

**PreK Elements that Increase Third Grade Achievement: An Analysis of the Child-Parent Center and Gates Foundation Effectiveness Metrics**

The long history of evidence that a variety of preschool and prekindergarten programs have sustained effects on child well-being has spurred expansion of public programs with the goal of universal access.<sup>1-4</sup> It is estimated that half of all 4-year-olds enroll in state PreK and other public programs.<sup>5</sup> When considering all types of early education, 4 in 5 three- and four-year-olds are enrolled for at least part of the day.<sup>6</sup> Because of wide variability in quality across programs and the strong evidence that only high-quality early education has sustained effects on school competence, the identification of the most impactful program elements has become a top priority.<sup>7,8</sup> The feasibility, costs, and implementation requirements to scale these identified elements are also paramount.

We summarize results from analyses of two sets of effectiveness elements, the Bill & Melinda Gates Foundation’s 15 essential elements<sup>9</sup> (Gates-15) and the Child-Parent Center 21 elements<sup>10</sup> (CPC-21; Tables 2 and 3). Both are based on a synthesis of evidence, although the CPC elements derive from life-course results of one of the most established public PreK programs as well as principles of school reform. The two questions are (a) whether 3rd grade achievement gains are greater as the number of elements increases and (b) which particular elements are most associated with gains.

**Data and Elements.** As part of the Midwest Child-Parent Center P-3 Expansion Project (CPC expansion), 3,156 students from 39 schools in the Chicago and Saint Paul Public School Districts were tracked from PreK through 3<sup>rd</sup> grade.<sup>11-15</sup> At the end of PreK (2012-13) all of these program and comparison group students had school readiness scores on district assessments and 2,101 of the 4-year-olds from the PreK year had 3<sup>rd</sup> grade scores on state reading and math assessments (spring 2017). A wide variety of implementation and outcome measures from schools, teachers, principals, students, and observers were collected to assess the program elements (see Tables 2 and 3 plus Appendices). The CPC expansion is a scale-up of a revised school reform model of the program implemented from fall 2012 to spring 2017.<sup>10,11</sup>

**Results.** CPC students experienced a significantly greater number of effectiveness elements in both CPC-21 (Mean = 14.3 vs.6.8) and Gates-15 frameworks (11.9 vs. 10.4; Tables 2 and 3). This was expected given the relatively strong implementation of the PreK component. For both frameworks, school readiness skills and 3<sup>rd</sup> grade reading and math scores increased as the number of effectiveness elements increased. As shown in Table 1, 5 CPC and 3 Gates elements were most associated with PreK and 3<sup>rd</sup> grade achievement gains. They also reduced the SES-achievement gap from 8% to 40%. The number of Gates elements required to improve 3<sup>rd</sup> grade achievement was 11. For CPC, it was 13.

Table 1. PreK Elements Associated with School Readiness and 3<sup>rd</sup> Grade Achievement Proficiency on State Tests

<i>Framework</i>	<i>Effect size for School Readiness</i>	<i>% increase in 3<sup>rd</sup> gr. reading</i>	<i>% increase in 3<sup>rd</sup> gr. math</i>	<i>% reduction in 3<sup>rd</sup> gr. SES-achiev. gap</i>
<i>A, CPC elements</i>				
Full-day PreK	Large	33 percent	59 percent	28 percent
Class Size of 17 or less	Large	15 percent	23 percent	16 percent
Task-Oriented Classroom	Large	13 percent	13 percent	8 percent
Parent Resource Room	Medium	n/a	30 percent	22 percent
Continuity between PreK/K	Medium	32 percent	30 percent	22 percent
<i>B, Gates elements</i>				
Increased Learning Time	Large	34 percent	42 percent	32 percent
Teacher with B.A/Comp.	Large	45 percent	36 percent	40 percent
Integrated Systems Approach	Large	47 percent	n/a	22 percent

Note. Values are percentage change over no element present averaged across districts and adjusted for baseline factors in PreK. Ns = 2,101 to 3,200. A large effect size is an increase in proficiency of at least 30% (medium is 20% to 30%). Full-day is Chicago only. Achiev gap = 32 points. Gates data-driven decisions linked to positive achievement gains in Saint Paul but not Chicago. PD modules/coaching linked to gains in Chicago.

**Conclusion.** It is well documented that programs demonstrating sustained positive effects and high economic returns have many common elements, including (a) low child-to-staff ratios, (b) an intensive but developmental instructional approach, and (c) well-trained and compensated staff.<sup>2, 3, 16-18</sup> Our findings from Chicago and Saint Paul generally support longstanding principles<sup>7</sup> but also less recognized resources for teachers and families.<sup>15,19</sup> Because our data were from high quality programs, some elements may be more impactful as variability increases. Scaling these elements is feasible, as found in the CPC expansion, but will require increased investment and monitoring beyond that found in most current programs.

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**Table 2.** Percentage of CPC and non-CPC (Control) preschool students in the first year of the MCPC project (2012-13) whose site or classroom met recommendations for each CPC element of program quality. All sites were located in the Chicago (IL) or Saint Paul (MN) public school districts.

CPC Program Element	Indicators	% CPC students	% Control students
<b>Effective Learning Experiences</b>	Small class size ( $\leq 17$ )	60.8	16.9
	Full day instruction (6+ hours per day)	20.0	0.0
	Teacher education (Bachelor's degree or higher)	100.0	100.0
	Balance of child- and teacher-driven instruction	80.0	57.3
	Task-oriented instruction	70.7	54.6
<b>Aligned Curriculum</b>	Consistent learning experiences from PreK to 3 <sup>rd</sup> grade	69.8	34.4
	Curriculum covers core domains	30.7	37.8
	Cross-grade collaboration	37.0	60.7
<b>Collaborative Leadership Team (CLT)</b>	Complete collaborative leadership team	95.6	0.0
	Head Teacher provides active leadership	95.6	0.0
	Highly engaged principal	95.9	38.1
<b>Continuity and Stability</b>	Guaranteed enrollment policy	90.4	100.0
	Consistent leadership team	40.5	92.6
	At least 80% school-wide retention rate	41.7	45.4
<b>Professional Development (PD)</b>	In-person and online coaching support	43.2	0.0
	Site mentors support Head Teachers	84.5	100.0
	Review of online PD modules	100.0	0.0
<b>Parent Involvement (PI)</b>	Parent resource room	96.4	0.0
	PRT and SCR outreach worker present	95.6	0.0
	Ample, diverse opportunities for PI	66.2	0.0
	PI opportunities address parent needs	56.2	19.2
<b>Average number of CPC indicators met</b>		14.3	6.8

**Table 3.** Percentage of CPC and non-CPC (Control) preschool students in the first year of the MCPC project (2012-2013) whose site or classroom met recommendations for each Gates Foundation element of program quality. All sites were located in the Chicago (IL) or Saint Paul (MN) public school districts.

Gates Foundation Element	% CPC students	% Control students
Education and compensation	98.6	100.0
Adult-child ratios	100.0	89.0
Two adults in the classroom	100.0	100.0
Teacher-child interactions focused on learning	80.0	57.3
Formative assessments	100.0	100.0
Learning Time	20.0	0.0
Support for DLLs	98.6	100.0
Support for students with special needs	100.0	100.0
Age-appropriate learning standards	100.0	100.0
Proven curriculum	32.7	67.4
Data-driven decision making	37.2	61.8
Professional development	100.0	100.0
Integrated systems	24.6	0.0
Strong leadership	91.5	38.1
Public commitment	100.0	100.0
<b>Average number of Gates recommendations met</b>	11.9	10.4

**Appendix 1.** Correlations of CPC and Gates elements of all preschool students in the first year of the MCPC project (2012-2013). All sites were located in the Chicago (IL) public school districts.

	CPC: ELE	CPC: AC	CPC: PD	CPC: PI	CPC: CS	CPC: CLT	G: Ratio	G: Learning Time	G: Curriculum	G: Date driven	G: Integrated	G: T&C Interaction	G: Strong Lead
CPC: ELE	1.0000												
CPC: AC	0.2952*	1.0000											
CPC: PD	0.4768*	0.0690*	1.0000										
CPC: PI	0.4084*	-0.0627*	0.8512*	1.0000									
CPC: CS	-0.0827*	0.2739*	-0.3799*	-0.3492*	1.0000								
CPC: CLT	0.3686*	-0.0706*	0.8259*	0.9300*	-0.3098*	1.0000							
Gates: Class ratio	0.0498*	-0.0044	0.2619*	0.2837*	-0.2372*	0.2552*	1.0000						
Gates: Learning time	0.3881*	-0.0542*	0.1793*	0.1449*	-0.3554*	0.1869*	0.0951*	1.0000					
Gates: Proven curriculum	0.0781*	0.2081*	-0.1603*	-0.3534*	0.5032*	-0.3739*	-0.2045*	-0.3091*	1.0000				
Gates: Data driven	-0.1689*	-0.0486*	-0.4675*	-0.4055*	0.1924*	-0.2982*	-0.1212*	0.1762*	-0.0817*	1.0000			
Gates: Integrated system	0.0455*	0.0136	0.4021*	0.1956*	-0.1442*	0.2170*	0.0609*	0.0912*	-0.2980*	-0.2884*	1.0000		
Gates: Teacher Child	0.6294*	0.4704*	0.2337*	0.1353*	0.0114	0.1001*	-0.1357*	0.1381*	0.0508*	0.0101	0.0818*	1.0000	
Gates: Strong leadership	0.1551*	0.0107	0.4790*	0.5830*	0.0080	0.7642*	0.0725*	0.0308	-0.1534*	-0.0186	0.1582*	0.0542*	1.0000

*Note.* The following Gates elements are omitted from this table, because there was no variation in these indicators among the classrooms in the sample: ---

**Appendix 2.** Correlations of CPC and Gates elements of all preschool students in the first year of the MCPC project (2012-2013). All sites were located in the Saint Paul (MN) public school districts.

	CPC: ELE	CPC: AC	CPC: PD	CPC: PI	CPC: CS	CPC: CLT	G: Educ & Comp	G: TC Int	G: DLL	G: Data	G: Integrated	G: Strong
CPC: ELE	1.0000											
CPC: AC	0.6102*	1.0000										
CPC: PD	0.5947*	0.5808*	1.0000									
CPC: PI	0.5821*	0.3627*	0.3651*	1.0000								
CPC: CS	-0.2230*	-0.4298*	-0.4111*	-0.1099*	1.0000							
CPC: CLT	0.7258*	0.5491*	0.7846*	0.8337*	-0.2946*	1.0000						
Gates: Educ and Comp	-0.0245	-0.0186	0.2334*	-0.3477*	0.3644*	-0.1961*	1.0000					
Gates: T & C interaction	0.8287*	0.7456*	0.6591*	0.7003*	-0.2475*	0.8400*	-0.1648*	1.0000				
Gates: Support DLL	-0.0245	-0.0186	0.2334*	-0.3477*	0.3644*	-0.1961*	1.0000*	-0.1648*	1.0000			
Gates: Data driven	0.3233*	0.3908*	0.4121*	0.2458*	-0.6007*	0.3234*	0.0962*	0.2716*	0.0962*	1.0000		
Gates: Integrated System	0.7258*	0.5491*	0.7846*	0.8337*	-0.2946*	1.0000*	-0.1961*	0.8400*	-0.1961*	0.3234*	1.0000	
Gates: Strong leadership	0.7258*	0.5491*	0.7846*	0.8337*	-0.2946*	1.0000*	-0.1961*	0.8400*	-0.1961*	0.3234*	1.0000*	1.0000

*Note.* The following Gates elements are omitted from this table, because there was no variation in these indicators among the classrooms in the sample: ---

Appendix 3. Indicators used to define the six CPC elements for sites/classrooms in the MCPC project during the 2012-13 year.		
Indicator	Recommendation met by CPC classrooms if...	Recommendation met by non-CPC classrooms if...
<b>Effective Learning Experiences</b>		
Small class size	Class size was ≤ 17	
Full day instruction	Programming was provided for 6+ hours/day	
Teacher education	Teachers had at least a bachelor's degree	
Balance of child- and teacher-driven instruction	On the CAR, teachers reported that 35 to 65% of time was spent on child-initiated activities	Teacher reported on the CAR that 35 to 65% of time was spent on child-initiated activities <b>OR</b> spent time on both child- and teacher-directed activities (based on the CLAC) <b>OR</b> scored above the district mean on CLASS Emotional Support
Task-oriented instruction	Teachers scored above the district mean on one or both CLAC scales	Classroom scored above the district mean on one or both CLAC scales <b>OR</b> scored above the district mean on one or more dimensions of the CLASS
<b>Aligned Curriculum</b>		
Consistent learning experiences P to 3	Curriculum plan showed evidence of consistent curriculum, practices, or learning standards from PreK to upper grades (as determined by project staff)	Principal reported that their school's curriculum was aligned "very well" from PreK to 3 <sup>rd</sup> grade in each of six areas
Curriculum covers core domains	Teacher reported that their curriculum covered language, math, science, and socioemotional learning "very well"	
Cross-grade collaboration	Principal self-reported strong support of practices promoting cross-grade collaboration (mean score of 3+ out of 4)	
<b>Collaborative Leadership Team (CLT)</b>		
Complete CLT	A complete CPC-defined CLT (principal, head teacher, and PRT) was in place at any point during the school year	
Head teacher provides active leadership	Head teacher was rated as medium or high in active leadership by project staff	
Highly engaged principal	Principal's involvement in implementation of the CPC program was rated medium or high by project staff	Principal's involvement was rated medium or high by project staff <b>OR</b> Principal reported making decisions in collaboration with assistant principal and teachers
<b>Continuity and Stability</b>		
Guaranteed enrollment policy	Students were guaranteed continuous enrollment in the same site (or affiliated elementary school)	
Consistent leadership team	Principal, head teacher, and PRT remained in their roles from one year to the next	School principal remained in their leadership role from one year to the next
At least 80% retention rate	At least 80% of students were retained in the site from one year to the next	
<b>Professional Development (PD)</b>		
In-person and online coaching support	Erikson PD program was implemented with "high" or "very high" fidelity (as rated by Erikson facilitators)	
Site mentors support Head Teachers	Mentor logs reported at least two mentor visit per year	School received at least one visit per semester from a dedicated PD coach
Review of online PD modules	At least two Erikson PD modules were implemented at the site (approximately 5 hours of PD, on average)	
<b>Parent Involvement (PI)</b>		
Parent resource room	School/site provided a dedicated parent resource room	
PRT and SCR outreach worker present	A PRT and SCR were both in place for at least six months out of the school year	
Ample, diverse opportunities for PI	PI logs provided evidence that the site facilitated at least one event per month (on average) in each of six categories	
PI opportunities address parent needs	PI logs provided evidence of at least nine events in each category identified in the needs assessment	There was evidence that the site assessed family needs <u>and</u> provided at least nine events in at least one CPC event category <i>other</i> than school involvement

**Appendix 4.** Operational definitions of the Gates Foundation 15 Elements for sites/classrooms in the MCPC project during the 2012-2013 school year.

Element and Definition	Recommendation met by CPC classrooms if...	Recommendation met by non-CPC classrooms if...
<b>Education and compensation:</b> Teachers earn a B.A. and early learning credential, and are compensated at the same level as K-3 teachers	Teacher had at least a bachelor's degree, AND... ...was licensed in a state that required training in early learning <u>or</u> reported other specialized training (e.g., a B.A. in early childhood education), AND ... ...was employed by a district <u>or</u> received compensation comparable to district teachers.	
<b>Adult-child ratios:</b> Maximum class size of 22, and adult:child ratio between 2:15 and 2:22	Class size did not exceed 22 AND adult:child ratio did not exceed 2:22.	
<b>Two adults in the classroom</b>	Two adults were consistently present in the classroom (e.g., a teacher and teaching aide)	
<b>Teacher-child interactions focused on learning:</b> Teachers use structured activities and play	On the Classroom Activity Report, teacher indicated a balance of child-initiated and teacher-directed activities (in line with the CPC definition, 35 to 65% of class time was child-initiated).	Teacher reported on the CAR that 35 to 65% of time was spent on child-initiated activities <u>OR</u> spent time on both child- and teacher-directed activities (based on the CLAC) <u>OR</u> scored above the district mean on CLASS Emotional Support
<b>Formative assessments:</b> Classroom-based assessments designed to help teachers & administrators improve outcomes	Program implemented some form of systematic assessment to monitor student progress. (All classes met this recommendation by implementing the TS GOLD or IGDI/PALS.)	
<b>Learning Time:</b> 6-6.5 hours/day, 180 -205 days/year	Programming was provided for six or more hours per day.	
<b>Support for DLLs:</b> Bilingual teachers & specialists	Program was affiliated with a school district (which would routinely provide these services) <u>or</u> showed other evidence that DLL and/or special education support was provided.	
<b>Support for students with special needs:</b> Early intervention		
<b>Age-appropriate learning standards:</b> Goals for academic and social-emotional learning align w/ the expectations of kindergarten and beyond	Program learning standards were aligned with state or national learning standards <u>and</u> these standards addressed both academic and socioemotional domains.	
<b>Proven curriculum:</b> Research-based curriculum that is aligned with cognitive and social-emotional goals and teachers' professional development	For at least one primary curriculum used at the site, CPC project staff were able to find independently gathered evidence (i.e., not from the publisher) that the curriculum was linked to improved outcomes for <i>preschoolers</i> .	
<b>Data-driven decision making:</b> Program uses data to inform action and improve outcomes for children, as part of a cycle of continuous improvement	Principal reported that teachers were expected – to a “moderate” or “great” extent (score of 3 or higher on a four-point scale) – to use student data to strengthen classroom practice and set goals for individual children	
<b>Professional development:</b> Ongoing coaching focused on improving teacher-child interactions	Teachers at the site participated in PD provided by the Erikson Institute (3-4 modules) <u>and</u> received individualized support from CPC mentors.	Teachers at the site participated in organized PD (organized by principal or district) <u>and</u> received individualized support from coaches.
<b>Integrated systems:</b> Learning goals, curriculum, professional development, formative assessments, and data are tied together and are mutually reinforcing	Site demonstrated excellent fidelity of CPC program implementation (indicated by a rating of at least 3.5 on a five-point scale) for the Aligned Curriculum, Professional Development, <u>and</u> Collaborative Leadership CPC program elements. All non-CPC sites received a rating of 0 on this element.	
<b>Strong leadership:</b> Educators create a culture of high expectations, public commitment, and communicate importance of quality to parents	Site's head teacher was rated medium/high in active leadership, and principal was rated medium/high on involvement in implementation of the CPC program, by project staff	Principal's involvement in school activities was rated medium/high by project staff <u>OR</u> Principal self-reported making decisions in collaboration with the assistant principal and teachers
<b>Public commitment:</b> Support from elected officials, courts, policy environment to sustain public commitment to high-quality pre-K	Site was located in a state that provided publicly-funded PreK services and a school district that demonstrated commitment to high-quality PreK above and beyond the provision of basic services (e.g., was willing to support implementation of an experimental program like CPC)	