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# Do Gifted Students Really Prefer to Work Alone?

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Gifted students' preference to work alone is widely espoused, but studies vary widely in their explanations. We re-examined this notion in terms of motivation and social constructivism among 247 school-identified gifted and high-achieving and regular-education students in Grades 4 through 12. Survey data assessed learning style, interests, preferred learning conditions, learning-related personality, perceptions of learning support, comments about ideal learning situations, and beliefs about why some children might prefer working alone. Some general preference to working alone was found among gifted students, but this was not strong and it varied based on how the question was posed. Gifted students who felt that their work was appreciated by teachers and fellow students reported the strongest preference to work with others.

Keywords: gifted, group work, high achieving, learning preferences, learning styles, student beliefs, support in classrooms, work alone

A widespread impression persists that gifted children prefer to work alone, repeated straightforwardly in major textbooks. Davis and Rimm (1998) wrote, "they prefer to work alone or with 'true peers'—other gifted students—rather than with regular students" (p. 34). Even more recent literature regarding standardized intelligence tests (not the only valid index of giftedness) includes the claim that teachers of students achieving IQ scores of 120 and above need to create opportunities for students to seek and find information independently, because they enjoy reasoning things through alone (Ruf, 2003). However, empirical evidence varies widely. Three publications highlight this variability.

Rayneri, Gerber, and Wiley (2006; using Dunn, Dunn, & Price's *Learning Style Inventory* [LSI]; also see Kolb, 1976) found no preference for working alone among 80 sixth-, seventh-, and eighth-grade gifted students. However, Dunn, Dunn, and Price (1978/2000); Dunn and Price (1980); and Griggs and Price (1980) suggested that a preference for working alone increases with age or grade. This increase might reflect a growing understanding that one's own academic abilities will be judged at the time of college applications, an avoidance of carrying the burden for a group, or a desire to compete against other students.

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French and Shore (2009) synthesized working-preference studies and found competing conclusions (see Table 1). The literature on cooperative learning suggested that the child's experience of the learning context, including group composition, might play a role in shaping preferences to work alone or with others (Coleman & Gallagher, 1995; Neber, Finsterwald, & Urban, 2001). The preference, in whatever direction, might be situational rather than a personality characteristic, or perhaps a bit of both; a simple dichotomy between working alone or with others, without considering context, might be an oversimplification or stereotype.

Social constructivist theory (Vygotsky, 1978) predicts that gifted children who do not feel socially and cognitively supported by their environments, regardless of grade, sex, or formal identification, will more strongly prefer to learn alone. Under some conditions—perhaps typical of classrooms when the question was first asked—gifted children have indeed been found to prefer to work alone (Davis & Rimm, 2005).

A key theoretical point in Vygotsky's (1978) theory is that all learners, in their *zone of proximal development* (ZPD) are capable of accomplishing in dialog with more knowledgeable others what they cannot do alone. Therefore, novel or more challenging learning, well argued as a preference of gifted children (Callahan & Miller, 2005; Diezmann & Watters, 1997; Maniatis, Cartwright, & Shore, 1998) occurs in the ZPD and is necessarily a social activity. Children who are sufficiently stimulated and supported by their

TABLE 1
Summary of Previous Research on Gifted Students' Preference or Not to Work Alone

| *Measures* | *Design* | *Sample level, N* | *Prefer alone* | *Author (year)* |
|---|---|---|---|---|
| CPI[a] (1956) and classroom observations | Mixed Methods | Early elementary to high school $N = 929$ | Mixed findings | Lessinger and Martinson (1961) |
| CPI (1956) | Quantitative | Junior high $N = 71$ | Mixed findings | Haier and Denham (1976) |
| Dunn et al. LSI (1975) | Quantitative | Elementary $N = 269$ | No | Dunn and Price (1980) |
| Dunn et al. LSI(1975) | Quantitative | Junior high $N = 170$ | Yes | Griggs and Price (1980) |
| Renzulli and Smith LSI(1978) | Quantitative | Late elementary $N = 598$ | Yes | Stewart (1981) |
| Dunn et al. LSI(1978) | Quantitative | Late elementary and junior high $N = 169$ | Mixed findings | Price, Dunn, Dunn, and Griggs (1981) |
| Dunn et al. LSI(1978) | Quantitative | Junior high $N = 170$ | Yes | Price et al. (1981) |
| Locally developed survey | Quantitative | Early elementary $N = 420$ | Yes | Boultinghouse (1984) |
| Dunn et al. LSI (1981)[b] and Renzulli and Smith LSI (1978) | Quantitative | Late elementary $N = 425$ | Yes | Ricca (1984) |
| Dunn et al. LSI (1987) | Quantitative | Junior high $N = 155$ | No | Ewing and Yong (1992) |
| Owens and StratonLPSS[c](1980) | Quantitative | High school $N = 62$ | No | Li and Adamson (1995) |
| Locally developed survey | Quantitative | Late elementary and junior high $N = 500$ | No | Burns, Johnson, and Gable (1998) |
| Renzulli and Smith LSI (1978); Renzulli, Smith, and Rizza LSI (1998) | Quantitative | High school $N = 398$ | Yes | Chan (2001) |
| Locally developed survey | Quantitative | Late elementary to high $N = 49$ | Mixed findings | French and Saunders (2004) |
| MBTI[d] | Meta-analysis | All levels | Yes | Sak (2004) |
| Dunn et al. LSI (1997/2000) | Quantitative | Junior high $N = 80$ | No | Rayneri et al. (2006) |
| Multiple | Review | All levels | Mixed findings | French and Shore (2009) |

*Notes.* [a]CPI = California Personality Inventory.
[b]Other versions of this scale were published between 1978 and 1997.
[c]LPSS = Learning Preference Scale-Students.
[d]MBTI = Myers-Briggs Type Indicator.

environments should seek to interact with their peers and have a decreased preference for solitude. Of course *peers* has more than one meaning. Age is less relevant in this context than shared interests, and the most valuable peer would be someone with converging interest but knowledge or skills as yet unfamiliar to the learner.

## RESEARCH QUESTIONS

1. Which gifted students prefer to work alone? Are they defined by means of identification, grade, or sex?
2. How strong is the preference to work alone? Is this related to the use of open-ended questions or to items that ask directly about working alone?
3. Why do some gifted students opt to work alone? Do different groups of students have different ideas about why people opt for different learning conditions?
4. Do gifted students who feel adequately supported in their learning welcome opportunities to work with others more than those who do not feel supported?

## METHOD

### Participants and Data Collection

Participants were recruited from the Johns Hopkins University Center for Talented Youth (CTY) summer program in Saratoga Springs, New York, and the Fairfield, Connecticut school district (in which there were distinct gifted programs). CTY students scored between the 95th and 99th percentile on any reasoning section, verbal or nonverbal, of one of their last two nationally normed tests. The Johns Hopkins University Research Committee allowed letters and consent forms to be sent in orientation packets to all 400 CTY parents; 60 were returned. Among these, 37 students returned their assent forms and surveys, a 62% return rate (9% of the potential total population). All were included in the school-identified gifted group. CTY students were mailed surveys and stamped return envelopes.

CTY students comprised a mixture of private- and public-school students, as well as home-schooled students. They came from across the United States, especially the northeastern states. No data were gathered regarding

their individual schools of origin; some may have been accelerated, others had experienced enrichment opportunities, and others did not experience any differentiation in their regular schools.

Fairfield students identified as gifted had been identified at the end of the third grade on the basis of achieving scores at or above the 97th percentile on the CogAT and Connecticut Mastery Tests (CMT). They had teacher recommendations and consistently high scores on district-wide academic assessments (e.g., Gates-MacGinnity language arts); if their scores were insufficient but teacher recommendations stressed high performance, stellar product evaluations of classroom work could result in the *gifted* label. By agreement with the participating high school, both formally school-identified gifted and high-achieving students (not formally identified as gifted, but in advanced-placement or honors-level courses and high achieving) were included in this study and analyzed separately. Not-identified (control) students were recruited only from the Fairfield schools. In the 18 Fairfield classrooms-7 elementary, 8 middle school, and 3 high school, representing approximately 395 parents—letters and consent forms were distributed to students, who were asked to take them home to their parents; 225 parental consent forms were returned and 210 students then returned their assent forms and completed the surveys in class (93% return, 53% of the total population).

In the Fairfield elementary school, identified gifted students were given in-class enrichment opportunities and individual or small-group instruction by gifted resource teachers. In Grades 4 and 5, gifted students were also pulled out of their regular classrooms for *challenge groups* in which they could research particular topics of interest. In middle school, gifted students were provided advanced instruction in language arts and mathematics through differentiated classroom lessons and special programs. After-school programs run by outside specialists were also available to identified gifted students for seminars and other programs. Finally, in the Fairfield high school, programs including honors and advanced-placement courses and multivariate calculus represented the educational options for both identified gifted and high-achieving students.

In total, the final sample from CTY and Fairfield schools included students at elementary ($n = 50$), junior high ($n = 117$), and high schools ($n = 80$), encompassing students in Grades 4 to 12, 110 males and 137 females; 111 school-identified gifted, 44 high-achieving, and 92 not-identified students participated (Table 2 presents sample details).

Surveys were distributed in class (see Appendix) to students who gave assent and whose parents gave consent; other students were given packets complete with consent forms in case they had simply been unable to return them earlier. Two days later each class was visited to collect the replies. Following data collection, five names were drawn; two cinema tickets were mailed to each.

TABLE 2
Number of Survey Participants From Both Samples

| | | *School level* | | | |
|---|---|---|---|---|---|
| *Sex* | *Ability group* | *Elementary* | *Junior high* | *High school* | *All levels* |
| Girls | Not identified | 19 | 24 | 5 | 48 |
| | School-identified gifted | 10 | 22 | 22 | 54 |
| | High achieving | 0 | 21 | 14 | 35 |
| | Girls' subtotal | 29 | 67 | 41 | 137 |
| Boys | Not identified | 13 | 20 | 11 | 44 |
| | School-identified gifted | 8 | 25 | 24 | 57 |
| | High achieving | 0 | 5 | 4 | 9 |
| | Boys' subtotal | 21 | 50 | 39 | 110 |
| Total | | 50 | 117 | 80 | 247 |

## Instrument

Renzulli and Smith's (1978) *How I Like to Learn* (a) Project items 2, 9, 10, 21, 28, 36, 44, 47, and 51; (b) Peer Teaching items 3, 23, and 30; and (c) Independent Study items 4, 13, 17, and 50 were included. Content validity of items on the survey was initially established by expert judges including professors of education, teachers, administrators, and advanced graduate students. Construct validity was established by a principal components analysis, which yielded 14 components, followed by a factor analysis. Items that loaded .35 or higher on a given factor were assigned to that factor or the factor on which it loaded most. Nine factors emerged, but items from only three were utilized in the current study. In Renzulli and Smith's analysis, internal consistency was $\alpha = .77$ for Projects, .57 for Peer Teaching, and .50 for Independent Study. In the present study, likely due to the large sample, $\alpha$ exceeded .70 for all three: .80, .70, and .75 respectively.

To address students' social self-perceptions, Popularity factor items (1, 3, 6, 11, 40, 46, 49, 51, 58, 65, 69, and 77) from the 80-item *Piers-Harris Children's Self-Concept Scale* (or *The Way I Feel About Myself*; Piers & Harris, 1996) were added. Responses are *yes* or *no*. The Piers-Harris scales have high internal consistency (.88 to .93) and test–retest reliability (median = .73). They correlate highly with other reputable children's self-concept measures (e.g., *Coopersmith Self-Esteem Inventory*; Coopersmith, 1959; Lipsitt's *Children's Self-Concept Scale*; Lipsitt, 1958) and indices of behavior (e.g., *Children's Manifest Anxiety Scale*; Castaneda, McCandless, & Palermo, 1956).

From the *Personality and Interest Inventory* (Hildreth, 1936), item IX asked with whom respondents wished to spend time outside class (including no companions). Some new items were created. Face validity was established

through presentation to our research team. Affective support was operationalized as encouragement and appreciation of work, based on studies of support pertaining to learning communities (Gencoz & Ozlale, 2004; Mullen & Tallent-Runnels, 2006). Using pilot data (French & Saunders, 2004), we added a *sometimes* option to the original yes or no. Open-ended questions were either removed or reworded. One suggested-choice item allowed respondents to select their preferred learning situations. A final open-ended question asked students to speculate on why some students might prefer to work alone, whereas others prefer to work in groups. This was intended to encourage replies from students less comfortable speaking about themselves and to benefit from students' knowledge of their peers. The full final instrument is appended.

## Data Coding and Missing Data Provisions

To understand desired group composition, a nonstandardized content-analysis approach was based on five codes for survey item 18—"Please describe your ideal (best possible or most enjoyable) kind of learning situation:"

1. involves working alone or independently,
2. involves working with one other person, or in a small group,
3. involves working with several peers (number unspecified, or in a large group),
4. involves working alone in combination with working with others,
5. does not specify if working alone or with others, and inference either way is not easy to make.

The same codes were applied to responses on survey item 20—"Please describe your worst or least enjoyable kind of learning situation." These questions elicited responses not necessarily pertaining to the individuals one liked or disliked working with, but, because that specific preference was of interest, responses were also classified and coded to allow analysis of whether participants felt strongly enough about this particular preference to report work partners (or lack thereof) without being led to do so.

Informal open coding and constant comparison (Corbin & Strauss, 1990) was applied with survey item 40 (why they think some students prefer to work with others or alone). The resulting categories were as follows:

1. involves ability levels (smarter, faster, not as smart);
2. involves personality (introverted, independent, extraverted, more comfortable with others);
3. involves level of popularity, social self-perception, or level of desire to socialize;
4. involves fairness of work distribution (take charge, lazy, can split up work);
5. involves ability to tailor the content or method of completing the task (distracted by others' ideas, can reflect on others' ideas); and
6. involves a vague response (people are different, some work better alone).

Interrater reliability on 75 surveys by two other research-group members was 97% for item 18, 93% for 20, and 88% for 40, and a consensus was easily reached on discrepant codes before the remaining 247 surveys were coded.

Missing categorical data were not replaced because it is difficult to anticipate responses to such items. Because the Independent Study and Peer Teaching scales comprised only five and three items, respectively, only when just one cell was empty were missing data replaced by the person's mean response for their missing data (Abelson, 1995). Nine occurences of one or two empty cells on the nine-item Project scale were filled with mean data.

Although Shore and Tsiamis (1986) reported minimal differences between IQ and otherwise-identified gifted students, a statistically significant difference between the school-identified gifted and high-achieving groups emerged on personal independence; therefore, their data were analyzed separately. School-identified CTY and Fairfield participants did not differ significantly, so these groups were combined.

## Statistical Analyses

Individual analyses of variance (ANOVAs) were calculated for school-identified gifted and high-achieving students versus not-identified participants, the three grade groups, sexes, support from others, and survey-preference outcome variables. The dependent variables examined were the LSI factors of Peer Teaching, Projects, and Independent Study. Multivariate analysis of variance (MANOVA) was applied first to protect against Type I error; ANOVAs and post hoc analyses followed. The SPSS statistical package was used for MANOVAs, ANOVAs, and post hoc analyses.

Generalized linear modeling (GLZ; StatSoft, 2003), considered an extension of general linear modeling (GLM), such as MANOVA, is used to analyze data from a nonnormal distribution (e.g., categorical data). GLZ allows examination of interactions between independent variables, comparing frequencies rather than means. GLZ was conducted on the three categorical items (school-identified gifted and high-achieving versus not-identified participants, sex, and perceived support), with planned contrasts on significant results. Grade was examined separately because of different groups at each grade level. Item 17 was examined to determine the frequency and category of respondents who chose work alone and who chose read a textbook (considered an exclusively independent learning activity on Renzulli and Smith's LSI; Renzulli & Smith, 1978) and what percentage also chose other items that are exclusively independent activities. GLZ for item 38

compared the frequencies of respondents who selected the option no companions to play with during their free time to those who crossed out this choice or left it untouched. Because the difference between the latter two was not meaningful, responses to either were recoded as not selected.

Items 18, 20, and 40 were also analyzed using GLZ, items 18 and 20 regarding most ideal and least enjoyable learning situations and item 40 regarding what underlies students' (others' or their own) preferences for working with others versus alone. The link function used in these three analyses was log, because of the Poisson distribution of the data.

## RESULTS

School-identified gifted and high-achieving students' responses were analyzed separately. Because there was no high-achieving group at the elementary level, all analyses were done twice: first with all three groups including the junior high– and high-school levels and second with two groups (not-identified and school-identified gifted) at the elementary level.

All significant MANOVAs were followed by individual ANOVAs. The normality assumption was met on continuous variables. MANOVAs are sensitive to the effects of outliers (Tabachnick & Fidell, 2001); because most of the measures were 5-point scales, only the onset and the count variables were capable of having outliers, and none were found.

Assumptions regarding covariance (Box's M test; Tabachnick & Fidell, 2001) and homogeneity of variance (Levene's test; Levene, 1960) were also met, with few exceptions noted in their respective tables. $F$ is robust when these assumptions are violated. Although the robustness of multivariate statistics is not fully known, because the interpretation of MANOVA results rests on the follow-up interpretation of significant univariate effects, the $F$ test is assumed to be robust (StatSoft, 2003).

Roy's greatest root is the multivariate significance test reported in this section. Roy's greatest root was consistently more sensitive when detecting main effects and interactions across all models tested. This is logical, given that Renzulli and Smith's LSI (1978) comprises three subscales (the three dependent variables in the MANOVAs), all of which measured some aspect of school-related activity. Although Renzulli and Smith indicated three distinct factors in his validation of this instrument, the three subscales may not be completely independent of each other; there could be an underlying factor representing attitudes toward school. We conducted a principal components analysis, yielding a single strong component across all 16 Renzulli and Smith LSI items, but it can still be broken down into various subscores indicative of types of school activities.

Support items and the popularity item within the survey were significantly positively correlated; therefore, one item from these was selected as the proxy support item to avoid redundancy. The *people appreciate my work* variable (hereafter called *work appreciated* or *appreciated*) was most highly correlated with the other two variables of *people encourage me in my academic pursuits* and *popularity* ($r = .31$, $p < .001$; $r = .22$, $p < .001$, respectively) and was therefore used as the support variable in all analyses. People encourage me in my academic pursuits and popularity were removed from subsequent analyses to avoid redundancy. Distributions of the LSI item responses for Project, Peer Teaching, and Independent Study did not diverge significantly from normality.

### Question 1: Preference to Work Alone, Identification Process, Grade, and Sex

#### *Statistical Results*

A small main effect for group emerged, $F(3, 40) = 2.88$, $p = .048$; $ES = .18$, power = .65, on LSI Independent Study, because elementary–school–identified gifted participants significantly (but a small effect) rated independent study activities higher ($M = 16.11$, $SD = 2.7$) than not-identified participants ($M = 13.68$, $SD = 3.8$); $F(1, 42) = 5.45$, $p = .024$; $ES = .12$, power = .63. Figure 1 shows a small overall main effect of group, $F(3, 181) = 6.49$, $p < .001$; $ES = .10$, power = .97, and a significant but small difference in which combined junior high– and high-school (JHHS)–aged school-identified gifted participants rated Independent Study activities higher ($M = 13.77$, $SD = 3.5$) than did high-achieving students ($M = 11.93$, $SD = 3.7$) or not-identified participants ($M = 10.78$, $SD = 3.4$), $F(2, 182) = 8.68$, $p < .001$; $ES = .08$, power = .97.

Figure 2 illustrates a small overall interaction between group and sex, $F(3, 181) = 4.69$, $p = .004$, $ES = .07$, power = .89, on both the Peer Teaching and Independent Study factors. A significant difference (but small effect)

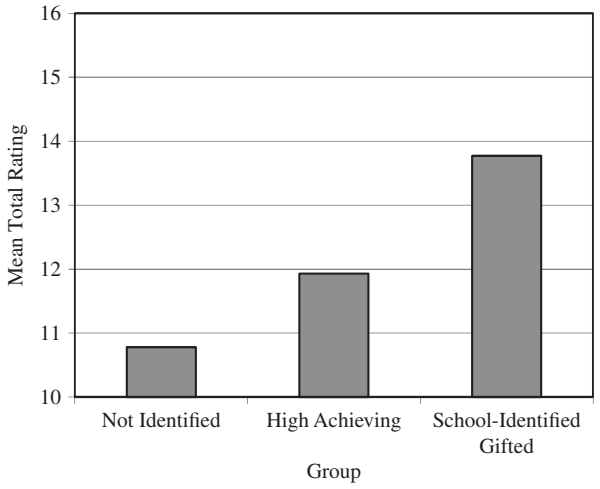


FIGURE 1 Combined junior high– and high-school students' mean ratings of independent study on the LSI.

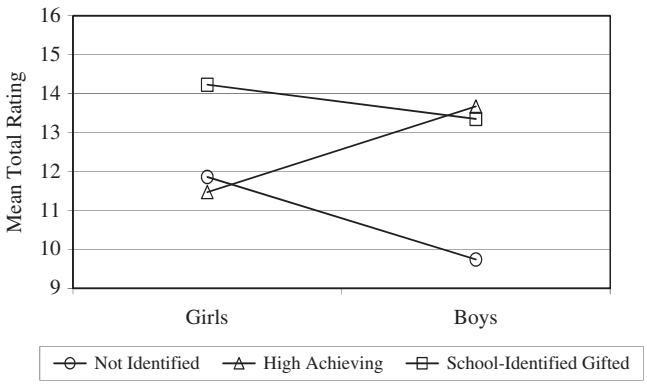


FIGURE 2 Combined junior high– and high-school students' mean ratings of independent study on LSIGroup × Sex interaction.

was noted between school-identified gifted girls ($M = 11.20$, $SD = 2.2$) and boys ($M = 9.34$, $SD = 2.4$); girls rated Peer-Teaching activities higher, $F(2, 182) = 6.01$, $p = .003$; $ES = .06$, power = .88. Also, school-identified gifted girls ($M = 14.23$, $SD = 3.7$) rated Independent Study activities ($M = 9.74$, $SD = 3.3$) significantly higher than not-identified boys, $F(2, 182) = 3.18$, $p = .05$; $ES = .05$, power = .68. Associations between variables were weak.

There was a small overall main effect of grade on LSI Independent Study, $F(3, 195) = 9.63$, $p < .001$; $ES = .13$, power = 1.00. A significant difference (but weak association) was noted on planned comparisons between elementary participants and junior high– and high-school participants, $F(2, 196) = 10.75$, $p < .001$; $ES = .10$, power=.99. Elementary-school participants rated Independent Study activities higher ($M = 14.58$, $SD = 3.6$) than junior high– ($M = 12.40$, $SD = 3.6$) or high-school participants ($M = 12.85$, $SD = 3.9$).

### *Interpretation of the Statistical Results*

School-identified gifted students at both the elementary- and JHHS levels demonstrated a greater preference for working alone. Perhaps the independent learning activities described seemed like what they were accustomed to doing in school and had thus become more comfortable for them.

School-identified gifted girls rated Independent Study more highly (perhaps because they were gifted, not girls) than did not-identified boys, and they also rated Peer Teaching as being more enjoyable than did school-identified gifted boys. The latter difference might reflect more socially influenced, sex-related, people-pleasing behavior. Consistent with past research (Eder, 1985; Lessinger & Martinson, 1961), girls' preferences to work with others may change from late childhood to early and then late adolescence. In the current study, elementary-school–identified gifted girls did not prefer to work alone compared to those in junior high school. This warrants further study of girls' responses to specific items compared to their responses to learning situations in general.

No difference was found between school-identified gifted and high-achieving students versus their not-identified peers in terms of whom they wanted to spend time with after school. Responding to a suggested-choice item, gifted participants did not indicate a preference to spend time alone after school any more than did not-identified participants. This corroborates previous research by Csikszentmihalyi, Rathunde, and Whalen (1993) and Enersen (1993) that suggested that even if gifted students may spend time alone during and outside of school, they desire contact with peers (not necessarily same-age) just as much as their not-identified counterparts. However, high-school students chose no companions more than did elementary students.

## Question 2. Strength of Preference, Methodological Impact

### *Statistical Results*

Suggested-choice items about working alone and reading and open-ended items about most and least enjoyable learning situations, all newly created, were examined through MANOVA along with related LSI items. For work alone, an overall moderate effect, $F(3, 45) = 8.09$, $p < .001$; $ES = .35$, power = .99, and individual low-to-moderate main effect $F(1, 47) = 21.83$, $p < .001$; $ES = .32$, power = 1.00, was noted at the elementary level. Students who selected work alone had a higher mean score on the Independent Study factor ($M = 16.46$, $SD = 2.6$) than those who did not select work alone ($M = 12.43$, $SD = 3.4$).

At the JHHS level, an overall low-to-moderate, $F(3, 190) = 25.72$, $p < .001$; $ES = .29$, power = 1.00, and individual—one pair of means at a time—low-to-moderate main effect was also noted, indicating a relationship between work alone and Project, $F(1, 192) = 10.57$, $p < .001$; $ES = .10$, power = .90, and work alone and Independent Study factors, $F(1, 192) = 52.45$, $p < .001$; $ES = .22$, power = 1.00. Those who selected work alone had a lower mean score on the Project (group work) factor ($M = 28.33$, $SD = 6.6$) than those who did not select work alone ($M = 31.09$, $SD = 4.8$). Also, as at the elementary level, those who selected work alone had a higher mean score on the Independent Study factor ($M = 14.02$, $SD = 3.3$) than those who did not select work alone ($M = 10.58$, $SD = 3.3$).

With regard to the suggested-choice read a textbook item (last line, item 17, appended), a main effect for group was observed at the JHHS level. There was a significant difference between not-identified, school-identified gifted, and high-achieving students. School-identified gifted chose *read a textbook* more often (19%; 81% did not select this; Figure 6) than not-identified (13%; 85% did not select this) and high-achieving students (5%; 93% did not select this; Figure 6). For the suggested-choice read a textbook item and Renzulli items, there were no significant effects at the elementary level. At the JHHS level,

however, small overall, $F(3, 190) = 6.73$, $p < .001$; $ES = .10$, power = .97, and individual main effects emerged, indicating a relationship between read a textbook and LSI Project and Independent Study items, $F(1, 192) = 7.4$, $p = .007$; $ES = .04$, power = .77 and $F(1, 192) = 10.48$, $p < .001$; $ES = .10$, power = .90, respectively. Those who selected read a textbook had a lower mean score on the Project (group work) factor ($M = 26.75$, $SD = 8.8$) than those who did not select read a textbook ($M = 30.03$, $SD = 5.3$). Also, those who selected read a textbook had a higher mean score on the Independent Study factor ($M = 14.54$, $SD = 3.9$) than those who did not select read a textbook ($M = 12.15$, $SD = 3.5$).

No significant effects for group, sex, or work appreciated were noted on the open-ended questions addressing most and least enjoyable learning situations. The raw data indicated a higher proportion of elementary participants who mentioned situations involving working alone on the best learning situation item (18% of this group) than did junior high- (10%) or high-school participants (6%). Correspondingly, high-school participants mentioned situations in which they were working alone and working with others more (23%) than did junior high–school (7%) or elementary participants (2%). The sample size did not permit us to explore these grade differences in more detail.

For the best learning situation and Renzulli and Smith (1978) items, a relationship was observed at the elementary and JHHS levels (Figure 3). At the elementary level, moderate overall, $F(3, 27) = 5.35$, $p = .005$; $ES = .37$, power = .89, and individual main effects, $F(2, 28) = 5.23$, $p = .012$; $ES = .27$, power = .79, of best learning were found on the Independent Study factor. Students who mentioned work alone as most ideal had a higher mean score on the Independent Study factor ($M = 17.33$, $SD = 2.2$) than did those who cited working with several peers ($M = 12.71$, $SD = 4.1$).

At the JHHS level, a low-to-moderate overall, $F(4, 182) = 14.38$, $p < .001$; $ES = .24$, power = 1.00, and small individual main effects were noted between best learning and all three Renzulli factors: (a) Project, $F(4, 182) = 4.00$, $p = .004$; $ES = .10$, power = .90; (b) Peer Teaching, $F(4, 182) = 2.52$, $p = .043$; $ES = .10$, power = .707; and (c) Independent Study, $F(4, 182) = 9.64$, $p < .001$; $ES = .18$, power = 1.00. Those who cited work alone as most ideal had a lower mean score on the Project (group work) factor ($M = 26.53$, $SD = 6.7$) than those who cited working with several peers ($M = 31.53$, $SD = 5.1$). A similar difference on the Project factor was observed between those who gave an unclear response about whom they most liked to work with ($M = 27.93$, $SD = 6.7$) and those who cited a preference for working with several peers. Also, as noted at the elementary level, students who cited work alone as a best learning situation had a higher mean score on the Independent Study factor ($M = 14.59$, $SD = 3.3$) than those who cited a preference for working with several peers ($M = 11.09$, $SD = 3.5$). Differences were also noted between those who cited working with several peers and those who mentioned work alone and working with others ($M = 15.46$, $SD = 3.4$). Finally, differences were noted between those who mentioned work alone and work with others compared to those whose responses were unclear ($M = 12.30$, $SD = 3.2$).

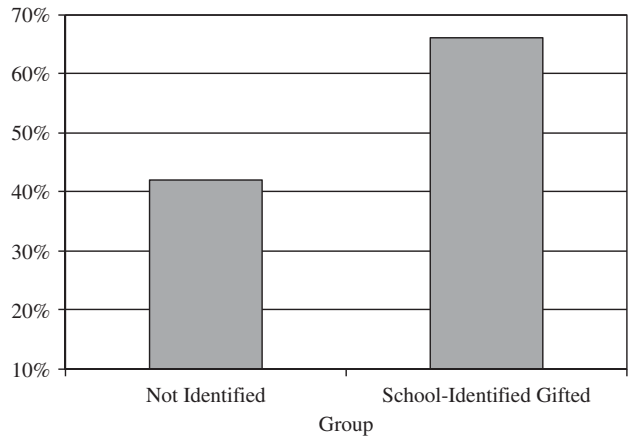


FIGURE 3 Percentage of school-identified gifted and not-identified students across grades who selected the suggested-choice item work alone.

With regard to the open-ended least enjoyable (worst) learning situation item and Renzulli items, no significant effects were observed at the elementary level. At the JHHS levels, a low-to-moderate overall, $F(4, 185) = 17.13$, $p < .001$; $ES = .27$, power = 1.00, and a low individual main effect were noted on the Project, $F(4,185) = 3.65$, $p = .007$; $ES = .07$, power = .87, and Independent Study factor, $F(4, 185) = 11.17$, $p < .001$; $ES = .20$, power = 1.00. Students who cited work alone as a worst learning situation had a higher mean score on the Project (group work) factor ($M = 31.54$, $SD = 5.5$) than those who cited working with several peers ($M = 27.44$, $SD = 6.8$). Also, those who cited work alone as a worst learning situation had a lower mean score on the Independent Study factor ($M = 11.32$, $SD = 3.7$) than those who cited working with several peers ($M = 15.26$, $SD = 2.8$). Differences were also noted between those who cited working with several peers and those who cited work alone and work with others ($M = 10.25$, $SD = 4.7$) and those whose responses were unclear ($M = 11.89$, $SD = 3.2$).

When directly offered the choice to work alone as an option, students identified as gifted made this selection significantly more often, $\chi^2(1, N = 244) = 3.99$, $p < .05$ (also see Figure 3).

### *Interpretation of the Statistical Results*

Effect sizes were at best low to moderate. However, a small effect is sufficient for this study, considering that its purpose to explore the original assertion that gifted students prefer to work alone: a small effect may be telling if it can tease apart two models, while a large effect might not matter if it was already anticipated according to multiple theories (Meline & Schmitt, 1997).

School-identified gifted students across grades chose work alone more often when the option was suggested;

however, this was not observed in separate grade data when additional variables were entered into the equation. Elementary-school–identified gifted students did not demonstrate a preference to work alone on suggested-choice or open-ended items. Although the preference to work alone was demonstrated for JHHS-school–identified gifted students on one suggested-choice item, it did not emerge on open-ended items for any school-identified gifted students.

Despite the similarity of responses on many Likert-type items and the suggested-choice and open-ended items, responses to Likert-type items may overstate a preference to work alone because of the possibility of patterned responses: elementary-school–identified gifted students did not demonstrate the same preference on suggested-choice or open-ended items. Consistent with earlier findings by Dunn et al. (1978/2000), Dunn and Price (1980), and Griggs and Price (1980), with higher age or grade came higher reported preference to work alone. This might reflect new understanding that grades can impact life choices, a more competitive culture promoted by secondary schools, or that elementary classrooms offer more opportunities for pursuit of extended individual and collaborative work.

Also, the open-ended items may need to be modified to query the most important attributes of a learning situation when asking about most ideal and worst-imagined learning situations. Many students described their ideal or least enjoyable learning situations in considerable detail; others just listed one attribute (e.g., subject or location).

## Question 3: Reasons Given Why Others May Opt to Work Alone or Otherwise

### *Statistical Results*

There was an overall group difference, $\chi^2(1, N = 213) = 4.11$, $p < .05$, between school-identified gifted and not-identified students (see Figure 4) and an individual main effect of group ($p = .04$) across all grades between not-identified and school-identified gifted participants on reasons given to work alone or otherwise. School-identified gifted participants (26%) cited personality more often than did not-identified participants (19%). Not-identified participants gave a vague response (e.g., people are different; 20%) more often than school-identified gifted participants (8%). Not-identified JHHS participants gave a vague response (25%) more often than school-identified gifted (2%). School-identified gifted students (11%) selected fairness more often than not-identified students (5%); perhaps this suggests sensitivity to the *free-rider* effect. A free rider, when working toward a collective goal, takes advantage of others' contributions to minimize personal effort but maximize outcomes (e.g., grades; Orbell & Dawes, 1981).

A significant difference was found between not-identified and high-achieving participants at the junior high– and high-school levels (see Figure 5). High-achieving students gave

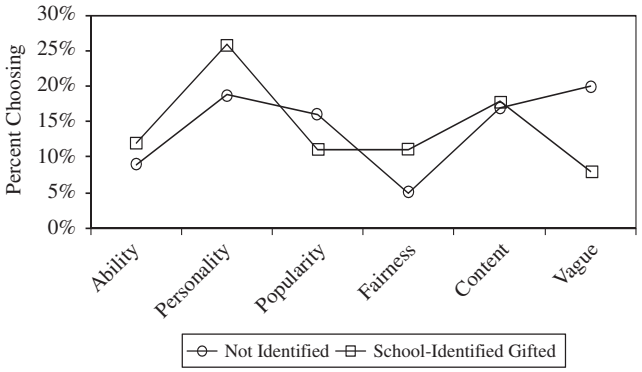


FIGURE 4 Reasons for learning preferences as a percentage of school-identified gifted and not-identified students across grades.

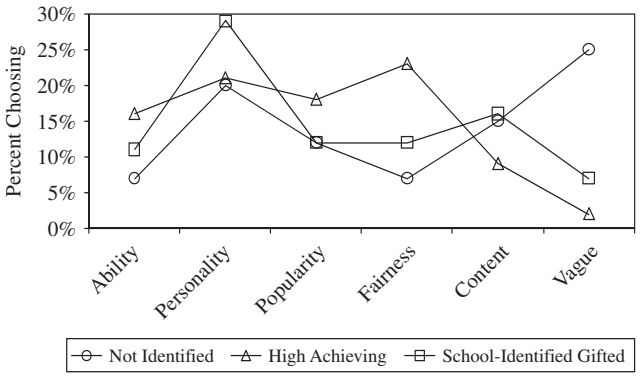


FIGURE 5 Reasons for learning preferences as a percentage of school-identified gifted, high-achieving, and not-identified students across combined junior high and high school.

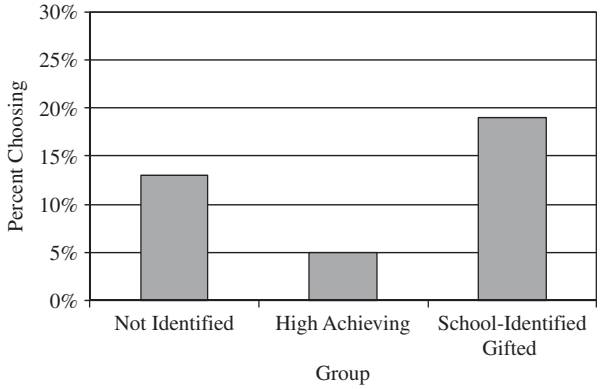


FIGURE 6 Percentage of school-identified gifted, high-achieving, and not-identified students across combined junior high and high school who selected the suggested-choice item to read.

fairness of work distribution as a reason for why some may wish to work more frequently (23%) than did not-identified participants (7%).

There was a significant overall main effect for work appreciated. An individual main effect was obtained between elementary participants who felt that their work was appreciated and those who felt that their work was only

sometimes appreciated ($p = .006$). Sometimes appreciated students cited ability as a reason why some may wish to work alone more often (35%) than appreciated participants (0%). The latter cited ability to tailor work content most frequently, 33% versus 12% for the sometimes appreciated. Sometimes appreciated participants also cited fairness of work distribution as a reason more frequently (12%) than appreciated participants (0%). Appreciated participants saw popularity as a reason more often (23%) than did sometimes appreciated (12%).

### *Interpretation of the Statistical Results*

Students offered several explanations for differing preferences, including ability level, personality, popularity, perceived fairness of work distribution, and ability to tailor one's work to the group. Given that school-identified gifted students cited personality attributes as the reason for differing learning preferences (as did Ruf, 2003) more often than high-achieving students, and high-achieving students cited fairness of work distribution more often, one might speculate that each group perceived others through their own experiences. Specifically, the school-identified gifted students experienced differing learning preferences as a personality characteristic, and the high-achieving students perceived that students in general—like themselves—prefer to work along if they have typically taken on the lion's share of the work in groups.

Not-identified elementary- and high-school students less clearly articulated reasons why people might prefer to work alone. During junior high school (early part of Piagetian formal operations years), students may be newly capable of metacognition and retrospective reflection on their elementary-school experiences. However, given many new learning experiences that follow, high-school students may again struggle to make sense of why they and students in general have varying preferences. Additionally, the gifted group seemed more able to articulate their reasoning compared to others. They may have more defined learning preferences, have reflected more on learning conditions that work best for them, be more able to speculate on reasons for others' learning preferences, and be more able to communicate these ideas more effectively in writing.

Bridging to question 4, elementary students who felt consistently supported selected popularity most to explain why people might want to work alone or with others. If responses were projective, these students likely felt adequately popular and thus perceived themselves as being supported. Supported participants saw the ability to define assignments according to their own interests as a determining element in this preference. Those who felt that their work was only sometimes appreciated saw issues with others' ability levels or fairness of work distribution. If responses were projective, students perceiving others as not as bright or less motivated may have perceived themselves as being less supported.

## Question 4: Perceived Support and Preference to Work Alone or With Others

### *Statistical Results*

A small overall main effect of work appreciated was observed, $F(3, 181) = 2.6$, $p = .054$; $ES = .04$, power $= .63$. A significant difference (but small effect) was noted between JHHS participants who rated their own work as not appreciated and those who felt their work was sometimes appreciated or appreciated on the LSI Project factor, $F(2, 182) = 3.58$, $p = .03$; $ES = .04$, power $= .66$. Specifically, JHHS students who did not feel that their work was appreciated rated Project activities lower ($M = 25.06$, $SD = 8.8$) than those who felt that their work was sometimes appreciated ($M = 29.81$, $SD = 5.9$) or not appreciated ($M = 29.98$, $SD = 5.6$).

Another small overall interaction was observed between group and work appreciated, $F(4, 182) = 3.26$, $p = .013$; $ES = .07$, power $= .83$, on both the Peer Teaching and Independent Study factors. A significant difference but small effect was noted between not identified–not appreciated participants and two other groups, both not identified–sometimes appreciated and not identified–appreciated participants, on the Peer Teaching factor, $F(4, 182) = 2.98$, $p = .02$; $ES = .06$, power $= .79$. Not identified–not appreciated participants rated Peer Teaching activities lower ($M = 7.00$, $SD = 2.6$) than not identified–sometimes appreciated and not identified–appreciated participants ($M = 10.62$, $SD = 2.2$; $M = 11.25$, $SD = 1.7$, respectively).

At the JHHS level, there were no significant overall effects but several individual main effects and interactions. First, a main effect of work appreciated on work alone was observed, because not appreciated students significantly selected work alone more (69%) than those who were sometimes appreciated (48%); conversely, those who felt that their work was not appreciated did not choose work alone as often (25%) as those who felt that their work was sometimes appreciated (52%). Second, an interaction between group and work appreciated was observed. Participants who were not identified-not appreciated selected work alone more often (50%; 33% did not select this) than those who were not identified-sometimes appreciated (36%; 64% did not select this).

A main effect of work appreciated was also noted, with significant differences being observed between participants who felt that their work was not appreciated, those who felt that their work was sometimes appreciated, and those who felt that their work was appreciated. The not appreciated group chose read a textbook (a solo activity) more often (38%; 56% did not select this) than those who felt that their work was sometimes appreciated (17%; 83% did not select this) and appreciated (8%; 91% did not select this).

Overall, group and work appreciated significantly interacted on read a textbook (see Figure 7). Not identified-not appreciated students chose read a textbook more often (33%;

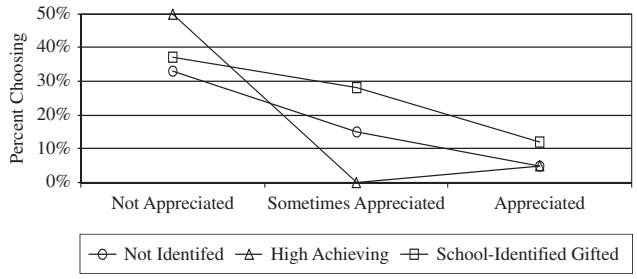


FIGURE 7 Percentage of school-identified gifted, high-achieving, and not-identified students across combined junior high and high school who selected the suggested-choice item to read, Group × Support interaction.

50% did not select this) than not identified–sometimes appreciated (15%; 85% did not select this) or appreciated participants (5%; 95% did not select this). Another interaction occurred between school–identified gifted–not appreciated students, who chose read a textbook more often (37%; 63% did not select this) than school-identified gifted-appreciated (12%; 89% did not select this). No Group × Grade effects emerged on this item.

There was a significant difference between school-identified gifted and not-identified students on work appreciated on the reason for learning preference question for elementary participants, $\chi^2(1, N = 213) = 4.11, p < .05$. For not-identified students who felt supported, popularity was the most frequently stated reason for learning preferences on open-ended items (33%), whereas for school-identified gifted students who felt supported, the ability to tailor content was the most frequently stated reason (42%). For those who felt that their work was sometimes appreciated, 27% of not-identified students felt that ability levels were the reason for differing learning preferences versus a much higher 50% of school-identified students.

Also, as seen in Figure 8, a significant difference (but small effect) was noted across all groups and work appreciated groups on the Independent Study factor,

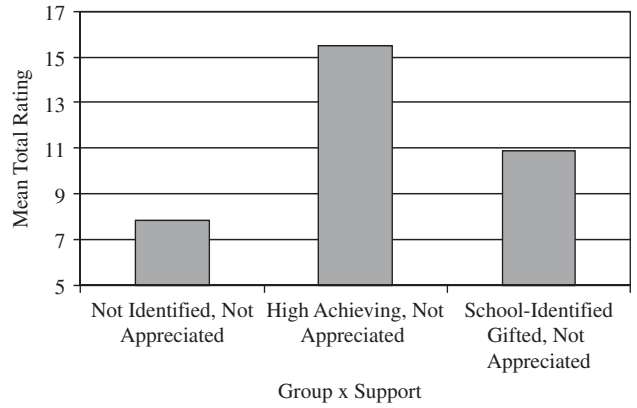


FIGURE 8 Percentage of school-identified gifted, high-achieving, and not-identified students across combined junior high and high school on LSI independent study items, Group × Support interaction.

$F(4, 182) = 2.41$; $p = .05$; $ES = .05$, power = .684. Not-identified and not appreciated students rated Independent Study activities lowest ($M = 7.83$, $SD = 4.2$). High achieving–not appreciated participants rated Independent Study activities highest ($M = 15.50$, $SD = 0.7$). School-identified gifted-appreciated participants rated Independent Study activities the next highest ($M = 14.38$, $SD = 3.4$) and school-identified gifted–sometimes appreciated students rated Independent Study activities the third highest of all the groups ($M = 13.50$, $SD = 3.3$).

### *Interpretation of the Statistical Results*

School-identified gifted students who did not feel supported chose an independent learning activity (reading) more often than did those who were more consistently supported. High-achieving students who felt unsupported rated Renzulli Independent Study items higher than all other groups. Finally, not-identified students who did not feel supported rated all learning activities lower than other groups. It seems that school-identified gifted students' perceived level of support strengthened—or exacerbated—their preference to work alone. This is consistent with working alone as a last resort for certain students, rather than a preference based entirely on learning styles. Nonsupported gifted students preferred activities in which they worked alone compared to those who felt supported. As expected, respondents who did not feel supported rated Independent Study activities more highly and chose working alone or reading more often than did those who were more consistently supported.

Both Peer Teaching and Independent Study activities were rated least enjoyable by students who were not identified and not supported. Regardless of how students are asked to learn academic material, teachers should encourage a supportive classroom climate to foster greater appreciation of school by all students. Students generally may be better able to work comfortably with others following a history of being well supported.

At the elementary level, students who felt consistently supported selected popularity most often in explaining why people might want to work alone or with others. Supported students saw the ability to tailor work to their own interests or approach as important in this preference. Those who felt that their work was only sometimes appreciated saw issues with other ability levels or fairness of work distribution as a determining factor in learning preferences. As suggested by Diezmann and Watters (1997), gifted students preferred to collaborate with peers when the task was challenging and felt supported when working with similarly able peers.

## CONCLUSIONS

Some gifted students prefer to work alone some of the time. A general preference toward working alone among

gifted students is strengthened or exacerbated by their social learning environment. When asked to rate their preferences directly, the majority of gifted students express a preference to do schoolwork alone. Traditional school-based identification is related to this preference across grades on Likert-type items; grade or sex differences do not predict outcomes assessed this way.

However, we believe that now, under conditions such as an inquiry-driven constructivist pedagogy (see Aulls & Shore, 2008; Vygotsky, 1978) that include purposeful student–student interaction and mutual respect and appropriate support for all students (without implicitly assuming that gifted pupils are deficient in social attitudes or fully capable of learning without support or scaffolding), a different response to this question might be found. Gifted students might express a preference to work with others when the learning situation is appropriate to their learning goals and if the nature of interaction supports their needs as well as those of others. For example, Kanevsky (L.S. Kanevsky, personal communication August 6–7, 2009) has proposed a preference to collaborate when gifted learners are not slowed down in their work. The preference to work alone is less pronounced when explored through open-ended or suggested-choice questions. When given lists of options, junior high–school–identified gifted express a slightly stronger preference to work alone than elementary-school-identified gifted. Gifted girls demonstrate the strongest preference to work alone.

Differently identified groups have different ideas about the reasons for people's learning preferences in general. School-identified gifted students see learning preferences as a personality rather than popularity issue and a higher percentage of school-identified gifted students select fairness of work distribution as a reason for their learning preferences compared to not-identified students. It remains to be explored whether these last two outcomes reflect heightened awareness of or sensitivity to the consequences of free-rider effects and related phenomena.

Perceived support from others, which increases comfort in a social group, is significantly related to reported preferences for group work. Gifted or otherwise, the less supported students are or feel, the more inclined they are to report a desire to work alone. Nonsupported school-identified gifted students preferred to work alone to a greater degree than those who reported feeling supported. These children could be isolated, or isolating themselves, which may suggest existing social or emotional difficulties, or it may lead to such difficulties. Also, attitudes toward learning activities across the board diminish for those mainstream students who do not feel supported. High preference for working alone, although expressed by gifted girls when assessed directly, did not recur with more open-ended or suggested-choice formats; therefore, there does not seem to be less apparent support experienced by these girls. It might be informative to further explore sex differences and social desirability in responses.

## IMPLICATIONS

### Theory

Social constructivism, the theoretical base for inquiry-based learning, provides a helpful lens through which to view learning preferences in general and among gifted students in particular. Because dialogue is needed when the learner is in the zone of proximal development—tasks are doable assisted but not alone—then feeling supported is important. Feeling supported is important. Gifted students in traditional learning situations may more often be expected to provide the consultant role and may fear loss of image when they are the help seekers if the environment is not supportive.

### Research Methodology

We do not propose that more open-ended queries are more valid than direct questioning or rating scales, but they generate more nuanced replies. Open-ended or suggested-choice responses also help us determine under what conditions gifted students might prefer to work alone or with different combinations of others, and on what kinds of tasks.

### Practice

The strongest classroom messages from this study are (a) gifted students do not necessarily prefer to work alone and (b) their willingness, and that of all students, to work with others is especially dependent on their feeling supported in their learning by teachers and fellow students. Casual remarks that a bright student should be able to do something on his or her own or that the teacher's time or effort is needed more by other students delivers a message that the gifted student's needs are not well supported. Those needs can be met by developing mutually supportive communities of learners in the classroom and by empowering students to take on a variety of classroom roles (e.g., mentor, formative evaluator) that are traditionally seen as the teacher's. Every student in a class needs to feel that others will support their learning; gifted students and others who are aware of that support are more predisposed to willingly work together in varying combinations. Without that community, working with others risks conveying the impression, if not reality, of free-riding, and this may be recognized by students and their parents (see Saunders, 2004) who also have an impact on student attitudes.

Mental-health professionals, from pediatricians to counselors and school psychologists, should recognize that when children and youth express aversion to school, describe isolation, or express low self-worth or efficacy, they could reflect a lack of perceived support in the classroom. A self-fulfilling prophecy might exist: The belief that gifted students might prefer to work alone, fueled by the gifted-education literature itself, leads to classrooms in which they receive little support

and indeed work alone. Yet gifted students do not appear to favor working with anyone on any task; giving precision to this assertion requires further research. It can be helpful to ask whether they feel alone in school, whether they would like to work on some activity with some other students, and, if so, to follow this up with the teachers. In teacher education and gifted education in particular, we need to start rephrasing some of the textbooks.

## AUTHOR NOTE

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## REFERENCES

Abelson, R. P. (1995). *Statistics as principled argument*. Hillsdale, NJ: Erlbaum.

Aulls, M. W., & Shore, B. M. (2008). *Inquiry in education: The conceptual foundations for research as a curricular imperative* (Vol. 1, pp. 99–120). New York, NY: Erlbaum.

Boultinghouse, A. (1984). What is your style? A learning styles inventory for lower elementary students. *Roeper Review*, *6*, 208–210.

Burns, D., Johnson, S., & Gable, R. (1998). Can we generalize about the learning style characteristics of high academic achievers? *Roeper Review*, *20*, 276–281.

Callahan, C. M., & Miller, E. M. (2005). A child response model of giftedness. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 38–51). Cambridge, England: Cambridge University Press.

Castaneda, A., McCandless, B. R., & Palermo, D. S. (1956). The children's form of the Manifest Anxiety Scale. *Child Development*, *27*, 317–326.

Chan, D. W. (2001). Learning styles of gifted and non-gifted secondary students in Hong Kong. *Gifted Child Quarterly*, *45*, 35–44.

Coleman, M. R., & Gallagher, J. J. (1995). The successful blending of gifted education with middle schools and cooperative learning: Two studies. *The Journal for the Education of the Gifted*, *18*, 362–384.

Coopersmith, S. (1959). A method for determining types of self-esteem. *Journal of Abnormal and Social Psychology*, *59*, 87–94.

Corbin, J., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, *13*, 3–21.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. New York, NY: Cambridge University Press.

Davis, G. A., & Rimm, S. B. (2005). *Education of the gifted and talented* (5th ed.). Boston, MA: Allyn & Bacon.

Diezmann, C. M., & Watters, J. J. (1997). Bright but bored: Optimising the environment for gifted children. *Australian Journal of Early Childhood*, *22*, 17–21.

Dunn, R., Dunn, K., & Price, G. E. (2000). *Learning Style Inventory*. Lawrence, KS: Price Systems. (Original work published 1978)

Dunn, R., & Price, G. E. (1980). The learning style characteristics of gifted students. *Gifted Child Quarterly*, *24*, 33–36.

Eder, D. (1985). The cycle of popularity: Interpersonal relations among female adolescents. *Sociology of Education*, *58*, 154–165.

Enersen, D. L. (1993). Summer residential programs: Academics and beyond. *Gifted Child Quarterly*, *37*, 169–176.

Ewing, N. J., & Yong, F. L. (1992). A comparative study of the learning style preferences among gifted African-American, Mexican-American, and American-born Chinese middle grade students. *Roeper Review*, *14*, 120–123.

French, L.,& Saunders, K. (2004, November). *Why do gifted children, their parents and teachers disagree on the importance of group work?* Poster session presented at the annual meeting of the National Association for Gifted Children, Salt Lake City, UT.

French, L. R., & Shore, B. M. (2009). A reconsideration of the widely held conviction that gifted students prefer to work alone. In B. Hymer, T. D. Balchin, & D. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 176–182 plus references in the unified bibliography). London, England: Routledge.

Gencoz, T., & Ozlale, Y. (2004). Direct and indirect effects of social support on psychological well-being. *Social Behavior and Personality*, *32*, 449–458.

Griggs, S. A., & Price, G. E. (1980). A comparison between the learning styles of gifted versus average suburban junior high school students. *Roeper Review*, *3*, 7–9.

Haier, R. J., & Denham, S. A. (1976). A summary profile of the non-intellectual correlates of mathematical precocity in boys and girls. In D. P. Keating (Ed.), *Intellectual talent research and development* (pp. 225–241). Baltimore, MD: Johns Hopkins University Press.

Hildreth, G. (1936). *Personality and Interest Inventory*. New York, NY: Teachers College Press.

Kolb, D. A. (1976). *The Learning Style Inventory: Technical manual*. Boston, MA: McBer.

Lessinger, L. M., & Martinson, R. A. (1961). The use of the California Psychological Inventory with gifted pupils. *Personnel and Guidance Journal*, *39*, 572–575.

Levene, H. (1960). Robust tests for equality of variances. In I. Olkin, H. Hotelling, et al. (Eds.), Contributions to Probability and Statistics (pp. 278–292). Palo Alto, CA: Stanford University Press.

Li, A. K. F., & Adamson, G. (1995). Siblings of gifted secondary school students: Self-perceptions and learning style preference. *Roeper Review*, *18*, 152–153.

Lipsitt, L. P. (1958). A self-concept scale for children and its relationship to the children's form of the manifest anxiety scale. *Child Development*, *29*, 463–472.

Maniatis, E., Cartwright, G. F., & Shore, B. M. (1998). Giftedness and complexity in a self-directed computer-based task. *Gifted and Talented International*, *13*, 83–89.

Meline, T., & Schmitt, J. F. (1997). Case studies for evaulating statistical significance in group designs. *American Journal of Speech-Language Pathology*, *6*, 33–41.

Mullen, G. E., & Tallent-Runnels, M. K. (2006). Student outcomes and perceptions of instructors' demands and support in online and traditional classrooms. *The Internet and Higher Education*, *9*, 257–266.

Neber, H., Finsterwald, M., & Urban, N. (2001). Cooperative learning with gifted and high-achieving students: A review and meta-analyses of 12 studies. *High Ability Studies*, *12*, 199–214.

Orbell, J., & Dawes, R. (1981). Social dilemmas. In G. M. Stephenson & J. H. Davis (Eds.), *Progress in applied social psychology* (Vol. 1, pp. 37–65). Chichester, England: Wiley.

Owens, L., & Straton, R. (1980). The development of a cooperative, competitive, and individualized learning preference scale for students. *British Journal of Educational Psychology*, *50*, 147–163.

Piers, E. V., & Harris, D. B. (1996). *The Piers-Harris Children's Self-Concept Scale*. Los Angeles, CA: Western Psychological Services.
Price, G. E., Dunn, R., Dunn, K., & Griggs, S. A. (1981). Studies in students' learning styles. *Roeper Review*, *4*, 38–40.
Rayneri, L. J., Gerber, B. L., & Wiley, L. P. (2006). The relationship between classroom environment and the learning style preferences of gifted middle school students and the impact on levels of performance. *Gifted Child Quarterly*, *50*, 104–118.
Renzulli, J. S., & Smith, L. (1978). *Learning Styles Inventory*. Mansfield Center, CT: Creative Learning Press.
Renzulli, J. S., Smith, L. H., & Rizza, M. G. (1998). *Learning Styles Inventory*. Mansfield Center, CT: Creative Learning Press.
Ricca, J. (1984). Learning styles and preferred instructional strategies of gifted students. *Gifted Child Quarterly*, *28*, 121–126.
Ruf, D. (2003). *Use of the SB5 in the assessment of high abilities* (Stanford-Binet Intelligence Scales, Fifth Edition Assessment Service Bulletin No. 3). Itasca, IL: Riverside.
Sak, U. (2004). A synthesis of research on psychological types of gifted adolescents. *Journal of Secondary Gifted Education*, *15*, 70–79.
StatSoft. (2003). General linear models (GLM). Retrieved from www.statsoft.com/textbook/stathome.html
Saunders, K. S. (2004). *Parents' and teachers' views of group work and reporting of inquiry products* (Unpublished master's thesis). McGill University, Montreal, Quebec, Canada.
Shore, B. M., & Tsiamis, A. (1986). Identification by provision: Limited field test of a radical alternative for identifying gifted students. In K. A. Heller & J. F. Feldhusen (Eds.), *Identifying and nurturing the gifted: An international perspective* (pp. 93–102). Toronto, Canada: Hans Huber.
Stewart, E. D. (1981). Learning styles among gifted/talented students: Instructional technique preferences. *Exceptional Children*, *48*, 134–138.
Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston, MA: Allyn & Bacon.
Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
Walter, H., MacGinitie, R. K., MacGinitie, K. M., Dreyer, L. G., & Hughes, K. E. (2000). *Gates-MacGinitie Reading Tests (GMRT)*. Rolling Meadows, IL : Riverside Publishing Company.

## APPENDIX

Participant Code: #_____ School:_____
Group:_____Program:_____

How I Like to Learn

Adapted[1] by: Lisa R. French
Department of Educational and Counselling Psychology
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I am a (Circle one): Boy Girl
Date of Birth:_____
Grade (Circle one; if you are in between grades, please indicate the grade you just completed):
4 5 6 7 8 9 10 11 12

Parents' jobs (if any): Mother_____
Father_____
Do you have brothers or sisters (Circle one)? Yes No
The information you give on this survey will help me to understand the ways you like to learn and the ways you do not like to learn. This is not a test, and there are no "right" or "wrong" answers to any of the questions. Also, all of your answers are confidential. Please answer all of the questions and respond to each item as honestly as you can.

### Directions

This survey asks for your opinion about different classroom activities.

How enjoyable or not enjoyable do you find each one?

Please answer questions 1–16 on a scale of 1 to 5, where 1 = *not enjoyable*, 2 = *mostly not enjoyable*, 3 = *somewhat enjoyable*, 4 = *mostly enjoyable*, and 5 = *very enjoyable*.

Directions will be provided later for questions 17–46.

1. Going to the library with a group of people to look up information.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
2. Having a friend help you learn material you are finding difficult to understand.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
3. Studying on your own to learn new information.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
4. Working with other students on a project with little help from the teacher.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
5. Discussing class material with a group of other students.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
6. Preparing, on your own, to make a presentation to the class.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
7. Reading a book in order to learn all about some topic.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
8. Working with other students on a project the teacher suggests.
   1 2 3 4 5
   Not Enjoyable Very Enjoyable
9. Having a classmate teach you how to do something he or she is especially good at.

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[1] Survey items 1–16 were adapted from the *Learning Style Inventory* (Renzulli & Smith, 1978). Survey items 26–37 were adapted from the *Piers-Harris Children's Self-Concept Scale* (Piers & Harris, 1996). Survey item 38 was adapted from the *Personality and Interest Inventory* (Hildreth, 1936).

1 2 3 4 5
Not Enjoyable Very Enjoyable

10. Working with other students to develop a project related to a topic you are studying.
1 2 3 4 5
Not Enjoyable Very Enjoyable
11. Learning new information or how to solve a problem from another student in your class.
1 2 3 4 5
Not Enjoyable Very Enjoyable
12. Preparing a written report with a group of people.
1 2 3 4 5
Not Enjoyable Very Enjoyable
13. Working on your own on a project you choose yourself.
1 2 3 4 5
Not Enjoyable Very Enjoyable
14. Working with a group of people to prepare a lesson to present to the class.
1 2 3 4 5
Not Enjoyable Very Enjoyable
15. Working with other students in planning and completing a project.
1 2 3 4 5
Not Enjoyable Very Enjoyable
16. Doing research in the library for a paper you want to write.
1 2 3 4 5
Not Enjoyable Very Enjoyable

17. In the table below, please check off (✓) the learning situations that you enjoy (or prefer) compared to the others listed.

| | |
|---|---|
| Working one-on-one with an older student | Giving a presentation |
| Working one-on-one with a younger student | Listening to a presentation by a classmate |
| Working with boys | Listening to a teacher's presentation |
| Working with girls | Going to the library |
| Working with a group of students | Being involved in a discussion group with peers |
| Working alone | Working one-on-one with your teacher |
| Writing an exam | Working one-on-one with one of your parents |
| Working on a project | Working at home |
| Role-playing in class | Working in a different place (not home or school) (specify):_____ |
| Reading a textbook | Working with another person (not teacher or parent) (specify):_____ |

18. Please describe your ideal (best possible or most enjoyable) kind of learning situation:
_____
_____
_____

19. About how often do you experience your ideal kind of learning situation (as described in 18)? (Circle one)
1 2 3
Never Once or twice a year Several times a year
4 5
Once a month Once a week or more
20. Please describe your worst or least enjoyable kind of learning situation:
_____
_____
_____
21. About how often do you experience your least enjoyable kind of learning situation (as described in 20)? (Circle one)
1 2 3
Never Once or twice a year Several times a year
4 5
Once a month Once a week or more
22. 22a. When you work in a group at school, do you get to choose your group?
No Sometimes Yes
22b. Whom do you usually get to work with? Please check off (✓) one:
Classmates I like working with
Classmates I do not like working with
23. Do you feel that people around you (for example, parents, teachers, or classmates) help you/encourage you in your learning?
No Sometimes Yes
24. Do you feel that you have enough resources (for example, books or computer programs) to help you in your learning?
No Sometimes Yes
25. Do you feel that people around you (for example, parents, teachers, or classmates) appreciate your work (think your work is valuable or important)?
No Sometimes Yes

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For items 26–37, please indicate whether you agree or disagree with each statement:

26. My classmates make fun of me. Agree Disagree
27. It is hard for me to make friends. Agree Disagree
28. I am shy. Agree Disagree
29. I am unpopular. Agree Disagree
30. I feel left out of things. Agree Disagree
31. I am among the last to be chosen for games. Agree Disagree
32. My classmates in school think I have good ideas. Agree Disagree
33. I have many friends. Agree Disagree
34. People pick on me. Agree Disagree
35. In games and sports, I watch instead of play. Agree Disagree
36. I am popular with other young people. Agree Disagree
37. I am different from other people. Agree Disagree
38. Please circle your top three choices of people you *like* to be with during your free time. Please put a *line through* the three people you *do not like* to be with in your free time.
    Older boys Younger girls Mother
    No companions
    Younger boys Boys your own age Father
    Little children
    Older girls Girls your own age Teacher
    Other adults
39. Please circle your top three choices of the things you *like* to do during your free time. Please put a *line through* the three things you *do not like* to do during your free time.
    Talk on the phone Video/computer games
    Cook/bake Watch movies
    Play individual sports Play team sports
    Arts or crafts Do email
    Go out to eat with friends Work on my hobby
    Play with a friend Read
40. I'd welcome your thoughts on why some students prefer to do things alone and some students prefer to do things with others. How would you explain this difference? Why do you think this is so?

_____

_____

_____

When you are finished, please return the completed survey to your teacher or return it to [the researcher] via mail using the envelope provided.

THANK YOU!

## AUTHOR BIOS

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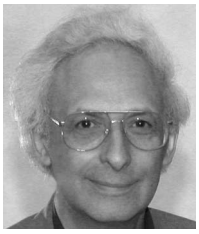

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