

# Children's Early Interest-Based Activities in the Home and Subsequent Information Contributions and Pursuits in Kindergarten

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This study examined the early interests of 109 children and their subsequent information contributions and pursuits in kindergarten. Four groups of children with similar interests were identified on the basis of the children's profiles of activities in the home, tracked bimonthly for over a year. Activity patterns reflected conceptual, social, procedural, or creative interests. The role of early interests in understanding academic engagement was investigated, with gender, cognitive skill, and temperament statistically controlled. Observational data from throughout the school year revealed differences in the types of information that children contributed to discussions and pursued in class related to children's early interests. Findings enrich understanding of young children's academic behaviors and extend theoretical models of academic self-instruction behaviors such as information exchanges and pursuits in classrooms.

*Keywords:* early childhood, personal interest, academic participation, information pursuits

Academically successful children institute an anthology of skills supportive of learning. Included among this repertoire of behaviors are self-initiated interactions with and quests for information (Zimmerman, 1989). For example, a good student actively contributes to scholarly discussions in the classroom and independently pursues information about academic topics, tasks, strategies, or performances, among other participation options. These interactions are a forum for students to access, elaborate, organize, integrate, or verify information and enhance understanding (Butler & Winne, 1995; Woloshyn, Pressley, & Schneider, 1992). The ability or willingness to adapt to the cognitive behavioral expectations of school has long-term as well as immediate effects on learning (Krapp & Fink, 1992). Consequently, it is important to understand the factors that may influence young children's academic uses and pursuits of information in the classroom.

Children's personalities, cognitive abilities, and motivational dispositions have all been linked to their academic behaviors (Bjorklund & Schneider, 1996), and interest has been credited as the bridge linking cognition, motivation, and academic outcomes (Hidi & Harackiewicz, 2000; Pekrun, Goetz, Titz, & Perry, 2002). Although numerous studies have investigated the ways in which psychological state variables related to learning such as focus, effort, and persistence are affected by individual interest, the impact of interest on young students' means of academic participation in school—such as self-initiated information contributions and pursuits—has been relatively unexamined.

Children as young as 3 years already express intense interests in particular forms of activity (Renninger, 1989). Interest occurs when a certain object or event triggers a curiosity response or sense of enjoyment (Fink, 1994). Some interest theorists have proclaimed that it is best defined by the content of activity rather than the object of activity because even if interest may be piqued by particular objects, different materials elicit and support different types of experiences and interactions or action potentials (Renninger, 1984). In turn, interest influences not only the way a child engages in a given activity but also the child's representation of interaction possibilities (Renninger, 1990). Consequently, early interest-driven activity types may render certain transactions more familiar or some forms of information more valuable, and future interactions may be informed by early kinds of engagement (Renninger, 1990, 2000).

The study of interest from an action-potential perspective has received relatively little attention in empirical research. To date, the type of interest most heavily investigated has been topic interest (Schiefele, 2001), and in queue, studies of interest outcomes have focused almost exclusively on its influence on children's efficiency or effectiveness in learning subject- or domain-relevant information (Hidi & Anderson, 1992; Hidi, Berndorff, &

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Ainley, 2002; Schiefele, 1990, 2001) or intensity and duration of involvement, dispositions, and motivation to learn in areas of interest (Hidi, 1990; Hidi & McLaren, 1991; Renninger & Leckrone, 1991; Schiefele, 2001). Studies of preschoolers have noted their use of interest objects as adaptive tools or security anchors and use of interest topics to initiate social contact with other children as they transition from home to school (Baum, Renzulli, & Hebert 1995; Krapp & Fink, 1992). However, the influence of interest may transcend content domains and exert more pervasive influence on children's participation patterns across settings. Early interests may direct subsequent participation strategy selection and use. Previous research with singular interest type foci has generated little information about how various interests may prepare children differently for interactions with academic information.

The present study examined children's interest-based activities in the home during early childhood and their subsequent contributions to academic discussions and quests for information in kindergarten. Temperament and cognitive characteristics of the child that could compete to explain differences in these academic behaviors were controlled. Consequently, this study offers an examination of the unique role of various early childhood interests for understanding differences in young children's uses and solicitations of information across domains and learning contexts in school.

### Children's Interests Expressed Through Play

Renninger and Wozniak (1985) suggested that children's interests can be identified by examining their time spent and level of engagement in particular activities relative to others. The activities in which young children consistently involve themselves are believed to reflect general orientations or socialized preferences for particular features of engagement (Krapp, Hidi, & Renninger, 1992; Renninger, 1989). Recent research has supported the notion that young children's pattern of activities may be indicative of some underlying comprehensive interest (Renninger, 1989) and shows that children themselves categorize their play on the basis of features or attributes of particular activities (Holmes, 1991). In fact, consistency has been noted in the action types of young children even in engagements with different objects (Renninger & Leckrone, 1991; Saracho, 1995). Therefore, young children's profiles of activity may be a better indicator of their interests than time spent within any single area of play.

Previous research has identified three attributes of activity that characterize interests in early childhood: material versus social focus, property or process referent, and reproductive versus transformative potential (Renninger, 1984). Some children are more focused on material-based activities best described as property or concept oriented (Renninger, 1989). During concept-oriented activity, the child focuses on object domain-specific or topical information exploration (Fink, 1994). Other children are focused more on particular practices or actions with objects (Renninger, 1989), referred to as process-oriented activity. These activities vary in how prescribed the schemas or scripts are that guide them (Johnson, Christie, & Yawkey, 1987; Pulaski, 1970; Renninger, 1984). Some materials have prescribed uses and functions, and the schemas or scripts that guide such activity are limited. Other materials are relatively free from intrinsic limits or structure, and thus, schema or script variability and transformative potential are

high. Therefore, process-oriented activity may be either highly structured (*procedural*), or open ended (*creative*). In contrast to children with these material-based interest types, some children are focused more on activities best described as socially oriented (Jennings, 1975; Krapp & Fink, 1992; Renninger, 1984). During socially oriented activity, the child is focused on enactment of social roles, routines, or processes.

Topical interests have been most heavily studied (Hidi et al., 2002; Schiefele, 1990, 2001); socially situated interests also have received attention in recent research (Sansone & Smith, 2000). These categories of interest as well as procedural and creative interests have been utilized in previous studies of vocational interest (Gati, 1991; Tracey, 1997). Less frequently, these categories have been used to describe differences in young children's personal interest types (Renninger, 1990), and, to date, this research has primarily examined intraindividual differences in children's play preferences. Presuming that individuals do have activity attribute pendants—material or social focused, property or process based, and structured or transformative preferences—children with common interests likely exhibit systematic similarities in the types of activities in which they spend their play time. This study examined children's profiles of play behaviors in the home to investigate the effects of differences in children's early childhood play interests and their subsequent academic involvement behaviors (contributions to discussion and pursuits of information) in school.

### Early Interests and Children's Academic Behaviors

Most studies of student learning approaches have been guided by views of academic involvement as a set of cognitive skills or a self-system trait (Vermunt, 1996, 1998). Students' levels and forms of participation in school have been correlated with—though distinctive from—general measures of cognitive skill (Zimmerman & Bandura, 1994; Zimmerman & Martinez-Pons, 1986). Personality characteristics have been associated with students' willingness to make use of opportunities to engage and sources of information in school (Birch & Ladd, 1998). In addition, research has shown that boys tend to control classroom conversations more than girls in the early elementary school years (Brophy, 1985; Jovanovic & King, 1998). Although the presence or absence of interest has been associated with children's level of engagement in school tasks (Schiefele, 2001), differences in children's personal interests have not been linked to their use of particular involvement strategies in classrooms. However, different interests lead to experiences that support different types of interacting and thinking (Sigel, 1993) and impact what and how a child learns (Baum et al., 1995; Renninger, 1990, 1992; Sansone, Weir, Harpster, & Morgan, 1992) by influencing the types of information that the individual attends to, deeply processes, and encodes (Hidi, 1990; Renninger, 1990; Renninger & Wozniak, 1985) as well as the individual's perceptions of values and expectations for behavior (Tobias, 1994). In these ways, interest serves as a mental and affective resource and leads to an enriched knowledge base and increased motivation to engage in particular ways (Ericsson & Smith, 1991; Hidi, 1990) that may have implications for children's involvement strategy selection in new events and settings.

Contemporary theories of interest distinguish between *situational interests*, which are triggered by external stimuli, and *individualized interests*, which are characterized by a relatively enduring predisposition to interact within a target domain (Krapp, 2002; Renninger & Hidi, 2002). However, theorists also assert that situational factors can both “catch” interest initially and “hold” it over time (Krapp, 2002) and that even individual interests are socially constructed and therefore are situational to some degree (Pressick-Kilborn & Walker, 2002). Whether intrinsically or extrinsically piqued, early interest-based activities maintained over time may exert some influence on subsequent interactions (Krapp, 2002). Therefore, differences in children’s interest-based activities in early childhood may be related to the differences observed in children’s contributions to academic discussions and information pursuits in kindergarten classrooms.

### *Contributions to Academic Discussions*

One’s prior knowledge has a strong influence on cognitive engagement and forms of engagement with tasks (Winne, 1995). A well-developed knowledge base allows children to contribute to academic discussions in the classroom by equipping them with the tools with which they can work (Woloshyn et al., 1992). However, self-regulated academic behaviors, such as active participation, are contingent on motivational as well as cognitive factors (Zimmerman, 1986). Even young children with limited knowledge may participate actively if interested or motivated to do so. Specifically, children’s sense of competence and control has been related to their level of engagement in classroom activities (Mischel & Shoda, 1995; Schunk, 1996). In addition, children have been found to be more involved in academic tasks when there is a perceived need or reason to exert effort, such as recognition of the value of learning or the desire to reap educational benefits (Sansone, Wiebe, & Morgan, 1999). Early interests that are better matched to the activities in school may relate to increased participation in classroom discussions, making interactions with information familiar and appreciable and more likely to be judged by children as within their competencies. However, during select interest-driven activities, children access, interpret, and construct understanding of information within a variety of categories, and certain types of activities that differ in focus (material or social), referent (property or process), and transformative potential may direct attention to particular kinds of information. As a result, even if children do not differ in how frequently they participate in classroom discussions, depending on their early interest orientations, they still may vary in the specific types of information they contribute to (or elicit from) discussions, such as task- or topic-relevant information, process or strategy information, or performance or personally relevant information.

### *Pursuits of Information*

Although children must attend to teacher instruction in order to learn, children also benefit from self-initiated pursuits of information through asking questions or soliciting assistance (Newman & Goldin, 1990; Ryan & Pintrich, 1997; van der Meij, 1990). The information that learners generate for themselves may enhance or update knowledge, introduce or inform procedures and strategies, or provide feedback related to performance expectations and suc-

cess (Resnick, 1987; Schneider & Pressley, 1997; Tobias, 1994). Factors that are related to whether children pursue information include their prior forms of knowledge (van der Meij, 1990) or achievement (Newman & Goldin, 1990), perceptions of their cognitive and social competence (Newman, 1990; Ryan & Pintrich, 1997), goals for learning (Butler, 1998; Newman, 1990; Ryan & Pintrich, 1997), and beliefs in the benefits of asking for help (Newman, 1990; Ryan & Pintrich, 1997). Experience within certain activities with either a material or social focus and property or process referent may render some forms of information more customary or familiar and provide encounters that make salient the relevance or usefulness of certain types of information. It seems plausible then to hypothesize that children’s early interest-based activities in the home may influence the types of information they pursue in school, such as factual, task-process, or normative information.

### The Present Study

The present study rested on several assumptions: (a) interests affect what children pay attention to and encode, as well as how they allocate effort during activities aligned with the interest; (b) young children cultivate interests through their activities in the preschool years; and (c) different interests are associated with specific opportunities to develop specialized knowledge or specific schemas for engaging with the world. Subsequently, young children’s patterns of involvement and interactions with particular forms of information in school may differ as a function of their interest histories. This study investigates these assumptions longitudinally, examining children’s early childhood interest-based activities in the home and later variations in their contributions to academic discussions and pursuits of information in kindergarten. Given that variations in cognitive aptitude, temperament, and gender could mask the relations between children’s interests and academic behaviors, we statistically controlled these variables in order to examine the unique contribution of children’s interests to their patterns of participation and information pursuits in the classroom.

### Method

#### *Participants*

One hundred nine children (58 boys and 51 girls) who would enter kindergarten the next school year were recruited from a larger sample participating in a longitudinal study of early interest development. Children were between the ages of 4 years, 0 months and 4 years, 6 months at the onset of the study ( $M = 4$  years, 2 months) and between the ages of 4 years, 11 months and 6 years, 0 months at the time of entrance to kindergarten ( $M = 5$  years, 6 months). Children were recruited from two Midwest cities and neighboring communities.

The majority of children were White (88% White, 3% African American, 4% Asian American, 1% Latino, and 5% biracial) and from middle- to upper-middle-class families. The average number of years of parents’ education was 16.03 ( $SD = 1.76$ ) for mothers and 16.51 ( $SD = 2.40$ ) for fathers. On average, the families had three children. Annual family income ranged from less than \$15,000 to more than \$100,000, with a mean of approximately

\$55,000 ( $SD = \sim \$35,000$ ). Children in the sample on average had spent approximately 18 hr ( $SD = 14.71$ , range = 0–52) per week in day care 1 year before school entry.

### Procedure

Data on children's personal characteristics and home activities collected at intake and throughout the 12 months prior to school entry were used for this study. During an initial laboratory visit, a battery of tests was administered to assess the child's receptive language skills, cognitive efficiency, and short-term memory. During this initial laboratory visit, parents provided basic child and family demographic background information. Parents also reported their child's activities in the home. Two months after the baseline assessment and continuing for 1 year, bimonthly interviews with parents were conducted to regularly update information about the child's activities. During a second laboratory visit at the beginning of the second year of the study (generally conducted 1–5 months before kindergarten began), the parents completed questionnaires about their child's temperament as well as their child's activities in the home.

Children were observed in their kindergarten classrooms so that aspects of academic engagement could be evaluated. Four doctoral students in educational psychology (blind to home activity data and to specific hypotheses) were trained during a 1-month period to use an observational coding system to assess the targeted academic behaviors. After interrater reliability of 90% was reached on practice tapes, observations in the classroom began. To monitor coder consistency, we conducted frequent reliability checks using a second coder throughout the study. Each research assistant observed and coded behaviors for approximately one quarter of the sample. All data for a particular child were collected by the same research assistant.

Classroom observations began in the first month of school and were complete by the end of April. The observer was seated in the classroom, close enough to view the child's work and listen to verbalizations. Throughout 5-min observation intervals, the observer tallied each occurrence of target academic behaviors. An audio cassette player with headset and an audiotaped cue were used to signal completion of the 5-min observation interval. At the conclusion of the 5-min observation interval, the observer counted tallies and recorded total frequencies for each of the academic behavior categories. Eighteen 5-min intervals of data for each child were collected during academic work in kindergarten: six during independent work, six during small-group work, and six during teacher-directed instruction, for a total of 90 min (30 min during independent work, 30 min during small-group work, and 30 min during teacher-directed activities). The observer began 5-min intervals of data collection only when academic activities occurred in an appropriate learning context. No more than six 5-min intervals of data were collected for each child during a single classroom visit. Consequently, for each child, data were collected during at least three class visits at intervals approximately equally spaced throughout the school year.

### Measures

*Child's temperament.* Mothers or fathers completed scales from the Child Behavior Questionnaire (Goldsmith & Rothbart,

1991), a widely used measure of child temperament. Six scales were used: inhibitory–control, activity level, attention, approach–anticipation, shyness, and intensity of emotion. Parents rated 58 items (8 from the attention scale and 10 items from each of the other five scales) on a 7-point Likert scale (1 = *low*, 7 = *high*). To create scores for each of the scales, we reverse coded and averaged scale items when necessary. For each of the scales, a high score indicates a high level of the temperament characteristic assessed. We calculated composite control and emotional responsiveness scores used as covariates in the principal analyses of the study by reverse coding when necessary and averaging the appropriate scales. The inhibitory–control or restraint, attention, and activity level (reversed) scores were used to create the control composite, a measure of the child's general self-control abilities ( $\alpha = .74$ ). Approach–anticipation, shyness (reverse coded), and intensity of emotion scores were used to create the emotional responsiveness composite, a measure of the child's receptiveness to the environment and extroversion ( $\alpha = .71$ ).

*Cognitive ability.* The child's cognitive ability was assessed with a battery of tests to measure three principal areas: language, analytic skill, and working memory. Language skills (receptive vocabulary) were assessed using the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997). Analytic skill was assessed using accuracy scores from the Kansas Reflection–Impulsivity Scale for Preschoolers (KRISP; Wright, 1971). The KRISP was designed to assess the extent to which a child selectively attends to perceptual details and is systematic in the visual processing of pictures. Verbal working memory was assessed using the Working Memory–Sentences Test (Siegel & Ryan, 1989). We calculated a composite cognitive skill score for use as a covariate in the principal analyses by standardizing and averaging the child's scores on each of the three cognitive measures ( $\alpha = .69$ ). Higher or lower composite scores provide a general estimate of the cognitive resources available to the child (high scores indicate high cognitive resources).

*Children's interest-based activities in the home.* A bimonthly parent report was used to gather information about the child's activities in the home. We coded parent responses to the following four questions: (a) "What does your child prefer to do during his/her free play time?" (b) "What kinds of toys or objects (bought in stores as well as found in nature) does your child like to play with the most?" (c) "Are there any special pretend themes that seem to reoccur in your child's play?" and (d) "If your child had 1 hr to play anything s/he wanted, what do you think s/he would prefer?" There were no restrictions on number of activities parents could mention.

Information from parents' open-ended responses to questions concerning their child's activities across the year was used to create a profile of scores for each child. First, each child activity reported by the parent was categorized into one of eight major activity types derived from previous research on young children's play (Bergen, 1988; Saracho, 1995; Smilansky, 1968): topic-centered exploration, construction or mechanical activity, games with rules, physical activity and/or sports, literacy, art and/or music, fantasy, and sociodramatic activity (see Appendix). We calculated the percentage of activities within each of the types by dividing the number of reported activities aligned with that type by the total number of reported activities for the year. Final activity profile scores represent the percentage (relative frequency) of

reported activities in each type during the year. To assess intercoder agreement for each activity type, two investigators double-coded 25% of the reported activities independently. A version of Cohen's kappa appropriate for frequency data (Bartko & Carpenter, 1976; Berry & Mielke, 1988) was calculated to evaluate interrater agreement for each activity type score in the profile. Kappas ranged from .83 to 1.00.

There was considerable variability in the play experiences of individual children. On average, a young child participated in about 16 different activities as part of routine play in the home across the year ( $M = 15.65$ ,  $SD = 4.44$ , range = 9–27). The frequencies of activities in this sample were similar to those reported from other large studies of 4- to 6-year-olds' play interests (Macari, Simock & DeLoache, 2003; Simcock, Macari, & DeLoache, 2002). Although the children engaged in a wide array of activities in their homes, their play tended to be narrowly distributed across the major domains. About one third of the children were engaged in activities distributed across two play domains, about one third were engaged in activities across three play areas, and one third of the children were engaged in activities across four domains. In line with characteristics of play behavior (property vs. process referent, material vs. social focus, structure vs. transformative potential) described by Renninger (1984, 1989) in previous research, patterns in the children's profiles were suggestive of underlying interests in particular forms and features of activity, seemingly indicators of conceptual, procedural, creative, or socially oriented interests. Children were assigned to one of four interest groups on the basis of evaluation of the defining characteristics of the activity types and combination of types prominent in their personal activity profiles (Table 1).<sup>1</sup>

Activity with a property referent and transformative potential distinguished the play of some children. These children, assigned to the *conceptual* interest group, spent the largest proportion of their activity in object or topic-centered explorations (63%). Their activities were characterized by interactions with materials with a focus on topical concepts (e.g., dinosaurs, astronomy) and the acquisition of domain-relevant information. Process-based systematic or programmatic activity with a material focus distinguished the play of other children. These children, assigned to the *procedural* interest group, spent large portions of their activity in construction or mechanical activities (23%), games with rules (16%), and sports (19%). These activities were characterized by interactions in various processes with materials that had inherent structure or prescribed uses, such as blocks, puzzles, Legos, and erector sets, or predetermined goals and routines, such as board games, card games, and sports. Activity with a process referent, material focus, and transformative potential distinguished the play of another group of children. These children, assigned to the *creative* interest group, spent large portions of their activity in music or art (40%), fantasy (17%), and literacy (11%) activities: Their activities involved interaction in various processes with flexible materials that could be used innovatively (i.e., paints, crayons, clay, glue, scissors, paper and pencil, other craft objects, and musical instruments) or contexts in which the child could enter imaginary worlds (i.e., books, other media, fantasy play). Activity with inherent structure and an interpersonal focus distinguished the play of a final group of children. Children assigned to the *socially oriented* interest group spent the largest proportion of their activity in sociodramatic activities (58%). Their activities involved interac-

Table 1  
Average Proportion (Relative Frequency) of Activity in Each Type of Play for Children in the Four Interest Groups

Play type	Interest group			
	Conceptual ( $n = 27$ )	Procedural ( $n = 30$ )	Creative ( $n = 24$ )	Social ( $n = 28$ )
Topical exploration				
<i>M</i>	.63 <sup>a</sup>	.12	.03	.02
<i>SD</i>	.32	.27	.06	.04
Construction/mechanical				
<i>M</i>	.05	.23 <sup>a</sup>	.04	.06
<i>SD</i>	.10	.27	.15	.02
Games with rules				
<i>M</i>	.06	.16 <sup>a</sup>	.02	.07
<i>SD</i>	.11	.18	.05	.14
Physical/outdoor/sports				
<i>M</i>	.03	.19 <sup>a</sup>	.05	.10
<i>SD</i>	.07	.28	.11	.21
Literacy				
<i>M</i>	.02	.06	.11 <sup>a</sup>	.04
<i>SD</i>	.04	.14	.18	.10
Fantasy				
<i>M</i>	.05	.07	.17 <sup>a</sup>	.08
<i>SD</i>	.05	.10	.04	.03
Art or music				
<i>M</i>	.03	.03	.40 <sup>a</sup>	.08
<i>SD</i>	.07	.07	.37	.17
Sociodramatic				
<i>M</i>	.15	.13	.22	.58 <sup>a</sup>
<i>SD</i>	.24	.20	.31	.34

<sup>a</sup>Types of play distinguishing the activity of each interest group from all other interest groups on the basis of the results of Scheffé complex comparisons.

tions with toys that served as props for various types of social reconstructive role play (i.e., relationships, social roles, occupational themes).

We conducted two sets of analyses in order to verify that relatively homogeneous groups could be differentiated from patterns in the children's profiles of activities across the eight play types. First, we performed complex contrasts using the Scheffé multiple comparison procedure to determine if inimitable domains of activity differentiated each group from all other interest groups (Table 1). The percentage of topic-centered activities reported was significantly higher for children in the conceptual group than for all the other children,  $t(105) = 11.75$ ,  $p < .001$ . The percentages of reported involvement with construction or mechanical activities, games with rules play, and sports were significantly higher for children in the procedural interest group than for the other children,  $t(105) = 4.71$ ,  $p < .001$ ;  $t(105) = 2.25$ ,  $p = .02$ ; and  $t(105) = 2.17$ ,  $p = .03$ , respectively. The percentages of music and

<sup>1</sup> The purpose of the original larger study from which participants for the current study were drawn was to investigate expertise in early childhood. As a consequence, the current study may include more children with conceptual interests than one might expect to see in the general population of preschool-aged children. One might expect the other three interest types to be fairly evenly distributed; however, previous research indicates that only about one third of preschool children develop conceptual interests (Johnson et al., 2004).

art activities, fantasy play, and literacy activities reported was significantly higher for children in the creative interest group than for all the other children,  $t(105) = 7.69, p < .001$ ;  $t(105) = 5.49, p < .001$ ; and  $t(105) = 2.59, p = .01$ , respectively. The percentage of dramatic activities reported was significantly higher for children in the socially oriented interest group than for all the other children,  $t(105) = 6.32, p < .001$ .

Next, a k-means cluster analysis of the eight activity types (requesting four groups) was performed. Group assignments generated in the cluster analysis provided support for group assignments made on the basis of qualitative analysis (92% agreement). For the cases in dispute ( $n = 9$ ), final group placements were made on the basis of qualitative analysis rather than the mathematical solution (Anderberg, 1973).<sup>2</sup> Given support for our hypothesis that children's patterns of activity reflect underlying comprehensive interests in particular types of activities, we were able to proceed in the investigation of the study's principal hypothesis: Children's early interests expressed through play may be related to differences in children's academic behaviors in school.

*Children's academic behaviors in kindergarten.* We assessed the children's academic contributions and pursuits in the kindergarten classroom using an observational coding system adapted from an instrument developed in previous studies of children's academic self-regulation in third-grade (Stright, Neitzel, Sears, & Hoke-Sinex, 2001) and in kindergarten (Neitzel & Stright, 2003). The original system captured information only about children's frequency of contributions to discussions and information pursuits. Refinements were made to facilitate more detailed assessments through specification of the types of information contributed and pursued in the classroom. Because the likelihood of classroom environmental effects cannot be ignored, observations of each child were divided equally in three academic contexts—teacher-directed, small-group work, and independent work—in an effort to control for these effects and ensure a representative sampling of all the children's behaviors.

Frequency counts of three types of information contributions to class discussions were made: providing elaborations or extensions, sharing suggestions or rationales, and generating connections or associations. Instances of the child sharing topic- or project-related facts or details were counted as elaborations—extensions. Instances of the child offering possible solutions, explanations or rationales, or suggestions for strategies to try were counted as suggestions—rationales. Instances of the child making ties between the topic of discussion and personal experiences or relating that topic to other issues were counted as connections—associations. We calculated final scores for each information contribution type by adding the frequency counts for each behavior from all observation periods.

We assessed the child's pursuits of information in the classroom using frequency counts of instances in which the child sought information in the classroom from the teacher, a peer, or other resources in the classroom. The child's pursuits of three information types were coded as additional information, task-process information, or normative information. Instances of the child seeking objective, factual information or requesting more details about a topic of study were counted as pursuits of additional information. Instances of the child seeking task or process (mastery) information, which includes strategies, rationales, and explanations of procedures or how and why things work, were counted as task-process information pursuits. Instances of the child seeking infor-

mation for the purpose of making social comparisons, evaluating performance in relation to peers, or determining relative standing ("Did I do it the way it's suppose to be?" "How did everyone else do it?" "Is mine as good as his?") were counted as normative information pursuits. We calculated final scores for each type of information pursuit by adding the frequency counts for each behavior from all observation periods.

Previous research has shown high correlations between parent instructional support behaviors in the home and observations of children's subsequent classroom involvement behaviors (Neitzel & Stright, 2003; Stright et al., 2001) and between observations and teacher ratings of these classroom behaviors (Stright & Neitzel, 2003). To assess intercoder agreement for the academic information contributions and pursuits in this study, Carin Neitzel observed jointly with each of four trained graduate research assistants and independently coded 25% of the classroom observations done by each of the research assistants. The observations with each research assistant were conducted at intervals equally spaced across the data collection period. For each academic information contribution and pursuit type, we calculated intercoder agreement using a variation of Cohen's kappa appropriate for frequency data (Scott & Hattfield, 1985). Cohen's kappas ranged from .82 to .95 for types of contributions to class discussions and .83 to .97 for types of information pursued.

## Results

First, preliminary analyses were conducted in order to provide descriptive information about the children and their interest-based activities as well as their academic behaviors and to check the assumptions associated with analyses of variance with covariates. In addition to the initial analyses reported here, the distributions of each variable in each of the four interest groups also were examined statistically and graphically. All assumptions of normality, homogeneity of variance, and linearity were upheld. Next, we conducted two split-plot factorial analyses of covariance (ANCOVAs) to examine differences among the interest groups in their academic behaviors.

### *Children's Personal Characteristics and Interests*

Frequencies, ranges, means, and standard deviations were calculated for each of the child characteristics variables; and analyses were conducted to assess gender, cognitive aptitude, and temperament differences across the four interest groups. There were statistically significant differences in interest group membership based on gender,  $\chi^2(3, N = 109) = 29.49, p < .001$ , Cramer's  $V = .52$  (see Table 2). Boys more often than girls had concept-oriented interests (proportions of .36 and .12, respectively) and procedural interests (proportions of .38 and .16, respectively); girls more often than boys had creative interests (proportions of .37 and .09, respectively) and socially oriented interests (proportions of .35 and .17, respectively).

<sup>2</sup> To ensure that this grouping decision did not alter the findings, we conducted all group comparison analyses using both grouping methods. There were not significant differences in the outcomes of these analyses, and no changes in the interpretations or conclusions drawn as a result of the grouping decision.

Table 2  
Play Interest Group Membership by Gender

Gender	Interest group			
	Conceptual ( <i>n</i> = 27)	Procedural ( <i>n</i> = 30)	Creative ( <i>n</i> = 24)	Social ( <i>n</i> = 28)
Boys	21	22	5	10
Girls	6	8	19	18

There also were statistically significant differences among the four interest groups in children's personal characteristics, Wilk's  $\lambda = .70$ ,  $F(9, 250) = 7.52$ ,  $p < .001$ , partial  $\eta^2 = .18$  (Table 3). Specifically, there were differences among the interest groups in cognitive skill,  $F(3, 105) = 7.21$ ,  $p < .001$ , partial  $\eta^2 = .17$ ; control,  $F(3, 105) = 5.04$ ,  $p = .003$ , partial  $\eta^2 = .13$ ; and emotional responsiveness,  $F(3, 105) = 3.82$ ,  $p = .01$ , partial  $\eta^2 = .10$ . Follow-up tests revealed that on average, the children in the concept-oriented interest group had higher cognitive skills than the children in the creative,  $t(49) = 3.11$ ,  $SE = 0.18$ ,  $p = .002$ , and procedural,  $t(55) = 2.35$ ,  $SE = 0.17$ ,  $p = .02$ , interest groups. Typically, children in the creative and procedural interest groups had higher levels of control than children in the socially oriented interest group,  $t(50) = 3.15$ ,  $SE = 0.17$ ,  $p = .002$ , and  $t(56) = 3.51$ ,  $SE = 0.16$ ,  $p = .001$ , respectively. On average, children in the concept-oriented and socially oriented interest groups were more emotionally responsive than children in the procedural interest group,  $t(55) = 2.76$ ,  $SE = 0.19$ ,  $p = .007$ , and  $t(56) = 2.36$ ,  $SE = .18$ ,  $p = .02$ , respectively. There were no systematic differences between boys and girls in cognitive skill or temperament characteristics.

### Children's Academic Behaviors in the Kindergarten Classroom

Ranges, means, and standard deviations were calculated for each of the academic behaviors observed during the 90 min of

classroom observation (Table 4). In addition, we conducted bivariate correlations to examine the relations among children's different academic behaviors. Children who frequently pursued additional information in the classroom were likely to add elaborations–extensions during class discussions ( $r = .65$ ,  $p < .001$ ) and were less likely to make associations–connections during class discussions ( $r = -.30$ ,  $p = .002$ ) or to pursue normative information ( $r = -.24$ ,  $p = .01$ ). Children who frequently pursued task-process information in the classroom were likely to offer suggestions–rationales during class discussions ( $r = .49$ ,  $p < .001$ ) and to pursue normative information ( $r = .19$ ,  $p = .05$ ). Children who frequently made connections–associations were less likely to elaborate or extend class discussions ( $r = -.25$ ,  $p = .01$ ) but were more likely to offer suggestions–rationales during discussions ( $r = .24$ ,  $p = .01$ ) and to pursue normative information ( $r = .19$ ,  $p = .05$ ).

A series of multivariate analyses of variance (MANOVAs) were conducted to determine whether there were systematic differences between boys and girls in their frequency of academic behaviors in the classroom. In general, boys more often than girls contributed to class discussions, Wilk's  $\lambda = .83$ ,  $F(3, 105) = 7.17$ ,  $p < .001$ , partial  $\eta^2 = .17$ , and pursued information in class, Wilk's  $\lambda = .77$ ,  $F(3, 105) = 10.55$ ,  $p < .001$ , partial  $\eta^2 = .23$ . Specifically, follow-up analyses of variance (ANOVAs) on each behavior revealed that boys more often than girls provided elaborations–extensions,  $F(1, 107) = 15.77$ ,  $p < .001$ , partial  $\eta^2 = .13$ , and suggestions–rationales,  $F(1, 107) = 8.71$ ,  $p = .004$ , partial  $\eta^2 = .08$ . Girls did not differ from boys in their frequency of connections–associations made during class discussions. Boys more often than girls pursued additional information,  $F(1, 107) = 13.68$ ,  $p < .001$ , partial  $\eta^2 = .11$ , and task-process information,  $F(1, 107) = 8.96$ ,  $p = .003$ , partial  $\eta^2 = .08$ . Girls did not differ from boys in their normative information pursuits.

The relations among child characteristics and academic behaviors were examined through bivariate correlations. Children who had higher cognitive skills were likely to share more elaborations–extensions in class discussions ( $r = .26$ ,  $p = .01$ ) and pursue

Table 3  
Means, Standard Deviations, and Ranges in Personal Characteristics of Children in Each Play Interest Group

Personal characteristic	Interest group			
	Conceptual ( <i>n</i> = 27)	Procedural ( <i>n</i> = 30)	Creative ( <i>n</i> = 24)	Social ( <i>n</i> = 28)
Child cognitive skill				
<i>M</i>	0.34 <sub>a</sub>	−0.16 <sub>b,c</sub>	−0.31 <sub>c</sub>	0.26 <sub>a,b</sub>
<i>SD</i>	0.60	0.67	0.55	0.58
Range	−0.53–1.74	−1.12–1.58	−1.80–0.82	−0.97–1.03
Child control				
<i>M</i>	4.97 <sub>a,b</sub>	5.22 <sub>a</sub>	5.19 <sub>a</sub>	4.67 <sub>b</sub>
<i>SD</i>	0.39	0.60	0.54	0.77
Range	4.15–5.85	4.03–6.66	4.16–5.96	3.08–6.26
Child responsiveness				
<i>M</i>	4.86 <sub>a</sub>	4.36 <sub>b</sub>	4.59 <sub>a,b</sub>	4.80 <sub>a</sub>
<i>SD</i>	0.69	0.62	0.79	0.66
Range	3.82–5.08	3.36–5.48	3.76–6.48	3.11–5.41

Note. Means sharing a common subscript are not significantly different by the Dunn–Sidak multiple comparison test ( $p < .05$ ).

Table 4  
*Descriptive Statistics for Children’s Academic Behaviors During 90 Min of Observation (N = 109)*

Child academic behaviors	M	SD	Range
Contribution to class discussions			
Elaboration–extension	3.82	3.20	0–13
Suggestion–rationale	5.06	3.73	0–14
Connection–association	4.47	3.27	0–12
Pursuit of information			
Additional information	2.10	1.98	0–9
Task-process information	3.63	2.77	0–13
Normative information	4.55	2.93	0–13

additional information at higher frequencies ( $r = .25, p = .01$ ). Children described as higher in control were more likely to offer suggestions–rationales during discussions ( $r = .23, p = .02$ ) and pursue task-process information in class ( $r = .19, p = .04$ ). Children described as higher in responsiveness were less likely to pursue task-process information ( $r = -.23, p = .02$ ); however, they were likely to pursue normative information more frequently ( $r = .19, p = .05$ ).

*Differences in Children’s Academic Behaviors Related to Children’s Interests*

We statistically controlled children’s gender, cognitive skills, and temperament, characteristics that could compete to explain differences in children’s academic behaviors by entering them as covariates in all analyses. Statistical removal of the variance in children’s behaviors associated with their gender, cognitive skills, and temperament permitted an examination of the distinctive contribution of children’s interests to understanding differences in their contributions to class discussions and information pursuits in kindergarten.<sup>3</sup>

*Contributions to discussions.* We conducted a split-plot factorial 4.3 analysis of covariance (ANCOVA) to examine children’s participation in discussions. Children’s interest type was the between-subjects factor (four levels), and children’s type of contributions to class discussions was the within-subjects factor (three levels), with the effects of children’s gender, cognitive skill, and temperament being controlled. However, gender was the only covariate with a significant unique effect on children’s overall frequency of contributions to classroom discussions,  $F(1, 93) = 6.81, p = .01, \text{partial } \eta^2 = .07$ .

In the between-subjects analysis of variance, there were no differences among the interest groups in their overall frequency of participation in discussions in the classroom,  $F(3, 101) = 0.44, p = .73, \text{partial } \eta^2 = .01$ . In the within-subjects analysis, significant differences in frequency were found in the types of information that the children contributed to discussions in class,  $F(2, 100) = 4.96, p = .01, \text{partial } \eta^2 = .10$ . In general, the children contributed suggestions–rationales more often than elaborations–extensions. However, a significant interaction signaled differences in the types of information children contributed to discussions depending on their interests,  $F(6, 202) = 3.65, p = .002, \text{partial } \eta^2 = .10$  (see Figure 1).

To identify the differences in children’s profiles of contributions to discussions, we conducted factorial profile (repeated measures)

analyses and post hoc comparisons for each group to examine differences in the types of contributions made within each interest group, controlling for the familywise error rate using Holm’s sequential Bonferroni approach (Table 5; comparisons across each row). There were significant differences in the frequency of behaviors within the profiles of each interest group: conceptual,  $F(2, 52) = 5.76, p = .005, \text{partial } \eta^2 = .18$ ; procedural,  $F(2, 58) = 6.10, p = .004, \text{partial } \eta^2 = .17$ ; creative,  $F(2, 46) = 4.66, p = .01, \text{partial } \eta^2 = .17$ ; and socially oriented,  $F(2, 54) = 4.67, p = .01, \text{partial } \eta^2 = .15$ . Children with conceptual interests shared elaborations–extensions more often than they made connections–associations,  $t(26) = 2.93, SE = 0.96, p = .01$ . Children who had procedural interests shared suggestions–rationales more often than elaborations–extensions,  $t(29) = 3.36, SE = 0.91, p = .002$ , or connections–associations,  $t(29) = 2.36, SE = 0.87, p = .03$ . Children with creative interests made connections–associations and shared suggestions–rationales more often than elaborations–extensions,  $t(23) = 2.49, SE = 0.95, p = .02$ , and  $t(23) = 3.02, SE = 0.73, p = .01$ , respectively. Children with socially oriented interests made connections–associations more often than elaborations–extensions,  $t(27) = 2.55, SE = 0.83, p = .02$ .

In addition, a series of one-way ANCOVAs and Holm’s sequential Bonferroni follow-up comparisons were conducted to assess differences among interest groups in the frequency of their three types of contributions to class discussions with the effects of children’s gender, cognitive skill, and temperament controlled (Table 5; comparisons within each column). There were significant differences among groups in their elaborations–extensions,  $F(3, 101) = 3.98, p = .01, \text{partial } \eta^2 = .11$ ; suggestions–rationales,  $F(3, 101) = 2.95, p = .04, \text{partial } \eta^2 = .08$ ; and connections–associations,  $F(3, 101) = 2.61, p = .05, \text{partial } \eta^2 = .07$ . Children with conceptual interests provided elaborations–extensions more than children whose interests were procedural,  $t(55) = 2.86, SE = 0.83, p = .01$ ; creative,  $t(49) = 2.37, SE = 0.98, p = .03$ ; or socially oriented,  $t(53) = 2.99, SE = 0.94, p = .01$ . Children who had procedural interests talked about suggestions–rationales in class discussions more often than children who had socially oriented interests,  $t(56) = 2.84, SE = 0.68, p = .01$ . Children who had creative or socially oriented interests made connections–associations more often than children who had conceptual interests,  $t(49) = 2.68, SE = 1.03, p = .03$ , and  $t(53) = 2.52, SE = 1.01, p = .03$ , respectively.

*Information pursuits.* To examine children’s information pursuit behaviors, we conducted a split-plot factorial 4.3 ANCOVA. Again, children’s interest type was the between-subjects factor (four levels) and the children’s type of informational pursuits was the within-subjects factor (three levels), with the effects of children’s gender, cognitive skill, and temperament controlled. However, gender was the only covariate with a significant unique relationship to children’s overall frequency of information pursuits in the classroom,  $F(1, 93) = 3.88, p = .05, \text{partial } \eta^2 = .04$ .

In the between-subjects analysis of variance, there were no differences among the interest groups in their overall frequency of information pursuits in the kindergarten classroom,  $F(3, 101) =$

<sup>3</sup> It should be noted that the outcomes, interpretations, and conclusions drawn from initial analyses conducted without covariates included did not change with entry of the covariates.

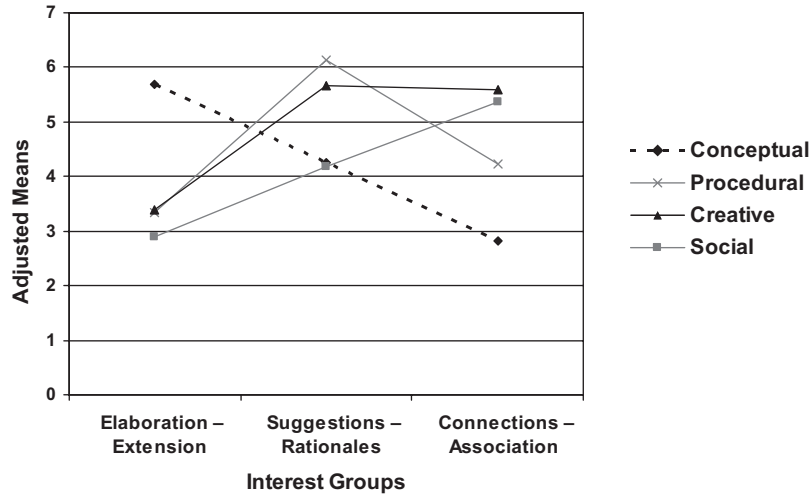


Figure 1. Plot of interactions between children’s interests and types of contributions made to academic discussion in the kindergarten classroom.

1.12,  $p = .34$ , partial  $\eta^2 = .03$ . In the within-subjects analysis, significant differences in frequency were found in the types of information that the children pursued in the classroom,  $F(2, 100) = 26.25, p < .001$ , partial  $\eta^2 = .34$ . In general, the children pursued normative information more often than additional and task-process information and pursued task-process information more often than additional information. However, a significant interaction signaled differences in the types of information the

children pursued depending on their interests,  $F(6, 202) = 8.81, p < .001$ , partial  $\eta^2 = .21$  (see Figure 2).

To identify the differences in the children’s profiles of information pursuits and the frequency of the types of information pursued within each of the interest groups, we conducted factorial profile (repeated measures) analyses and post hoc comparisons, controlling for familywise error rate using Holm’s sequential Bonferroni approach (Table 6; comparisons across each row). Children who had conceptual interests did not differ in the frequency of their pursuits of the various types of information,  $F(2, 52) = 0.95, p = .39$ , partial  $\eta^2 = .04$ , but there were significant differences in the frequency of behaviors within the profiles of children whose interests were procedural,  $F(2, 58) = 19.38, p < .001$ , partial  $\eta^2 = .40$ ; creative,  $F(2, 46) = 18.42, p < .001$ , partial  $\eta^2 = .45$ ; and socially oriented,  $F(2, 54) = 35.75, p < .001$ , partial  $\eta^2 = .57$ . Children who had procedural interests sought task-process information and normative information more often than additional information,  $t(29) = 5.71, SE = 0.65, p < .001$ , and  $t(29) = 5.10, SE = 0.74, p < .001$ , respectively. Children with creative interests

Table 5  
Post Hoc Comparisons Examining Differences in the Frequency of Types of Contributions to Class Discussion Within Each Interest Group (Rows) and Between Interest Groups For Each Type of Contribution to Class Discussions (Columns)

Interest group	Frequency of contributions to class discussion		
	Elaborations or extensions	Suggestions or rationales	Connections or associations
Conceptual ( $n = 27$ )			
<i>M</i>	5.70 <sub>a,c</sub>	4.25 <sub>a,b,c,d</sub>	2.82 <sub>b,d</sub>
<i>SE</i>	0.64	0.75	0.73
Procedural ( $n = 30$ )			
<i>M</i>	3.33 <sub>b,d</sub>	6.13 <sub>a,c</sub>	4.22 <sub>b,c,d</sub>
<i>SE</i>	0.64	0.79	0.73
Creative ( $n = 24$ )			
<i>M</i>	3.38 <sub>b,d</sub>	5.67 <sub>a,c,d</sub>	5.59 <sub>a,c</sub>
<i>SE</i>	0.75	0.92	0.86
Socially oriented ( $n = 28$ )			
<i>M</i>	2.89 <sub>b,d</sub>	4.19 <sub>a,b,d</sub>	5.36 <sub>a,c</sub>
<i>SE</i>	0.68	0.83	0.77

Note. Frequency of contributions = estimated means after model covariates (child characteristics: gender, cognitive skill, control, and emotional responsiveness) were controlled. For each interest group, means sharing a common subscript are not significantly different by the Holm’s sequential Bonferroni comparison procedure ( $p < .05$ ). Subscripts a and b denote comparisons across each row (within-group comparisons). Subscripts c and d denote comparisons within each column (between-group comparisons).

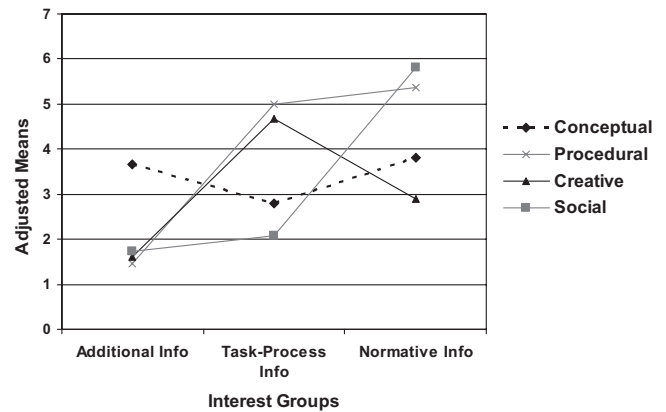


Figure 2. Plot of interactions between children’s interests and the types of information pursued in the kindergarten classroom.

Table 6  
*Post Hoc Comparisons Examining Differences in the Frequency of Types of Information Pursuits Within Each Interest Group (Rows) and Between Interest Groups (Columns) for Each Type of Information Pursuit*

Interest group	Frequency of information pursuit		
	Additional information	Task-process information	Normative information
Conceptual ( <i>n</i> = 27)			
<i>M</i>	3.66 <sub>a,d</sub>	2.80 <sub>a,e,f</sub>	3.80 <sub>a,e</sub>
<i>SE</i>	0.36	0.56	0.61
Procedural ( <i>n</i> = 30)			
<i>M</i>	1.45 <sub>b,e</sub>	4.99 <sub>a,d</sub>	5.36 <sub>a,d</sub>
<i>SE</i>	0.36	0.56	0.61
Creative ( <i>n</i> = 24)			
<i>M</i>	1.62 <sub>c,e</sub>	4.67 <sub>a,d,e</sub>	2.89 <sub>b,e</sub>
<i>SE</i>	0.42	0.65	0.71
Socially oriented ( <i>n</i> = 28)			
<i>M</i>	1.72 <sub>b,e</sub>	2.08 <sub>b,f</sub>	5.82 <sub>a,d</sub>
<i>SE</i>	0.38	0.59	0.64

*Note.* Frequency of information pursuit = estimated means after model covariates (child characteristics: gender, cognitive skill, control, and emotional responsiveness) were controlled. For each interest group, means sharing a common subscript are not significantly different by the Holm’s sequential Bonferroni comparison procedure ( $p < .05$ ). Subscripts a, b, and c denote comparisons across each row (within-group comparisons). Subscripts d, e, and f denote comparisons within each column (between-group comparisons).

sought more task-process information than normative,  $t(23) = 3.00$ ,  $SE = 0.40$ ,  $p = .01$ , or additional,  $t(23) = 6.32$ ,  $SE = 0.40$ ,  $p < .001$ , information and more normative than additional information,  $t(23) = 2.97$ ,  $SE = 0.44$ ,  $p = .01$ . Children who had socially oriented interests sought normative information more than task-process,  $t(27) = 6.80$ ,  $SE = 0.56$ ,  $p < .001$ , or additional,  $t(27) = 6.39$ ,  $SE = 0.69$ ,  $p < .001$ , information.

In addition, we conducted a series of ANCOVAs and follow-up comparisons using the Holm’s sequential Bonferroni approach to assess differences among the interest groups in frequency of their pursuits of each information type with the effects of children’s gender, cognitive skill, and temperament controlled (Table 6; comparisons within each column). There were significant differences among groups in their pursuits of additional information,  $F(3, 101) = 8.82$ ,  $p < .001$ , partial  $\eta^2 = .21$ ; task-process information,  $F(3, 101) = 5.92$ ,  $p = .001$ , partial  $\eta^2 = .15$ ; and normative information,  $F(3, 101) = 5.16$ ,  $p = .002$ , partial  $\eta^2 = .13$ . Children who had conceptual interests pursued additional information more often than children whose interests were procedural,  $t(55) = 4.70$ ,  $SE = 0.47$ ,  $p < .001$ ; creative,  $t(49) = 3.29$ ,  $SE = 0.62$ ,  $p = .001$ ; or socially oriented,  $t(53) = 3.46$ ,  $SE = 0.56$ ,  $p = .001$ . Children who had procedural interests sought task-process information more often than children with conceptual,  $t(55) = 3.04$ ,  $SE = 0.72$ ,  $p = .003$ , and socially oriented,  $t(56) = 3.23$ ,  $SE = 0.90$ ,  $p = .002$ , interests. Children who had creative interests also asked for task-process information more often than children with socially oriented interests,  $t(50) = 3.08$ ,  $SE = 0.84$ ,  $p = .003$ . Children with creative and conceptual interests sought normative information less often than children with procedural interests,  $t(52) = -2.68$ ,  $SE = 0.92$ ,  $p = .02$ , and  $t(55) = -2.05$ ,

$SE = 0.76$ ,  $p = .04$ , respectively, or socially oriented interests,  $t(50) = -3.26$ ,  $SE = 0.90$ ,  $p = .002$ , and  $t(49) = -2.14$ ,  $SE = 0.94$ ,  $p = .03$ , respectively.

### Discussion

This is the first known prospective investigation of the relations between the interest-related activities of a fairly large sample of preschoolers and their classroom behaviors at school entry. This study offers a detailed account of the complex relations between children’s interest-based activities in the home during the early childhood years and subsequent forms of academic participation in kindergarten.

Children in four interest groups (conceptual, social, procedural, and creative) did not differ in their frequency of information contributions and pursuits in the kindergarten classroom. However, exploration of the trends both between and within interest groups revealed differences among the groups in the frequency of various types of information contributions and pursuits as well as unique profiles of academic participation behaviors within each group. There was remarkable consistency between the types of information that the children offered in discussions and pursued in the classroom and those that the children likely experienced or practiced through interest-based activity routines. Although we are cognizant of the fact that there are likely mediator variables we have not measured that could account for this consistency, it quite plausibly reflects a relationship between children’s early engagement with particular types of information through interest-based activities in the home and later ways of interacting with information in school.

#### *Children’s Interests and Academic Information Contributions and Pursuits*

Children who had process-oriented interests (both procedural and creative) offered suggestions and provided rationales during class discussions and actively sought task-process information more frequently than did children with other interest orientations. The activities characteristic of process-oriented interests often involve trial and error, examination of interrelations among factors, and investigation of alternative approaches to problems. Therefore, these activities may support the acquisition of information about how tasks work and generation of general strategies, routines, or procedures for approaching tasks (Vandenberg, 1980, 1990). In these activities, the children may have learned to pay attention to specific aspects of tasks and problem-solving situations.

Children who had creative interests differed from children who had procedural interests in their information pursuits in ways consistent with the experiences they likely had in their early childhood activities. The children who had creative interests pursued normative information much less often than did children who had other interests and made connections and associations more often than the other children. Children with creative interests may be unconcerned with information for the purpose of social comparison because the activities that are characteristic of their interests usually permit exploration of possibilities without established standards for evaluation (Pulaski, 1970, 1973; Sutton-Smith, 1979). These children may be unaware of performance assessment

routines or the usefulness of information that can be gained, or they simply may derive their own benchmarks by which they measure their progress. Open-ended activities also are a forum for the generation of novel ideas (Clark, Griffing, & Johnson, 1989) and associations (Cole & Lavoie, 1985). The connections made by children in the creative interest group may be artifacts of a predilection for unique approaches or interpretations and, therefore, may represent cognitive elaborations (Klein & Kihlstrom, 1986; Symons & Johnson, 1997), or creative children may use connections as instruments to increase interest (Sansone et al., 1992; Wolters, 1999). We did not distinguish between connections and associations that were novel conceptualizations and those that were personal links between classroom topics of discussion and previous experiences or ways of understanding. In future research, measurements that allow teasing apart the particular function of young children's connections and associations could be beneficial.

Children who had socially oriented interests often made connections and associations during class discussions but offered suggestions and rationales as well. They most frequently pursued normative information. The activities of children with socially oriented interests involve the use of toys or props in the enactment of roles about life experiences focused on relationships or the roles or rules and structure of society (Jennings, 1975). These information-seeking behaviors may simply be a mirror of the children's socially oriented interests, or they may be a function of a lack of experience or practice with activities that support other forms of knowledge or interaction routines (Ericsson, Krampe, & Tesch-Romer, 1993). Future research that examines the metacognitive talk of children in class may assist researchers in isolating the most appropriate of these interpretations.

Children who had concept-oriented interests offered more facts or details to discussions, elaborating on and extending academic conversations, and made fewer connections and associations than most children. In contrast to children from other interest groups, they sought additional information about topics of study as often as other types of information. Children with concept-oriented interests typically engage in activities that involve interactions with materials, books, and other media, often with the goal of acquiring domain-specific information (Johnson, Alexander, Spencer, Leibham, & Neitzel, 2004). Consequently, these children may possess better-developed knowledge bases as well as more experience with the integration and organization of information (Chi & Koeske, 1983; Mervis, Pani, & Pani, 2003). In this way, the interest-relevant activities that are familiar and valued may be better matched to the information-dominated activities emphasized in classrooms (Super & Harkness, 1986) and may prepare the children for participation of this type in school.

### *Children's Academic Behaviors in Kindergarten*

In contrast to previous studies of academic participation behaviors that have focused on older children or adolescents (for a meta-analysis, see Winne & Perry, 2000), this study offers a rich analysis of the academic information exchanges and pursuits of young children in school. Although, the primary purpose of this study was to examine the differential effect of children's early interests on their subsequent forms of academic engagement, we would be remiss to ignore an opportunity to at least briefly examine this rare portrait of young children's general academic partic-

ipation patterns, a profile of behaviors touted in prior research as important to achievement in school (Normandeau & Guay, 1998).

In general, the young children in this study were actively involved in discussions and in the pursuit of information. An argument could be made that the academic behaviors observed might be specific to children from relatively well-educated families; however, similar results have been found in observational studies of kindergarteners from less-educated families (Neitzel & Stright, 2003). During academic discussions, these children shared suggestions and rationales most often, although they customarily made connections and associations as well. Elaborations or extensions were more rare. In information pursuits in the classroom, the children asked for normative information routinely, more than they asked for task-process information or additional information about topics.

Although involved, the children may not seem to have been particularly self-reliant. However, young learners who were not self-directed and motivated probably would not care about how they performed. Habitual pursuits of normative information may reflect young children's desire to understand the standards of operation and expectations for performance in the academic setting (Bandura, 1986) or to obtain information about themselves as learners (Fernie, 1989). Therefore, we do not consider these self-regulation deficiencies. Social comparisons allow young children to determine the appropriateness of their academic behaviors and appraise their performances (Butler & Winne, 1995; Ruble, 1987; Ruble & Flett, 1988). As a result, evaluations against normative standards also can promote self-efficacy (Schunk, 1987, 1996; Schunk & Hanson, 1989).

Similarly, connections and associations offered during class discussions may represent young children's attempts to locate their place within the academic arena or to establish personal relevance. Brophy (1999) has argued that for learning to occur, the material to be learned must be potentially meaningful. Personal references may be tactics used to establish links to new material (Masten & Coatsworth, 1998; Sansone & Smith, 2000; Spires & Donley, 1998). Children's connections and associations also may reflect strategic efforts to enhance learning through the integration of new information with existing knowledge (Symons & Johnson, 1997).

Often, solicitation of normative information and reliance on self-relevant ties have been described as precursors to or inhibitors of more independent or sophisticated forms of academic self-regulation (Schunk & Zimmerman, 1997; Wolters, 2004). These practices seem to conflict with the image of a mastery-oriented, motivated, and self-sufficient individual. However, these practices are probably valuable in situations that are unfamiliar or when understanding is fragile. Thus, these findings raise questions about whether different self-regulation strategies serve distinct functions at different times in development. This warrants attention in future research.

### *Implications for Parents and Teachers*

The information derived from this study has implications for both parents and teachers. Many parents worry about how best to support their young children as learners, and the kinds of experiences and structures they should put in place for optimal growth. At least in part, children's academic self-instruction behaviors seem to be cultivated and sustained in the course of routine

activity. Therefore, young children's early interests are not insignificant and may provide the fundamental context and processes for academic preparation. These findings suggest that opportunities to participate in a variety of experiences be made available to children in early childhood. Differences in children's early childhood experiences did not translate into differences in levels of engagement in school. All of the children in this study, regardless of their interest-based activities, participated equally in the classroom milieu.

In order to construct knowledge, learners must be actively engaged with information and activities available in classroom settings (McCaslin & Good, 1996). Participation is a critical tool for academic success (Schneider & Bjorklund, 1992). Reciprocally, information has a strong influence on cognitive engagement and forms of engagement with tasks (Winne, 1995). Teachers should be aware that although children with all types of experiences seem equally primed to participate in the classroom environment, differences in their histories of home activities mean that young children may come to school with different kinds of interaction preferences. Teachers need to be open to children's predilections for different types of information exchanges and queries and aware that each of the different types of participation may have important benefits for young learners.

These findings also serve as a reminder to teachers that young children rely on their feedback to learn about the values and behavioral expectations of school, and young children's initial presumptions about their competencies and capabilities are founded on information from external sources (Butler & Winne, 1995). Consequently, teachers must be careful about the expectations, values, goals, and attributions conveyed. Finally, teachers also should be cautious in the use of interest categories for understanding and evaluating the behaviors, needs, and potentials of young children. It certainly could be useful to capitalize on what is known about children's interest proclivities in the design of settings and instructional strategies to support young children as they transition to school, but it could be equally harmful if this information were used to narrowly define children. Although children may express preferences for particular kinds of experiences and interactions, children also engage in and enjoy a variety of activities. Recent research has shown that interests are susceptible to change, particularly as young children enter new social settings, encounter new opportunities, and expand their social networks (Wang, 2003).

### *Final Comments and Directions for Future Research*

Past research has linked childhood activities with cognitive development (Fisher, 1992), motivation (Christie & Johnsen, 1983), social competence (Creasey, 1998), and theory of mind (Lillard, 1998), which are all important tools for academic self-regulation. The fundamental assumption framing the present study was that early childhood activities serve as a context in which young children develop, express, and further cultivate interests. Another assumption guiding this study was that interest-based activities provide exposure to different experiences and opportunities to develop certain types of knowledge and interaction scripts or routines. As a result, children's early interests may lead to differences in their academic participation. The remarkable consistencies noted in children's interests and academic behaviors

sustain the plausibility of this explanation and compel further research.

We believe that individual interest could only be inferred from a child's persistence and consistency of engagement across various activity types; therefore, an effective investigation of our research hypotheses required a longitudinal tracking of children's home activities. Although converging observations of children's activities would have been ideal, this simply was not logistically feasible. Parents are apt to be better retrospective reporters of home activity histories than young children. It is true that parents could provide unreliable and biased accounts of their own children's activities. Research by Andre and Brown (1969) has suggested, however, that mothers perceive their children's interests relatively accurately. In addition, incomplete and erroneous reports only would have made it more difficult for systematic relationships between children's interests and academic engagement or differences among interests groups to be detected. The emergence of clear and theoretically consistent patterns of relations helps to reduce concerns associated with our reliance on parental report.

Additionally, in any attempt to examine children's academic behaviors, the likelihood of classroom setting effects cannot be ignored. We attempted to control for these effects by controlling for academic subject and instructional context. However, classrooms are complex contexts, and it would be difficult to identify—let alone to control for—all of the possible variations; therefore, it is quite likely that some error with the potential to mask the influence of early interests was introduced in the measurement of children's academic behaviors. However, meaningful patterns powerful enough to be noted over any "noise" in the data were uncovered. Still, future studies of these relations should include efforts to devise more sophisticated methods of controlling (or considering) important features of the classroom environment.

In this study, gender posed another methodological and conceptual challenge. Gender was related to children's interests as well as their academic behaviors, making it difficult to disentangle the influences of interest-based activity from those of gender. Consequently, despite our efforts to statistically control these effects, the question still may be raised about whether the differences observed in the present study in academic self-regulation behaviors are attributable to gender rather than to early interests. We maintain that patterns in the findings argue against gender as a primary explanation. If gender were the principal causal factor, the patterns in contributions to classroom discussions and pursuits would have been similar for the two interest groups predominately composed of boys (conceptual and procedural) and of girls (social and creative). This was not the case.

To the extent that children's personal characteristics such as gender, cognitive skill, and temperament were adequately controlled, this study provides a rare examination of the unique relations between children's interest-based activities in early childhood and academic self-instruction behaviors in school. Surprisingly few studies have controlled for individual difference factors that could confound such studies. However, more than a single score (or two) may be required to control for complex constructs such as cognitive skill and temperament. Sample size (although relatively large for a study of this type) imposed limits on the number of variables that could be included in the analyses. Replication with larger samples would enable the examination of more complex models. For example, a child's cognitive abilities, per-

sonal characteristics, and interests may work together to influence classroom behaviors. An alternative possibility is that a child's early childhood interests represent the juncture of personal and socialization factors and may be a more proximal source, mediator, or moderator of influence on behavior in new settings.

Interest in early childhood has been described as an artifact of social-contextual as well as interpersonal factors (Neitzel, Johnson, & Alexander, 2003). The material resources available, as well as procedures and structures instituted within the home, help shape children's expectancies, values, goals, and mental models for roles and action possibilities (Pintrich & Schrauben, 1992; Super & Harkness, 1986). Consequently, knowledge and interaction routines cultivated during early childhood activities may be fundamental to children's academic behaviors, or the same processes that support the emergence of particular interests in the home also may support the development of children's academic behaviors, or both may contribute uniquely. Additional research is needed to simultaneously examine the direct and indirect influences of important elements of the home environment and individual cognitive and personal resources of the child.

Further research also is needed to examine how long connections between early interests and academic behaviors endure. Findings in the present study suggest the influence of children's early interests appears relatively pervasive across the first year of school. However, as children spend increasingly more time in school, the many new and intriguing ideas and experiences encountered may exert greater influence. Thus, children are likely to move away from early predilections, making the influence of childhood interests less prominent over time. On the other hand, if early schemas for interactions are maintained, the influence asserted may persist. Investigation of these and other important questions will enhance theoretical models of academic self-regulation development in which the individual and social contexts each assume important roles.

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## Appendix

## Interest Orientation Types; Toys or Materials; and Activities

Orientation/interest type	Toys or materials	Characteristic activities
Concept orientation—conceptual interest: Topic-centered exploration.	Interaction with toys or materials with a focus on object concepts and features. Characteristic topics: Dinosaurs, trains, insects, astronomy, geographic locations, ocean life, weather.	Seeking focal object/topical information (i.e., interactions with adults, books, media, or other information sources); questioning; organizing and managing information and object- or topic-relevant experiences.
Process orientation		
Procedural interest		
Construction or mechanical	Organizational toys designed for arrangement of parts: Puzzles, Cuisenaire rods, blocks, Legos, Tinker toys, peg boards, erector sets, models.	Examining interrelations of factors, one-to-one correspondence, and part-to-whole concepts; matching or grouping; producing; generating solutions; engaging in trial-and-error learning; investigating and evaluating alternate methods; practicing task process.
Games with rules	Board games, checkers, chess, tag, and hide and seek.	Practicing game-relevant skills, procedures/process information, strategies, and problem solving.
Physical or motor	Gross motor toys (e.g., swings, slides, bicycles, skates, and jump ropes) and sports equipment (e.g., bats, balls, and Frisbees).	Practicing relevant skills, procedures/process information, strategies, and problem solving.
Literacy (also may be creative, depending on activity focus)	Books, story books with tapes, reading and writing activities.	Focusing on learning the skill or process of reading.
Creative interest		
Art and music	Art supplies (e.g., paints, crayons, pencils and paper, markers, clay, play dough, scissors, glue, other craft materials); CDs or tapes; instruments; dance props; microphones.	Engaging in self-expression, creation, production, and generation of ideas or alternative methods; exploring material uses or transformations; processing information.
Fantasy	Materials used in imaginative, nonliteral ways; enactment of fictitious roles removed from everyday experiences (super heroes, fairy tales, cartoon characters).	Imagining; transforming materials and tasks; recognizing relations; making connections and associations; showing openness and flexibility; using imagery and symbolic representation.
Literacy (or may be procedural, depending on focus)	Books, story books with tapes, reading and writing activity.	Entering world of make-believe; expressing; practicing new roles.
Social orientation		
Dramatic play: Focus on relationships	Dolls and accessories, kitchen sets and other housekeeping props, dress-up clothes (may represent a variety of thematic roles).	Engaging in symbolic representation and verbal communication; enacting roles about life experiences; taking on adult roles/tasks, representing what is understood; practicing and testing understanding.
Dramatic play: Focus on social process	Miniature props: Cars, trains, bulldozers, and so on; buildings for community/occupational themes (houses, fire stations, airports, farm sets, mechanic garages).	Using props to enact roles and to imitate and recreate structures and procedures of society, exhibiting attention to social structure, roles, rules, and procedures.

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