

A Synthesis of Research on Psychological Types of Gifted Adolescents

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In this study, the author synthesizes results of studies about personality types of gifted adolescents. Fourteen studies were coded with 19 independent samples. The total number of identified participants in original studies was 5,723. The most common personality types among gifted adolescents were “intuitive” and “perceiving.” They were higher on the Introversion, Intuition, Thinking, and Perceiving dimensions of the personality scales of the Myers-Briggs Type Indicator (MBTI) when compared to general high school students. Also, gifted adolescents differed within the group by gender and by ability. Based on the findings, the author discusses teaching practices for gifted students according to their personality preferences.

The personality characteristics of highly able youth have been investigated extensively (Chiang, 1991; Cordrey, 1986; Gallagher, 1987; Geiger, 1992; Hawkins, 1997; Jackson, 1989; McCarthy, 1975; McGinn, 1976; Mills, 1984, Mills & Parker, 1998). In these studies, gifted adolescents were found to be different from the general adolescent population, as well as different among themselves in personality types as measured by the Myers-Briggs Type Indicator (MBTI). Personality dimensions have also been shown to be associated with academic achievement and intelligence. For instance, Myers (1980) asserted that the possibility of one’s being intuitive-introverted increases as academic giftedness increases. One might anticipate, then, that a high introverted or intuitive type may be related to high intellectual capacity and high academic achievement in one or more areas.

Psychological Type Theory

In the 1920s, Jung developed the theory of psychological types to elucidate natural differences in human behaviors. He postulated that apparently random behaviors of an individual could be understood in terms of his or her use of the func-

tions of perception and judgment. Jung’s theory differentiates between two typological categories: attitude-related types and function-related types. Jung portrayed the two attitude types in terms of directions or orientations in behaviors and interests of people toward the material world. These orientations bring about two attitude types: extraversion and introversion.

In relation to the extraversion-introversion dimension, the relationship between individual and environment is to be investigated. Extraverted types develop a strong awareness of their environment for stimulation. The typical extravert has a strong propensity to influence others, but is likely to be influenced by others, as well. Extraverts usually seem confident, accessible, and expansive in the manner in which they build relationships with others (Jung, 1971; Lawrence, 1984; Spoto, 1995). Introverts, on the contrary, are somewhat more independent and idea-oriented than the extraverts, as they usually get their excitement from the inner world. They may sometimes seem lost in thought or maybe somewhat inaccessible in the way they move around the world (Lawrence; Spoto).

The second typological category, function-related types, refers to the specific manner or means of adaptation that produces a consciously differentiated psychological function. Jung put forward four possible functions: “sensation, intuition,

thinking, and feeling” (Spoto, 1995, p. 33). Jung used “judging” to describe the polarity of thinking-feeling dimensions, which reflects an individual’s preference between two different types of judgment. Feeling types usually value harmony and human relationships in their judgments. They make decisions subjectively with a consideration of society’s values. On the other hand, Jung (1971) designated “thinking” as an opposite function to “feeling.” In contrast to feeling types, thinking types emphasize logic and objectivity in reasoning. This preference suppresses values and uses impersonal feelings in decision making (Spoto).

Jung (1971) believed that “sensation and intuition” constituted two perceiving types. Sensing types rely mostly on the five senses while they perceive information, which makes them factual and observant. Sensing types usually approach a problem in a carefully deliberate way; hence, they perceive apparent aspects of the issue (Jung; Lawrence, 1984; Spoto, 1995). Spoto stated that, unlike sensing types, intuitive types look at things holistically and critically to get a sense of the whole over the parts; hence, they are usually imaginative, speculative, and analytical, and they can be more creative. They are able to see abstract, theoretical, and global relationships.

Moreover, Myers extended Jung’s theory, adding a perceiving-judging polarity, which she considered to be connected with the extraversion and introversion polarity (Spoto, 1995). Judging and perceiving refer to the process a person uses in dealing with the outer world. A judging type is well organized, systematic, and orderly and has a planned way of life, while a perception type is spontaneous, receptive, and understanding and has a flexible way of life (Myers & McCaulley, 1985a).

Giftedness and Psychological Type

Myers and McCaulley (1985b) proposed that psychological type is related to aptitude and achievement. People who preferred introversion and intuition showed greater academic aptitude than those who preferred extraversion and sensing. Thinking types are thought to be better at some tasks that require logical analysis, while feeling types are better at tasks that require understanding of human relations. Moreover, Myers and McCaulley found that judging types perform better on applications, which are thought to be related to higher grades, while perceiving types outperform judging types on aptitude measures. Therefore, it might be hypothesized that gifted adolescents should prefer introverted-intuitive thinking types, as they are precocious in intellectual development. However, their preference for judging-perceiving can show more variance.

Although gifted adolescents demonstrate all personality types as measured by the MBTI, they tend to prefer certain

types more than general high school students do. For instance, researchers (Delbridge-Parker & Robinson, 1989; Gallagher, 1990; Hoehn & Bireley, 1988) reported that about 50% or more of the gifted population is introverted compared to the general population, whose preference for introversion is 25%. Silverman (1985) found that 34% of 61 graduate students were extraverts, while 66% were introverts. However, some other studies have revealed different results about gifted adolescents’ preferences on the extraversion-introversion dimension. For example, Williams (1992) found that extraverts were more frequent than introverts in the gifted population. Yet, Csikszentmihalyi (1997) has argued that creative people have both traits at the same time, while the general population tends to be one or the other.

Research also reveals that most gifted adolescents are intuitive, as opposed to the general population, most of whom (70%) prefer sensing (Gallagher, 1990; Hawkins, 1997; Hoehn & Bireley, 1988; Mills, 1983; Myers & McCaulley, 1985a, 1985b; Olaszewski-Kubilius & Kulieke, 1989; Williams, 1992). Since intuitive types are better at abstraction, symbols, theory, and possibilities, they outperform sensing types on aptitude tests. For example, when MBTI types of 3,503 high school male students in a college-preparatory curriculum were compared with the students’ IQ scores, all intuitive types had higher scores than sensing types (Myers & McCaulley, 1985b). Also, Delbridge-Parker and Robinson examined the MBTI preferences of 72 gifted junior high students who were finalists in the Duke Talent Identification Program and found that the gifted students showed strong preferences for intuition (75%).

Furthermore, thinking and feeling functions seem to vary in the preferences of gifted adolescents. Bireley (1991) has asserted that gender and age can explain some of this variance. For example, most females tend to prefer feeling in their judgments, while most males prefer thinking. Also, developmental trends in thinking can bring about differences. For example, Bireley stated that the adolescent movement toward the more logical and objective style may reflect the shift from a feeling to a thinking type. Several studies have demonstrated distributions of preferences of gifted adolescents on the thinking-feeling scale. For instance, Hoehn and Bireley (1988) found that 67.5% of their gifted sample preferred feeling, while there were important differences between elementary and secondary students’ personality types. Most elementary students preferred feeling, while most secondary students preferred thinking.

In addition, researchers (Gallagher, 1990; Hawkins, 1997; Hoehn & Bireley, 1988; Mills, 1984; Myers & McCaulley, 1985b; Williams, 1992) have reported that gifted learners generally have a stronger preference for perceiving over judging. However, the Atlas of Type Tables (MacDaid, Kainz, & McCaulley, 1986) indicates that most of the general population

prefers judging. Piirto (1990) found that 95% of 50 creative adolescents were intuitive-perceptive. Delbridge-Parker and Robinson (1989) compared type preferences of 72 gifted junior high students to those of 1,001 National Merit Finalists and found that the percentage of the types in both groups were alike. Myers and McCaulley (1985b) stated that, because perceptive types are more open to new information, they score higher on aptitude measures, whereas judging types can be slightly higher in grades because they are well organized and focused.

Rationale for the Research Synthesis

There have been many studies about personality characteristics of gifted adolescents. A substantial number of these studies used the MBTI as a tool to explore personality types of precocious youth. Although the findings of most studies are similar, some researchers found somewhat different results about personality preferences of gifted adolescents in some scales of the MBTI. In addition to differing results, the type of data reported in original studies varies. Although some of the studies used just percentiles, others used continuous scores and self-selection ratio to report data. The studies also employed different base populations or norm groups available in the manual of the MBTI and in the Atlas of Type Tables. This caused varying results in the difference between the psychological types of the gifted adolescents and the general high school population. Therefore, lack of unity among processes and findings of the studies have caused difficulties in interpreting the results. Another problem arises from studies not reporting enough data by ability level, sex, age, and grade of the participants, even though it is well known that these variables help us to understand better the diversity of the gifted population.

Therefore, an integration of the findings of these studies is essential to understanding the psychological types of gifted adolescents. The purpose of this study was to empirically investigate personality types specific to gifted adolescents as measured by the MBTI. This investigation involved research integration for the purpose of creating generalizations in four dimensions of the eight basic types—Extraversion-Introversion (EI), Sensing-Intuition (SN), Thinking-Feeling (TF), and Judging-Perceiving (JP)—and in 16 personality types, which represent combinations of the basic types: ISTJ, ISFJ, INFJ, INTJ, ISTP, ISFP, INFP, INTP, ESTP, ESFP, ENFP, ENTP, ESTJ, ESFJ, ENFJ, and ENTJ. The following questions guided this study.

1. How do psychological types of gifted adolescents differ from those of the general high school students as measured by the MBTI?
2. How do psychological types of gifted adolescents differ among themselves as measured by the MBTI?

Method

Sample

Original studies constituted the sample in this research synthesis (the studies included in the research synthesis are marked with an asterisk in the references). These studies were reported in published articles, books, technical reports, and unpublished dissertations and reports related to psychological types of gifted adolescents as measured by the MBTI (see Table 1). Fourteen studies with 19 independent samples were coded. The reason for including unpublished research was to avoid missing valuable data. The norm group was composed of high school students in 11th and 12th grades. Data for the norm group were adapted from the Atlas of Type Tables (MacDaid, Kainz, & McCaulley, 1986).

Data Collection

The literature review was done by means of the online version of the Educational Resource Information Center (ERIC) and *Dissertation Abstracts International*. Currently, ERIC contains either abstracts, full texts of studies, or both indexed from 1966 to the present. Keywords used in the search with various combinations were *gifted*, *talented*, *personality*, *personality characteristics*, *personality types*, *psychological types*, *Myers-Briggs Type Indicator*, and *MBTI*. Four hundred and twelve studies either in full-text or in abstract format were found. After an examination of each abstract, 63 studies were selected for further review. The rest of the studies were excluded from further investigation for three possible reasons: They were completely irrelevant to this research, they did not use the MBTI, or they were not original research.

After 63 studies were obtained, including articles, reports, books, and dissertations, they were coded in identification forms for further review, which indicated that only 14 of them had enough data for inclusion. Each study had to report either the number of participants falling into each type, the eight basic personality types of the participants, or both to be included in this research synthesis. The 14 studies yielded 19 independent samples because some of them had more than one sample. Also, multiple studies by an author were carefully reviewed to avoid duplication in the synthesis. When sample characteristics matched in different studies by an author that were published in different journals and at different times, the one that had more data about findings and sample characteristics was included in the synthesis. Only two studies of one author (Mills, 1984; Mills & Parker, 1998) were included because there were 14 years between these two studies and the sample characteristics were significantly different. The 19 samples were then coded in sample characteristics forms and type distributions forms for inclusion.

Table 1
Sources of the Coded Studies

Source	Sample*	Study**	Sample %
Journal	5	3	26
Doctoral dissertation	7	5	37
Book	4	4	21
Unpublished report	3	2	16
Total	19	14	100

Note. * Number of samples taken from each source; ** Number of studies taken from each source.

Coding Forms and Code Book

In order to code studies, the author developed several coding forms and a code book. The code book provided information necessary to code data from primary studies into coding forms. It contains names, labels, and code values of the variables in data sets and explains abbreviations. There were three major coding forms used in this study: identification, sample characteristics, and type distributions.

The identification form helped to identify whether or not a study would be further investigated and included in the research synthesis. The initial 63 studies were coded using these forms. The following pieces of information were coded: an identification number for each study, year of publication, author(s), title of the study, source of data, and a decision of whether or not the study was to be coded further, and reason for not coding if the study was to be excluded (Rosenthal, 1978), and date of coding. Also, sample characteristics were coded as age, grade, sex, and ability level, with specific domains coded as verbal and math through using a sample characteristics forms. This section was completed for each sample reported in each study. The last of the coding forms was type distributions. It helped to code findings of each study according to the personality types that characterize each sample. All data, the percentage of each type in a sample, and the number of subjects preferring each type were coded. The 19 samples extracted from the final 14 studies were coded using these last two forms.

Data Analysis

The MBTI provides three methods to report data and extract meaning from these data: percentile scores, self-selection index or self-selection ratio, and continuous scores. The MBTI percentile scores indicate the proportion of people in a sample who prefer a particular MBTI personality type. The self-selection index (SSI) compares the number or percentage of participants in a type to those in the base population or in a

comparison group. Conceptually, it is the ratio of the observed frequency to the expected frequency. If the index is greater than 1.00, there are more participants in that type than expected from their numbers in the base population. On the other hand, continuous scores are a linear transformation of preference scores such that the midpoint is established at 100 and preference scores for E, S, T, and J are subtracted from 100, while preference scores for I, N, F, and P, are added to 100.

For this study, statistical integration of the data was done through a pooling technique as opposed to the traditional effect-size model (Cooper & Hedges, 1994; Glass, 1976; Gass, McGaw, & Smith, 1981; Rosenthal, 1978) because most studies either did not provide any comparative data or did not report enough data to estimate effect sizes. First, the number of participants of the studies in a particular type was pooled. This procedure was carried out for each type. This resulted in the total number of participants falling into each type. Then, frequencies were distributed across the types according to subjects' gender, age, and ability level. The number of subjects in each type was divided by the total subjects, and the result was multiplied by 100. This provided the percentage of subjects in each type by total group, age, gender, and ability level.

In order to test statistical significances, the *z*-test of statistical significance was employed at the $p < .05$ significance levels. The *z*-value was obtained for each basic type reported for the samples used in the studies and weighted in order to test statistical significance between groups. In addition to comparisons between the gifted population and the general high school population and comparisons within the gifted population by gender and ability, this integration also provided a gifted base population or a gifted norm group by means of the pooling technique.

Instrument

The MBTI is a forced-choice, self-report inventory that discriminates among dimensions of personality types as described by the theory of Carl Jung (Devito, 1989; Myers & McCaulley, 1985a; Spoto, 1995). The purpose of the MBTI is to identify people's basic preferences in relation to their perceptions and judgments. It generates four dichotomous preferences or eight basic personality types: EI (Extraversion-Introversion), SN (Sensing-Intuition), TF (Thinking-Feeling), and JP (Judging-Perception). Combinations of these 8 types yield 16 personality types.

The EI index illustrates whether a person is extravert (E) or introvert (I). The SN index shows one's preference for either sensing (S) or intuition (N). The TF index indicates one's preferences for either thinking (T) or feeling (F). The JP index illustrates one's preference for either judging (J) or perceiving (P).

The MBTI manual (Myers & McCaulley, 1985a) reports the reliability and validity of the data. Internal consistency is obtained by means of the split-half technique and stability via test-retest correlations. Correlations are high when the time interval between tests is short (Devito, 1989). As reported in the MBTI manual, coefficient alpha ranges from .76 to .83. The test-retest reliability coefficient ranges from .87 (7 weeks) to .48 (14 months).

In addition, criterion validity was established in many studies in education, counseling, management, and occupations. For example, as reported in the MBTI manual (Myers & McCaulley, 1985a), correlations between the MBTI extraversion dimension and business interest and drama interest on the Kuder Occupational Interest Survey (Kuder, 1968) are .37 and .30 ($p < .01$) and between the MBTI introversion, intuition, and thinking dimensions and engineering interest are .25, .33, and .34 ($p < .01$), respectively. Construct validity was established by correlating scores of the MBTI with those of similar personality measurements. For example, the correlation between the MBTI extraversion-introversion scale and Jungian Type Survey (Wheelwright, Wheelwright, & Buehler, 1964) extraversion-introversion scale is .79 ($p < .01$), between sensing-intuition scales is .58 ($p < .01$), and between thinking feeling scales is .60 ($p < .01$). More validity and reliability studies are available in the MBTI manual.

There are three MBTI forms in current use: Form G is the standard form for general use; Form F has additional unscored research items; and Form AV is the abbreviated self-scoring version. In this research synthesis, three of the original studies used Form G, four studies used Form F, and seven of the studies did not report which form was used.

Results

Descriptive Data

Table 1 shows the distributions of studies integrated into this research synthesis. While all 19 samples provided information for the estimation of z scores of the eight basic personality types, 16 of them supplied data for the determination of 16 personality types. There were 5,723 participants classified by gender and age as shown in Table 2. However, 34% of participants' ages were not specified by the original studies, nor were 22% of participants' gender. Because grades were specified broadly by the original studies, it was impossible to construct categories or determine the number of participants falling into each grade. However, all the participants were within grades 6–12, with an overwhelming majority in the 8th grade and above. Eleven of the original studies provided mean SAT scores of the samples (3,624 participants). Mean SAT scores of each

Table 2

Frequency of Participants Classified by Age and Gender

Age	Frequency	Percent
12–16	2,738	48
17 and above	1,029	18
Not specified	1,956	34
Total	5,723	100
Gender	Frequency	Percent
Female	2,661	46.5
Male	1,798	31.5
Not specified	1,264	22
Total	5,723	100

sample were pooled, which resulted in a Verbal mean score of 501.71 and a Math mean score of 544.87. The majority of participants were eighth graders from the talent search at Johns Hopkins University.

Psychological Types of Gifted Adolescents

Comparisons between gifted adolescents and general high school students. Gifted adolescents were significantly more introverted than the normative group ($n = 5,723$; $z = 3.85$; $p < .01$). The data analyzed in this investigation revealed that 51.3% of the gifted adolescents were extraverts and 48.7% were introverts (Table 3). Comparatively, 64.85% of the normative group was reported to prefer extraversion and 35.15% was reported to prefer introversion in the Atlas of Type Tables (MacDaid, Kainz, & McCaulley, 1986). Also, the analysis indicated that gifted adolescents were significantly more intuitive than the general high school population ($z = 12.71$; $p < .01$). While 71.60% of the gifted adolescents preferred intuition, the normative group showed a preference of 31.90% in this scale. Further, this integration of research results revealed significant differences between the gifted samples and the normative in the thinking dimension ($z = 1.72$; $p < .05$; one-tailed). While 53.80% of the gifted adolescents preferred thinking, the preference of the normative group was 47.50% in this dimension. Moreover, the gifted adolescents were significantly higher than the general high school population in the perceiving dimension ($z = 4.96$; $p < .01$). They preferred perceiving over judging, contrary to the normative group. The percentage of the gifted adolescents preferring perceiving was 60.10%, while the per-

Table 3

Frequency and Percentage of the Eight Personality Types of the Total Gifted Samples and the Normative Group

Scale	Gifted*		Norm**	
	N	%	N	%
Extraversion	2,988	51.3	6,044	64.8
Introversion	2,836	48.7	3,276	35.2
Sensing	1,643	28.4	6,350	68.1
Intuition	4,165	71.6	2,970	31.9
Thinking	3,128	53.8	4,432	47.5
Feeling	2,688	46.2	4,888	52.5
Judging	2,342	39.9	5,091	54.6
Perceiving	3,485	60.1	4,229	45.4

Note. * Number of samples included in this study is 19.

** The norm group is composed of high school students in 11th–12th grades. Data for the norm group is adapted from the Atlas of Type Tables (Macdaid, Kainz, & McCauley, 1986).

centage of the normative group in this dimension was 45.40%.

Variations in gender. Table 4 shows gender comparisons. The gifted females were significantly higher in extraversion when compared to the gifted males (53.40% vs. 45.83%; $z = 3.05$; $p < .01$). Although the gifted females were higher than the gifted males in the intuition direction of the intuition-sensing scale (76.25% vs. 70.72%), the seeming difference was not statistically significant. Yet, gifted females were significantly higher than gifted males in the feeling dimension (59.96% vs. 30.71%; $z = 8.5$; $p < .01$). There also was a nonsignificant difference between the gifted females and gifted males in the judging-perceiving scale. The gifted males were higher than the gifted females in the perceiving dimension (60.29% vs. 56.69%).

Variations in ability. The high verbal group was statistically significantly higher than the high math group in the intuition dimension of the sensing-intuition scale (math $n = 460$, verbal $n = 66$; $z = 4.98$; $p < .01$). Conversely, the high math group was significantly higher than the high verbal group (65% vs. 45%) on the thinking dimension of the thinking-feeling scale ($z = 5.33$; $p < .01$). Although the high math group was higher than the high verbal group in the introversion dimension of the extraversion-introversion scale ($z = .095$; $p = .47$) and in the judging dimension of the judging-perceiving scale ($z = .080$; $p = .50$), the differences were not statistically significant.

Concerning the 16 personality types, there were differences between the gifted and the general high school students. The most common personality types were INFP, INTP, ENFP, and ENTP among the gifted adolescents (see Table 5), while

Table 4

Percentage of Eight Personality Types Among the Gifted Adolescents by Gender

Scale	Female %	Male %
Extraversion	53.40	45.83
Introversion	46.60	54.17
Sensing	23.75	29.28
Intuition	76.25	70.72
Thinking	41.04	69.29
Feeling	59.96	30.71
Judging	43.31	39.71
Perceiving	56.69	60.29

the norm group showed ESFP, ENFP, ESTJ, and ESFJ as the most common types. INFP, INTP, ENFP, and ENTP types constituted almost 50% of the whole gifted sample compared with 19% of the normative group.

Discussion and Conclusion

The most common type among gifted adolescents is intuition. The high preference of gifted adolescents for intuition compared to general high school students in this study is consistent with what Myers and McCauley (1985b) wrote about the connection between the psychological type theory and academic aptitude. They stated that people showing high scores on introversion (I) and intuition (N) show greater academic aptitude than those who score high on extraversion (E) and sensing (S). While sensing types almost always fall below the mean in IQ, intuition types are mostly above the mean. Indeed, IN types with P or J usually have the top scores in the comparisons of students' SAT, IQ, and Florida Eighth Grade Test in the manual of the MBTI. However, according to McCauley and Myers, this is not necessarily related to intelligence; rather, it is related to the match between the academic characteristics of IN types and the content of aptitude tests. When gifted adolescents are compared to general high school students according to their preference for intuition, they are more likely to enjoy solving new problems and dislike doing the same thing repeatedly. They also are conclusive, impatient, and interested in complicated situations. They might be more interested in novelty according to the type theory.

Although gifted adolescents may not be as introverted as previously believed, almost half of them show a preference for introversion. When this preference is compared to the prefer-

Table 5

Frequency and Percentage of Sixteen Personality Types of the Gifted Samples and the Normative Group

Type	N	Gifted	Norm*	Type	N	Gifted	Norm*
		%	%			%	%
ISTJ	330	6.83	6.92	ESTP	155	3.21	6.52
ISFJ	132	2.73	6.82	ESFP	127	2.63	9.37
INFJ	231	4.78	1.79	ENFP	746	15.45	7.60
INTJ	364	7.53	2.62	ENTP	548	11.35	4.89
ISTP	156	3.23	4.16	ESTJ	188	3.89	14.97
ISFP	104	2.15	5.40	ESFJ	160	3.31	13.97
INFP	503	10.41	3.89	ENFJ	220	4.55	3.61
INTP	582	12.05	3.54	ENTJ	282	5.84	3.93

Note. Number of samples in each type included in this study is 16;

* The norm group ($n = 9,320$) is composed of high school students in 11th-12th grades. Data for the norm group is adapted from the Atlas of Type Tables (Macdavid, Kainz & McCaulley, 1986).

ence of the general high school students, they are overrepresented on this dimension. This finding implies that introverted gifted adolescents prefer quiet learning environments and individual work to group work.

This research synthesis provided evidence that gifted adolescents' preference of thinking is slightly higher than feeling, which contradicts some of the studies included in this research synthesis. This might be, on the one hand, because some studies with a much larger number of participants found gifted adolescents to prefer the thinking type. A reason might be because developmental trends could have some influence on gifted adolescents' judgments toward more logical thinking. In other words, as Bi-reley (1991) suggested, gifted adolescents might become thinking-oriented earlier than the general population. Gifted adolescents' preference for thinking in their judgments is also higher when compared to the preference of the general high school population. The implication of this finding might be that gifted adolescents prefer analysis and putting things into logical order and are more impersonal, fair, and firm-minded when compared to general high school students.

Unlike general high school students, who usually prefer judging to perceiving, most gifted adolescents prefer perceiving to judging in planning their lives. Consequently, this preference can make them more open to alternatives and more curious about new situations. They also can have difficulties in finishing projects because perceiving types are usually unorganized according to the type theory.

Significant trends were found in gender and ability groups in gifted adolescents in the intuition-sensing and thinking-feeling scales. Gifted adolescents are not homogeneous in regard to

their psychological types. They differ within themselves as much as they differ from the general high school population concerning their perceptions and judgments. Gifted females are significantly higher than gifted males in the extroversion and intuition dimensions, but insignificantly higher in the feeling and judging dimensions. The significant differences in extraversion and feeling preferences between gifted females and gifted males could be partially accounted for by the general sex differences in these scales according to the type theory.

Regarding type differences in ability groups, the High Verbal Group is higher than the high math group in intuition; conversely, the high math group is higher than the high verbal group in thinking. This finding indicates that both groups have different preferences in perceiving information and making judgments. Verbally gifted students can be more interested in and adept at comprehending the global aspect of a phenomenon than mathematically gifted students, who can be more interested in and adept at analyzing critical parts of the phenomenon. However, the findings about the personality preferences of these two ability groups should be interpreted with caution because the majority of the participants who were identified as mathematically or verbally gifted based on their SAT scores were eighth graders and the youngest participants. It is a question of whether or not differences in abilities may account for differences in type preferences. Also, whether or not differences in psychological types account for differences in specific abilities is a question to be further investigated. Therefore, future research to study relationships between personality characteristics and intellectual abilities would provide new insights into understanding the unique characteristics of gifted adolescents.

Implications for Teaching-Learning Situations

Different preferred learning experiences exist for each psychological type (Myers & McCaulley, 1985b; Sternberg, 1999). Sternberg asserted that cooperative learning (group work), for example, is more likely to appeal to external people than internal people because externals enjoy working in groups, while internals enjoy working individually. There is a common belief about the preference of gifted students for individual learning. Interestingly, in this study, both types are distributed almost equally in gifted adolescents. Therefore, it is likely that gifted students can benefit from both group projects and individual projects to a maximum extent provided that teachers have the flexibility to teach to different styles of thinking. However, Sternberg has cautioned about the possibility that gifted students might spend their time in group work teaching less able children, rather than learning.

Moreover, Myers and McCaulley (1985b) suggested that intuitive-introverted types prefer self-paced learning and courses that enable them to study on their own initiative. In the same line of thinking, projects encourage students to branch out and create their own work (Sternberg 1999; Sternberg & Grigorenko, 2000). Hence, project-based learning is more likely to be preferred by intuitive-introverted students because they can have opportunities to structure tasks that they like to do. They also can benefit more from less structured and inductive approaches. In addition, an integration of a structured teaching model into a less structured model would provide new, exciting ways in education of intuitive-introverted gifted students. For example, an integration of Renzulli's (1977) unstructured Type III Enrichment model and Parnes' (1988) structured Creative Problem Solving would fit into learning characteristics of gifted students who prefer introversion and intuition, for these models foster analytical, creative, and practical thinking through self-paced learning and group and individual projects.

The preference for objectivity and logical order of thinking types shows in their preferences for small-group discussions, thought-based questioning (Sternberg, 1999; Sternberg & Grigorenko, 2000), and carefully structured courses with clear goals (Myers & McCaulley, 1985b). Because the majority of mathematically gifted adolescents prefer thinking style in their judgments, a well-organized and individually paced program of instruction might encourage them in schools. For example, Taba's Teaching Strategies Program (Schiever, 1991) would be a useful teaching technique for thinking types because it is sequentially structured on analytical and dialectical brainstorming about causes and consequences of events, organization of information based on logical and illogical associations, and generalization of assumptions.

Most gifted adolescents are perceptive types according to this research synthesis. Because perceptive types are more likely

to be unorganized and late on assignments, an atmosphere of flexibility in the classroom may help them in their learning. For instance, Betts' (1985) Autonomous Learner Model and Tieffinger's (1975) Self-Directed Learning would be good ways to motivate perceptive types since these models help to develop intrinsic motivation and autonomous learning skills and habits.

The findings of this study suggest the effectiveness of teachers who use a variety of methods in their teaching, particularly in high schools. If they rely solely on a single method, such as lecture, they may exclude certain students. Therefore, modification of teaching-learning strategies based on personality-learning styles, as well as academic abilities of gifted adolescents, might improve their learning. At least, some instruction should match gifted students' styles of thinking in order for them to benefit maximally from the instruction.

Finally, this study also has some limitations that are characteristic of most compilation analytical studies. First, any limitations of the original studies are also limitations of this study to some degree. In most of the original studies, there was no information about the socioeconomic status of the participants. Also, age and ability were reported broadly or not specified in some studies. Another limitation comes from the fact that, although the MBTI is appropriate for adolescents and adults, some participants' ages were as young as 12 in some studies. However, the authors of the original studies claimed that gifted students reach the adolescent stage cognitively and emotionally earlier than those who show a normal developmental pattern. Because of these limitations, the findings of this study should be interpreted with special caution to the sample and the instrument characteristics.

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