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RAQUEL PLOTKA

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Comparing Peer-Interactions, Teacher-Child Interactions, and Challenging Behaviors in Same-Age and Mixed-Age Preschool Classrooms

Raquel Plotka, Pace University, USA

Abstract: Theorists and researchers have conflicting opinions and findings regarding the role of mixed-age classrooms in preschool education. According to Piaget interactions with peers of the same age are preferable, since children closer in age are more likely to learn in similar ways. However, Vygotsky believed that interactions among children of different ages provide an optimal context for development. The present study aimed at assessing whether mixed or same-age classroom status affects the quality of peer interactions, teacher-child interactions, and children's behaviors in the preschool classroom. Data from 308 teachers placed in three, four, and mixed three- and four-year-old classrooms, serving children from low socio-economic status in urban preschools, was analyzed using General Linear Models (GLM). The results have shown that in mixed-age classrooms, teachers reported lower levels of conflicts in peer interactions ($F(1, 302) = 9.92$, $p = .0001$), lower levels of negative teacher-child interactions ($F(1, 302) = 6.13$, $p = .002$), and marginally lower levels of challenging behaviors than in same-age classrooms ($F(1,302) = 3.41$, $p = .06$). The results of this study inform theory and practice regarding the role of mixed-age classrooms in preschool education and can prove valuable in the development and implementation of preschool programs, especially those serving low-income children.

Keywords: Preschool, Mixed-Age Classrooms, Peer-Interactions, Teacher-Child Interactions, Challenging Behaviors

Introduction

Theorists and researchers have mixed opinions and findings regarding the role of mixed-age classrooms in preschool education. According to Piaget (1932), interactions with peers of the same-age are preferable, since same-age children are more likely to have similar problem-solving skills and construct knowledge in similar ways. However, Vygotsky (1978) believed that interactions among children of different ages provide an optimal context for development, as both older and younger children benefit from the process of "scaffolding." Research has resulted in mixed findings, with several studies supporting the benefits of mixed-age classrooms (Rothstein-Fisher and Howes 1988), and several studies supporting the benefits of same-age classrooms in preschool education (Moller, Forbes-Jones, and Hightower 2008).

The Montessori's (1912) approach to early childhood curriculum strongly supports mixed-age classrooms in preschool, claiming it helps children learn to regulate emotions and develop social skills. Similarly, the National Association for the Education of Young Children (NAEYC), the United States' foremost professional organization for early childhood educators, has followed the Vygotsky and Montessori approach and endorsed the implementation of mixed-age early childhood classrooms throughout the United States (NAEYC 1996). Despite the lack of consensus in the field and the relatively little research available in the area, mixed-age classrooms are fairly common in preschool programs across the United States, especially those serving low-income children, such as Head Start. The present study was aimed at addressing the gap in the literature by assessing whether mixed or same-age groups affected social processes in the preschool classroom including peer interactions, teacher-child interactions, and challenging behaviors.

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Support for Mixed-Age Classrooms

Vygotsky (1978) proposed that children in mixed-aged groups gain social skills during the process of "scaffolding," in which a more competent individual supports the learning process of a less competent one, through social interactions and modeling. Through scaffolding, older children have the opportunity to develop confidence and leadership skills, while younger children learn social and language skills from more competent peers. Researchers have found support for Vygotsky's ideas. For example, Rothstein-Fisher and Howes (1988) found that younger children in mixed-age classrooms displayed more complex language use because of their interactions with older children, as compared to children in same-age classrooms. Similarly, they found that younger children displayed more complex social and dramatic play skills as a result of their interactions with older children. Studies have also found several advantages for older children in mixed-age classrooms. For example, Hercheid (1997) found that interacting with younger children resulted in older children displaying more pro-social behaviors and empathy. Likewise, French et al. (1986) found that older children in mixed-age classrooms display more leadership skills. Lastly, research has found that in mixed-age classrooms, older children had the opportunity to develop mentorship skills (Moller et al. 2008).

Researchers have also identified simultaneous benefits for younger and older children. For example, Goldman (1981) observed that in mixed-age classrooms younger and older children engaged in less parallel play and in more interactive play (Goldman 1981). Similarly, in mixed-age classrooms, parents and teachers made less comparisons based on age and focused more on children as individuals (Whale and Kantor 1992). This resulted in a decrease in competition among peers and a focus on mastery-oriented goals. Mixed-age classrooms were found to be especially beneficial for children with disabilities, who benefit from the decrease in comparison and competition and the focus on individual goals that is natural in mixed-age classrooms (Blasco et al. 1993).

Support for Same-Age Classrooms

Nevertheless, Piaget (1932) believed that children are more likely to construct knowledge and problem-solve when they can exchange ideas with peers with similar skills and abilities. According to Piaget, because of older children's modeling and younger children's imitation, younger children might miss out on the opportunity to create their own knowledge. In addition, older children might lack challenging opportunities to test their problem-solving skills. In contrast, in same-age groups peers with similar levels of social power would be able to gain social skills by learning to negotiate and resolve disputes as equals.

Some researchers have found support for Piaget's ideas. For example, the mixed-age classroom had been found to present low academic challenges for older children (Dunn, Kontos, and Potter 1996), and children displayed lower scores in social, motor, and cognitive development with greater age variability in their class (Moller et al. 2008). In addition, researchers found that children engaged in more complex forms of play in same-age classrooms (Roopnarine 1992). They also found that children engaged in less solitary play and participated more in teacher-directed activities in same-age classrooms (Goldman 1981). Furthermore, studies found that in mixed-age classrooms, younger children were involved in more negative interactions (Urberg and Kaplan 1986), and older children were more detached and displayed onlooker behaviors more often (Goldman 1981). In sum, the research findings are not conclusive when it comes to comparing the effects of mixed and same-age classrooms on young children.

The Central Role of Peer Interactions, Teacher-Child Interactions, and Children's Behavior in Preschool

Social processes, such as peer interactions and teacher-child interactions, represent a cornerstone of early childhood education. Promoting an environment that supports these processes is considered to be a priority to preschool educators. Classroom age composition might play an important role in the way children interact with each other, in the way teachers interact with children, and correspondingly, in the behavioral outcomes of children in the classroom. Positive peer interactions play a key developmental role in preschool, and they predict a positive perception of school, better adjustment to kindergarten, and positive academic outcomes in elementary and high school. On the other hand, poor interactions with peers in preschool are associated with lower academic performance and emotional maladjustment (McWayne, Fantuzzo, and McDermott 2004). In addition, peer interactions are especially important for children in low-income urban areas who experience several challenges, and these interactions have been shown to be a protective factor by helping children become resilient in the face of cumulative adversity (Hampton and Fantuzzo 2003).

Similar to peer-interactions, teacher-child interactions are particularly important in the preschool classroom (Dobbs and Arnold, 2009). The preschool teacher is generally the first adult-child interaction outside of the family. Positive teacher-child relationships help children develop social skills to negotiate challenging situations and help children have a more positive perception of school (Moritz Rudasill and Rimm-Kaufman 2009). Positive teacher-child interactions in preschool have a positive influence on children's language, academic performance, and social competence in elementary school (McWayne et al. 2004). A child's ability to respond to social demands with appropriate behavior is a skill developed during the preschool years. By the end of the fifth year of life, the level of a child's ability to control and moderate his or her behavior in response to social situations remains stable for the rest of his or her development (Raikes et al. 2007). On the other hand, challenging behaviors are some of the biggest concerns of preschool teachers, as behavior plays a central role in children's ability to transition and adjust to school and succeed academically. Furthermore, most teachers consider behavior a bigger challenge in early education than a lack of academic skill. For example, Rimm-Kaufman, Pianta, and Cox (2000) found in a national representative group of kindergarten teachers in the United States, most teachers considered problem behaviors a bigger challenge in children's adjustment to kindergarten than academic competency. This finding points to the importance of looking at the preschool years as a key developmental stage to preventing challenging behaviors.

Both peer and teacher-child interactions are central to positive academic experiences in preschool, and it is important to assess what group setting, mixed or same-age classrooms, best promotes positive interactions. Similarly, because of the importance of addressing and preventing problem behaviors in preschool, studying which group setting is more likely to result in lower levels of problem behaviors, can be considered highly informative.

Head Start Programs

Head Start is a national, publically-funded preschool program designed to give low SES children in the United States the opportunity to develop physically, socially, and emotionally and promote school readiness (New York City ACS 2010). Head Start programs strive to give poor children the social and educational opportunities to become successful learners and to be ready for school. All Head Start programs adhere to a series of national performance standards, which require that curricula be developmentally appropriate and encourage social interaction within the classroom as a way to promote children's readiness in multiple domains (Zigler and Bishop-Josef 2006). Head Start follows guidelines sponsored by the National Association for the Education of Young Children (NAEYC), which encourages mixed-age classrooms. Few studies have empirically

tested the role of mixed-age classrooms in Head Start programs, and these studies focused on academic skills (Bell, Greenfield, and Bulotsky-Shearer 2013; Moller et al. 2008). All Head Start classrooms adhere to national performance standards that guide curriculum. Because the same curricular standards are used for same-age and mixed-age classrooms across programs, Head Start classrooms present the ideal setting for comparing the effects of classroom age composition.

Gap in the Literature

The literature on the effects of mixed-age classrooms in preschool is limited, and most studies only focused on academic skills (Bell, Greenfield, and Bulotsky-Shearer 2013; Moller et al. 2008). In addition, although mixed-age classrooms were promoted by movements like Montessori and organizations like NAEYC, there is a lack of consensus as to whether mixed-age classrooms result in benefits for young children. Furthermore, in most studies, children's challenging behaviors and quality teacher-child interactions were not taken into account, despite the central role of these processes in the preschool classroom. In addition, most studies were restricted in the number of classrooms and were conducted in one organization. Very few studies focused on programs targeting low socio-economic status (SES) children (Moller et al. 2008). Lastly, many studies were carried out more than twenty years ago and newer findings might bring light to this research question. The present study attempted to address this gap in the literature by assessing the experience of a large number of preschool teachers in multiple centers serving low SES children.

Research Questions

The present study attempts to answer the following questions:

1. Is the quality of peer interactions different in same-age or mixed-age classrooms?
2. Is the quality of teacher-child interactions different in same-age or mixed-age preschool classrooms?
3. Do teachers experience more challenging behaviors in same-age or mixed-age classrooms?

Method

Participants

The participants were 308 teachers in Head Start preschool centers coordinated by the Administration of Children Services of New York City. There were 119 teachers in mixed three- and four-year-old classrooms, ninety-five teachers in three-year-old classrooms, and ninety-four teachers in four-year-old classrooms. Table 1 depicts the age composition of the classrooms in the sample. All children reached their classroom target age by December 31. The majority of children attending Head Start in New York City are children from cultural and linguistic minority backgrounds, and this is highlighted in Table 2, which illustrates the typical Head Start population in New York City.

Procedure

This study consisted of preschool teachers reporting on their experiences and observations in the classroom. Teachers' reports are widely used in the study of social processes in the classrooms (Rimm-Kaufman et al. 2001) and have shown to have predictive validity (Fuhs, Farran, and Nesbitt 2015). Teachers were recruited by the New York City Administration of Children

Services (ACS), which coordinates about 300 Head Start preschool centers throughout New York City (New York ACS 2010). The New York City ASC Division of Head Start oversees the largest municipal preschool system in the United States, and it provides services to approximately 100,000 children ages three and four (New York City ACS 2010). The director of each center recruited teachers for the study, and teachers were asked to fill out a survey and a consent form. A survey was developed based on measures available in previous research studies. Before the survey was administered, it was shared with small focus groups of Head Start preschool teachers to ensure that it reflects common social processes taking place in the classroom based on teachers' experiences. The survey was edited based on teachers' feedback. This was part of a larger study addressing social and emotional processes in Head Start classrooms in New York City.

Group comparison in a quasi-experimental design with naturally occurring groups was used. This design was used by several researchers studying classroom processes in early childhood, when assigning participants to conditions is impractical or beyond the control of the researchers (Zan and Donegan-Ritter 2014). Head Start classrooms are ideal for group comparisons in a quasi-experimental design because all classrooms and teachers adhere to a national standardized curriculum, and this minimizes the chances of the results being related to curriculum differences, differences in teachers' goals and objectives, or program philosophy.

Table 1: Teachers' Classroom Age Composition

Age Composition of Teachers' Classrooms		Percentage	*N*
Teachers in:	Same-age classrooms	63	189
	Mixed-age classrooms	37	119
	Total	100	308
Teachers in:	Three-year-old classrooms	32	95
	Mixed-age classrooms	37	119
	Four-year-old classrooms	30	94
	Total	100	308

Table 2: Children's Background Characteristics[1]

Background	Percentage
Hispanic/Latino	46
North American/European	33
Multiple/non-Specific	27
Black/African American	25
Asian	5
American Indian	2

Measures

To answer the research questions, a survey was developed in order to measure conflict in peer interactions in the classroom, quality of teacher-child interactions, and challenging behaviors in the classrooms. The survey was adapted from several validated measures used in previous research studies, and was first implemented in small focus groups to verify that the survey covers most classroom situations. The following measures were used as part of the survey.

[1] Data based on New York State Council on children and families

Conflict in Peer Interactions

Conflict in peer interactions was measured by an adaptation of the play disruption dimension of the Penn Interactive Peer Play Scale (PIPPS), developed by Hampton and Fantuzzo (2003). This scale was designed as a teacher's rating scale of children's disruptive peer interactions during play in preschool. This measure was found to be valid for low-income children and has been shown to have sound construct, confirmatory, and predictive validity (Hampton and Fantuzzo 2003). Teachers are asked to rate how often they observe a specific behavior in their classroom. Items included behaviors such as "child is physically aggressive" or "disrupts the play of others." There are a total of eleven items in the scale, and teachers use a Likert-type scale ranging from one to four indicating whether the behavior is seen 1) never, 2) seldom, 3) often, and 4) always. Higher scores indicate higher incidences of the behavior.

Quality Teacher-Child Interactions

The quality of teacher-child interactions was measured in two ways. We measured positive teacher-child interactions and negative teacher-child interactions. Positive teacher-child interactions were measured through items adapted from the Webster-Stratton, Teacher Coder Impressions Inventory (Webster-Stratton 1998). This measure was developed as an observational method of assessing effective teacher-child interaction in the classroom, and in this study teachers were asked to indicate how often they are likely to interact this way with children. Sample items include "teacher praises child" or "teacher follows through," and teachers indicate whether they are likely to do so never, sometimes, often, or very often. Negative teacher-child interactions were measured through the Inappropriate Interactions subscale from the Teacher Strategies Questionnaire. This measure was developed by Webster- Stratton (2009). In this study teachers were asked to indicate how often they are likely to interact with children in such ways. Sample items include "teacher comments in loud voice" or "teacher excludes a child from an activity," and teachers indicated whether they never, sometimes, often, or very often are likely to interact that way.

Challenging Behaviors

Challenging behaviors were measured by a scale developed by Rimm Kaufamn and colleagues (2000) for kindergarten teachers, which focused on the most common challenges children face in their kindergarten classrooms. Teachers were asked to identify for how many children in a typical class the following behaviors were a problem. The items were rated on a five-point scale with higher scores indicating a larger percentage in the classroom displays the behavior. Sample items include "difficulty following directions" and "difficulty working in a group," and for each characteristic teachers were expected to indicate if 1) none, 2) a few, 3) about one-fourth of the class, 4) about half of the class, or 5) more than half of the class faced this problem. Three items from the original survey were not included since they did not apply to a preschool setting.

Classroom Age Composition

For the analysis, teachers were divided into same-age classrooms (n = 189) and mixed-age classrooms (n = 119).

Results

The descriptive statistics are presented in Table 3. Questions one, two, and three were answered by conducting a multivariate analysis of variance through general linear models (GLM) to detect a multivariate difference between the two groups. A General Linear Model was conducted

because this approach is considered more accurate than running several individual *t*-tests, because one multivariate test minimizes the error and possibility that results are due to chance. Simultaneous follow-up comparisons were conducted to detect the specific differences by group at the variable level. These comparisons are presented in Table 4.

Table 3: Descriptive Statistics

Variable	*Mean*	*S.D.*	*Range*	*N*
Conflict in Peer Interactions	2.44	.59	1–4	308
Positive Teacher-Child Interactions	2.44	.53	1–4	
Negative teacher-Child Interactions	1.98	.48	1–4	
Children's Challenging Behaviors	2.11	.68	1–5	

The results of the General Linear Models indicated multivariate significance, and teachers in same-age and mixed-age classrooms were found significantly different in several ways, GLM: Roy's Largest Root =.007, F (5, 302) = 3.64 ($p < .0001$). Because of the significant multivariate difference, follow-up variable comparisons were conducted.

Table 4: Follow Up Comparisons[2]

Variables	Mean		*F*	*p*
	Same-Age	Mixed-Age		
Conflict in Peer Interactions	2.54	2.31	9.92	.002
Positive Teacher-Child Interactions	2.48	2.38	1.30	.141
Negative Teacher-Child Interactions	2.09	1.93	6.13	.01
Challenging Behaviors	2.18	2.02	3.41+	.06

The study had three research questions assessing whether peer interactions, quality of teacher-child interactions, and challenging behaviors are different for mixed- and same-age classrooms. As shown in Table 4, the results indicate that in mixed-age classrooms, teachers report significantly lower levels of conflict in peer interactions than in same-age classrooms. Similarly, teachers in mixed-age classrooms engaged in significantly lower levels of negative interactions with children than in same-age classrooms. In addition, teachers reported a trend of lower levels of challenging behavior in mixed-age classrooms. These results inform theory and practice regarding the role of mixed-age classrooms in preschool settings.

Discussion

Theorists and researchers differ in their ideas and findings about mixed-age classrooms in preschool, and this topic has never been explored with a large sample of teachers in multiple centers and in low SES classrooms. Similarly, most studies did not take into consideration quality of peer interactions, teacher-child interactions, and children's challenging behaviors, despite the significance of these processes in the preschool classroom. This study attempted to bridge this gap in the literature. This study found support for Vygotsky's assertions and Montessori's ideas regarding the benefits of mixed-age classrooms in preschool. Similarly, this study found support for the NAEYC endorsement of mixed-age classrooms as appropriate and beneficial in early childhood.

[2] $N = 308$

Why Are Social Processes in Mixed-Age and Same-Age Classrooms Different?

This study found that mixed-age classrooms resulted in advantages in peer interactions. As proposed by previous researchers (Whale and Kantor 1992), mixed-age classrooms decrease competition and comparisons. Children learn to understand others as individuals with different skills and abilities and appreciate them for who they are and what they can accomplish in the present. This might reduce conflict during play and other activities as children learn to interact in more cooperative and less competitive ways. In addition, the process of scaffolding might help develop pro-social behaviors and empathy in older children towards younger children and reduce conflict. Similarly, younger children might gain social skills and become more competent peers, which would also result in reduced conflict. This confirms the findings of Hercheid (1997) and Rothstein-Fisher and Howes (1988).

Mixed-age classrooms are especially effective at reducing challenging behaviors for low-income preschoolers. Maria Montessori (1912) developed her approach while working with high-risk, low-income young children in immigrant communities, and found that the mixed-age approach was most effective. Montessori believed that in this specific environment, mixed-age groups helped reduce classroom behavior challenges because mixed-age groups helped children regulate their emotions and behavior and display better social skills in their interactions with children and adults. Montessori explained that as children came into the program and learned to regulate their emotions and behaviors, they taught their skills to new cohorts of younger children and modeled for them ways to deal with conflict in effective and positive ways. This reduced problem behaviors and peer conflict. Children in Head Start classrooms in the United States are from similar backgrounds and experienced similar social risks to the children in Maria Montessori's programs, and, thus, experienced similar benefits in mixed-age classrooms.

Teachers in mixed-age classrooms displayed less negative teacher-child interactions than teachers in same-age classrooms. As previous studies suggested, in mixed-age classrooms teachers develop individual expectations for each child based on their abilities and skills instead of developing generalized group expectations based on age. This might reduce teachers' frustrations and inappropriate expectations, and result in less negative teacher-child interactions. Similarly, it is possible that as peer interactions and challenging behaviors decline, teachers engage in less negative interactions with the children in their classrooms. The differences in teacher-child interactions were found significant in the negative interactions category and not in the positive interactions category. This is common in adult-child interaction research (Kuczynsky and Kochanska 1990). In data based on self-reports, individuals are likely to overestimate their positive interactions. Nevertheless, when individuals admit to negative interactions, even when these are underestimated, they are highly informative and have larger predictive validity than positive interactions.

Implications for Preschool Education

Accessibility to preschool education is growing in the United States and in the world and understanding the benefits of mixed-age classrooms, especially for low-income children, should be considered highly informative in the development of such programs. The results of this study support Montessori's assertion that mixed-age classrooms are beneficial for young children growing up in poverty. These findings should inform new programs targeting young, at-risk children. Mixed-age classrooms can be highly beneficial, because they help children develop appropriate behaviors, peer interactions, and teacher-child interactions, which predict later academic success. Mixed-age classrooms are easier to implement in rural settings, in which resources might not allow for a separate classroom for each age group. One of the advantages of mixed-age classrooms is that they resemble natural community and family settings in which children of different ages might spend most of the day together.

This study also has implications for teachers in established programs and in same-age classrooms. Mixed-age classrooms force teachers to develop individualized expectations for children's behaviors based on children's abilities and needs, instead of generalized group expectations based on age. When teachers develop individualized expectations, they view children in a more positive light, which reduces teacher-child conflict and negative behavior. At the same time, children learn to develop individualized expectations, respect, and value for their peers, based on what their peers can accomplish, rather than age. As a result, the climate in the classroom shifts from competition to cooperation and decreases peer conflict. All teachers of young children, including those in same-age classrooms, can strive to create a cooperative classroom environment guided by individualized expectations of young children based on children's unique strengths, needs, and development instead of group expectations based on age.

Limitations

This study has important strengths, including the large sample size and the use of validated measures. One important limitation of the present study is the variability of age. Mixed-age classrooms included three- and four year-olds and same-age classroom included three- or four-year-old children. Larger variability in age would have been more preferable. Nevertheless, due to the fragmented nature of early childhood education systems in the United States, it is generally difficult to find large age variability in the same early education setting. For example, most five-year-olds are placed in kindergarten as part of the public schools system, infant and toddlers (ages birth-three) are most likely served in childcare centers, and preschoolers (ages three and four), typically join a variety of private or publically funded preschool programs, such as Head Start. Another limitation is that Head Start programs serve low SES children and the results might not generalize to children of other backgrounds.

Conclusion

Theory and research were not conclusive when it came to the advantages of mixed-age classrooms in preschool. This study attempted to bridge this gap in the literature by comparing social processes in mixed-age and same-age preschool classrooms. The findings pointed at the advantages of mixed-age classrooms when it comes to peer interactions, teacher-child interactions, and challenging behaviors for low-income preschoolers. Accessibility to preschool education is growing in the United States and in the world, and understanding the benefits of mixed-age classrooms, especially for low-income children, should be considered highly informative in the development of such programs.

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ABOUT THE AUTHOR

Dr. Raquel Plotka: Assistant Professor, Pace School of Education, Pace University, New York City, New York, USA

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