Published in final edited form as:
Science. 2007 March 30; 315(5820): 1795–1796.

Opportunities to Learn in America's Elementary Classrooms

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Abstract

Observations in 737 5th-grade classrooms reveal high amounts of basic skills instruction in reading and math as whole-group or individual-seatwork, delivered with mediocre instructional quality. Cooperative learning, technology, social studies or science are rare. Observed opportunities show little association with features of teachers or schools. Across 1st, 3rd and 5th grades, classroom quality is low if children are poor or are low on achievement; for others quality is inconsistent across grades. The promise of legislative mandates for high quality educational programs will depend on more accurate assessments of teaching and must address inequity in access to high-quality educational experiences.

America's students have been tested regularly for many years, with results being used to close schools, fire principals, award merits, and focus professional development and curriculum reform. Nevertheless, little attention is paid to measuring what teachers do to foster learning--the quantity and quality of classroom instruction. Nearly all state certification standards for "highly-qualified-teachers" focus only on degree status, not teaching performance (1,2). Despite evidence that teachers' instructional practices and relationships with students account for a significant portion of the "added value" for achievement of attending school (3,4,5), few studies *observationally* chronicle actual classroom experiences for large samples of students and teachers. Indeed, no research to date documents children's observed classroom experiences *over time*.

Here we describe results from a longitudinal study tracking the nature and quality of elementary-school classroom experiences for more than 1,000 American children recruited at birth from 10 U.S. sites and enrolled in more than 2,500 classrooms distributed across more than 1,000 elementary schools and 400 school districts. Our investigation is the closest approximation to an epidemiological study of opportunities to learn in American classrooms, with the caveat that the sample was not constructed as nationally representative. Virtually all of the teachers observed were credentialed by their state and meet current standards for highly qualified elementary-school teachers (1).

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Standardized observation of classrooms provides a complement to the current focus on student test performance as the measure of quality in the educational system and can document opportunities to learn that presumably produce student test performance. We describe results from observations in 5th grade, in which we: a) coded the presence of 44 behavioral events for 80 one-minute intervals dispersed in 10-minute cycles over approximately 6 hours and b) rated 9 dimensions of the quality of the emotional and instructional climate. This 5th grade protocol was identical to approaches used in 1st and 3rd grades. Descriptions of these methods and information on the NICHD Study of Early Child Care and Youth Development are available in the supplementary on-line materials and at http://secc.rti.org/.

Results

Experiences in an elementary-school classroom

Table 1 presents data for 5th grade, showing results nearly identical to 1st and 3rd grades, which are reported elsewhere. Most of the day (91.2%) children worked in whole-group or individual-seatwork settings. Elementary students spent very little time (< 5%) in small-group instruction. In 5th grade more than 30% of instruction was in literacy and 25% was in math; in 1st and 3rd grade over 50% was in literacy and less than 10% was in math. Science and social studies activities occurred less than 10% of the time. The average 5th grader received 500% more instruction in basic skills than teaching focused on problem solving or reasoning; this ratio was 10:1 in 1st and 3rd grades. About 20% of the time teachers were instructing students on managing materials or time. These averages obscure variation across classrooms; see Table 1.

Classrooms were rated on 9 dimensions of emotional and instructional climate using 7-point scales (6,7). Higher ratings were predictive of gains on standardized tests of reading and math in pre-kindergarten (8); reading in first grade (3) and math in 5th grade (7). With ratings of “3” reflecting modest levels of quality, emotional climate of classrooms was judged moderately positive, with “teacher sensitivity” and “positive classroom climate” being rated approximately “5.” Classrooms were fairly busy, with “productive use of time” rated 4.9. Ratings of instructional climate were low. “Richness of instructional methods,” reflecting conceptually-focused instruction, averaged 3.6 and “evaluative feedback” on student performance averaged 3.44. Overall quality of instruction involved one method or mode of instruction (e.g., vocabulary worksheet, watching teacher do math problems), with generic, perfunctory feedback on correctness. Ratings of quality, like exposure measurements discussed earlier, were similar to those for 1st and 3rd grades.

What predicts classroom climate?

To address this question, we combined ratings into composites reflecting emotional and instructional climate and related these to teacher, student, child and family factors, including teachers’ years of experience and salary, family income, and child ability and skills; see Table 2. Teacher credentialing was not investigated because nearly all teachers met state requirements.

Regarding teacher characteristics, emotional climate proved more positive when teachers reported having more influence on school policy and greater feelings of efficacy. Larger class size was associated with somewhat less positive emotional climate. Quality of instructional climate was higher when teachers had somewhat fewer years of teaching experience, earned higher salaries and reported more influence on school policy and greater efficacy. The magnitude of all reported associations was very small and causal direction is unknown. Total variance accounted for (R^2) of observed classroom quality by these teacher, classroom, and school characteristics (using regression) was 0.04 for emotional and 0.06 for instructional

climate. Emotional and instructional climate were higher for children of more highly educated mothers and from families with higher income levels. All significant associations were small.

How consistent was a child's classroom experience across 1st, 3rd, and 5th grades?

Not very—and results were not a function of (some) children switching schools. Although quality of emotional environment was modestly stable from one observation to the next (r =. 17, $p < .05$ and r = .25; $p < .05$), quality of instructional climate was not (range: r =.05 to r = . 12, p = ns). To further examine consistency, emotional and instructional climate composites were divided into terciles at each grade and children classified as "consistently" in high- or low-quality classrooms (if in the high or low tercile on 2 or more occasions across grades 1, 3 and 5 and never in the low tercile). Only 17% of children experienced consistently high-emotional-climate classrooms with 19% experiencing consistently low-emotional-climate classrooms. Comparable figures for instructional climate were 14% and 20%. Across all 3 grades, 7% of children experienced classrooms high on instructional and emotional climate.

Does family poverty or child ability predict consistency of schooling?

As predictors, we used the consistency classifications just described, the child's scores on standardized tests of reading and math at 54 months (divided into terciles), and family income-to-needs ratio (using Federal guidelines for poor, near-poor, not-poor). Children from non-poor families and who scored high on achievement at 54 months were most likely to experience classrooms high in positive emotional climate throughout elementary school. Poor children were highly unlikely (only 10%) to experience high-instructional-climate classrooms across multiple grades.

Discussion

In this multi-state observational and longitudinal study of children in American primary-school classrooms, opportunities to learn for this sample of mostly middle-class students proved highly variable and did not appear congruent with the high performance standards expected for students or those described by most state teacher certification and licensure documents. Rather, experiences in 5th grade, although highly variable, were geared toward performance of basic reading and math skills, not problem-solving or reasoning skills or other content areas. Few opportunities were provided to learn in small groups, develop/practice/exercise analytic skills, or engage in extended interactions with teachers. Moreover, classroom opportunities were not related to teacher training or credentials or to regulations intended to produce effective teaching. Although teachers met credentialing standards, their classrooms offered mediocre instruction and support for students' development, even if emotionally positive. For children who needed support it was unlikely to be provided consistently.

Stakeholders interested in ensuring access to high-quality teaching should be concerned that opportunities to learn in classroom settings are unrelated to features used to regulate such opportunities and that those most in need of high-quality instruction are unlikely to experience it consistently. In painting a picture of elementary schooling consistent with national studies of pre-kindergarten, kindergarten (9),1st, and 3rd grades (6,7) this investigation poses a challenge for education policy and teacher preparation: If definitions and assessments of high-quality teaching and the mechanisms for ensuring equal access to high-quality educational experiences rely on teachers' credentials, degrees, or school attributes, as they currently do, actual opportunities to learn may not be altered (2).

It is important to note that this study was large and relied upon direct observations of classrooms, using instruments predictive of students' gains in achievement. Aspects of classrooms observed—emotional and instructional support—contribute to the elimination of

the achievement gap in 1st grade for students at risk of low performance (3), predict growth in children's functioning in large-scale studies of pre-kindergarten children and classrooms (8), and predict reading and math achievement growth and social functioning through 5th grade in the present sample (10,11). A recent national study in England, using these and other scales, reported a similar pattern of effects for elementary students (5). Other reports concur that these features of teacher-child interaction are indicative of good teaching (e.g., 12,13). Collectively, these investigations demonstrate that developmentally-beneficial features of classroom experience can be observed reliably in large numbers of classrooms and that such observations capture a portion of the "value-added" effect of enrollment in a given classroom. To pose matters differently, given that value-added modeling of student achievement shows that classrooms and teachers matter (4,14), for these approaches to contribute more powerfully to an evidence-based agenda for improving classroom teaching and the preparation of teachers, classrooms need to be observed. Value-added research that integrates observations (e.g., 5) can enhance knowledge of the mechanisms through which classrooms exert their influence on children's development--and how such effects can be produced.

This study's results provide sobering evidence regarding the nature, quality, and distribution of opportunities to learn in American elementary classrooms. Science and policy aimed at producing and maintaining effective teaching is as pressing a need as curriculum and assessment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

This research is directed by a steering committee and supported by NICHD through a cooperative agreement (U10).

References

1. U.S. Department of Education. Definitions from the No Child Left Behind Act. 2002. www.ed.gov/policy/elsec/leg/esea02/pg107.html#sec9101
2. Educational Testing Service. Where we stand on teacher quality: An issue paper from ETS. 2004. http://tfp.ets.org/pub/corp/positon_paper.pdf
3. Hamre BK, Pianta RC. Child Dev 2005;76:949. [PubMed: 16149994]
4. Nye B, Konstantopoulos S, Hedges L. Educ. Eval. & Pol. Analy 2004;26:237.
5. Sammons, P., et al. Variations in teacher and pupil behaviors in Year 5 classes. Institute of Education, University of London; London: 2006.
6. NICHD Early Child Care Research Network. Child Dev 2002;71:960.
7. NICHD Early Child Care Research Network. Elem. Sch. J 2005;105:305.
8. Howes C, et al. Dev. Psych. (in press)
9. Pianta RC, La Paro K, Payne C, Cox MJ, Bradley R. Elem. Sch. J 2002;102:225.
10. NICHD Early Child Care Research Network. Child Dev 2004;74:1639.
11. NICHD Early Child Care Research Network. AERJ-TLHD. (under review)
12. Bogner K, Raphael L, Pressley M. Sci. Studies of Reading 2002;6:135.
13. Brophy, J.; Good, T. Handbook of Research on Teaching. Wittrock, M., editor. MacMillan; New York: 1986. p. 328-375.
14. Sanders, WL.; Rivers, JC. Cumulative and residual effects of teachers on future student academic achievement. University of Tennessee Value-Added Research and Assessment Center; Knoxville: 1996.

Table 1

Descriptions of Fifth Grade Classroom Settings: Mean Number of Intervals[1] in which Time-Sampled Codes Were Observed

	# of intervals[1]	S.D.	Range
Setting			
Whole class	31.68	10.26	0 - 57.00
Large group > 5	0.87	2.98	0 - 29.25
Small group ≤ 5	4.42	5.64	0 - 35.25
Individual	23.04	9.77	0 - 54.00
Activities			
Literacy/language arts	21.97	8.64	0 - 48.00
Word-level	10.03	8.12	0 - 48.00
Comprehension	16.93	9.39	0 - 58.50
Mathematics	14.64	6.45	0 - 42.75
Computation	10.51	7.27	0 - 42.00
Concept/problem-solving	4.23	5.68	0 - 35.25
Science	6.81	6.88	0 - 37.50
Social studies	7.85	7.02	0 - 36.00
Enrichment	1.50	3.57	0 - 30.00
Technology	1.30	3.39	0 - 22.50
Free time	0.33	1.57	0 - 19.50
Transition/management	10.25	5.77	0 - 39.00
Teacher behavior			
Attends to child	5.05	3.34	0 - 21.75
Teaches basic skills	18.99	8.79	0 - 44.25
Teaches analysis/inference	3.97	4.65	0 - 27.00
Managerial instructions	10.78	5.23	0 - 30.75
Disciplines	0.59	1.37	0 - 16.50
Positive affect	1.49	2.31	0 - 18.75
Negative affect	0.24	0.88	0 - 9.75

[1] Reflects the number of intervals in which code was registered based on a 60-interval scale. Actual number of intervals ranged up to 80.