6	3.6	3.7	3.7	3.6	3.7	3.6
Cohort 1 Post	% Fairly or Confident	100%	100%	94%	94%	94%	100%	88%
Cohort	Rating and Percent Confident for Subject	Language	Arts	Science	Motor	Math	Soc/Emo	Literacy
Cohort 2 Pre	Average Rating	3.4	3.5	2.9	3.4	3.1	3.3	3.5
Cohort 2 Pre	% Fairly or Confident	96%	96%	70%	96%	87%	96%	91%
Cohort 2 Post	Average Rating	3.5	3.5	3.5	3.5	3.4	3.4	3.5
Cohort 2 Post	% Fairly or Confident	100%	100%	95%	100%	100%	100%	100%

Ratings: 1-Not at all, 2-A little, 3-Fairly, 4-Very

Table 7: Assessment Data Available for Individual Sub-Groups.

Group	Cohort	Total Number Pre Tests	Total Number Post Tests	Both Pre and Post Tests	Total Number Assessed
Group 3a	1 (2011-12)	310	303	225 (58.0%)	388
	2 (2012-13)	390	483	297 (51.6%)	576
	Two-Year Participants	77*	91*	55* (60.4%)	91**

*Two year participants with both pre-tests, post-tests and all pre- and post- assessment data in both 2011-12 and 2012-13 respectively.
**Two year participants with both post-tests.

Table 8: CAA Performance on the Bracken 2011-12 and 2012-13

CAA 2 Year Performance on Bracken		2011 12 N=225			2012 2013 N=297			Two Year Participation N=91		
		Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference	First Post-Test 2011-12	Second Post-Test 2012-13	Difference
School Readiness Composite	Avg Raw Score	32.3 (18.2)	43.3 (19.2)	10.99***	31.3 (18.9)	45.9 (18.4)	14.6***	31.1 (17.7)	51.7 (17.0)	20.6***
	Avg Percentile	29.4 (28.6)	33.7 (28.3)	4.32***	28.7 (27.4)	37.5 (27.7)	8.8***	33.1 (30.7)	37.7 (29.2)	4.6*
	Avg Scaled Score	7.7 (3.2)	8.1 (3.2)	.47***	7.7 (3.0)	8.6 (3.0)	.9***	8.1 (3.3)	8.5 (3.3)	.4
Texture and Material	Avg Raw Score	7.5 (5.6)	10.5 (6.1)	2.9***	7.7 (5.2)	10.9 (5.8)	3.1***	7.2 (5.0)	13.4 (6.1)	6.2***
	Avg Percentile	27.5 (24.9)	30.3 (24.4)	2.8*	29.8 (24.5)	31.3 (23.4)	1.5	29.4 (24.9)	35.5 (27.2)	6.1*
	Avg Scaled Score	7.6 (2.7)	8.0 (2.6)	.37*	7.9 (2.6)	8.2 (2.3)	.24	7.9 (2.6)	8.5 (2.7)	.62*
Quantity	Avg Raw Score	8.7 (6.6)	12.3 (7.5)	3.6***	8.3 (6.3)	12.3 (6.9)	4.0***	7.7 (6.2)	14.0 (7.0)	6.3***
	Avg Percentile	22.7 (21.1)	26.6 (23.6)	3.9**	22.9 (20.3)	26.0 (20.8)	3.1**	22.4 (21.6)	25.3 (22.1)	2.9
	Avg Scaled Score	7.2 (2.4)	7.5 (2.6)	.34*	7.3 (2.2)	7.6 (2.3)	.31*	7.2 (2.4)	7.5 (2.4)	.31
Time and Sequence	Avg Raw Score	5.8 (4.6)	8.1 (5.1)	2.3***	5.8 (4.6)	8.2 (4.7)	2.4***	5.0 (4.5)	9.5 (5.1)	4.5***
	Avg Percentile	30.5 (24.9)	32.0 (24.0)	1.4	31.1 (24.8)	32.3 (23.3)	1.3	29.1 (26.2)	21.0 (23.6)	1.9
	Avg Scaled Score	7.9 (2.7)	8.2 (2.5)	.30	8.0 (2.8)	8.3 (2.3)	.3*	7.6 (3.0)	8.2 (2.2)	.59

Note: Values in table are means with standard deviations in parentheses.
*$p < .05$, **$p < .01$, ***$p < .001$

Post hoc analyses of paired t-tests indicating improvement in mean scaled scores frequently revealed low power and small effect sizes. However, contrasts in SRC for Group 3a, cohort 2, yielded statistically significant results exceeding 99% power and an effect size greater than .4. It is tempting to

infer that this improvement in SRC scores for Group 3a, cohort 2, may be due to longer teacher participation in ECSITE trainings, although additional analyses will be required (Table 9).

Table 9: Significance of Change in Mean Subtest Scaled Scores by Evaluation Sub-Group

Sub Groups 3a		SRC	Texture and Material	Quantity	Time and Sequence
Cohort 1 (2011-12) N=225	Mean diff.	.47	.37	.34	2.7
	s.m.e.	.12	.15	.14	.18
	t	3.8	2.5	2.5	1.7
	p	<.001	.01	.02	.10
	Power	70.2%	49.9%	48.7%	49.7%
	Effect size	.26	.17	.16	.11
Cohort 2 (2012-13) N=297	Mean diff.	.92	.24	.31	.30
	s.m.e	.12	.15	.13	.15
	t	7.72	1.60	2.4	2.0
	p	<.001	.11	.02	.05
	Power	99.9%	48.9%	22.3%	51.7%
	Effect size	.45	.09	.09	.12
Cohort: Two Year Participants (2011-2013) N=91	Mean diff.	.37	.62	.31	.39
	s.m.e	.21	.27	.25	.31
	t	1.8	2.3	1.2	1.9
	p	.07	.03	.22	.06
	Power	99.9%	51.1%	51.2%	49.9%
	Effect size	.45	.24	.13	.20

s.m.e. – Standard mean error
Cells highlighted in gray illustrate statistically significant increase in mean scaled score below p=.05.
Cells highlighted in yellow illustrate post Hoc power analyses greater than 80% and moderate to large effect sizes.
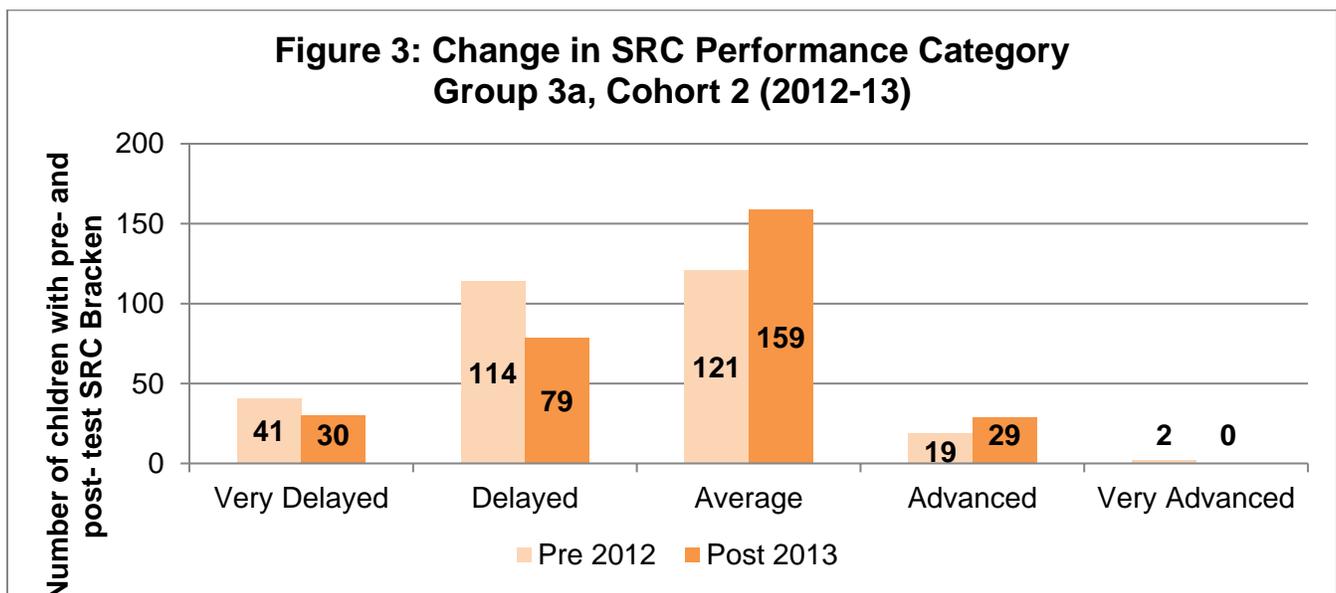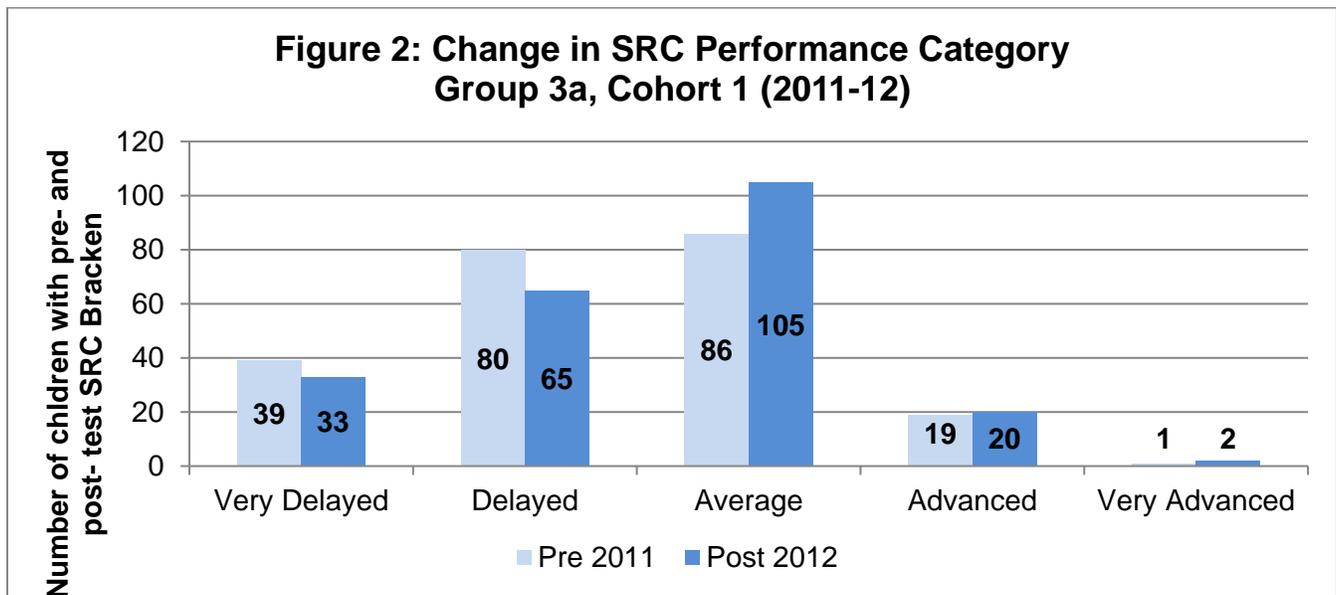

Table 10 indicates the percentage of children with both pre- and post- test who improved their percentile rank and who improved by at least one performance category. The Bracken Assessment designates 5 performance categories as follows: "Very Advanced" (scaled scores 16-19), "Advanced" (scaled scores 13-15), "Average" (8-12), "Delayed" (scaled scores 5-7), and "Very Delayed" (scaled scores 1-4).

A graphic representation of change in School Readiness Composite performance category for Group 3a, cohort1 is provided in Figure 2, and for Group 3a, cohort 2, in Figure 3. Change in performance category is significantly correlated for both academic years [Group 3a, cohort 1, r_s (225) = .778, p<.001; Group 3a, cohort 2, r_s (297) = .709, p<.001]. Change in performance category for two-year program participants is also significantly correlated [Group 3a, Two Years, r_s (91) = .781, p<.001]. Greater improvement in SRC scores was achieved in the second year of the ECSITE program at CAA.

Table 10: Percent of Children with Improved Percentile Rank and Performance Category

Sub Test	Percent of Children with Pre and Post tests Who Maintained or Improved their Percentile Rank			Percent of Children who Improved by an Entire Performance Category		
	Cohort 1 (2011-12) N=225	Cohort 2 (2012-13) N=297	Cohort 3 (Two-Year) N = 91	Cohort 1 (2011-12) N=225	Cohort 2 (2012-13) N=297	Cohort 3 (Two-Year) N = 91
SRC	44.4%	54.9%	70.3%	24.9%	29.6%	22.0%
8	46.7%	43.1%	58.2%	25.8%	23.9%	31.9%
9	43.1%	48.1%	59.3%	28.8%	27.6%	23.1%
10	49.3%	43.1%	62.6%	29.1%	22.9%	29.7%

Cells highlighted in yellow indicate highest percent increase.

Figure 2: Change in SRC Performance Category Group 3a, Cohort 1 (2011-12)

Figure 3: Change in SRC Performance Category Group 3a, Cohort 2 (2012-13)

5.) Preliminary and Baseline Analysis of Impacts

A summary of program impact questions, their place within the logic model, and their findings are summarized in the chart below (Table 11). A total of 122 children with some record of attendance at a CAA center were successfully tracked into kindergarten. For ECSITE participants with Bracken assessment data, there were 18 children form Group 3a, cohort 1, who could be successfully matched to KRA-L scores in 2012-13 (Table 12). The lower than expected rates of matching appear to be due to the following three factors: 1.) High rates of residential and school mobility which prevented assessment of all children enrolled throughout the academic year at CAA; 2.) Enrollment in school districts other than Cincinnati Public Schools; 3.) Low rates of signed releases from CAA families providing permission to link assessment data. Additional efforts to secure signed parent permissions should help to increase the number of matches in future years of evaluation.

Table 11: Summary of Program Impact Questions and Findings
1.) Do children achieve school readiness and developmental success in kindergarten?
Logic Model Impact: **Children achieve developmental success and school readiness in kindergarten**

a.) Hamilton County children who participated in ECSITE are better prepared in math/science than children who did not participate in science enrichment , and demonstrate increased kindergarten readiness because of this preparation as indicated by KRA-L scores. An estimated 75 children in academic year 2012-13 and 115 children in academic year 2013-14 will be matched to school readiness scores. They will be more likely to achieve scores above community benchmark standards indicating school readiness.	122 Children previously enrolled in CAA ECSITE classrooms were linked to KRA-L scores. Their mean was 17.43 (s.d. 7.26) 18 Children previously enrolled in ECSITE were matched to KRA-L scores. Their mean raw score was 16.22 (s.d. 7.26)
b.) Northern Kentucky children who participated in ECSITE are better prepared in math/science than children who did not participate in science enrichment , and demonstrate increased kindergarten readiness because of this preparation as indicated by DIAL-3 scores. An estimated 75 children in academic year 2012-13 and 115 children in academic year 2013-14 will be matched to school readiness scores. They will be more likely to achieve scores above community benchmark standards indicating school readiness.	Awaiting approval of data sharing agreement

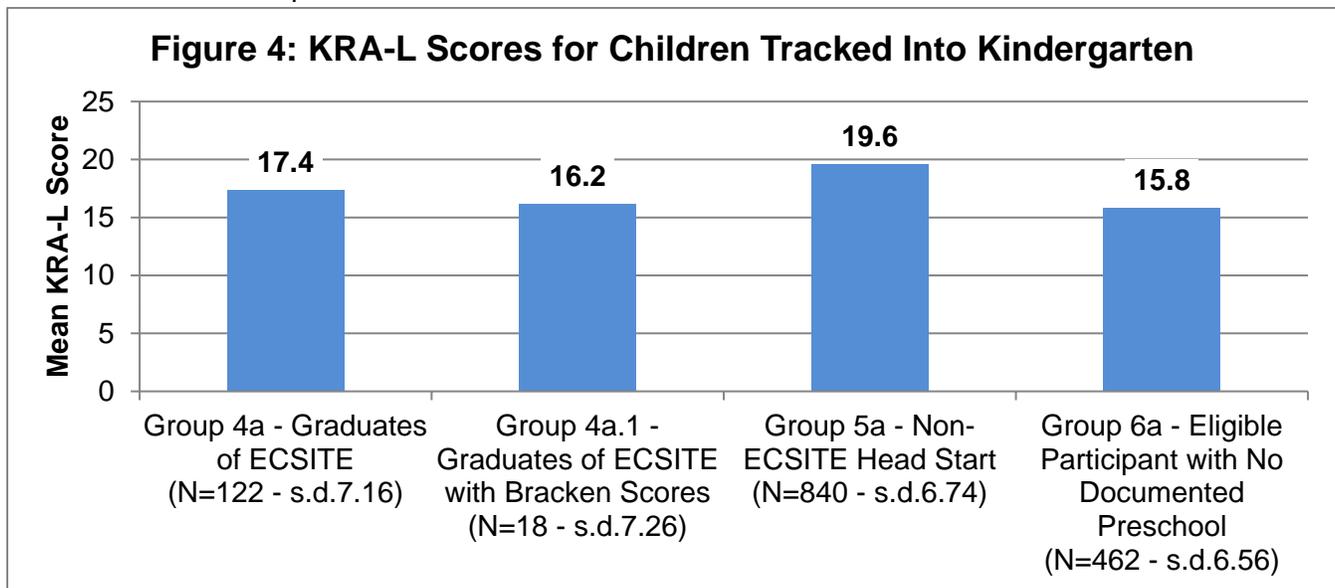| c.) Children will be ready for kindergarten in Hamilton County. > 60% of ECSITE participants score a 19 or above on the KRA-L.	35.3% of ECSITE participant with KRA-L scores received a score of 19 or above.

Table 12: Children Enrolled in ECSITE and Tracked into Kindergarten

Total Number of Children Tracked from ECSITE into Kindergarten	Total with Bracken Assessment Data	Total Number Pre Tests*	Total Number Post Tests*	Both Pre and Post Tests*
122	18	17	16	15

*Bracken assessments for the previous academic year (2011-12) matched to KRA-L scores.

In Ohio, the Kindergarten Readiness Assessment-Literacy (KRA-L) scores provide insight into ECSITE participants' success in kindergarten (Figure 4). The differences between these groups is significant [$F_{(3, 1438)} = 32.82$, $p<.001$].

For ECSITE graduates with Bracken scores, 2011-12 Bracken SRC scaled post-test scaled scores were significantly correlated with KRA_L scores [$r_p(15) = .519$, $p = .04$]. Of the 18 children with Bracken data who were tracked into kindergarten, 16 had post-test scores. Their KRA-L mean is slightly higher than the total KRA-L mean for this sub-group. A comparison of their Bracken sub-test results and mean KRA-L score is provided in Table 13.

Figure 4: KRA-L Scores for Children Tracked Into Kindergarten

Mean KRA-L Score

- Group 4a - Graduates of ECSITE (N=122 - s.d.7.16): 17.4
- Group 4a.1 - Graduates of ECSITE with Bracken Scores (N=18 - s.d.7.26): 16.2
- Group 5a - Non-ECSITE Head Start (N=840 - s.d.6.74): 19.6
- Group 6a - Eligible Participant with No Documented Preschool (N=462 - s.d.6.56): 15.8

Table 13: Comparison of Bracken Post-Test Scaled Score Means and Mean KRA-L

(Sub) Test	SRC	8	9	10	KRA L
N = 16	7.19 (3.21)	8.44 (2.50)	7.56 (2.87)	7.50 (1.54)	16.7 (6.68)

6.)   Summary and Next Steps

ECSITE has met or exceeded many of the goals they have set for implementation and outcomes for their program. ECSITE teachers are receiving quality professional development and classroom materials which contribute to increased levels of teacher comfort and competency in science and math lessons, increased engagement of children in the classroom with science and math activities, and positive trends in parent support and participation.

While data is still forthcoming for children enrolled at NKCAC in Northern Kentucky, data provided for children enrolled in ECSITE classrooms at CAA (Ohio) indicate substantial pre- to post-test improvement in measures of preschool development. The largest increases in Bracken scores can be seen for children in the second year of the ECSITE program and for children with two years of experience. This may be related to wider integration of ECSITE materials and teaching practices after the inaugural year of the program at CAA.

Because of the tight correlation in Bracken and KRA-L scores demonstrated for Group 3a, cohort 1, the substantial improvements in Bracken results for children in the second year of ECITE at CAA suggest a positive trend in KRA-L scores will emerge over time. Although the KRA-L scores for cohort 1 were lower than those for children from other Head Start agencies who did not receive the benefits of the ECSITE program (Group 5a), difficulties in tracking children into kindergarten may have unrealistically slanted these results. Provided there are improvements in collection of parent permissions and in tracking children into kindergarten, future trends in mean KRA-L scores for subsequent cohorts of CAA graduates may be more indicative of program outcomes.

Given the initial successes of the program in years one and two, the fidelity of program implementation, and positive trends in children's developmental outcomes, we anticipate highly positive outcomes in the data for year 3 as second year and two-year participants in ECSITE are promoted into kindergarten.

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