Enhancing Visibility of Students' Learning Styles for Talent Development Using Actual and Ideal School Drawings.

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Abstract

As the field of gifted education has increasingly embraced broader definitions of giftedness, teachers and specialists in the education of the gifted and talented need additional ways to assess the talent development needs of a broader array of students. Since learning styles comprise an important component of any comprehensive talent development plan, teachers need efficient ways to learn each student's preferences. The two studies reported here explored the consistency with which school drawings revealed a student's learning style preferences. They extended the work of Knoff and Prout with children's actual school drawings to add an ideal school drawing as well as 19 learning style questions. In Study 1 eighth grade students (n=125) and students in third and fourth grade (n=229) in Study 2 completed actual and ideal school drawings twice with a three-month interval between administrations. The results showed that the students selected their learning style preferences with consistency within and across trials. While developed for use in talent development programming for high ability students, these studies showed that the drawings could successfully be used with the broad spectrum of students found within any classroom to enhance their talent development.

Classroom Visions: A Classroom-based Technique for Identifying Student's Learning Style Preferences for Use in Talent Development

The approach to gifted and talented education has broadened from one that tries to promote the talents of only a select few identified students to a comprehensive approach that seeks to develop the talents of all students (Renzulli & Reis, 1991; Ross, 1993; Treffinger & Feldhusen, 1996). In addition, the field has moved from a one dimensional and narrow definition of giftedness to multidimensional conceptionalizations of giftedness. These factors mean that we need to change the ways we identify and serve students (Chan, 2006; Hong & Aqui, 2004; Worrel & Schaefer, 2004). Treffinger recommended that we " move away from *the* gifted student and *the* gifted program to programming for giftedness and bringing out the strengths and talents in people" (Henshon, 2006, p.121). Further, he said that the key to doing this was understanding a student's style of being gifted. The purpose of this research was to explore the use of a student's actual and ideal school drawings as a way for a student to communicate his or her learning style preferences. This information can be used as a component of individually appropriate talent development plans.

Research Design

The two studies reported here represent the culmination of a series of research studies in which this researcher examined ways to understand the

educational preferences and learning styles of students who had been identified as gifted. It has long been clear to this researcher that students, who have been identified as gifted, have strong learning preferences so she designed a series of studies to learn more about the student's ability to contribute to the identification of these preferences. Stephenson (1972) posited that it was the individual alone who can best provide insight about his or her preferences. This was supported as the studies found that these students could effectively communicate their preferences to others, using verbal prompts from the research on best practices in gifted education (1989, 1997), when prompted by open-ended questions (1994), and through their actual and ideal school drawings (1995). In the current research, this researcher extended Knoff and Prout's (1985, 1991) Kinetic School Drawing (KSD) technique by adding both an ideal component and a series of self report questions on learning styles in order to determine a student's learning style preferences.

While the results of these earlier studies showed that students could communicate their learning preferences in ways others could understand and that these preferences were not limited by the student's own school experiences, the school pictures seemed to offer a richness of information that was far greater than that of words alone. In the earlier studies, it was not clear what a nice teacher was or exactly what constituted a preference for a challenging learning opportunity for a particular student. In addition, although the 1995 school drawing study did not

explicitly ask a student to depict his or her learning style preferences, these seemed to emerge spontaneously in both the actual and ideal drawings. Therefore this research was designed to see if students could effectively communicate their learning style preferences through their school drawings and communicate these consistently in responding to a series of questions about which learning styles they preferred in each picture they drew.

Learning Styles Preferences of Gifted Students

Just as students have a range of abilities, they typically have a range of learning style preferences (e.g., DeBello, 1990; Dunn, Beaudry, & Klavas, 1989; Sternberg & Griegorenko, 1997). Messink (1994) described these preferences as self-consistent regularities in both cognitive and personality variables that are spontaneously evoked without awareness or choice in a wide variety of situations having similar information-processing requirements.

There have been many studies that have looked at the learning styles of the gifted as a particular educational population (Callahan, Tomlinson, Moon, Tomchin, & Plucker, 1995; Dunn. 1990; Griggs, 1983,1984; Pyryt, Sandals, & Begoray, 1998; Reid & Romanoff, 1997; Sternberg, 2000; Sternberg, & Grigorenko, 1993). These studies have shown that many of these students preferred active, independent, and challenging learning that they like to engage through a number of different sensory modalities and pedogical approaches. While high numbers of students, who have been identified as gifted, may prefer

one learning style, others in that same sample may not have that same preference. In addition students, who have not been identified as gifted, may have the same preference as those who had been identified as being gifted (Dunn, Griggs, Olson, Beasley, & Gorman, 1995). While the group differences that emerged in these studies were interesting, it is the information for each individual that it is essential to know (Alvino, 1980).

Since the intent of this research was to address the talent development needs of gifted students, the results of studies with that population were used to develop the learning style question prompts for use with the school drawings used in this research. All the questions that were used were supported by research on learning styles with populations of students who had been identified as gifted. Table 1 shows a summary of this research. This ensured that the learning styles information that would emerge addressed those learning styles that the research had shown to be important to identified populations of gifted students.

Van Tassel-Baska (2006) reported that it is increasingly likely that students, who are gifted, will be in heterogeneous settings, so to be consistent with this trend, these studies were done with samples of identified gifted students within the regular classroom. The samples in the two studies reported here each included at least a third who had been identified as gifted by the criteria adopted by that school district; the remainder of the sample represented the full spectrum

of ability levels. Since it is the preferences of the individual that are most relevant, the results have not been disaggregated.

Projective Methodology

There were several important methodological concerns to be addressed in developing the design of this work. The 1995 study used projective methodology in which the students were to select and draw any actual or ideal learning experience. In projective methodology, the assumption is made that when a person selects an experience to communicate, he or she is selecting one that is of importance to that individual (Anastasi, 1988). A large number of subjective, projective techniques have been developed that tend to use a relatively unstructured task and virtually unlimited responses options (Anastasi, 1988). Clark (1995) reported that these characteristics contributed to the continuing controversy about the relative merits of these techniques. Catterall and Ibbotson (2000) reported that subjects found projective tasks fun and engaging especially when respondents become involved in their analysis and interpretation. After losing popularity in the 1960's, Piotrowksi, Keller, and Ogawa (1993) found that projective techniques were again being used worldwide.

Falk (1981) suggested that drawing techniques were especially appropriate for use with children as they allowed them to communicate their feelings indirectly and were a more natural medium for them than they would be for adults (Mathews, 1996, Mares, 1996). However, he cautioned against using poorly

conceived categories of interpretation. Chandler (1990) suggested that the usefulness of projective techniques with children might be that they can increase understanding about an individual rather than that they be used to determine psychiatric group membership.

The ways to understand and interpret the drawings continues to be debated. *School Psychology Quarterly* published a series of papers and responses (Holtzman & Pleis, 1993; Knoff; Motta, 1993, Little, & Tobin, 1993; Motta, Little, & Tobin, 1993 a & b) that looked at the research on interpreting children's drawings and the corroboration of these interpretations with quantitative measures of personality, achievement, or intelligence. Most of the studies discussed used protocols in which the researchers inferred meaning or tried to relate the results of the drawing task with a quantitative task or test. The articles raised concerns about the reliability and validity of these protocols. Subsequent research has supported the use of children's drawings to reveal their perceptions about their world (Gross, & Hayne, 1998; Malchiodi, 1998; Montasser, Cole, & Fuld, 2002; Stafstrom, Rostasy, & Minster, 2002). Gamradt and Staples (1994) used children's school drawings as a component of an evaluation of a large school reform project because they thought that the drawings were a developmentally appropriate, intrinsically interesting task for participants of various ages as well as being consistent with the fourth generation evaluation tools suggested by Lincoln and Guba (1989). Wieder (1998) examined the individuality, cross-

cultural, and universal implications of children's art and posited that we can learn to understand children's learning styles better through the study of their drawings.

While students share common school experiences, the aspects of what is important within each experience are unique for each individual. In the current studies, the pictures were used as a stimulus to draw the student's attention to what about a school experience was important and then to use this information to communicate his or her learning style preferences through the series of self-report questions. (See Figure 1 and Figure 2.) The self-report questions allowed this researcher to gain insight directly from the individual in consistent ways across the sample. They also bypassed the challenge of inferring meaning from the drawings of young children, which is made more challenging by their developmental drawing level.

Knoff, who was one of the developers of KSD (1983, 1985,1991), completed a comprehensive evaluation of projective drawings techniques in 1990, concluded that the benefit of these drawings was that they could contribute to a better understanding of a child for the purpose of developing more appropriate and effective interventions. This supports the continued study of the use of children's drawings for the purposes presented here.

Mixed Methods Methodology

One of the goals of qualitative studies is to provide insights into human behavior in ways that differ from quantative approaches. Rather than being

hypothesis driven, they try to explain and establish credibility for their findings through a variety of ways (Coleman, Guo, & Dabbs, 2007; Freeman, deMarrais, Presissle, Roulston, & St. Pierre, 2007). In these studies, this was done through a mixed method approach. Since the school drawings were a projective-qualitative task, the use of self-report questions gave additional focus to the students in making judgments about their learning styles and allowed for comparisons of individual and group responses. Finally, the findings of two studies are reported here to provide additional credibility to the data (Creswell, 2003; Mertens, 2005). The research design was the same for both studies. Study 1 was done with a sample of eighth grade students and Study 2 with a sample of third and fourth grade students. The two samples provided information on the consistency of the findings and the viability of the technique with older and younger students.

Background

Cognitive and Affective Implications of Children's Art

Since the innovative aspect in this research used children's depictions of school experiences, it was important to look at the research on the cognitive and affective implications of children's art. Golumb (1992), in a comprehensive review of the literature on studies that used children's art, reported that, "For hundreds of years, the drawings of children have enchanted a rather diverse audience of psychologists, educators, art historians, and artists" (p.1). She found that children's art has been explored from a number of different perspectives that

can be summarized with two major orientations: a cognitive-developmental perspective and a projective-psychological.

Two leading proponents of the cognitive-developmental components of children's art were Piaget and Inhelder. They believed that drawing consists of externalizing previously internalized mental images (1971). Goodenough (1962) reported that children's drawings included more than visual imagery. She found that they also reflected cognitive development and had intellectual meaning. Her work using the Draw-a-Person test continues to be used to assess the intellectual development of children although concerns about the use of the findings for that purpose remain a concern (Kamphaus & Pleis, 1990). Harrison (1999) found that the levels of drawings of young children were good predictors of giftedness.

Researchers have also studied the projective-psychological implications of children's art. Drawings have been widely used to gain insight into the artistic, social, and emotional aspects of children (Coles, 1986, Gardner, 1980; Fassler, 1986; Goodnow, 1977; Lowenfeld & Brittain, 1987; McCabe & Hillmo, 1985; Oakland & Dowling, 1983; Rubenstein, Feldman, Rubin, Noveck, 1987; Wilson, 1985; Wilson & Wilson, 1987).

Research on Kinetic School Drawing. The kinetic approach to both family and school drawing, which has been adapted for use in these studies, has generated much interest among clinicians and researchers because it seemed to provide a richer source of data than did static drawings (Andrews & Janzen, 1988;

Habenicht, Shaw, Brandley, 1990; Hulse, 1951 & 1952; Mares, 1996; McPhee & Wenger, 1976; Meyers, 1978; Mostkoff & Lazarus, 1983; Nuttall, Chieh, & Nuttall, 1988; O'Brien & Patton, 1974; Prout, 1983; Prout & Celmer, 1984; Raskin, & Bloom, 1979; Raskin & Pitcher, 1977, Reynolds, 1978; Sarbaugh; 1982, Schneider, 1978; Walton, 1983). In the 1995 study the students, who had been identified as gifted, demonstrated in their pictures that they preferred to learn in differentiated settings through a variety of instructional and sensory modalities. They confirmed that they were similar to their peers by demonstrating stereotypical age and gender preferences in their pictures.

Methodology

Participants

In Study 1 there were 125 eighth grade students and in Study 2 there were 229 third and fourth grade students (n=119, 52% third; n=110, 48% fourth). The students were from schools whose state assessments were among the highest in the state. Each sample included at least one third of the group who had been identified as gifted and talented by their district's talent assessment battery.

Instruments

School Drawing Forms

The school drawing forms included two versions:

1) Kinetic School Drawing Form-Actual (KSD-A). This form asks the responder to draw a school picture (Prout & Phillips, 1974; Knoff & Prout, 1985, 1991). Used with permission.

2) Kinetic School Drawing Form- Ideal (KSD-I): This form asks the responders to draw a school picture that is ideal for them (Armstrong, 1995).

Both forms also included the same 19 self-report questions as to which learning style preferences the student thought were important for him or her in the picture. The questions were in a Likert scale format that allowed students to record the extent that the statement reflected their preference on a scale that went from 1 to 5. The questions were developed from a review of the research on learning styles (Curry, 1987, DeBello, 1990; Dunn, Beaudry, & Klavas, 1989; Dunn, Griggs, Olson, Beasley & Gorman, 1995; Dunn, Dunn & Price, 1989 & 2000; Fraser, 1986 & 1989; Gardner, 1983; Gregorc, 1985; Kolb, 1984; Lovelace, 2002; Messink, 1994; Moos, 1979, 1987) and the research on learning style preferences of students who had been identified as gifted cited earlier (See Table 1). The KSD-A and KSD-I forms are shown in Figure 1 and Figure 2.

Insert Table 1 About Here

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Insert Figure 1 About Here

Insert Figure 2 About Here

Procedure

Both studies used the same test-retest design with a single researcher administering all tasks. All respondents completed 2 drawings (KSD-A, KSD-I) in Trial 1 and the same forms in Trial 2 three months later. The drawing forms directed the students to draw an actual or ideal school experience, and put themselves, a teacher, and a friend or two in the picture. Everyone was to be doing something. The directions asked the student to identify who the individuals were in the picture and which learning preferences he or she was using in that picture by responding to the same 19 self-report questions. Students completed the tasks on different days. The order of the tasks was varied for the classes. Note: The Dunn, Dunn, and Price Learning Style Inventory (1989, 2000) was also given. The results, while interesting, were not pertinent to the studies reported here.

Data Analysis

The data were analyzed to look at the 1) consistency in the choice of response to each question and 2) consistency of a preference between one administration and another.

Responses and Preferences

A response was defined as the number (from 1-5) the student selected to answer each of the 19 learning style preferences questions on both drawing forms. Pearson correlations were used to learn more about the consistency of the student's responses (Patten, 2002). Correlations were considered significant beginning if r was ≥ .31 and p ≤ .001. Correlations of ≥ .31 -.50 were considered low positive correlations, ≥ .51 -.70 moderate positive correlations, and ≥. 71 -.90 high positive correlations (Hinkle, Wiersma, & Jurs, 1998).

Since the questions were designed to have the strongest valence at either end of the Likert Scale, a preference was defined by this researcher as the student selecting a response of a 1 or a 5. A selection of a response of 2, 3 or 4 was considered neutral and not a preference for purposes of these studies. For the school drawings the student selected a single answer of a 1 or a 5 to indicate the preference. For seven questions (# 5, 6, 7, 8, 13, 14, and 15), the choice was if this was a preference or not a preference, i.e., question 5 asked if the student preferred to learn with his or her hands or not. The remaining 12 questions

contained two different preference options such as question 1, which asked whether the student prefer it noisy or quiet.

Comparing consistency

This researcher defined consistency as the student selecting the same response from one administration of the task to another. The consistency was measured through the use of t-tests. Consistency could be compared between and across trials for the school drawings. The results were deemed consistent if the percentage of change between the number of students selecting one answer was within ≤ 20% of the number of students who selected that same response for that learning style preference on another form. Therefore, at least 80% of those respondents, who selected a particular preference once, had to have selected the same response again for it to be considered consistent.

Results

The school drawings showed that all students indicated having learning preferences and that even the most selected preferences were chosen by not much more than one-half of the students in that study. While there was a broad range in the learning style preferences the students selected, there were high levels of consistency in the selection of responses and specific preferences by the students in both studies.

Insert Table 2 About Here

Frequency of Responses

Insert Table 3 and Table 4 About Here

Tables 3 and 4 summarize the frequency of responses of the students to each of the 19 learning style questions for both trials for each study. The responses were considered significantly consistent if $r \geq .31$ and $p \leq .001$.

In Study 1, Trial 1 for the nineteen learning style preferences, 89.5 % (n=17) were significantly correlated when the full range of response options were compared for consistency of response with 47.4% (9) meeting the standard for moderate level of correlation and 42.1% (8) the low level. Only 2 (10.5%) preferences failed to meet the standard for significance. These were visual and formal/informal. In Trial 2, students met or exceeded the level of consistency for selecting the same response for 84.2 % (16) of the nineteen learning style preferences with 52.6% (10) showing moderate correlation, 21% (4) showing low correlation. Of the three that failed to achieve significance the first two were the same as those in Trial 1 with the addition of auditory in this Trial. Two preferences (10.5%) learn in the same way and snacking, showed the high level of correlation.

In Study 2 the results of the school drawings with the younger sample in Trial 1 showed that 84.2% (16) of the responses were significantly correlated within that trial. Only 15.8% (3) were at the moderate level and 63.2% (12) were at the low level. Four preferences (21.1%), did not demonstrate consistency. These were: working with a group or partner, visual, formal/informal, visual and tactile. However, in Trial 2, 94.7% (18) showed a positive correlation with 42.1% (8) being at the moderate level and 52.6% (10) at the low level. Only formal/informal did not reach the threshold for significance.

Only the preference named formal/informal never reached the threshold established for consistency in either study. The preference named visual did not show consistency in the first trial in either study. All other preferences showed consistency of response in one or more of the comparisons.

Consistency of Preference Results

A more compelling set of findings emerges in looking at the data on the consistency of preferences not just of response. Table 5 and Table 6 present this data.

Insert Table 5 and Table 6 About Here

A preference was considered consistent if the number of students selecting that preference was within ≤ 20% of those who selected that same preference in

another administration of that same task. In Table 5(Study 1) and Table 6 (Study 2), the first four columns show percentage of students who selected that learning style as a preference and then the remaining columns show the percent of difference for each preference by showing the percent of change below or beyond the 20% threshold. For example, in Table 4, for the tactile learning style preference, nearly one half of the students selected it as a preference (columns 1-4) each time they did a drawing. When comparing the percentage of consistency (columns 5-8) from Trial 1 from actual to ideal (15.1 %), Trial 2 actual to ideal (7.4), actual to actual (-.3), and ideal to ideal (-9.8), the students who selected that preference were consistent well below that ≤ 20 % threshold in all of the comparisons.

In Study 1, 74% (n= 14) of the preferences met that threshold for consistency in Trial 1 and Trial 2, 95% (from KSD-A Trial 1 to Trial 2), and 89% for the KSD-I from the first trial to the second. The preferences were more consistent when the student was drawing the same type of picture (actual or ideal) than they were when the student's actual and ideal pictures were compared. However, the vast majority of preferences were consistent with only four preferences in any of the comparisons greater than 30% but none over 49%. All preferences were selected as a preference by at least 20% of the students but most preferences were selected by less than one half of the sample. Only tactile and

wanting to snack were selected as a preference by more than one half of the sample in all the comparisons made.

In Table 5 which shows Study 2, *all* of the comparisons met the standard for consistency of the preference for *all* preferences for the comparison from KSD-A to KSD-I and for KSD-A to KSD-A. Only two preferences did not meet that standard from KSD-I to KSD-I and these were very close to the standard. These preferences were challenge (27%) and noise (21%). Again all the learning style preferences were preferred by at least one quarter of the students on their school drawing forms. However, overall the younger students in this study seemed to have more and stronger learning style preferences than did the older students in Study 1. Snacking, group work, the ability to move around, and wanting to finish one's work emerged as the most popular preferences. The students in this study also showed greater consistency of preferences than those in Study 1. However, the students in both studies were able to demonstrate a very high level of consistency in identifying the learning style preferences they preferred.

Discussion

Although many approaches have been used to describe and determine learning styles, researchers typically have not looked at consistency of the preferences over time. An individual's preferences often vary over time and in different settings (Kogan & Saarni, 1989). When consistent, however, these

preferences have particular relevance to talent-development planning -- a task which by its very nature should be sustained over an extended period.

In the 1995 study on the school drawings, outside raters were successfully able to determine the broad teaching and learning preferences of students who had been identified as gifted. In the studies reported here, students were able to use their drawn images and self-report information to communicate specific examples of their learning-style preferences. While a very few learning style preferences were selected by more than half of the students in each study, every preferences was selected by some of them. This diversity underscores the importance of facilitating the full array of learning styles.

Learning styles have particular importance for students with especially strong or numerous preferences. For example, Figure 2 and Figure 3 show the responses of an eighth-grade male student; he expressed 9 consistent learning preferences in both the actual and ideal pictures even adding an additional three in his ideal. His large number of educational preferences may have contributed to the frustration he portrayed so vividly in his pictures.

The student drawings themselves provide an important source of information not readily captured by the survey questions. Broderick and Penwill (1996) and Fisher (1993) found that respondents revealed sensitive information far more readily on projective tasks than when using quantitative metrics. In these studies, most students depicted typical learning situations in which their

learning preferences could be accommodated easily. For students such as the one discussed, the drawings provided an opportunity to reveal the strong conflict he felt between the expectations for school and social success and the vast gulf between his actual and ideal learning experiences. By allowing students to more fully express their true preferences, the pictures provide a key diagnostic for realizing ideal learning outcomes

It seemed most reasonable to look for consistency comparing data from one administration to another of the same assessment tool as Clinkenbeard and Murphy (1990) had found little consistency when even data from two quantative instruments purporting to measure the same construct were compared. It may be that the pictures provide a more developmentally appropriate way to determine learning styles than paper and pencil forms that require a great deal of reading and attention to detail. However, a comparison between another drawing instrument could not be made as no learning style instrument could be found that used pictures to determine learning styles in a systematic way (Personal Communication, Rita Dunn, 1996, 2003).

The consistency that emerged in the school drawings within and across trials strongly supports the pervasiveness of learning style preferences and the continued exploration of this type of projective methodology to learn more about them. Additional evidence to support the student's self-report information can be obtained by corroborating the results from the self-report data with a content

analysis of the pictures, interviews with the student, and classroom observations. While there was some variation in the results between samples, it appears that across ability levels, students as young as eight can successfully use the school drawings to reveal their learning style preferences.

Implications for Practice

As we learn more about a student's learning style preferences, we can use this information to plan, monitor, and modify school programs to make them consistent with each student's needs and thus maximize each student's learning potential (Armstrong, 1992). In whatever setting teachers address the talent development needs of students; they should do so based on a comprehensive diagnostic talent profile. Such profiles should include information on the student's cognitive abilities, work habits, interests and learning styles (Kirshenbaum & Armstrong_, 1999). Information on students learning styles should be an important component of a comprehensive diagnostic talent profile. A student's learning style preferences are relevant to successful learning whether the student is engaging new content, maximizing strengths, or remediating weaknesses.

Conclusion

This researcher began this line of inquiry to better understand how well students could articulate their learning styles to others. The consistency of the learning styles that emerged in the self-reports on their leaning style preferences

represent one way in which this can happen. The pictures are lively, funny, and sometimes poignant. All students have school images yet the experience of each student is unique. As seen in Figures 1 and 2 the images themselves invite a meaningful dialogue. Only one student in either sample asked, "What if my ideal and my actual are the same? " Should not this be the goal for all students? The pictures provide an image through which teachers can engage students in a discussion about what they might envision would be optimal for their talent development.

The positive findings in the use of actual and ideal school drawings to determine learning styles in this research goes beyond previous learning style research, which primarily relied on verbal self-reports. It adds to the literature on the use of projective methodology to understand children's drawings. Finally, the consistency that emerged between the two pictures within and across trials supports its use with educators as a technique to easily learn about a student's learning preferences for use in talent development. Finally, since the learning style questions on the school drawings were developed to include those preferences that research has documented as being of importance to identified populations of gifted students, the technique can serve such populations in either specialized programs or in mixed ability classes.

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Figure 1

Sample of an Actual School Picture Form

Classroom Visions: Actual School Picture

A. Think of all your school experiences. Now draw a school picture. Put yourself, the teacher, and a friend or two in the picture. Make sure everyone is doing something.

B. Please go back and label the people in the drawing and complete the next page. E=10=A

C. In this picture:

I am being forced to do homework 150% better each day.

The teacher(s) Telling me I should work harder

My friend(s) are trying to get through the wall of work, but it is impossible.

D. Circle the number that best reflects your learning preferences in the picture you just drew.

1. In this picture, I prefer it noisy 1 (2) 3 4 5 quiet
2. In this picture, I prefer it dim 1 2 3 4 (5) bright
3. In this picture, I prefer it cool 1 2 3 4 (5) warm
4. In this picture, I prefer it to be informal (on a couch or floor) 1 (2) 3 4 5 formal (at a desk or table)
5. I prefer to learn using my hands. no 1 2 3 (4) 5 yes
6. I prefer to learn by seeing or looking. no 1 2 3 (4) 5 yes
7. I prefer to learn by listening or speaking. no 1 2 (3) 4 5 yes
8. I prefer to learn with my body (moving or role-playing). no 1 2 3 4 (5) yes
9. I prefer to direct the learning myself (1) 2 3 4 5 follow an adult's directions
10. I prefer to learn in the morning 1 2 3 4 (5) afternoon
11. I prefer to study or work alone (1) 2 3 4 5 with adults nearby
12. I prefer to be with a partner 1 2 (3) 4 5 in a group
13. I prefer to have snacks. no 1 2 3 4 (5) yes
14. I prefer to move around when I learn. no 1 2 3 (4) 5 yes
15. It's important for me to finish what I start. no 1 2 (3) 4 5 yes
16. I prefer to decide what needs to be done (1) 2 3 4 5 have clear directions about what is expected
17. I prefer to learn the same way most of the time (1) 2 3 4 5 in different ways over time
18. I can complete my work best on my own (1) 2 3 4 5 when others remind me
19. I am challenged to succeed for myself 1 2 (3) 4 5 others (family, teachers, etc.)

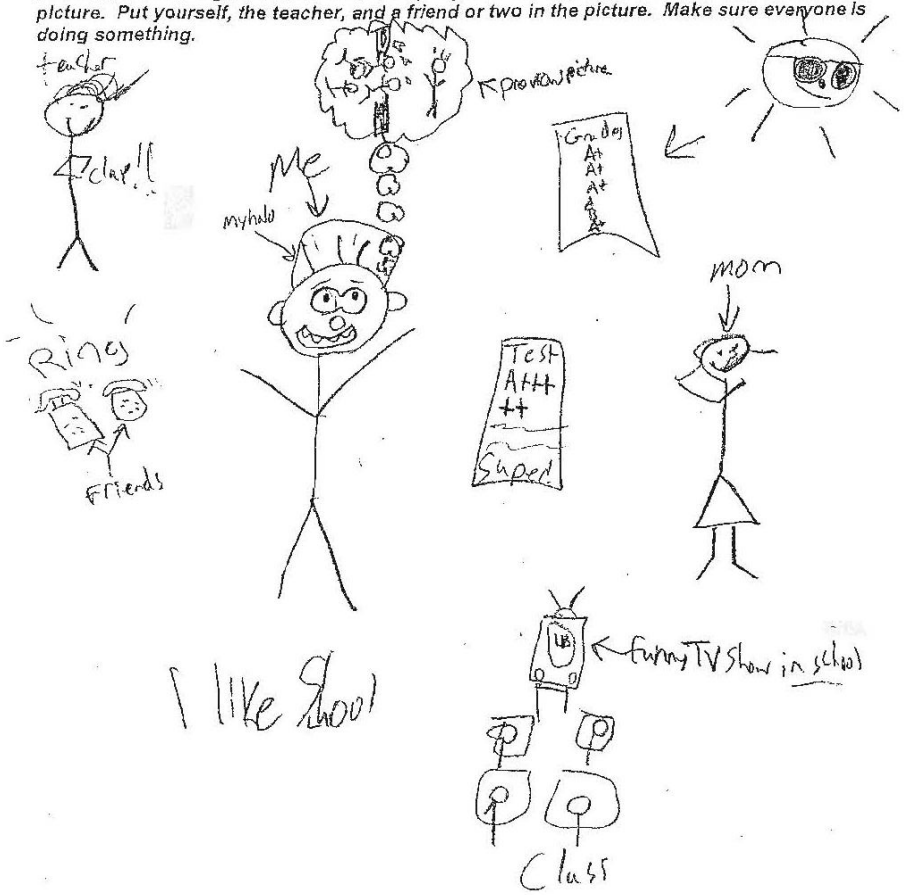
E. The most important thing(s) about this school is doing my homework so I don't get hassled by my parents.

Figure 2

Sample of an Ideal School Picture Form

Classroom Visions: Ideal School Picture

A. Think of what might be an ideal learning experience for you. Then draw an ideal school picture. Put yourself, the teacher, and a friend or two in the picture. Make sure everyone is doing something.



B. Please go back and label the people in the drawing and complete the next page. E-I O-T

I am Getting good grades. Being happy. Breaking the wall of work Having my social life.

The teacher(s) Clapping for me

My friend(s) are calling Me on the phone

D. Circle the number that best reflects your learning preferences in the picture you just drew.

1. In this picture, I prefer it: noisy 1 2 3 (4) 5 quiet
2. In this picture, I prefer it: dim 1 2 3 4 (5) bright
3. In this picture, I prefer it: cool 1 2 (3) 4 5 warm
4. In this picture, I prefer it to be: informal (on a couch or floor) 1 (2) 3 4 5 formal (at a desk or table)
5. I prefer to learn using my hands: no 1 2 3 4 (5) yes
6. I prefer to learn by seeing or looking: no 1 2 3 4 (5) yes
7. I prefer to learn by listening or speaking: no (1) 2 3 4 5 yes
8. I prefer to learn with my body (moving or role-playing): no 1 2 3 4 (5) yes
9. I prefer to direct the learning myself (1) 2 3 4 5 follow an adult's directions
10. I prefer to learn in the: morning 1 2 3 4 (5) afternoon
11. I prefer to study or work: alone (1) 2 3 4 5 with adults nearby
12. I prefer to be: with a partner 1 2 3 (4) 5 in a group
13. I prefer to have snacks: no 1 2 3 4 (5) yes
14. I prefer to move around when I learn: no 1 2 3 (4) 5 yes
15. It's important for me to finish what I start: no 1 2 (3) 4 5 yes
16. I prefer to: decide what needs to be done (1) 2 3 4 5 have clear directions about what is expected
17. I prefer to learn: the same way most of the time (1) 2 3 4 5 in different ways over time
18. I can complete my work best: on my own (1) 2 3 4 5 when others remind me
19. I am challenged to succeed for: myself 1 (2) 3 4 5 others (family, teachers, etc.)

E. The most important thing(s) about this school Is having fun.

Table 1

Summary of Findings on Learning Style Preferences of Students who have been Identified as Gifted

Learning Style Questions for KSD	Gifted Students Preferences	Research Studies
1. Noise	Analytic prefers low; global Prefers high	Dunn and Price, 1980
2. Light	Analytic prefers low; global Prefers bright	Dunn and Price, 1980
3. Temperature	Analytic prefers low; global Prefers high	Dunn and Price, 1980
4. Formal or informal setting	Analytic prefers formal; Global prefers informal	Dunn and Price, 1980
5. Tactile	Prefer perceptual modalities	Barbe and Milone, 1982; Fasko, 2001
6. Visual	Prefer perceptual modalities	Barbe and Milone, 1982; Fasko, 2001
7. Auditory	Prefer perceptual modalities	Barbe and Milone, 1982 Fasko, 2001
8. Kinesthetic	Prefer perceptual modalities	Barbe and Milone, 1982 Fasko, 2001
9. Self-directed or other directed	Prefer to be self-directed	Grigorenko and Sternberg, 1997
10. Time of day	Analytic prefer morning; Global prefer afternoon	Dunn and Price, 1980
11. Adult present or not	Gifted students prefer not	Griggs, 1984
12. Group work or partner	Prefer peer teaching	Boultinghouse, 1984
13. Snacks	Analytic prefers not; global Prefer to	Dunn and Price, 1980
14. Move around or not	Prefers to move	Boultinghouse, 1984
15. Persistence	Prefer to be	Pyryt, Sandals, and Begoray, 1998

16. Decide how to do a task	Prefer to	Grigorenko and Sternberg, 1997; Maker, Nielson, and Rogers, 1994; Sternberg, 2000
17. Learn in same ways or not	Prefer to learn in different ways	Boultinghouse, 1984; Fasko, 2001
18. Completes work for self or others	Prefer to do for self not others	Okabayashi and Torrance, 1984
19. Likes a challenge	Prefer to be challenged	Griggs, 1983, Maker, Nielson and Rogers, 1994

Table 2

Consistency of Students' Responses Between Their Actual and Ideal School Drawings in Trial 1 and Trial 2 in Study 1 and Study 2

Learning Style Preferences	Trial 1		Trial 2	
	Study 1	Study 2	Study 1	Study 2
Learn Same Way	.342*	.417	.712	.514
Light	.492	.370	.508	.475
Temperature	.583	.401	.610	.617
Like to be Challenged	.526	.443	.578	.591
Persistence	.533	.411	.585	.483
Direction Decision	.506	.390	.420	.493
Follow Directions or Self	.408	.531	(.282)	.410
Adult Pressure or Alone	.483	.461	.445	.561
Group Work or Partner	.625	(.279)	.509	.403
Completes Work	.577	.515	.659	.462
Auditory	.498	(.275)	.607	(.317)
Kinesthetic	.374	.428	.518	.443
Snacks	.554	.460	.776	.692
Time of Day	.533	.601	.519	.693
Move Around	.561	.373	.372	.527
Self Motivated	.526	.443	.578	.591
Visual	(.197)	(.291)	.361	(.329)
Formal/Informal	(.264)	(.267)	(.212)	(.298)
Tactile	(.321)	(.495)	(.282)	.495

* $p > .31$, all correlations were significant at $p > .000$. ( ) indicates mot significant.

Table 3

Study 1: Percentages and Frequencies of Students' Responses on Actual and Ideal school pictures

Learning Preferences	Trial 1						Trial 2					
	Actual (KSD-A)			Ideal			Actual			Ideal		
	1	NP	5	1	NP	5	1	NP	5	1	NP	5
1. Noisy or Quiet	26.8% (n=45)	52.4(88)	20.8(35)	28.7(48)	50.9(85)	20.4(34)	37.3(47)	42.9(54)	19.8(25)	42.9(54)	45.2(57)	11.9(15)
2. Dim light or Bright light	34.1(57)	37.1(62)	28.7(48)	38.9(65)	35.3(59)	25.7(43)	34.9(44)	38.9(49)	26.2(33)	39.7(50)	31.0(39)	29.4(37)
3. Temp.: Cool or Warm	28.7(48)	42.5(71)	28.7(48)	35.3(59)	36.5(61)	28.1(47)	28.6(36)	55.6(70)	15.9(20)	31.0(39)	42.1(53)	27.0(34)
4. Informal or Formal	46.4(77)	39.8(66)	13.9(23)	66.9(111)	24.1(40)	9.0(15)	50.8(64)	34.9(44)	14.3(18)	69.0(87)	24.6(31)	6.3(8)
5. Use Hands or not	54.2(91)	20.8(35)	25.0(42)	52.7(87)	27.3(45)	20.0(33)	52.4(65)	26.6(33)	21.0(26)	56.3(71)	23.0(29)	20.6(26)
6. Not looking seeing to prefer	40.5(68)	36.3(61)	23.2(39)	47.6(79)	30.1(50)	22.3(37)	41.3(52)	30.2(38)	28.6(36)	50.0(63)	28.6(36)	21.4(27)
7. Not listening or speaking to prefer	38.0(63)	42.4(72)	18.7(31)	40.5(66)	39.9(65)	19.6(32)	38.1(48)	41.3(52)	20.6(26)	41.3(52)	34.1(43)	24.6(31)
8. Not learning with body or prefer	41.7(70)	32.7(55)	25.6(43)	53.3(89)	31.1(52)	15.6(26)	43.7(55)	31.0(39)	25.4(32)	55.6(70)	20.6(26)	23.8(30)
9. Direct learning by self or follow adult directions	23.8(40)	58.9(99)	17.3(29)	29.5(49)	50.6(84)	19.9(33)	27.0(34)	52.4(66)	20.6(26)	25.6(32)	53.6(67)	20.8(26)
10. Mornings or afternoons	35.1(59)	39.3(66)	25.6(43)	36.7(61)	41.6(69)	21.7(36)	31.7(40)	47.6(60)	20.6(26)	32.8(41)	48.8(61)	18.4(23)
11. Work alone or with adults nearby	26.2(44)	55.4(93)	18.5(31)	24.7(41)	57.2(95)	18.1(30)	23.8(30)	54.8(69)	21.4(27)	29.4(37)	50.0(63)	20.6(26)

Table 3 continued

Study 1: Percentages and Frequencies of Students' Responses on Actual and Ideal school pictures

Learning Preferences	Trail 1						Trail 2					
	Actual (KSD-A)			Ideal			Actual			Ideal		
	1	NP	5	1	NP	5	1	NP	5	1	NP	5
12. Work with partner or in a group	38.9(65)	43.1(72)	18.0(30)	41.0(68)	47.0(78)	12.0(20)	40.5(51)	45.2(57)	14.3(18)	42.4(53)	44.8(56)	12.8(16)
13. Not to snack or snack	56.5(95)	20.8(35)	22.6(38)	59.4(98)	24.2(40)	16.4(27)	58.7(74)	21.4(27)	19.8(25)	63.5(80)	16.7(21)	19.8(25)
14. Not to move or prefer	44.6(75)	27.4(46)	28.0(47)	48.2(80)	28.9(48)	22.9(38)	46.0(58)	24.6(31)	29.4(37)	51.2(64)	22.4(28)	26.4(33)
15. Not to finish to prefer to	35.9(60)	28.1(47)	35.9(60)	45.8(76)	24.1(40)	30.1(50)	40.5(51)	32.5(41)	27.0(34)	46.0(58)	23.8(30)	30.2(38)
16. Decide what needs to be done or clear directions	29.8(50)	46.4(78)	23.8(40)	30.1(49)	49.1(80)	20.9(34)	23.8(30)	43.7(55)	32.5(41)	32.5(41)	48.4(61)	19.0(24)
17. Learn in same or different ways	24.4(41)	47.6(80)	28.0(47)	26.1(43)	47.9(79)	26.1(43)	29.4(37)	46.0(58)	24.6(31)	32.0(40)	48.0(60)	20.0(25)
18. Does best work on own or when reminded	43.5(73)	41.1(69)	15.5(26)	38.8(64)	49.7(82)	11.5(19)	43.7(55)	43.7(55)	12.7(16)	42.4(53)	45.6(57)	12.0(15)
19. Challenged to succeed for self or others	35.3(59)	53.3(89)	11.4(19)	29.7(49)	58.8(97)	11.5(19)	31.7(40)	55.6(70)	12.7(16)	34.9(44)	54.0(68)	11.1(14)

Note: The percentage and number of students selecting that response is given. Responses of 1 and 5 are preferences. Responses of 2, 3, or 4 are not and are shown as NP.

Table 4

Study 2: Frequencies and percentages of students' responses on Actual and Ideal school pictures

Learning Preferences	Trial 1						Trial 2					
	Actual (KSD-A)			Ideal			Actual			Ideal		
	1	NP	5	1	NP	5	1	NP	5	1	NP	5
1. Noisy or Quiet	34.1% (n=78)	32.8(75)	33.2(76)	40.2(92)	29.3(67)	30.6(70)	37.1(85)	31.4(72)	31.4(72)	97(42.5)	27.6(63)	29.8(68)
2. Dim light or Bright light	32.8(75)	39.3(90)	27.9(64)	36.1(82)	42.3(96)	21.6(49)	31.3(71)	41.4(94)	27.3(62)	28.5(65)	46.5(106)	25.0(57)
3. Temp.: Cool or Warm	25.9(59)	56.6(129)	17.5(40)	25.4(58)	55.3(126)	19.3(44)	29.4(67)	45.2(103)	25.4(58)	30.7(70)	45.6(104)	23.7(54)
4. Informal or Formal	61.4(140)	26.8(61)	11.8(27)	51.3(117)	38.6(88)	10.1(33)	62.9(144)	24.0(55)	13.1(30)	59.6(136)	30.3(69)	10.1(23)
5. Use Hands or not	51.5(117)	38.8(88)	9.7(22)	48.5(110)	39.2(89)	12.3(28)	47.4(108)	37.7(86)	14.9(34)	47.6(109)	35.8(82)	16.6(38)
6. Not looking seeing to prefer	48.7(110)	36.7(83)	14.6(33)	42.9(96)	37.9(85)	19.2(43)	43.6(99)	38.8(88)	17.6(40)	44.1(101)	40.6(93)	15.3(35)
7. Not listening or speaking to prefer	43.8(98)	38.4(86)	17.9(40)	41.7(95)	39.9(91)	18.4(42)	38.4(88)	36.7(84)	24.9(57)	41.9(95)	41.4(94)	16.7(38)
8. Not learning with body to prefer	45.9(105)	40.6(93)	13.5(31)	46.7(107)	36.2(83)	17.0(39)	48.5(111)	41.5(95)	10.0(23)	51.1(117)	36.2(83)	12.7(29)
9. Direct learning by self or follow adult directions	61.1(140)	23.6(54)	15.3(35)	49.3(113)	32.3(74)	18.3(42)	51.1(117)	31.4(72)	17.5(40)	48.5(111)	34.5(79)	17.0(39)
10. Mornings or afternoons	50.2(115)	34.5(79)	15.3(35)	42.8(98)	44.1(101)	13.1(30)	43.4(99)	40.4(92)	16.2(37)	44.1(101)	39.3(90)	16.6(38)
11. Work alone or with adults nearby	42.8(98)	37.6(86)	19.7(45)	45.0(103)	39.7(91)	15.3(35)	41.0(94)	41.9(96)	17.0(39)	48.0(110)	33.2(76)	18.8(43)

Table 4 continued

Study 2: Frequencies and percentages of students' responses on Actual and Ideal school pictures

Learning Preferences	Trial 1						Trial 2					
	Actual (KSD-A)			Ideal			Actual			Ideal		
	1	NP	5	1	NP	5	1	NP	5	1	NP	5
12. Work with partner or in a group	53.7(123)	39.7(91)	6.6(15)	52.0(119)	41.5(95)	6.6(15)	56.3(129)	39.3(90)	4.4(10)	50.7(116)	46.3(106)	3.1(7)
13. Not to snack or snack	70.2(160)	17.1(39)	12.7(29)	63.6(145)	19.3(44)	17.1(39)	70.3(161)	17.0(39)	12.7(29)	67.7(155)	20.1(46)	12.2(28)
14. Not to move or prefer	55.8(125)	29.9(67)	14.3(32)	49.1(112)	34.2(78)	16.7(38)	51.1(117)	33.2(76)	15.7(36)	51.1(116)	33.0(75)	15.9(36)
15. Not to finish or prefer to	67.1(153)	15.4(35)	17.5(40)	65.5(150)	16.2(37)	18.3(42)	74.2(170)	13.5(31)	12.2(28)	72.4(165)	16.2(37)	11.4(26)
16. Decide what needs to be done or clear directions	46.9(106)	38.9(88)	14.2(32)	48.9(112)	34.5(79)	16.6(38)	46.5(106)	35.1(80)	18.4(42)	44.5(102)	38.9(89)	16.6(38)
17. Learn in same or different ways	37.6(86)	44.1(101)	18.3(42)	38.4(88)	39.7(91)	21.8(50)	42.8(98)	37.6(86)	19.7(45)	38.9(89)	41.5(95)	19.7(45)
18. Does best work on own or when reminded	52.8(121)	41.5(95)	5.7(13)	46.7(107)	48.5(111)	4.8(11)	52.4(120)	39.7(91)	7.9(18)	50.2(115)	42.8(98)	7.0(16)
19. Challenged to succeed for self or others	43.6(99)	48.0(109)	8.4(19)	38.0(87)	54.1(124)	7.9(18)	41.9(95)	48.0(109)	10.1(23)	47.8(109)	42.1(96)	10.1(23)

Note: The percentage and number of students selecting that response is given. Responses of 1 and 5 are preferences. Responses of 2, 3, or 4 are not and are shown as NP.

Table 5

Study 1: Summary of Consistency of Eighth Grade Students' Preferences on Actual (A) and Ideal (Id) Drawings

Learning Preferences	Column 1 Trial 1-A	Column 2 Trial 1-Id	Column 3 Trial 2-A	Column 4 Trial 2-Id	Column 5 % Change: Trial 1-A→Id	Column 6 % Change: Trial 2-A→Id	Column 7 % Change: Trial 1→2-A	Column 8 % Change: Trial 1→2-Id
Noise	26.8%	28.7%	37.3%	42.9%	7.1%	15.0%	(39.2%)	(49.5%)
Light	34.1	38.9	34.9	39.7	14.1	13.8	2.3	2.1
Temp	28.7	35.3	28.6	31.0	(23.0)	8.4	-0.3	-12.2
Formal/in	46.4	56.9	50.8	69.0	(22.6)	(35.8)	9.5	(21.3)
Tactile	54.2	62.4	52.4	56.3	15.1	7.4	-3.3	-9.8
Visual	40.5	47.6	41.3	50.0	17.5	(21.1)	2.0	5.0
Auditory	38.0	40.5	38.1	41.3	6.6	8.4	0.3	2.0
Kinesthetic	41.7	53.3	43.7	55.6	(27.8)	(27.2)	4.8	4.3
Follow Directions	23.8	29.5	27.0	25.6	(23.9)	-5.2	13.4	-13.2
Time of day	35.1	36.7	31.7	32.8	4.6	3.5	-9.7	-10.6
Adult inter.	26.2	24.7	23.8	29.4	-5.7	(23.5)	-9.2	19.0

Table 5 cont.

Study 1: Summary of Consistency of Eighth Grade Students' Preferences on Actual (A) and Ideal (Id) Drawings

Learning Preferences	Column 1 Trial 1-A	Column 2 Trial 1-Id	Column 3 Trial 2-A	Column 4 Trial 2-Id	Column 5 % Change: Trial 1-A→Id	Column 6 % Change: Trial 2-A→Id	Column 7 % Change: Trial 1→2-A	Column 8 % Change: Trial 1→2-Id
Group work	38.9	41.0	40.5	42.4	5.4	4.7	4.1	3.4
Snacks	56.5	59.4	58.7	63.5	5.1	8.2	3.9	6.9
Move around	44.6	48.2	46.0	51.2	8.1	11.3	3.1	6.2
Finish	35.9	45.8	40.5	46.0	(27.6)	13.6	12.8	0.4
Direction dec.	29.8	30.1	23.8	32.5	1.0	(36.6)	(-20.1)	8.0
Learn same	24.4	26.1	29.4	32.0	7.0	8.8	(20.5)	(22.6)
Complete work	43.5	38.8	43.7	42.4	-10.8	-3.0	0.5	9.3
Challenge	35.3	29.7	31.7	34.9	-15.9	10.1	-10.2	17.5

Note. A preference was defined as when a student selected a 1 or a 5 on the 19 learning style self-report questions. Scores are reported here in percentages. Columns 1-4 are the percentages of students selecting that construct as a preference. Columns 5-8 show the percentage difference of students selecting preferences within trials (actual to ideal) and across trials (actual to actual; ideal to ideal).

Table 6

Study 2: Summary of Consistency of Third and Fourth Grade Students' Preferences on Actual (A) and Ideal (Id) Drawings

Learning Preferences	Column 1 Trial 1-A	Column 2 Trial 1-Id	Column 3 Trial 2-A	Column 4 Trial 2-Id	Column 5 % Change: Trial 1-A→Id	Column 6 % Change: Trial 2-A→Id	Column 7 % Change: Trial 1→2-A	Column 8 % Change: Trial 1→2-Id
Noise	34.1%	40.2%	37.1%	42.5%	17.9%	14.6%	8.8%	5.7%
Light	32.8	36.1	31.3	28.5	10.1	-8.9	-4.6	(-21.1)
Temp	25.9	25.4	29.4	30.7	-1.9	4.4	13.5	(20.9)
Formal/in	61.4	51.3	62.9	59.4	-16.4	-5.6	2.4	15.8
Tactile	51.5	48.5	47.4	47.6	-5.8	0.4	-8.0	-1.9
Visual	48.7	42.9	43.6	44.1	-11.9	1.1	-10.5	2.8
Auditory	43.8	41.7	38.4	41.9	-4.8	9.1	-12.3	0.5
Kinesthetic	45.9	46.7	48.5	51.1	1.7	5.4	5.7	9.4
Follow Directions	61.1	49.3	51.1	48.5	-19.3	-5.1	-16.4	-1.6
Time of day	50.2	42.8	43.4	44.1	-14.7	1.6	-13.5	3.0

Table 6 cont.

Study 2: Summary of Consistency of Third and Fourth Grade Students' Preferences on Actual (A) and Ideal (Id) Drawings

Learning Preferences	Column 1 Trial 1-A	Column 2 Trial 1-Id	Column 3 Trial 2-A	Column 4 Trial 2-Id	Column 5 % Change: Trial 1-A→Id	Column 6 % Change: Trial 2-A→Id	Column 7 % Change: Trial 1→2-A	Column 8 % Change: Trial 1→2-Id
Group work	53.7	52.0	56.3	50.7	-3.2	-9.9	4.8	-2.5
Snacks	70.2	63.6	70.3	67.7	-9.4	-3.7	0.1	6.4
Move around	55.6	49.1	51.1	51.1	-11.7		-8.1	4.1
Finish	67.1	65.5	74.2	72.4	-2.4	-.24	10.6	10.5
Direction dec.	46.9	48.9	46.5	44.5	4.3	-4.3	-.09	-9.0
Learn same	37.6	38.4	42.8	38.9	2.1	-9.1	13.8	1.3
Complete work	52.8	46.7	52.4	50.2	-11.6	-4.2	-0.8	7.5
Challenge	43.6	38.0	41.9	47.8	-12.8	14.1	-3.9	(25.8)
Adult inter.	42.8	45.0	41.0	48.0	5.1	17.1	-4.2	6.7

Note. A preference was defined as when a student selected a 1 or a 5 on the 19 learning style self-report questions. Scores are reported here in percentages. Columns 1-4 are the percentages of students selecting that construct as a preference. Columns 5-8 show the percentage difference of students selecting preferences within trials (actual to ideal) and across trials (actual to actual; ideal to ideal).

Table 6 cont.

Study 2: Summary of Consistency of Third and Fourth Grade Students' Preferences on The Learning Style Inventory (LSI)

Learning Style	LSI Trial 1	LSI Trial 2	% Change: Trial 1→2
Auditory	41.5	28.4	(-31.6)
Visual	40.6	44.5	9.6
Tactile	17.0	52.0	(205.9)
Kinesthetic	27.9	38.0	(36.2)
Intake	37.1	43.7	17.8
Time of day	19.7	37.1	(88.3)
Late morning	27.5	40.2	(46.2)
Afternoon	23.1	22.7	-1.7
Mobility	23.6	63.3	(168.2)
Parent motivated	13.1	89.5	(583.2)
Teacher motivated	2.6	85.2	(3176.9)

Note: A preference on the LSI is a standard score $\leq 40 \geq 60$. Scores are reported as the percentage of students selecting that construct as a preference. A difference of $\geq 20\%$ of number of students selecting that preference in Trial 1 and Trial 2 is considered to be consistent. Differences beyond that range are reported in parentheses.