

Association Between the Quality of Teacher-Child Interaction and Language Development

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Abstract. The article presents a review aimed at studying the relationship between classroom quality and preschoolers' language development. Classroom quality is understood as the quality of teacher-child interactions in the kindergarten classroom. The rationale for this study is determined by multiple findings that language devel-

opment at preschool age is a powerful predictor of schooling outcomes.

Research results are analyzed and systematized separately for three domains of the Classroom Assessment Scoring System (CLASS™): instructional support, emotional support, and classroom organization. We demonstrate which aspects of language development (phonological awareness, vocabulary, sound-letter knowledge) are affected more or less by classroom quality. The article presents the results of correlational and longitudinal studies. The high level of agreement among their findings indicates effectiveness of the CLASS™ as a method to assess classroom quality and the significant impact of classroom quality on language development in the three domains specified.

Keywords: preschool age, classroom quality, Classroom Assessment Scoring System (CLASS), instructional support, emotional support, classroom organization, language development, vocabulary, phonological awareness, sound-letter knowledge.

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Education quality enjoys the status of an independent field of research today [Burchinal et al. 2009; Peisner-Feinberg et al. 2001], and the past decade has seen diversification of research problems within the field. A bunch of studies analyze the influence of teacher-child relationship on preschoolers' cognitive, emotional, and social development [Palermo et al. 2007]. Cross-disciplinary studies designed to

identify the most efficient strategies of investing in education development [Barnett 2008; Heckman 2006] are growing in number. What all those research directions have in common is the focus on kindergarten classroom quality as a critical factor of child development [Mashburn et al. 2008; Pianta, La Paro, Hamre 2008].

This article provides a review of studies on the association between classroom quality and language development of preschool children. Our interest in language development is driven by its essential role in the development of children's cognitive abilities, emotional self-regulation skills, and psychological readiness for school.

Classroom Quality

Modern studies discriminate between early childhood learning environment and classroom quality. Learning environment is assessed with easily measurable indicators, such as teacher-child ratio, availability of materials and facilities for children's creative and play activities, accessibility of materials, teachers' experience and professional qualifications [NICHD Early Child Care Research Network 2005]. The quality of learning environment is assessed in global research using the *Early Childhood Environment Rating Scale (ECERS-R)* [Harms, Clifford, Cryer 2014]. This instrument measures some aspects of classroom quality, too. However, the resulting assessment is comprehensive and normally does not provide a complete picture of kindergarten classroom interactions.

Classroom quality is harder to evaluate because it is teacher-child interactions that should be assessed. The existing characteristics of classroom quality have descended from psychological theories of human development. John Bowlby's theory of attachment [Bowlby 1969] gave birth to the concept of dynamics of interpersonal relationships; Urie Bronfenbrenner's theory of ecological systems [Bronfenbrenner 1986] is where understanding of family as an aggregate of hierarchical subsystems has come from; Lev Vygotsky's cultural-historical approach to development [Vygotsky 1980] provided evidence for the important role of communication in children's mental development. The most efficient instrument for observing those characteristics is the Classroom Assessment Scoring System™ (CLASS™) [Pianta, La Paro, Hamre 2008; Almazova, Bukhalenkova, Simonyan 2018].

This study focuses on classroom quality as a factor of language development, since a number of publications testify that it plays a guiding role [Justice, Piasta 2011; Vasilyeva, Waterfall 2011]. In particular, language development in early childhood is related to child's interactions with adults and peers in the kindergarten [Catts, Adlof, Weismer 2006; Curby et al. 2009; Hu et al. 2016; NICHD Early Child Care Research Network 2005, and others]. We expect that a review of available studies will allow us to identify the components of early childhood classroom quality that affect preschoolers' language development the most. The main contribution of this study is that disaggregat-

ed findings in this field are analyzed and systematized in the Russian language for the first time. Our review seeks to answer the following research questions:

1. Is there agreement among the findings of the studies using the CLASS™ instrument to assess classroom quality?
2. Does teacher-child interaction quality have a statistically significant impact on preschool children's language development?
3. Does this impact vary as a function of children's socioeconomic status and personal psychological characteristics?

Indicators of Language Development

Language development is an umbrella term covering several mental processes that a child needs to acquire oral and written language skills. The National Early Literacy Panel's report distinguishes between phonological development, lexical development, syntactic/grammatical development, and sound-letter knowledge as components of language development [Lonigan, Shanahan 2009]. Phonological development involves the ability to detect spoken language and individual phonemes as well as to produce sounds and words using the articulation skills acquired. Lexical development is assessed through the effectiveness of learning the meaning of words (lexical units); it is expressed as the size of a child's vocabulary. Syntactic/grammatical development is about learning the rules to combine words into sentences. Finally, sound-letter knowledge is the ability to associate sounds (letters) with graphical symbols, which includes early reading and writing skills.

Similar classifications of language development milestones are presented in Russian publications. Tatiana Akhutina and her colleagues suggest treating oral praxis as manifestation of articulation development, rhythm and word repetition and oral speech comprehension as the outcome of phonological development, ability to name objects and actions as an indicator of lexical development, and understanding and use of syntax as a measure of syntactic development [Akhutina et al. 1996]. Lyubov Tsvetkova and Izabella Abeleva identify the sensorimotor, lexicogrammatical, and psychological levels of language development [Abeleva 2012; Tsvetkova 2004]. The sensorimotor level is responsible for auditory speech perception; the lexicogrammatical level is where speech is processed (comprehension of words and the structure of single utterances); and the psychological level is that of written and oral speech comprehension.

This review will rely upon the typology used in the National Early Literacy Panel, as it fully matches the methodology of the studies analyzed [Lonigan, Shanahan 2009]. Those studies confine themselves to exploring phonological awareness, vocabulary, and sound-letter knowledge as aspects of language development, leaving out syntax—probably because syntactic awareness and knowledge are hard to assess in preschool children.

Search Strategy The review covers studies on the relationship between classroom quality and language development (phonological awareness, vocabulary, and sound-letter knowledge) published between 2009 and 2018. When selecting the publications, we considered the teacher-child ratio in kindergarten classrooms (excluding the studies with three and fewer students per teacher). The review does not include studies with sample groups smaller than 13 children. The electronic databases Web of Science and eLibrary were used to search for full texts of the articles. Of the 30 publications found, 25 satisfied the search criteria specified above. The selected studies analyze children aged 3–7 years attending kindergartens in Australia, Great Britain, China, Portugal, the United States, Finland, and Sweden.

Classroom Quality Assessment Methodology All the studies reviewed use the CLASS instrument to assess classroom quality [Pianta, La Paro, Hamre 2008], as it works perfectly for establishing the picture of teacher-child interactions in the kindergarten. Our methodology takes cue from empirical findings that demonstrate the crucial role of adult-child interactions throughout children's mental development [Downer, Sabol, Hamre 2010]. Data on classroom interactions is collected using the method of structured observation in which an expert observes teachers instruct and communicate with children in a few consecutive 20-minute observation cycles. Within each cycle, the expert documents carefully the characteristics of teacher-child and peer interactions across three domains: emotional support, instructional support, and classroom organization.

The emotional support scale captures how teachers create an emotionally safe environment, which implies establishing friendly (literally “warm”) and supportive relationships with children. Important effects of emotional support on children include enjoyment in learning, comfort in the classroom, and appropriate levels of independence in choosing activities and peers to interact with.

The instructional support scale is designed to evaluate the tools that teachers use to develop cognitive and language skills in children. It captures how teachers promote children's thinking and engage them in learning (diversity of learning materials and interaction patterns). The score will be high if teachers regularly give challenging tasks to children and encourage them to solve the tasks independently, supporting and extending their ideas. Teacher feedback quality is an essential ingredient of preschool teaching: it must be personalized and extensive, and stimulating generation of new ideas (not just being the “correct-answer” type).

The classroom organization scale allows assessing the effectiveness of instructional strategies and the quality of classroom organization. A high score is awarded if the teacher promotes self-regulation skills in children, has clear and uncontroversial expectations about their behavior, communicates the rules for group interaction in

a clear way, and fosters commitment to those rules in all kinds of situations.

Therefore, the CLASS enables experts observing kindergarten classrooms in real life to evaluate comprehensively the quality of classroom interactions. The three scales assess different aspects of interactions, providing for differentiated analysis of classroom quality.

Language Development Assessment Methodology

The phonological component of language development (phonological awareness, oral language comprehension) was assessed using the Test of Preschool Early Literacy [Lonigan et al. 2007], the Phonological Awareness and Literacy Screening [Invernizzi et al. 2004], and the phonological skills test methods proposed by Minna Torppa [Torppa et al. 2007].

Children's lexical development was evaluated using such tools as Peabody Picture Vocabulary Test [Dunn et al. 1965], Test de Vocabulario Imagenes Peabody [Dunn et al. 1986], Chinese Version of the Peabody Picture Vocabulary Test [Lu, Liu 2005], and Picture Vocabulary Subtest of the Woodcock-Johnson [Woodcock et al. 2001]. The Oral & Written Language Scale was used to test children's oral expression skills [Carrow-Woolfolk 1995].

Researchers made inferences about children's ability to detect and use sound/symbol correspondences by testing their knowledge of letters and numbers with the Woodcock-Johnson Tests of Cognitive Abilities [Woodcock et al. 2001] and the Tool for Assessing Reading and Writing Skills [Lerkkanen, Poikkeus, Ketonen 2006] and their understanding of the forms and functions of written language with the Preschool Word and Print Awareness assessment [Justice, Piasta 2011] and the Test of Preschool Early Literacy [Lonigan et al. 2007].

Correlational Studies

A meta-analysis of ten studies evaluating phonological development and letter-sound knowledge [Aikens et al. 2010; 2012; Bulotsky-Shearer et al. 2014; Burchinal et al. 2009; Curby, Brock, Hamre 2013; Dotterer et al. 2013; Peisner-Feinberg et al. 2008; Peisner-Feinberg, Schaaf, LaForett 2013; Weiland et al. 2013; West et al. 2010] was conducted by Michal Perlman and his co-authors [Perlman et al. 2016] to assess the relationship between classroom quality and children's mental development. The aggregate sample included over 7,000 children aged 4–6. The meta-analysis did not reveal any significant relation between vocabulary size or letter knowledge and CLASS indicators. Such results, however, could be explained by using an inefficient method of data analysis. In a methodological study, Christina Weiland and her co-authors demonstrated low efficiency of using correlational procedures to assess the association between preschool quality and children's developmental outcomes [Weiland et al. 2013].

The sharp decline in the number of correlational studies in the field is probably explained by the need to figure out which methods actually work.

Longitudinal Studies

An alternative to correlational analysis is longitudinal studies. Their design allows observing the development of children in kindergarten classrooms of different quality over a long period of time. Bridget E. Hatfield regards longitudinal studies as a type of natural experiment, in which classroom quality is the experimental condition [Hatfield et al. 2016]. The longitudinal method makes it possible to control for additional factors affecting language development (socio-economic status, cultural and ethnic background, etc.) by measuring the impact of classroom quality on language development. For this purpose, researchers observe children twice, at the beginning and at the end of a kindergarten year. Analysis of the differences between the baseline and end-of-year assessment results provides for experimental evaluation of the role of classroom characteristics in children's mental development. Below, we will focus on the longitudinal studies analyzing language development characteristics as indicators of preschoolers' mental development.

A number of studies reveal a significant impact of instructional support quality on sound-letter knowledge and vocabulary [Aikens et al. 2010; Burchinal et al. 2009; 2010; Dotterer et al. 2013; Howes et al. 2008; Mashburn et al. 2008]. It has been established that children in classrooms offering a higher quality of instructional support show significantly greater gains in vocabulary learning, oral expression, and letter knowledge. According to Andrew J. Mashburn, developmental effects depend largely on the quality of teacher-child interactions, whereas curriculum, class size and teachers' qualifications have no significant influence on children's development [Mashburn et al. 2008:742].

Ying Guo and her colleagues found emotional and instructional support to be statistically significant predictors of children's print awareness and vocabulary knowledge [Guo et al. 2010]. A few years later, the research team conducted a study to examine how vocabulary gains were affected by classroom quality and classroom age composition [Guo et al. 2014]. During a preschool year, children attended mixed-age and same-age classrooms of differing quality. Of all the parameters analyzed, only classroom organization was found to have a significant impact on vocabulary gains.

Some research groups have found emotional support quality to have significant effects on the development of letter-sound knowledge [Hamre, Pianta 2005; Pakarinen et al. 2017; Silinskas et al. 2017]. A Finnish research team led by Gintautas Silinskas revealed that Grade 1 reading outcomes are much better in classrooms in which teachers show warmth and sensitivity, provide well-established routines, and

set clear expectations for student behavior [Silinskas et al. 2017:1]. The studies mentioned discover differences in how teacher-child interaction quality affects language development as a function of children's individual characteristics. Bridget K. Hamre and Robert C. Pianta demonstrate that positive effects are higher for children with fewer socioeconomic resources as well as for those with behavioral, communication, and cognitive problems. Eija Pakarinen and her co-authors found positive effects of classroom interactions to be stronger for children who initially had difficulties with language development than for those who never experienced such problems.

A Chinese research team assessed kindergarten effectiveness by examining the relationship between investment of financial resources in early childhood education and student cognitive development [Hu et al. 2016]. Of all the parameters analyzed, only teacher-child interaction quality was a significant factor of vocabulary development. The effect of instructional support was most salient, followed by emotional support and classroom organization.

As Hatfield and her colleagues found out, children in well-organized classrooms show significantly greater gains in print and phonological awareness than those in poorly organized classrooms [Hatfield et al. 2016]. However, classroom organization quality only has significant impact on language development in classrooms with high levels of emotional support.

Terri J. Sabol and her co-authors examined the influence of preschool classroom quality and children's engagement in learning on language development [Sabol, Bohlmann, Downer 2018]. Engagement in learning was assessed as observed children's individual engagement with teachers and peers and their interest in learning activities. Quality of instructional support and classroom organization was found to influence the development of sound-letter knowledge. The scholars emphasize that children's positive engagement was a more powerful predictor of language development than the indicators of classroom quality. Their findings offer a new perspective for classroom quality research as they provide evidence for the significance of individual psychological characteristics of children as educational actors.

Discussion A meta-analysis of studies examining the association between classroom quality and preschoolers' language development conducted by Perlman and his colleagues [Perlman et al. 2016] revealed no statistically significant relations. Similar findings were obtained in another meta-analysis [Cornelius-White 2007]. Longitudinal studies turned out to be more informative. Table 1 combines the results of the reviewed studies that measure association between the CLASS and preschool children's phonological awareness, vocabulary, and letter-sound knowledge.

Table 1. Association Between the CLASS Measures and Components of Preschoolers' Language Development

Author(s)	N	Age	Language Development Assessment Methods	ES	IS	CO
Aikens N. et al. 2010	3,315	3–4 years	[PPVT-4; Dunn 2006] - Vocabulary [WJ-III; Woodcock 2001] - Letter-sound knowledge		+	
Guo Y. et al. 2010	328	3–5 years	[PPVT-III; Dunn 1997] - Vocabulary [PWPA; Justice 2001] - Letter-sound knowledge [PALS; Internizzi 2004] - Phonological awareness	+	+	
Guo Y. et al. 2014	130	4–5 years	[PPVT-III; Dunn 1997] - Vocabulary	-	-	+
Burchinal M. et al. 2010	1,129	3–4 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness Letter knowledge - Letter-sound knowledge	-	+	
Dotteter et al. 2012	3,584	3–5 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness [WJ-III; Woodcock 2001] - Letter-sound knowledge	-	+	
Howes C. et al. 2008	2,8	3–4 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness [WJ-III; Woodcock 2001] - Letter-sound knowledge	-	-	
Mashburn J. et al. 2008	2,439	4–5 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness [WJ-III; Woodcock 2001] - Letter-sound knowledge	-	+	
Hamre B et al. 2005	919	5–6 years	[PPVT-4; Dunn 2006] - Vocabulary [WJ-III; Woodcock 2001] - Letter-sound knowledge	+	-	
Hamre B et al. 2013	1,407	4–5 years	[PPVT-4; Dunn 2006] - Vocabulary [WJ-III; Woodcock 2001] - Letter-sound knowledge	-	-	
Silinskas G. et al. 2017	1,029	5–7 years	Reading of letters and words - Letter-sound knowledge	+	-	+
Pakarinen E. et al. 2017	515	6–7 years	[Torppa 2007] - Phonological awareness	+	-	+
Hu Y. et al. 2013	589	5–6 years	[C-PPVT-R; Lu 2005] - Vocabulary	+	+	+
Hartfield B. et al. 2015	875	3–4 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness [WJ-III; Woodcock 2001] - Letter-sound knowledge	-	+	-
Burchinal M. et al. 2013	929	4–5 years	[PPVT-III; Dunn 1997] - Vocabulary [OWLS; Woolfolk 1995] - Phonological awareness [WJ-III; Woodcock 2001] - Letter-sound knowledge		-	
Sabol T. et al. 2018	211	4–5 years	[PPVT-III; Dunn 1997] - Vocabulary [WJ-III; Woodcock 2001] - Letter-sound knowledge [TOPEL; Lonigan 2007] - Phonological awareness	-	+	-

Notes: (a) ES—Emotional Support; IS—Instructional Support; CO—Classroom Organization; (b) "+" denotes a significant positive relationship between the parameters; "-" denotes that no significant positive or negative relationship between the parameters is observed; (c) Empty cells denote that no data on relationship between the parameters is available.

Analysis of the studies listed above provides answers to the research questions asked at the beginning of this review. The first question concerned agreement among the findings of the studies examining how preschoolers' language development is associated with the classroom quality indicators assessed using the CLASS instrument. There is obvious agreement in assessing the influence of instructional support on different aspects of children's language development, statistically significant effects being reported by most of the studies reviewed. However, salient discrepancies are observed in assessment of the role of emotional support quality. We believe that differences in the magnitude of association between emotional support and language development across the sample may be related to the problem of the "form and content" of communication. The emotional support scale measures teachers' ability to create an emotionally safe environment in the first place, while the instructional support scale evaluates the methods that teachers use to develop children's vocabulary and language skills. It can be thus concluded that instructional support quality does have a more significant impact on children's language development.

A lot of researchers exploring early childhood language development ignore the factor of classroom organization quality. Yet, the few studies that do consider this parameter testify to its high significance. For instance, better-organized classrooms are associated with greater gains in vocabulary [Curby et al. 2009; Hu et al. 2016], phonological awareness [Hu et al. 2016; Sabol, Bohlmann, Downer 2018], and letter-sound knowledge [Pakarinen et al. 2017; Silinskas et al. 2017]. The classroom organization scale of the CLASS instrument evaluates the methods that teachers use to foster children's learning abilities, engagement, and interest in learning. We suggest that including this scale in research may help discover important relationships, since it evaluates the teacher-child interactions that contribute to successful acquisition of new language skills by students.

The second question was whether teacher-child interaction quality has a statistically significant impact on preschool children's language development. A number of large-scale longitudinal studies show that children in better-organized classrooms show significantly higher language development gains in quite a range of aspects, such as vocabulary [Aikens et al. 2010; Curby, Brock, Hamre 2013; Dotterer et al. 2013; Guo et al. 2010; Howes et al. 2008; Hu et al. 2016; Mashburn et al. 2008; Pakarinen et al. 2017], ability to recognize and name letters [Aikens et al. 2010; Burchinal et al. 2010; Hamre et al. 2013], oral speech comprehension [Mashburn et al. 2008], and awareness of written language [Guo et al. 2010; Hatfield et al. 2016].

We believe that greater language development gains in well-organized classrooms can be explained by teachers actively expanding the zone of proximal development [Vygotsky 1980]. Probably, as a result of positive classroom interactions organized by the teacher (high

scores on the emotional support scale), children feel safe, confident, and enthusiastic about engaging in various tasks and conversations. The teacher promotes children's thinking and reasoning skills and creates situations that require classroom discussion (high scores on the instructional support scale). Children in high-quality classrooms tend to organize and express their own ideas on a regular basis, which is observed much less often in classrooms offering low quality of instructional support.

Our third research question was whether the impact of classroom quality on language development varies as a function of children's socioeconomic status and personal psychological characteristics. The available research findings show that the effects vary depending on children's socioeconomic backgrounds and on whether they experience behavioral, cognitive or communication problems as they enter kindergarten [Hamre et al. 2013; Sabol et al. 2018; Silinskas et al. 2017]. Positive effects turn out to be significantly stronger for children of lower socioeconomic status and those with behavioral, learning, and peer communication difficulties than for students outside those categories. Therefore, the risks in child development mentioned above can be mitigated by providing a high quality of teacher-child interactions in the kindergarten classroom.

This review has some important limitations that should be taken into account when using its results. First of all, it does not control for age variability across kindergarten classrooms. Most studies focused on the age of 4–5 years, but some samples included children aged 5–6. At different stages of child life, teacher-student interaction may affect the same aspects of language development in different ways. In addition, the review does not make allowance for region-specific cultural differences due to the lack of data on cultural and ethnic background of study participants in the reports published.

Conclusion This review examines the results of studies on the association between classroom quality and language development of preschool children. A number of studies show that teacher-child interaction quality has a considerable impact on children's language development. For example, students in classrooms offering high interaction quality tend to have greater gains in vocabulary, letter knowledge, and oral speech comprehension than children in lower-quality classrooms. Therefore, it is not unreasonable to argue that high classroom quality is associated with greater children's outcomes in each of the language development aspects analyzed (phonological awareness, vocabulary, and letter-sound knowledge).

A fairly high level of agreement among the study findings indicates that the CLASS is a rather efficient instrument to obtain information on teacher-child interaction quality in research on the association between classroom quality and preschoolers' language development. It

thus offers a promising method that is consistent with the logic of the cultural-historical theory and can be useful for studying classroom quality on Russian samples. The method can also be used to develop learning environment recommendations for kindergartens and preschool educational institutions.

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