

Grade-School Children's Social Collaborative Skills: Links With Partner Preference and Achievement

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Little is known about the skills children need to successfully collaborate with classmates on academic assignments. The purposes of this study were to identify grade-schoolers' collaborative skills, evaluate the importance of identified skills for collaborative work, and determine whether differences in skill use were related to children's social and scholastic competence. Initially, third through fifth graders (N = 113) described attributes of "good" collaborators, and these attributes were distilled into distinct skill categories or "types." Next, third through fifth graders (N = 212) rated exemplars of each skill type as a basis for skill importance and peers' skill use and provided data that were used to construct measures of work partner preference and peer acceptance. Teachers reported on participants' achievement in multiple academic domains. Four categories of work-related and interpersonal skills were identified, and these skill types were differentially associated with children's work partner preferences, peer acceptance, and achievement. Overall, the findings help to specify the types of skills grade-schoolers need to relate effectively with classmates in the context of collaborative academic tasks.

KEYWORDS: collaborative skills, social skills, peer-mediated learning

A longstanding aim in peer relations research has been to understand how children succeed or fail at developmentally significant interpersonal tasks. Considerable investigative effort, for example, has been devoted to understanding how children accomplish tasks such as making a friend, gaining inclusion into peers' play activities, and earning acceptance in

peer groups (see Ladd, 2005; Ryan & Ladd, 2012). One insight to emerge from this work is that both task features (e.g., task type, constraints) and children's skills (e.g., behavioral, social-cognitive, emotion regulation) figure prominently in task outcomes. Evidence shows that children are more likely to succeed at making a friend when certain relational conditions are present (e.g., dyadic play, shared interests) and when they possess the skills needed to establish these conditions (see Ladd, 2005).

Much of this research has been conducted in classrooms, and findings have illuminated the task conditions and skills that affect children's chances of achieving these relationship outcomes. Classrooms have become a focal context because it has been hypothesized that children's experiences with classmates affect their school adjustment and progress. Evidence supports this premise (see Ladd, Herald-Brown, & Kochel, 2009) and indicates that certain relational tasks and outcomes, such as making friends and repelling bullies, warrant attention. It is less clear, however, why other classroom tasks involving peers—some of which might have greater impact on children's social and scholastic development—remain underresearched. Teachers

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commonly utilize instructional strategies that require children to work with classmates on academic assignments (see Antil, Jenkins, Wayne, & Vadsay, 1998), but little has been done to investigate the *social* task conditions and skills that affect children's success in this peer context.

Peer Mediated Learning as a Social-Collaborative Task

Instructional strategies that encourage learning through peer interaction have been termed *peer-mediated learning* (PML). Multiple forms of PML have been developed (e.g., classwide peer tutoring, peer collaboration, group investigation, cooperative learning; see Damon & Phelps, 1989; Maheady, Mallette, & Harper, 2006), and most have been justified as methods for increasing student motivation and promoting "active" forms of learning (see L. S. Fuchs, Fuchs, Hamlett, et al., 1997; Johnson & Johnson, 2009; Ryan, Reid, & Epstein, 2004). Because evidence suggests that PML is effective for promoting achievement in grade-school children of all ages (see Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003), it has been widely utilized in schools. Evidence indicates that nearly 80% of elementary school teachers use PML in their classrooms on a sustained basis (Antil et al., 1998; Puma, Jones, Rock, & Fernandez, 1993).

By assigning children to dyads or small groups to engage in PML, teachers are, in effect, creating *temporary peer partnerships* and encouraging children to interact in ways that promote collaboration and learning. Evidence shows that classmates who work collaboratively rather than independently perform better academically (see Azmitia, 1988; Fawcett & Garton, 2005; Tudge, 1992), but insight into the social processes that enable some children to work more effectively with peers remains limited. In particular, little is known about the types of skills that make children effective peer collaborators. Rather, researchers' efforts to elucidate the mechanisms that underlie differential success have been focused on structural variations in PML, such as the ways children are paired or rewarded (e.g., varying group size, using homogenous or heterogeneous skill level dyads; see Fawcett & Garton, 2005; Schmitz & Winskel, 2008). The hypothesis that many children do not successfully participate in PML activities because they lack the social skills needed to do so remains underinvestigated.

In fact, teachers often implement PML activities with the assumption that children *already* possess the social skills needed to collaborate productively with peers. However, it may be erroneous to assume that all or even most children possess such skills. Substantial differences exist in children's preparedness to relate and work with classmates because social competencies are not universally taught (Ladd, 2005). Even socially adept children may need to develop new or specialized skills to work effectively with different types of partners.

Identifying Collaborative Skills From Theories and Models of Collaborative Learning

A logical first step toward identifying the skill sets that children need for peer collaboration is to map the subtasks inherent within prototypical collaborative tasks and determine whether these components call for specific skills. For grade-school children, collaborative tasks can be conceptualized (see Cohen, 1994) as academic assignments that are: (a) designed and prescribed by teachers, (b) undertaken by two or more classmates, and (c) performed with the expectation that participants will work together to achieve a collective goal or product (e.g., completion of assignment). Although the dynamic structure of collaborative assignments varies as a function of the task and participants (see Cohen, 1994), process models typically specify both cognitive and social components. For example, Barnes and Todd (1977) proposed a model that contained multiple cognitive components (e.g., constructing meaning for the assigned task, devising a problem to work on, setting up hypotheses, gathering evidence) as well as multiple social processes (e.g., controlling progress, managing competition and conflict, providing mutual support). In another model (Vedder, 1985), collaborative tasks were conceptualized as including processes such as specifying goals, creating plans, generating and selecting among alternative strategies, attempting solutions, revising plans, and so on.

These theoretical models of collaborative subtasks and processes provide an initial framework for research on skill specification. By defining collaborative subtasks and processes, hypotheses can be formed about skills that are relevant to peer collaboration and associated positive outcomes. Accordingly, in this study, efforts to identify and describe grade-schoolers' collaborative skills were guided in part by this deductive approach to skill specification.

Identifying Skills From Empirical Research on Collaborative Learning

A second step toward skill identification is to examine relevant studies and, from the available evidence, draw inferences about likely collaborative skill types. Relevant studies are those in which investigators describe or manipulate grade-schoolers' behaviors during collaborative activities and examine how these behaviors correlate with collaborative outcomes. Because few such studies exist, this inductive approach to skill identification was also utilized.

Evidence that might be used to identify collaborative skills comes from two types of investigative strategies. First, in intervention research, investigators have found that teaching social skills can improve children's PML performance. Webb and Farivar (1994) taught seventh graders communication and work-related helping skills during cooperative learning and found that they performed better academically than students who were taught only

communication skills. L. S. Fuchs, Fuchs, Hamlett, et al. (1997) taught two groups of second through fourth graders to provide and request help from peer partners prior to peer-mediated instruction and also trained children in the second group to offer partners task-relevant explanations. Children in a third (control) group received no skill instruction. Improvements in math achievement were found for the first two groups, as compared to the control group, and children in the second group evidenced stronger gains.

A second, less utilized empirical strategy is to sample collaborative learning participants and utilize them as informants about collaborative skills. Although research of this type is rare, findings attest to its utility. Prague (1989), for example, asked junior high students (ages 12–15) to describe skills that they thought were useful when working with classmates on school work. Frequently cited skills included working effectively and efficiently with group members, prompting responses from others, and thinking creatively.

Identifying Collaborative Skills: Building a Taxonomy From Theory and Evidence

Theory and evidence point to six types of collaborative skills. Models of collaborative learning suggest at least three types of social or work-related skills: (a) task specification and planning skills (Vedder, 1985), (b) conflict/competition management skills (Barnes & Todd, 1977), and (c) support skills (Barnes & Todd, 1977). Three additional skills can be inferred from empirical research on PML applications: (a) communication skills (Webb & Farivar, 1994), (b) work-related helping skills (e.g., Webb & Farivar, 1994), and (c) information sharing skills (e.g., providing/prompting ideas, task-related explanations; L. S. Fuchs, Fuchs, Hamlett, et al., 1997; Prague, 1989).

These six skill types represent a starting point for studies like this one, where the aims were to: (a) build and populate a taxonomy of collaborative skill types (e.g., identify additional skill types) and (b) begin to validate skills that are included in the taxonomy by testing the hypothesis that specific skills types are associated with relevant social and scholastic outcomes. Our efforts to address these aims were guided by several assumptions. First, we assumed that children's skills are context specific and that the identified collaborative skills would differ, partially, from those reported in research on peer relationship outcomes (e.g., friendship making, peer group entry). Second, we anticipated that the diversity of skills relevant to collaborative tasks have been underestimated because with few exceptions (e.g., Prague, 1989), skills have been specified deductively (positing their occurrence, relevance, importance, etc.) rather than empirically. Finally, we anticipated that more remains to be learned about collaborative *social* skills (i.e., competencies for interacting with partners) than collaborative *work-related*

skills (i.e., skills related to task performance or completion) because greater effort has been devoted to identifying skills that antecede collaborative products (e.g., learning outcomes) than to skills that facilitate collaborative processes (e.g., skills that make children preferred work partners).

Investigative Aims

The aims for this study were fourfold: (a) develop an expanded taxonomy of third through fifth graders' collaborative skills, (b) differentiate skills in terms of grade-schoolers' perceptions of their importance for collaborative work with classmates, (c) examine individual and sex differences in skill use and ascertain whether grade-schoolers who frequently use collaborative skills are more preferred as work partners by their classmates, and (d) determine whether grade-schoolers who use collaborative skills have higher levels of social and scholastic competence (i.e., social acceptance among classmates, academic achievement).

Because little is known about grade-schoolers' social and work-related collaborative skills, and few have surveyed this domain and documented skill types, our first aim was to gather descriptive data and begin to construct a collaborative skill taxonomy. This was accomplished by asking samples of third through fifth graders, in the context of individual open-ended interviews, to describe attributes that made someone (a peer) a "good" partner for collaborative tasks. Assuming that diverse characteristics would be reported, our next objective was to group children's responses into representative categories and using these categories, assemble classes of responses that were indicative of collaborative skills (i.e., skill "types"). Sex differences in skill types were examined, but not expected, because little or no basis for such differences exists in prior theoretical and empirical accounts of collaborative learning.

In addition to being diverse, skill sets/repertoires tend to be hierarchical, organized by responses that are most versus least relevant (central, adaptive) and utilized in specific task contexts. Accordingly, we also expected that children would distinguish among the identified skill types in terms of importance or relevance to collaborative activities. Thus, another study aim was to discriminate among the identified skill types in terms of their perceived importance to peer collaborators. To accomplish this, a sample of third through fifth graders were asked to rate the importance of exemplary skills within each of the identified skill type categories.

Relations between children's collaborative competence and classmates' preferences for work partners were examined as an initial test of the validity of the identified skill categories. Logically, if particular skills are essential for effective collaboration, then children who display these skills during collaborative activities should be preferred as work partners. Therefore, we hypothesized that classmates would exhibit stronger preferences for

collaborative partners whom they also perceived as possessing higher levels of the identified collaborative skills.

To further evaluate the validity of the identified skills, we examined the association between grade-schoolers' skill use and their social and academic competence in school. Because classroom peer collaboration is foremost among the school contexts where children are expected to relate and work successfully with peers, it is reasonable to expect that children's performance in this setting would have social and scholastic consequences. In particular, children who possess better collaborative skills are likely to be the most harmonious and effective work partners (e.g., easier to relate/work with, improve the odds of completing assignments successfully). These attributes, in turn, are likely to increase collaborators' social capital (one indicator of which is higher standing, or acceptance in their peer group) and enable them to attain higher levels of achievement. To evaluate these hypotheses, we correlated grade-schoolers' ratings on the identified collaborative skills with their peer group acceptance and achievement scores.

Method

Participants and Classroom Environments

The study sample included 212 children (107 females, 105 males; age range: 7 years, 8 months–12 years, 3 months) and 11 teachers who were recruited from third- (97 children; M age = 8.52 years; 5 teachers), fourth- (55 children; M age = 9.44 years; 3 teachers), and fifth- (60 children; M age = 10.51; years; 3 teachers) grade classrooms in three urban and suburban schools in the southwestern United States. Participants' ethnic/racial backgrounds were 34.5% European American, 44.3% Latino, 14.3% African American, 3.9% multiracial, and 3% other.

Another, preliminary sample was recruited 1 year prior to the study sample for measure development purposes. This sample contained 113 students (57 third graders, 26 fourth graders, and 30 fifth graders) who completed narrative interviews to identify themes in children's reports about collaborative skills. Because this sample was recruited from the same schools as the study sample, some of the students in the preliminary sample (28 children; 13.2%) were included in the study sample. These 28 children did not differ from those who were not included in the study sample on any of the investigation's measures, $F(12, 186) = .71, p > .05$. The ethnic/racial backgrounds for participants in the preliminary sample were 38% European American, 41.6% Latino, 15.0% African American, 2.7% multiracial, and 2.7% other.

The student populations in the schools from which both samples were drawn were diverse in race/ethnicity (School 1 [public]: 62.2% European American, 13.5% Latino, 5.4% African American, 18.9% other; School 2 [public]: 23.2% European American, 53.5% Latino, 19.2% African American, 4.0%

other; School 3 [charter]: 35.8% European American, 47.8% Latino, 11.9% African American, and 4.5% other) and socioeconomic backgrounds (student eligibility for free or reduced-price lunches: School 1: 47.6%; School 2: 74.0%; School 3: 41.3%). Academic proficiency ratings for the schools ranged from the 40th (School 2) to 50th (School 1) to 80th percentile (School 3) on state standardized exams (i.e., percentage of students proficient per grade compared to other schools in the state; www.greatschools.org).

Participating classrooms were ones in which teachers regularly incorporated (i.e., minimum 3–5 times per week) PML activities into their reading and language instructional programs. Teachers' PML activities were informal and diverse—as were their strategies for pairing students (e.g., random assignment, physical proximity, social or academic compatibility; but not ability based or gender homogeneous)—and were not representative of formal PML programs (e.g., CWPT, PALS; see D. Fuchs, Fuchs, Mathes, & Simmons, 1997). Children were not trained in peer collaboration prior to participation. Although diverse, teachers' PML activities had common features—all were: (a) designed and presented by teachers, (b) undertaken by groups of two to four classmates (group assignments differed over time), and (c) accompanied by instructions stipulating that group members should work together to achieve a collective goal or product.

Measure Development

Identifying "Skill Types"

To address Aim 1—creating a skill taxonomy—each of the 113 children in the *preliminary sample* completed an individual, standardized interview that was administered by a trained graduate student. Children first were asked, "When you work in groups on school work, what makes someone a good partner?" As a follow-up, or when children requested clarification, the question was rephrased: "When you work in groups on school work, what makes someone good to work with?" Interviewers recorded children's initial responses, used a standard follow-up prompt (i.e., "anything else?"), and ended the interview when respondents had nothing left to say. The average number of responses per child was 3.19 (range, 1–7).

To identify and distinguish among the reported partner characteristics, children's verbatim responses were transcribed and segmented into "attribute units" (i.e., portion of response/text containing a single partner characteristic). To delineate "skill type" categories from children's partner descriptions, a single judge (the third author) examined all attribute units and, using response content and previously identified skill categories, distinguished 11 distinct categories in the data. Five of the 11 categories were skills referenced in previous theory and research: (a) staying on task, (b) communicates and listens, (c) acts in a cooperative manner (cooperation), (d) provides support, and (e) attempts to solve disagreements. Three additional skill categories

that have not been delineated in past theory or research on collaboration also were identified: (f) maintains control of emotions and behavior, (g) attentive/responsive to others or others' perspectives, and (h) partners' character (e.g., conscientiousness, does what they say they will do). Beyond this, three *non-skill* categories were derived from the data: (i) relational qualities (e.g., a friend, someone I like), (j) partner's personal attributes (e.g., is smart, nice), and (k) task features/preparation (e.g., "we have all the materials needed").

Of the 361 identified attribute units, 323 were reliably categorized into the 11 identified categories by three independent raters. At least two raters agreed on 90% of all 361 attribute units and kappas between pairs of raters ranged from .71 to .74 (all $ps < .001$) across all categories. Coder disagreement was settled by majority, and attribute units that could not be reliably coded by at least one pair of raters were deemed "uncodable." Notably, 58.2% of the reported attributes were reliably classified into the skill categories, 31.3% fell into the non-skill categories, and the remaining 10.5% were uncodable due to rater disagreement or irrelevant/unclear child responses (e.g., "it is good"). Chi-square analyses revealed no significant differences by sex, $\chi^2_{(14)} = 16.52, p > .05$, or grade, $\chi^2_{(14)} = 23.10, p > .05$, in the frequency with which children mentioned each skill category.

Creating a Collaborative Skill Importance Measure

For Aim 2—distinguishing skills in terms of their importance for collaborative work—items were written to serve as exemplars of the eight skill and three non-skill categories identified from children's verbal descriptions (attribute units). Multiple items were written for each category, and within a category, items depicted exemplars that were frequently cited in the open-ended interviews. This resulted in a total of 49 skill and non-skill items (see Table 1 for a listing of all descriptors).

To estimate the importance of the skill types (categories) for collaborative activities, *study sample* participants ($N = 212$) rated all 49 skill descriptors. The importance of each item was rated in relation to the question: "If you needed a partner for school work, how important would it be for your partner to _____?" All items were rated on a 4-point scale, with 0 = *not at all important*, 1 = *a little important*, 2 = *important*, and 3 = *very important*. Commonalities and distinctions among skills were assessed by analyzing covariation in the ratings obtained for the 49 skill and non-skill items. An initial model containing 10 factors was tested using confirmatory factor analysis (CFA). Specifically, items were specified for each of the eight skill domains as shown in Table 1. In addition, items reflecting relational and partner attributes were designated on a single non-skill factor, and items reflecting task features/preparation were specified on a 10th factor. This model did not fit the data well, $\chi^2_{(1,044)} = 1,816.20$; Comparative Fit Index

Table 1
Taxonomy of Collaborative Skills and Standardized Factor Loadings for the Final Five-Factor Model

Assessment Items <i>"How important would it be for your partner to . . . ?"</i>	1 On-Task (5 items)	2 Cooperative (17 items)	3 Support/ Concern (7 items)	4 Conscientiousness (5 items)	5 Relational/ Partner (5 items)
Staying on task					
Keep working even if it gets hard	.53				
Focus on the work	.44				
Stay with you until work is done		.62			
Communicates and listens					
Pay attention to you		.45			
Listen to you		.43			
Share their ideas with you		.56			
Explain their ideas clearly		.55			
Give opinions		.68			
Tell you what they are thinking		.53			
Give ideas for answering questions		.58			
Look at you when you are talking		.46			
Listen to your ideas even if they don't agree		.49			
Explain how they got their answers		.65			
Cooperation					
Cooperate with you		.43			
Work with you on the assignment		.61			
Take turns reading/answering the questions		.61			
Work well with you, even if they don't want to be partners		.53			
<i>Ask you to explain your ideas more clearly when confused</i> ^a					

(continued)

Table 1 (continued)

Assessment Items	1 On-Task (5 items)	2 Cooperative (17 items)	3 Support/ Concern (7 items)	4 Conscientiousness (5 items)	5 Relational/ Partner (5 items)
Provides support					
Help you when you do not understand		.65	.58		
Make you feel okay, if you make a mistake			.51		
Encourage you			.60		
Say that you're doing a good job			.56		
Act nicely toward you			.48		
Calm you down when you are angry or frustrated			.68		
Cheer you up when you are sad			.58		
Care about your feelings					
<i>Try to make the questions easier for you^a</i>					
Attempts to solve disagreements					
Is willing to try things your way		.53			
Talk about questions when they disagree, instead of fighting				.64	
<i>Work through disagreements^a</i>					
Emotional and behavioral control					
Stay calm even when excited, angry, or frustrated					.57
<i>Keep from pouting when they don't get their way^a</i>					
<i>Keep their hands to themselves^a</i>					
Attentive/responsive to others					
<i>Let you know how they like to work^a</i>					
<i>Understand what you are good at^a</i>					
<i>Know how you like to do things^a</i>					

(continued)

Table 1 (continued)

Assessment Items	1 On-Task (5 items)	2 Cooperative (17 items)	3 Support/ Concern (7 items)	4 Conscientiousness (5 items)	5 Relational/ Partner (5 items)
Character/conscientiousness					
Do what they say they will do				.57	
Do their fair share of the work				.59	
Think things over before they say them				.51	
<i>Doesn't cheat on assignments^a</i>					
Relational/partner attributes					
Is your friend					.70
Is someone you have worked with before					.59
Is someone you like					.71
Is smart					.67
Gets good grades					.54
<i>Is cool^a</i>					
Task features/preparation					
Have everything needed to work	.62				
Know what you are supposed to be doing	.61				
Be prepared to work	.56				

Note. All factor loadings are significant at $p < .001$.

^aItem deleted due to cross-loading.

(CFI) = .76; root mean square error of approximation (RMSEA) = .06; standardized root mean square residual (SRMR) = .07, and results (e.g., relations among latent variables, cross-loadings, residuals, modification indices) implied the need for fewer items and a simpler structure. Guided by modification indices and theoretical considerations (see Schreiber, State, King, Nora, & Barlow, 2006), 10 items that had high cross-loadings on multiple factors were deleted, including all items that were developed to tap attentive/responsive (deleted items are italicized in Table 1).

A theoretically and empirically guided examination of the remaining 39 items suggested that rather than tapping two distinct constructs, items specified for staying on task and task features/preparation were tapping a single 5-item skill dimension that we labeled Staying on Task. Similarly, rather than two distinct skill domains, cross-loadings among the communicates/listens and cooperation items led us to specify a single 17-item dimension labeled Cooperative Skills. The third factor comprised 7 of the 9 items specified for provides support; 1 of the items demonstrated a better model fit with Cooperative Skills (“help you when you do not understand”) and 1 item was deleted (“try to make the questions easier for you”). The remaining 7-item factor was retained and labeled Support/Concern skills. A fourth factor included the 3 items that were initially specified as Character/Conscientiousness and 2 additional items that loaded on this factor (“talk about questions when they disagree, rather than fighting” and “stay calm, even with excited, angry, or frustrated”). Collectively, these 5 items were labeled Conscientiousness (e.g., self-discipline, deliberate actions, and persistence in the face of challenges/conflict). Lastly, the fifth factor comprised the Relational/Partner attribute items. A CFA computed for this revised 5-factor model (see Table 1 for standardized factor loadings) fit the data adequately, $\chi^2_{(658)} = 863.39$; CFI = .92; RMSEA = .04; SRMR = .06, and did so better than the 10-factor model, $\chi^2_{(386)}$ difference = 952.81, $p < .01$.

Measures

Collaborative Skill Importance

Five skill importance subscales were created by averaging importance ratings across items belonging to each of the five CFA-derived factors. The items comprising each factor (see Table 1) include: (a) 5 items referring to on-task behavior (Factor 1: On Task; $\alpha = .62$); (b) 17 items referring to sharing of information and ideas, cooperative/communicative behaviors (Factor 2: Cooperative Skills; $\alpha = .87$); (c) 7 items referring to emotional support (Factor 3: Support/Concern; $\alpha = .76$); (d) 5 items referring to self-discipline, deliberate actions, and fairness (Factor 4: Conscientiousness; $\alpha = .66$); and (e) 5 non-skill items (Factor 5: Relational and Partner Attributes; $\alpha = .76$). Because the aims of this study focused on collaborative skill use, only the four collaborative skill categories were retained for further analyses. Subscale means and standard deviations are shown in Table 2.

Table 2
Descriptive Statistics for Self-Reported Skill Importance Ratings

Collaborative Skill Type	Full Sample		Boys		Girls	
	<i>n</i> = 212		<i>n</i> = 105		<i>n</i> = 107	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
On Task	2.47 ^a	.50	2.47 ^a	.47	2.47 ^a	.53
Cooperative	2.20 ^b	.52	2.14 ^b	.54	2.25 ^b	.50
Support and Concern	2.15 ^b	.61	2.05 ^b	.64	2.25 ^b	.56
Conscientiousness	2.28 ^a	.60	2.19 ^b	.62	2.38 ^a	.56

Note. Means denoted by different letters within columns are statistically significant at $p < .05$.

Collaborative Skill Use

Estimates of the frequency of skill use were obtained by asking participants to rate how often each of their classmates utilized specific types of skills during collaborative activities. Because it was impractical for participants to rate all classmates on the 49 items used to construct the Collaborative Skill Importance measure, 11 of the 49 items were chosen with the constraint that all of the eight hypothesized skill types were reflected. Specifically, all eight skill types had at least one exemplar descriptor, and three of the eight skills types had two: (1) on-task (e.g., to tap both persistence and focus), (2) communicates/listens (e.g., to reflect sharing *and* listening), and (3) provides support (e.g., instrumental *and* emotional support).

Participants rated classmates in response to the question, "When you work in groups on school work, how often does this person _____?" using a 4-point scale (0 = *never*; 1 = *once or twice [rarely]*, 2 = *sometimes*, and 3 = *most of the time*). So that skill use scores paralleled the four skill categories subsequently identified for the Collaborative Skill Importance measure (see CFA described previously), the rated skill use items were partitioned and scores averaged as follows: (a) On Task (two items: "works hard until the work is done," "focuses on the work"), (b) Cooperative (four items: "listens to their partner," "shares their ideas," "helps their partner when they don't understand," "takes turns reading and answering questions"), (c) Support and Concern (three items: "makes their partner feel okay, even if they make a mistake;" "tells their partner they are doing a good job;" "tries to understand their partner's point of view"), and (d) Conscientiousness (two items: does their fair share of the work," "works through disagreements, rather than fighting about them"). For the four skill use categories, α ranged from .83 to .94 (see Table 3).

Table 3
Descriptive Statistics for Peer-Reported Skill Use Ratings

	Full Sample		Boys		Girls		F Value
	<i>n</i> = 212		<i>n</i> = 105		<i>n</i> = 107		
Collaborative Skill Type	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
On Task ($\alpha = .92$)	2.27	.91	2.19	.94	2.35	.91	5.31*
Cooperative ($\alpha = .94$)	2.20	.90	2.13	.92	2.27	.92	9.07**
Support and Concern ($\alpha = .83$)	2.12	.89	2.03	.89	2.21	.89	12.16***
Conscientiousness ($\alpha = .87$)	2.18	.92	2.10	.93	2.25	.89	4.58*

Note. Overall MANOVA: $F(4, 207) = 3.91, p < .01$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Collaborative Partner Preference

The extent to which children were preferred as partners for collaborative activities (i.e., “work preference”) was assessed by having participants rate classmates on the criterion, “When you work in groups on school work, how much do you like to work with this person?” using a 5-point scale (1 = *not much*, 3 = *kind of*, and 5 = *a lot*). Ratings received from classmates were averaged and standardized within classrooms. “Work-with” sociometric rating methods previously have been shown to yield reliable and valid data with grade-school children (see Oden & Asher, 1977; Singleton & Asher, 1977).

Classroom Peer Acceptance

Children’s peer group acceptance/rejection was measured with a roster-and-rating sociometric method (see Singleton & Asher, 1977). In each classroom children rated each classmate on the following criterion: “How much do you like to play with this person in school?” Ratings were made on a 5-point scale, with 1 = *not much*, 3 = *sometimes*, and 5 = *a lot*. Participants’ ratings were averaged and standardized by classroom. Evidence indicates that this measure yields reliable and valid data with grade-school children (see Cillessen & Bukowski, 2000).

Academic Achievement

Teachers were provided with four achievement dimensions, representing academic subjects (i.e., reading, arithmetic, spelling, oral language), and asked to rate participants’ status on each criterion, using a 5-point scale (0 = *far below grade level*, 1 = *below grade level*, 2 = *grade level*, 3 = *above grade level*, and 4 = *far above grade level*; $M = 1.88, SD = .88; \alpha = .92$).

Achievement measures of this type (i.e., teachers' grade-level ratings aggregated over subjects) have been shown to be reliable and valid with grade-school children (see Pierce, Hamm, & Vandell, 1999; Vandell & Pierce, 1998).

Procedures

School district consent and parents' written informed consent were obtained prior to children's participation. Eighty-seven percent of invited families consented to their child's participation. All study measures were administered to participants within the first 2 months of the school year by trained project staff. For the skill use, partner preference, and peer acceptance measures, children rated all classmates who had informed consent to participate in this study. During the course of the study, participants received a small gift and teachers received an honorarium.

Results

Data Analytic Strategy and Results of Preliminary Analyses

Preliminary analyses were conducted to examine variable distributions, relations, and missing data and to determine whether these and other data properties conformed to the assumptions of parametric statistics and data augmentation procedures (e.g., variables normally distributed, values missing at random). Descriptive statistics (means, standard deviations, and correlations) are presented in Tables 2 through 4. Missing data were rare (5% of the entire data set, range, 0%–8%). Measurement models and latent class analyses were calculated with Mplus (see Muthén & Muthén, 1998–2007), and missing data were estimated with the maximum likelihood robust estimator (MLR). Regression analyses and ANOVAs were computed in SPSS 19 after imputing 20 data sets. Results from the imputed data sets are pooled estimates.

Intraclass correlation coefficients (ICCs) were computed for the collaborative skills to examine the extent to which children responded similarly as a function of classroom membership. Overall, classroom variability was low (ICCs ranged from .02 to .07; see Hox, 2002), suggesting that we would expect these scores to correlate 2% to 7% simply due to children being in the same class. We recognize that features of the learning environment can encourage or undermine students' use of collaborative skills, or perhaps variations in teachers' pedagogical practices may emphasize some skills more prominently than others; however, our sample of 11 teachers within three schools precludes us from exploring these variations in detail.

Identification of Collaborative Skills

Four collaborative skill types were identified in the CFA performed on students' importance ratings for skill descriptors (see Method section).

Table 4
Correlations Among Study Variables

Study Variable	1	2	3	4	5	6	7	8	9	10	11
1. Child sex											
Student ratings of skill importance											
2. On Task	-.01										
3. Cooperative	.10	.53***									
4. Support and Concern	.17*	.40***	.70***								
5. Conscientiousness	.16*	.52***	.63***	.49***							
Peer reports of skill use											
6. On Task	.16*	.06	.08	.10	.10						
7. Cooperative	.20**	.05	.12	.11	.12	.89***					
8. Support and Concern	.23**	.05	.09	.09	.12	.87***	.93***				
9. Conscientiousness	.15*	.05	.09	.09	.11	.89***	.89***	.87***			
Outcome measures											
10. Academic achievement (TR)	-.09	.11	.05	-.04	.12	.47***	.50***	.44***	.46***		
11. Work preference (PR)	.21**	-.01	.07	.11	.09	.75***	.82***	.80***	.75***	.35***	
12. Peer acceptance (PR)	.04	.06	.15*	.22**	.13	.58***	.66***	.64***	.62***	.30***	.79***

Note. TR = teacher report; PR = peer report. For child sex, 0 = boys and 1 = girls.
* $p < .05$. ** $p < .01$. *** $p < .001$.

These categories were labeled On Task, Cooperative Skills, Support and Concern, and Conscientiousness. Subskills corresponding to each collaborative skill category are presented in Table 1.

Perceived Importance of the Skill Subtypes

The importance ratings students assigned to subskills within each collaborative category were averaged to form subscales, and the resulting means and standard deviations are shown in Table 2. A 2 (sex) \times 4 (skill type) repeated measures ANOVA was conducted to determine whether children placed more or less importance on different types of collaborative skills and whether such differences varied by sex. The four skill subscales were entered as the repeated measure, ordered from lowest to highest as a function of the subscales' mean importance rating. The relative order of importance (i.e., the order of subscales means from lowest to highest on children's ratings of importance) did not differ for boys and girls. Because sphericity could not be assumed (Mauchly's test, $\chi^2[5] = 45.29, p < .001$), degrees of freedom were corrected using the Huynh-Feldt estimates ($\epsilon = .90$). A main effect for skill type, $F(2.711, 569.39) = 29.32, p < .001$, was found; however, it was qualified by a sex by skill type interaction, $F(2.71, 569.39) = 3.49, p < .05$. Although all skill subtype ratings averaged above the scale's midpoint (> 1.5 on a 3-point scale; see Table 2), within-subjects contrasts (ordered repeated comparisons) revealed that on-task skills were rated significantly higher than cooperative and support and concern skills. Differences by sex were found in that boys rated on-task skills as more important than all other skills, including conscientiousness, whereas girls did not rate on-task as more important than conscientiousness skills.

Participants' Collaborative Skill Use as Reported by Classmates

Means and standard deviations for the collaborative skill use ratings children received from classmates are presented by skill domain and sex in Table 3. On average, the majority of participants were seen as utilizing all of the skill types "sometimes" if not more often (> 2.0) within classroom group work. A one-way (sex) multivariate analysis of variance was conducted to examine whether boys and girls differed significantly on the frequency with which peers perceived them to use each skill subtype. A significant overall effect was found, $F(4, 207) = 3.91, p < .01$, and tests of between-subjects effects indicated that girls were rated as using each skill subtype more frequently than boys.

Variability in participants' skill use ratings was substantial within each skill domain, suggesting that some participants were more frequent skill users than others. Of note, substantial proportions of participants received averaged ratings that were so low (< 2.00) as to imply that they "seldom" or "never" exhibited such skills during collaborative classroom activities

(i.e., On Task: 23.8% sample, 28.6% boys, 19.0% girls; Cooperative Skills: 27.9% sample, 33.3% boys, 25.5% girls; Support and Concern: 34.2% sample, 44.8% boys, 23.9% girls; Conscientiousness: 30.3% sample, 35.2% boys, 25.4% girls). Contrasts by skill category (χ^2 tests on proportions; Bruning & Kintz, 1987) revealed that significantly more participants received low usage ratings (< 2.00) for support and concern skills than for on-task skills ($\chi^2_{(1)} = 5.08, p < .05$). This finding, however, was qualified by sex. To be specific, whereas the proportion of boys rated low for support and concern skills was larger than the proportion of boys rated low for on-task skills, $\chi^2_{(1)} = 5.25, p < .05$, girls did not differ significantly in this regard. Further, cross-sex contrasts, $\chi^2_{(1)} = 9.37, p < .01$, showed that significantly more boys (44.8%) than girls (23.9%) received low use ratings for support and concern skills.

Strong, positive correlations were found among peer-reported participants' skill use scores across the four skill domains. Thus, correlations suggest that children who exhibited more or less frequent skill use in one domain exhibited a similar level of skill use in all of the other skill domains (see Table 4).

Are Frequent Skill Users Preferred Workmates, Accepted by Peers, and Higher Achievers?

This question was addressed first by correlating the ratings children received from classmates for skill use frequency with the scores they received on the work partner preference, peer acceptance, and teacher-reported achievement measures. Results are shown in Table 4. Regardless of subtype, skill use ratings correlated positively and significantly with the work partner preference, peer acceptance, and achievement measures. Moreover, these correlations remained similar in magnitude and statistically significant ($p < .001$) after sex was partialled (work preference r s ranged from .75 to .82; peer preference r s ranged from .58 to .66; academic achievement r s ranged from .48 to .54).

Second, to determine whether each skill type correlated with partner preference, peer acceptance, and achievement distinctly (i.e., beyond relations attributable to other skill types), a series of hierarchical linear regressions were conducted. Each of the continuous peer acceptance, work partner preference, and academic skill scores were regressed on the four skill type ratings (Step 1; simultaneous entry). Sex of child also was included in this step as a covariate (dummy-coded: boys = 0, girls = 1). Skill type by sex interaction terms were entered on a second step (simultaneous entry) to determine whether associations between outcome measures (peer acceptance, work partner preference, and academic skills) and skill types differed for boys versus girls. If the block of interaction terms was significant (i.e., significant R^2 increment), terms with significant regression weights were interpreted.

Table 5
Hierarchical Linear Regressions: Predicting Play Partner Preference, Work Partner Preference, and Achievement From Participants' Sex and Collaborative Skill Use

Predictor	Work Partner Preference		Peer Acceptance		Achievement	
	<i>b</i>	ΔR^2	<i>b</i>	ΔR^2	<i>b</i>	ΔR^2
Step 1		.69***		.46***		.29***
Sex	.07		-.20*		-.33**	
On Task	.02		-.38*		.12	
Cooperative	.58***		.98**		.54	
Support and Concern	.25*		.03		-.15	
Conscientiousness	.09		.13		.02	
Step 2		.01		.02*		.01
On Task \times Sex	.30		.31		-.23	
Cooperative \times Sex	.26		-1.02*		.02	
Support and Concern \times Sex	.08		.58		.13	
Conscientiousness \times Sex	.09		.15		.24	

Note. Unstandardized coefficients are reported for the highest significant hierarchical step or, when not applicable, the step in which they were added.

* $p < .05$. ** $p < .01$. *** $p < .001$.

For work partner preference, the first step of the regression analysis containing the skill type and sex indices was significant ($R^2 = .69$; $p < .001$); however, the block of interaction terms entered on the second step was not. Thus, only coefficients from the first step of the analysis are interpreted. As shown in Table 5, two of the four skill types were found to be significant, distinct, positive correlates: cooperative ($b = .58$) and support and concern ($b = .25$).

For peer acceptance, regression results were significant for the first step (skill type ratings; $R^2 = .46$; $p < .001$), the second step (skill type by sex interaction terms; $R^2 = .02$; $p < .05$), and the overall analysis ($R^2 = .48$; $p < .001$). On-task ($b = -.38$, $p < .05$) and cooperative ($b = .98$, $p < .001$) skills accounted for unique variance in peer acceptance. However, the latter finding was qualified by an interaction with sex such that cooperative skills were associated with higher peer acceptance for boys ($b = .98$, $p < .001$), but not for girls ($b = -.05$, $p > .05$).

For achievement, the first step of the regression analysis was significant ($R^2 = .29$; $p < .001$), but the second step containing interaction terms was not. On the first step, only sex emerged as a unique predictor of teacher-rated achievement ($b = -.33$, $p < .01$), with boys receiving higher achievement ratings than girls. None of the collaborative skills accounted for unique variation in achievement beyond the contribution of the others (although as

demonstrated earlier, they were all correlated with achievement after controlling for sex).

Distinguishing Among Children on the Basis of Skill Use Profiles

Associations between children's skill use and their social standing (i.e., as preferred work partners, accepted by peers) and academic competence (i.e., achievement) were also examined using person-oriented analyses. As a first step, we attempted to determine whether there were groups of children in the primary sample that possessed similar levels and types of skills. A series of latent profile analyses were used for this purpose. As a statistical method, latent profile analysis resembles latent class analysis, except that continuous-scale indicators are used to identify groups (i.e., classes) of children who exhibit similar patterns across multiple empirical indices (see Collins & Lanza, 2010).

To address this aim, a series of models were specified (i.e., one-, two-, three-, four-, five-, and six-class solutions) using the four peer ratings of collaborative skill use (i.e., On Task, Cooperative, Support and Concern, and Conscientiousness). To select among solutions with varying numbers of classes, several fit indices were examined including the Bayesian Information Criteria (BIC), Akaike Information Criteria (AIC), entropy, and the Bootstrap Likelihood Ratio Test (BLRT). Models with smaller AIC and BIC values indicate better fitting solutions. Entropy, a measure of classification quality, ranges between 0 and 1 with values closer to 1 indicating that individuals were more precisely classified into individual classes. A significant p value on the BLRT indicates that a model with k classes has better fit to the data than a model with $k - 1$ classes.

To begin, a one-class solution was calculated as a baseline model (BIC = 2,232.83, AIC = 2,231.44) and then compared with successive models to identify the best fitting model. Results indicated that the two-class solution (BIC = 1,646.11, AIC = 1,602.66, entropy = .96) had better model fit than the one-class solution based on the BLRT ($2 \times \Delta LL = 638.78$, $p < .001$), the three-class solution (BIC = 1,442.32, AIC = 1,382.16, entropy = .92) fit better than the two-class solution ($2 \times \Delta LL = 230.50$, $p < .001$), and the four-class solution (BIC = 1,278.80, AIC = 1,201.93, entropy = .93) fit better than the three-class solution ($2 \times \Delta LL = 190.23$, $p < .001$). Models with additional classes were also specified (e.g., five-class solution; BIC = 1,233.88, AIC = 1,140.29, entropy = .90 and six-class solution; BIC = 1,227.62, AIC = 1,117.32, entropy = .90), however the relative improvement in the information criterion between the four-, five-, and six-class solutions was minimal compared to solutions with fewer classes. Moreover, it did not appear that the five-class and six-class solutions identified additional classes of children who were substantively much different than the classes identified in the four-class solution. Thus, the four-class model was deemed the most

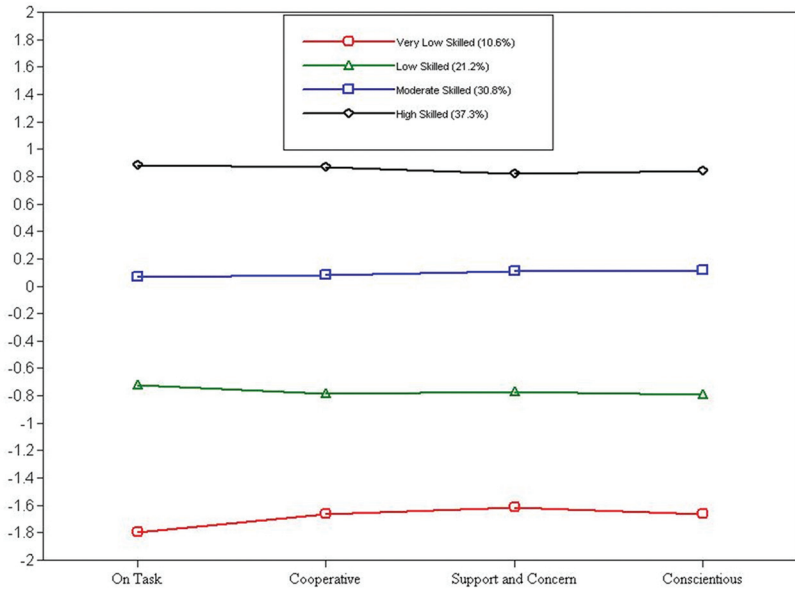


Figure 1. Skill-use profiles based on four-class solution from latent profile analysis.

appropriate and parsimonious solution. The four-class solution (see Figure 1) identified high-skilled (37.3% of total sample; 37.2% boys and 62.8% girls), moderate-skilled (30.8% of total sample; 54.7% boys and 45.3% girls), low-skilled (21.2% of total sample; 58.7% boys and 41.3% girls), and very low-skilled (10.6% of total sample; 66.7% boys and 33.3% girls) groups.

Skill Use Groups: Relations With Work Partner Preference, Peer Acceptance, and Academic Competence

Associations between the skills use groups (i.e., high-, moderate-, low-, and very low-skilled) and each of three competence indicators (i.e., social: work-partner preference, peer acceptance; scholastic: academic achievement) were examined using multinomial logistic regression analysis. These three competence indicators were simultaneously regressed on skill use group membership. In addition, child's sex was entered as a covariate to control for gender differences in group membership. The purpose of this analysis was to determine whether membership in a specific skill use group was associated with specific forms of social and academic competence, using the moderate-skilled group as the referent (see Table 6).

Table 6

Results of Latent Class Analysis on Associations Between Class Membership, Work Partner Preference, Peer Acceptance, and Academic Competence

Criteria	High Skilled		Low Skilled		Very Low Skilled	
	<i>b</i>	OR	<i>b</i>	OR	<i>b</i>	OR
Sex	1.01	2.74	-0.79	0.45	-1.16	.32
Work-partner preference	2.10**	8.17	-3.20***	0.04	-6.55***	<.01
Peer acceptance	0.44	1.55	-0.23	0.79	-0.43	.65
Achievement	0.90*	2.46	-1.06***	0.35	-2.07***	.13

Note. Competence criteria analyzed simultaneously; for each criterion, findings are with other criteria held constant. Moderate-skilled class was used as the reference group. OR = odds ratio.

* $p < .05$. ** $p < .01$. *** $p < .001$.

For work partner preference, results indicated that compared to children in the moderate-skilled group, children in the high-skilled group were more likely to be preferred as work partners ($b = 2.10$, $p < .01$, odds ratio [OR] = 8.17). In fact, for a one point increase in work partner preference, the odds of being in the highly skilled group was 8.2 times higher than being in the moderate-skilled group, holding sex, achievement, and peer acceptance constant. Similarly, compared to children in the moderate-skilled group, children in the low-skilled group and very-low skilled group were considerably less likely to be preferred as work partners ($b = -3.20$, $p < .001$, OR = .04 and $b = -6.55$, $p < .001$, OR < .01, respectively). Additional group comparisons were made to examine potential group differences between the low-skilled and very low-skilled groups. These analyses indicated that compared to the very low-skilled group, children in the low-skilled group were more likely to be preferred as work partners ($b = 3.36$, $p < .001$, OR = 28.70). Peer acceptance was not significantly associated with children's membership in a skill use group, after accounting for sex, work partner preference, and achievement.

Results for achievement showed that children in the high-skilled group had significantly higher scores than those in the moderate skilled group ($b = .90$, $p = .02$, OR = 2.46). For a one point increase in achievement, the odds of being in the highly skilled group as opposed to the moderately skilled group was about 2.5 times higher, holding sex, work partner preference, and peer acceptance constant. Moreover, compared to children in the moderate skilled group, children in the low-skilled and very low-skilled groups had significantly lower levels of achievement ($b = -1.06$, $p < .001$, OR = .35 and $b = -2.07$, $p < .001$, OR = .13, respectively). Additional group comparisons were made to examine group differences between the low-skilled and

very low-skilled groups. These analyses indicated that compared to the very low-skilled group, children in the low-skilled group had higher levels of achievement ($b = 1.01$, $p < .05$, $OR = 2.75$).

Discussion

Findings from this study contribute to a small but growing body of evidence that specifies the skills children need to relate and work effectively with classmates in peer-mediated learning activities. Among the skills that emerged from our findings were competencies reported in prior empirical investigations (i.e., empirically documented skills), competencies stipulated in models of collaborative learning (i.e., hypothesized skills), and novel skill types, or competencies not previously specified in research or theory on grade-schoolers' collaborative learning.

Toward a Taxonomy of Grade-Schoolers' Collaborative Skills

Two empirically demarcated skill types were substantiated in this investigation: help-related skills (giving/requesting aid) and communication skills (L. S. Fuchs, Fuchs, Hamlett, et al., 1997; Webb & Farivar, 1994). Not only did grade-schoolers frequently mention helping and communication skills in open-ended interviews (e.g., "help you when you are stuck," "discuss the answers"), but they also assigned higher ratings to categories that contained these skills when asked about competencies that affected their choice of work partners. In addition, another identified skill—"doing one's fair share of the work"—closely resembled a form of competence that was previously documented with older, junior high school students (i.e., dividing the assigned work fairly; Prague, 1989).

Other skills participants reported resembled competencies that have been stipulated in theories or models of collaborative learning but not corroborated empirically (i.e., hypothesized skill types). Consistent with the premise that essential collaborative skills include managing conflict and providing support (Barnes & Todd, 1977), we found that grade-schoolers verbalized and rated as important a partner's willingness to solve disagreements and to offer social/emotional support during collaborative interactions.

Also identified were novel skill types, or competencies not previously specified in research or theory on grade-schoolers' collaborative learning. First, in both skill descriptions and ratings, grade-schoolers endorsed the importance of "work-related" collaborative skills, including staying on task, remaining focused on work, and persevering with collaborators until an assignment was completed. Although a similar form of competence was mentioned in one prior study (i.e., "working effectively and efficiently"; Prague, 1989), the reported skills were not described with the level of specificity found here and were culled from data gathered with an older sample of respondents (i.e., adolescents). Second, participants mentioned and

endorsed skills that were indicative of conscientiousness, such as doing one's fair share of the work, following through on collaborative commitments, and regulating one's emotions and behaviors. Third, grade-schoolers described and ratified a more diverse and specific subset of social-emotional support skills than previously has been empirically documented or theoretically postulated. Included in this subset were competencies such as perspective taking (e.g., trying to understand a partner's point of view) and skills such as affirming, reassuring, and encouraging one's work partners (e.g., making partners feel OK, telling a partner "good job!").

Taken together, these findings lend support to some of the content found in empirically based skill taxonomies and corroborate some of the hypotheses advanced about the skills grade-schoolers need to succeed in collaborative learning activities. In addition, the findings extend our conceptions of relevant skill types and subtypes by exposing other, novel competencies that previously had not been identified empirically or theoretically. In this way, our results advance the descriptive goal of defining the universe of skill types (i.e., formulating task-specific skill taxonomies) that are germane (likely to help grade-schoolers be successful) to this social niche and the social/scholastic challenges students encounter in classroom collaborative tasks.

Are There Individual Differences in Students' Use of the Identified Collaborative Skills?

Our findings cast doubt on the assumption that all or most children in middle childhood *already* possess or utilize the social skills that are needed to interact productively with peers on teacher-prescribed collaborative activities. Instead, the results imply that there is substantial variability across children in their use of skills for relating and working with classmates in collaborative contexts. For example, skill use estimates, which were obtained for exemplars of each of four discrete skill categories, showed that nearly a quarter to one third of grade-schoolers were reported as seldom or never using collaborative skills during classroom group work, suggesting that skill deficiencies were not uncommon in each of the identified skill domains. Although not anticipated, it was discovered that more boys than girls were viewed by their classmates as deficient at showing support and concern when working together. It is possible that of the four identified skill subtypes, support and concern likely reflect skills requiring a level of social and affective competence (as opposed to instrumental competence) that is more developed in girls of this age. Leaper (1991), for example, found that boys exhibited fewer prosocial behaviors than girls in collaborative contexts. Grade-schoolers may be aware of this difference, and if so, it may be the reason why they judge boys to be less supportive than girls in collaborative contexts.

Unfortunately, although our findings imply that substantial numbers of grade-school children seldom use collaborative skills in classroom contexts that call for them, the data do not elucidate the underlying cause(s) of skill disuse. Further research is needed to clarify the determinants of individual differences in collaborative competence.

Perceived Value of the Identified Skills for Collaborative Work With Classmates

Analysis of participants' ratings of the importance of specific skill types as a basis for work partner selection implied that children perceived all of the identified skill categories as assets. However, some types of skills were thought to be especially desirable or important in work partners, and certain skills were differentially valued by boys versus girls.

It would appear that grade-schoolers, when choosing work partners, place a premium on peers' work-related social skills (e.g., staying focused on a task, continuing to work with partners until a task is completed). That these competencies received such uniformly high ratings suggests that children of this age, and boys in particular, recognize that these types of skills are especially pertinent and beneficial to productive collaboration or, conversely, understand that skill deficiencies within these domains are especially detrimental to collaboration and task success. The same appears to be true of conscientiousness-related social skills (e.g., seeking/contributing fair division of labor, attempting to resolve disagreements, regulating negative emotions), although it appears that girls value these skills even more highly than boys.

Grade-schoolers also considered important, although to a lesser degree, skills that were entitled cooperative skills (e.g., sharing ideas, helping partners) and social support skills (e.g., taking partners' viewpoint, praising partners' work). Although these skill types were rated significantly lower than work skills and conscientiousness-related skills, the rather high scores (on average) that grade-schoolers assigned to these skills implied that they are also essential competencies for collaborative contexts.

In sum, it would appear that most grade-schoolers value certain types of social skills for peer-mediated learning activities, perhaps because their experiences in classrooms have taught them that these skills are essential for collaboration and reliable predictors of task completion and scholastic success. These values appear rooted in a logic that, on the face of it, appears valid. Collaboration and learning are likely to be disrupted when partners lack work skills, contribute inequitably to joint tasks, fail to help and support each other, or behave in inflexible or volatile ways during collaborative interactions. Indeed, the authors' informal observations of classroom collaborative activities suggest that it is not uncommon for some children to leave the worksite, start off-task conversations with passersby, criticize partners, or

engage in other behaviors that detract from productive participation in collaborative assignments. Further, the importance that grade-schoolers placed on the identified skill types resonates with educators' suppositions about the skill deficiencies that tend to disrupt peer collaboration (see Dion, Fuchs, & Fuchs, 2005).

Are Grade-Schoolers' Collaborative Skills Related to Their Social and Scholastic Competence?

Data gathered to evaluate the validity of the identified skill categories produced findings that were consistent with expectations. Essentially, children who were skilled collaborators (e.g., rated by peers as frequent users of the identified skill types during peer-mediated learning activities) tended to be more preferred as work partners by classmates and received higher academic ratings by teachers than those who were perceived as less skilled collaborators.

First, our findings were consistent with the hypothesis that the identified skills enable grade-schoolers to be productive collaborators and that children who display these skills frequently in teacher-prescribed collaborative activities earn favorable reputations as work partners. Of all the skills types examined, it was the cooperative and support-concern skills that were most closely and distinctly associated with work partner preference. It is possible that by encouraging children not only to be cooperative but also supportive, teachers may increase children's attractiveness to classmates as collaborative partners.

Second, the positive association found between all types of collaborative skills and achievement was consistent with the hypothesis that learning is enhanced when children possess skills that enable them to work harmoniously and productively with classmates. It is conceivable that children who have better collaborative skills increase their own and others' engagement in learning and thereby make it more likely that they complete assignments successfully and attain higher levels of achievement.

Specificity of the Identified Social Skills for Peer Collaborative Learning Activities

Our findings also support the premise that the types of social skills that enable grade-schoolers to work harmoniously in peer-mediated collaborative activities are, to some extent, specific to this type of task and the interpersonal and scholastic challenges that occur within it. In this study, children described and endorsed three types of skills that rarely, if ever, have emerged as precursors for other pivotal childhood social tasks (e.g., making friends, gaining peer acceptance, entering peer group activities). First, we found that work-related skills (e.g., staying on task, remaining focused and avoiding distractions, and persisting rather than quitting or deserting

one's work partners) occupied positions of central importance in the overall skill pool. Second, certain cooperative (e.g., sharing ideas) and socio-moral (e.g., doing one's fair share of the workload) skills were valued by children and cited as criteria that influenced their choice of work partners. Third, grade-schoolers indicated that skilled collaborators controlled their own behaviors and emotions (i.e., self-regulation skills) while working on assignments with peers.

This skill specificity hypothesis was further supported by the fact that the identified skills were differentially related to the work- versus play-preference (i.e., peer acceptance) ratings participants received from classmates. Modest evidence for this conclusion was found at a bivariate level in that skill use ratings, for each of the identified skill types, were more closely associated with work- than with play-preference scores. More compelling, however, were results obtained from the contrasts performed on the skill use (profile) groups. In these analyses, *peer acceptance* was not significantly related to children's membership in a skill use group, after accounting for sex, work partner preference, and achievement. *Work partner preference*, however, was significantly associated with children's membership in a skill use group (after controlling for sex, play partner preference, and achievement), such that children in the most skilled group tended to be the most preferred work partners.

These findings imply that the forms of social competence that are relevant to peer-mediated collaboration are partially distinct from those required for other childhood social tasks, such as friend making, peer group entry, and peer group acceptance. It should be noted, however, that not all of the skills included in this emerging taxonomy of collaborative skills were distinct from those identified in relation to other pivotal childhood social tasks. Similar to the skills documented for friendship making (see Gottman, 1983; Parker & Seal, 1996), we found that grade-schoolers favored work partners who were supportive, able to communicate, and effective at solving disagreements. Likewise, our findings paralleled those obtained in research on peer group entry (see Putallaz, 1983) in that skilled collaborators were characterized as persons who were able to take their partners' point of view or attempted to understand their partners' perspectives while working together. Additionally, some of the prosocial skills that emerged in this study (e.g., cooperation, providing partners with support and affirmation) resembled those described in research on friendship formation and the behavioral antecedents of peer group acceptance (see Dodge, 1983; Gottman, 1983).

Limitations

Few studies lack limitations, and this one is no exception. Grade-schoolers' reports (perceptions) were the principal data source for the collaborative skills that were identified in this study, and for this reason the

identified skills might not fully represent those that emerge from other methodologies (e.g., independent observers, teacher reports, etc.). However, the fact that the skills grade-schoolers identified correlated in expected directions with indicators of social and academic competence provides support for the validity of the findings.

Because data were gathered 1 to 2 months after the start of the school year, students' collaborative experience with classmates may have been less extensive than later in the school year. However, several findings lend support to the validity of the peer report measures, including: (a) Substantial coherence was found between the skills grade-schoolers identified and their work partner preferences (i.e., children preferred partners who were seen as using the skills), (b) skill use ratings correlated differentially with work partner preference and peer acceptance (i.e., children did not simply nominate friends or liked peers as preferred work partners, and (c) children's reports of classmates' skill use correlated in significant and expected ways with achievement (i.e., data from a different informant—teachers).

The study was conducted in classrooms where teachers devised and implemented peer-mediated learning activities rather than utilizing evidence-based programs such as PALS or CWPT. It is possible that this investigative context may have influenced the types of skills identified. For example, some formal PML programs are designed (e.g., proscribed roles, timing, etc.) to minimize student disruptions and conflicts, and in such settings, our methodology might not have identified skills such as discussion and problem solving. For these reasons, the collaborative skills identified in this study may be more important for children's success in teacher-developed as compared to established PML programs.

In Conclusion

In sum, evidence from this investigation offers new insight into an understudied peer context—classroom settings in which grade-school children work collaboratively in dyads or small groups on teacher-prescribed learning activities (peer collaborative learning). In particular, the findings help to elucidate the work-related and interpersonal skills that children see as valuable for classroom collaborative learning activities and offer new clues as to why some children are more likely to succeed in this context (e.g., work effectively with peers, achieve better outcomes, etc.). By attending to these skills, for example, teachers may be better able to identify students who have difficulty working with classmates and help them learn behaviors that would increase their competence in peer-mediated learning activities.

To the extent that these findings further efforts to specify requisite skills for classroom peer collaboration, they also move us one step closer to

providing educators with an evidence-based foundation for curricula that are likely to help grade-schoolers succeed at teacher-prescribed collaborative tasks. By implementing instructional practices that encourage students to learn and apply the identified skill types, such as the 4R-SUCCESS program (Ladd et al., in press), it may be possible to increase students' appeal as work partners and make them more effective collaborators for peer mediated learning activities.

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