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Two perspectives on gifted students: Time One of a longitudinal study of academically gifted Iowa students, and program evaluation of CY-TAG, a summer residential program for highly gifted seventh and eighth grade students

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Two perspectives on gifted students:
Time One of a longitudinal study of academically gifted Iowa students, and program evaluation of CY-TAG, a summer residential program for highly gifted seventh and eighth grade students

by

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CHAPTER I. INTRODUCTION

Need for the Study

During Summer 1987, Iowa State University sponsored CY-TAG (Challenges for Youth -- Talented and Gifted), a summer institute for highly gifted seventh and eighth graders. Modeled after the Study of Mathematically Precocious Youth (SMPY) which was initiated by Julian Stanley at Johns Hopkins University in 1971 and other Talent Search programs which evolved from the Hopkins design, CY-TAG accepts students who as seventh graders earn at least 500 on the Scholastic Aptitude Test (SAT) mathematics subtest, 430 on the verbal subtest, or a combined score of 930 (scores are age-adjusted for younger and older students). The CY-TAG Selection Committee comprised of the CY-TAG coordinator, three course instructors, the SMPY mathematics coordinator, and two additional CY-TAG Advisory Committee members evaluated the more than 180 persons who applied for admission to the program and selected 72 students to participate in three courses: 16 in biotechnology, 17 in expository writing, and 39 in precalculus mathematics.

Based on information gathered from students, parents, school administrators, and CY-TAG staff, this study assesses program strengths which should be retained in successive years and makes recommendations for program improvement. It will also validate the effectiveness of this specific program and provide information useful to decision-makers including CY-TAG Advisory Committee members and outside funding sources. Program evaluation is integral to the successful continuation of CY-TAG,

as well as to insuring that it meets the needs of the students invited to participate.

For several reasons, it is appropriate that in addition to evaluating the CY-TAG program, a time-series/longitudinal study which focuses on gifted Iowa junior high students be initiated. First, although ISU has served as the site for the annual awards recognition ceremony for Iowa students participating in the Duke Talent Identification Program (the Duke TIP is a spin-off of the original Hopkins program) since 1981, this marks the first program in the state of Iowa that has focused on those students identified through the Duke TIP. Second, because the State of Iowa Code delineates identification of gifted students and program curriculum decisions as matters of local district control, it has not been possible to undertake a longitudinal study of Iowa gifted students who were identified on a common basis. Third, although various gifted program models including commuter summer programs are being studied via longitudinal projects, no residential summer programs have been evaluated through longitudinal study (C. P. Benbow, Department of Psychology, Iowa State University, personal communication, June 3, 1987); phone calls to directors of the Northwest Talent Search, the Rocky Mountain Talent Search, and the Duke Talent Identification Program verified that longitudinal studies have not been initiated concurrent with those programs. Therefore, in conjunction with this study, Time One data for a time-series/longitudinal study of Iowa gifted students will be gathered.

Perhaps George and Denham (1976) best defined the need for evaluation of programs for gifted students as well as the benefits which derive from

that evaluation: "...an attentive and interested student in the right educational environment will have more to contribute to his class and feel more satisfied as an individual. This consideration is especially important when the goal of education is to improve the individual and help him find a satisfying place in society" (p. 126).

Background

While interest in giftedness can be traced to early pioneers such as Galton (c. 1869), Terman (c. 1916), and Hollingworth (c. 1926), and to the reaction to Sputnik in 1957, current commitment to the talented-and-gifted movement was initiated in the mid-1970s (Davis and Rimm, 1985, pp. 3-7). In response to expanding perspectives on giftedness, the U.S. Office of Education (Marland, 1972) issued what has become a commonly cited comprehensive definition of giftedness:

> Gifted and talented children are those identified by professionally qualified persons who by virtue of outstanding activities are capable of high performance. These are children who require differential educational programs and/or services beyond those normally provided by the regular school program in order to realize their contribution to self and society.
>
> Children capable of high performance include those who demonstrated achievement and/or potential ability in any of the following areas, singly or in combination:
>
> 1. general intellectual ability
> 2. specific academic aptitude

3. creativity and productive thinking
4. leadership ability
5. visual and performing arts

...It can be assumed that use of these criteria for identification of the gifted and talented will encompass a minimum of 3 to 5 percent of the school population. (p. 2)

A great deal of literature focuses on the K-12 talented-and-gifted population in terms of identification, special needs, program models and alternatives, subgroups with even more specific needs such as the culturally disadvantaged gifted and the learning disabled/gifted populations, psychology of gifted education, counseling needs of gifted students, and benefits of gifted program participation (Colangelo & Zaffrann, 1979; Khatena, 1982; Maker, 1982; Renzulli, 1977, 1978; Stanley, George, & Solano, 1977; Torrance, 1965). The literature also documents that in addition to growth in numbers of in-school programs for gifted children, there has also been growth in numbers of extra-school programs for the gifted such as Saturday, weekend, and summer programs at local colleges and universities (Solowey, 1985). These programs are valuable because they allow interaction among gifted peers, they free students from limits on learning often found in the traditional classroom, and they provide students with access to university personnel and facilities. Passow (1979, p. 455) underscored the need for such programs and suggested that educators seek under-utilized resources, innovative models, and nontraditional settings.

The SMPY model is exemplary within the genre of extra-school programs. Its original goal, as defined by Keating (1976), was to select from an already extremely capable group those students most highly skilled in mathematical reasoning. Precocity in SMPY terms means "arriving at some stage of development earlier than expected, such that the individual's current state of development is more like that of someone much older. ...'quantitative precocity' means having attained a state of cognitive development in the quantitative area more like the developmental stage of someone several years older than the norm for age-mates" (p. 24).

Evaluative and follow-up studies of the SMPY model document its success. Stanley (1976b) described the success of the program and also noted its accelerative approach which sets it apart from other models of gifted education: "Results...show that considerable educational acceleration is not only feasible but also desirable for those young people who are eager to move ahead. Skipping school grades, taking college courses part-time, studying in social courses, and entering college early are inexpensive and supplemental to regular school practices. We do not advocate the usual in-grade, nonaccelerative 'enrichment' procedures often recommended for intellectually gifted children" (p. 3).

Developed according to the SMPY model, CY-TAG offers resources and experiences consistent with recommendations and practices cited above. Through a hands-on approach, the biotechnology course exposed students to the contemporary life sciences through a variety of learning activities including lectures, problem solving, small group activities and

discussions, demonstrations, field trips, and over sixty hours of laboratory time. As a culminating activity, students designed experiments based on individual interests and presented project summaries and results at a public poster fair.

An interdisciplinary perspective characterized the CY-TAG expository writing course. Students compared the composing and revising processes encountered by the writer to similar activities experienced by the musical composer, the artist, and the film maker. Literature served as the primary impetus for writing. Other learning activities included discussions, daily journal writing, oral and written projects on various topics, field trips, and the compilation of an anthology of student writing.

Instruction in the CY-TAG precalculus mathematics component adhered to Stanley's "DT-PI" model (Benbow, 1986; Benbow & Stanley, 1983; Stanley, 1978, 1986) in which "Diagnostic Testing" reveals those precalculus concepts which students have not yet mastered. This is followed by "Prescriptive Instruction" which focuses student and instructor efforts on the acquisition of those concepts. The "DT-PI" method accommodates individual learning differences in speed, style, and mastery of specific mathematical skills and knowledge. Throughout the program, pupil progress is monitored and documented through the use of standardized tests.

Stanley and Benbow (1986) reasoned that placement based on intelligence scores would not result in homogeneous groups in terms of special abilities; they contended that "It is illogical and inefficient to group students for instruction in mathematics mainly on the basis of

overall mental age or IQ." Instead, they advocated program identification and selection based on SAT scores for several reasons: the SAT is sufficiently difficult so that the average twelve-year-old will score halfway between chance and a perfect score; the test has a sufficiently high ceiling so that virtually no perfect scores will be earned; also, the SAT is a highly regarded professionally prepared measure which has been standardized and which is available in several secure forms.

SMPY personnel observed that although their subjects were "demonstrably unfamiliar with mathematics from algebra onward" (Benbow, 1986), many of them earned high scores on measures of mathematical reasoning ability. They concluded that "the SAT-M must function far more at an analytical reasoning level for the SMPY examinees than it does for high school juniors and seniors, most of whom have already studied rather abstract mathematics for several years. Moreover, because the test was so difficult and many students viewed the talent searches as a competition, our mode of identification also selected for high motivation" (p. 4).

The SMPY system identifies and enhances talent which is already evident rather than some assumed but hidden talent which has not become apparent (Benbow, 1986; Stanley & Benbow, 1986). Based on the rationale that students who reason exceptionally well and are highly mathematically talented can move through the standard math curriculum faster and better than typical performance indicates, SMPY exemplifies acceleration. The model also recognizes the importance of self-motivation and interaction with ability-peers in a fast-paced math classroom (Stanley, 1977).

Wallach (1978) summarized SMPY's strength as a gifted model and its success with students in this way:

> What is particularly striking here is how little that is distinctly psychological seems involved in SMPY, and yet how very fruitful SMPY appears to be. It is as if trying to be psychological throws us off the course and into a mire of abstract dispositions that help little in facilitating students' demonstrable talents. What seems most successful for helping students is what stays closest to the competencies one directly cares about: in the case of SMPY, for example, finding students who are very good at math and arranging the environment to help them learn it as well as possible. One would expect analogous prescriptions to be of benefit for fostering talent at writing, music, art, and any other competencies that can be specified in product or performance terms. (p. 617)

While strong positive developments in programming for the gifted have occurred, evaluation of those innovative programs has tended, in general, to lag behind. While accountability and assessment have become watchwords for all educators, evaluation of gifted programs is a relatively new development. This situation is attributable to several factors. First, the growth phase of gifted programs began only recently with the 1972 Marland Report. Second, as Renzulli (1975) described earlier prevailing attitudes, "The person who was bold enough to raise serious questions about the value or quality of a particular program was frequently looked upon as some sort of malcontent, especially if the program in question was cloaked in the mantle of innovation, launched with great fanfare, and

happened to be the 'brain child' of an influential group or well-known 'expert' in the education establishment. ...Programs for the gifted have been especially vulnerable to substituting the 'trying equals success' attitude for rigorous attempts to evaluate program effectiveness" (pp. 1-2). Third, evaluations of gifted programs are problematic because of difficulty in assessing the higher level cognitive objectives which characterize those programs, because individualized objectives often typify those programs, and because of measurement and statistical issues raised in using normed measures with a highly able homogenous group (Renzulli, 1975).

In a summary of gifted program evaluation efforts, Siewert (1980) noted that early work focused largely on program organization and curriculum development, and that "a paucity of published work in evaluation of educational programs for the gifted and talented existed before 1975" when Renzulli published his manual, A Guidebook for Evaluating Programs for the Gifted and Talented. Callahan (1986) also noted Renzulli's pioneering contribution and emphasis on "process, product, and presage information."

Leaders and researchers in gifted education have called attention to the lack of sound research design, rigor, and sufficient controls which have tended to characterize evaluations of gifted programs (Archambault, 1983; Buescher, 1986; Delisle, 1984; Kulieke, 1986). In general, they recommended that valid research designs be based on models such as those offered by Campbell and Stanley (quasi-experimental designs), Stake (Countenance Model), Stufflebeam (CIPP - Context, Input, Process,

Product), and Renzulli and Ward (Diagnostic and Evaluative Scales for Differential Education for the Gifted).

In discussing assessment of gifted programs, Passow (1979) recommended that "Evaluation procedures should take into account the higher cognitive concepts and processes, the creative and productive behavior, and the affective growth that are especially appropriate and often unique for gifted and talented persons. Reliance on standardized tests alone is a much too limited approach to evaluation for such students. Much more attention needs to be paid to their products and their performance in evaluating their development" (p. 452).

Popham (1975) advised that effective program evaluation is based on an eclectic approach. Likewise, numerous educators and researchers in gifted education (Buescher, 1986; Carter, 1986; Callahan and Caldwell, 1983; Kulieke, 1986; Renzulli, 1975) have advocated efficient evaluation based on adaptations, modifications, or combinations of existing assessment models. Therefore, the evaluation design utilized in this study is based on recommendations and guidelines issued by recognized leaders in both gifted education and educational assessment.

This project is also based on research issues and design consistent with extensive SMPY program evaluation. It is important to note that, although a lack of evaluation measures and designs has characterized gifted education in general, the SMPY staff has conducted a great deal of research and follow-up evaluation focused on program participants (Benbow & Stanley, 1983; Keating, 1976).

Statement of the Problem

A two-fold problem characterizes this research project. Regarding the program evaluation component of the study, the problem addressed is that of determining the extent to which CY-TAG meets its stated purpose of providing an educationally stimulating experience for highly gifted, academically precocious seventh and eighth graders. In terms of the time-series/longitudinal component of this study, the problem addressed is that of the collection and analysis of descriptive data which profiles highly gifted Iowa seventh and eighth graders.

Statement of the Purpose

The purpose of this study is also two-fold. First, it will provide information of value to various groups involved with or influenced by CY-TAG. These constituencies include the CY-TAG Advisory Committee which is responsible for program decisions; the Educational Foundation of America, the ISU Achievement Foundation, and other outside agencies which may be approached for continuation funding; faculty and staff who are responsible for curricular and extra-curricular program activities and are responsible for interpreting and enforcing program policies; K-12 school administrators whose cooperation is vital to the success of CY-TAG; participants' parents who are vitally interested in educational opportunities for the gifted; and most importantly, the participants themselves who deserve the best programming possible, given their unique learning needs. Second, it will provide baseline information which defines highly talented-and-gifted Iowa junior high students. This Time

One data will later serve as the basis for comparative studies and trend analysis as additional data are collected (a) from a new wave of students each year, and (b) through follow-up surveys at the time of subjects' high school and college graduations.

Statement of Assumptions

1. In spite of a number of models advocated for identification of gifted students, for purposes of the CY-TAG program and this research project it is assumed that SAT-V and SAT-M tests are accurate indicators of precocious academic giftedness.

2. It is assumed that the CY-TAG program offers participants opportunities for learning at an appropriate accelerated pace.

3. It is assumed that questionnaire items are valid and reliable, and (a) that satisfaction, self-esteem, and change items on evaluation questionnaires accurately measure program experiences as well as perceptions and attitudes which evolved from those experiences, and (b) that items on the longitudinal questionnaire adequately assess respondents' socio-economic status, involvement in gifted programs and extra-curricular activities, educational and career plans, interest and ability in content areas as well as persons who have provided encouragement in those areas, and self-perceptions and attitudes related to giftedness.

4. It is assumed that subjects were honest and accurate in their responses.

5. It is assumed (a) that school principals would have been the primary contact person for CY-TAG participants and their parents in seeking credit or advanced placement as a result of CY-TAG coursework, and (b) that school principals would have major responsibility and decision-making power in granting credit for CY-TAG coursework or in permitting advanced placement as a result of CY-TAG coursework; therefore, school principals of participants were asked to complete the school administrator evaluation form.

Delimitations

1. Student subjects are limited to those with observable academic giftedness as demonstrated by (a) SAT-Math scores of 500 or higher for the math course, (b) SAT-Verbal scores of 430 or higher for the composition course, and (c) combined SAT-M and SAT-V scores of 930 or higher for the biotechnology course. (It should be noted that (a) because these criteria are for seventh graders, eighth grade scores are age-adjusted; and (b) selected students scored far above the minimum requirements.) Identification did not include multi-dimensional assessment of giftedness. Although over 180 students submitted applications for CY-TAG, it was the decision of the CY-TAG Advisory Committee that participation during this first session would be limited to 72 students. Final invitation and waiting lists were determined by the CY-TAG Selection Committee.

2. Program evaluation data collection will be limited to students, parents, administrators, and faculty/staff who voluntarily complete survey items.

3. Because of CY-TAG specificity in terms of experiences, course content, and resources offered to a select group of students, generalizability to other gifted programs is limited.

4. Results based on student responses to survey items may be affected by gifted students' propensity for becoming gifted test-takers who perceive "right" or "approved" responses.

5. Pre- and post-test comparisons may be limited by statistical regression toward the mean, particularly among a highly homogeneous group.

6. Although the courses are fast-paced in terms of content, pre- and post-testing may not reveal significant academic gains over the three-week period of CY-TAG, particularly in the biotechnology and composition courses.

Data Source

Several data sources were employed in this study. Those utilized for the program evaluation component of the project include participants' SAT scores, pre- and post-tests, and questionnaires designed for students, parents, school administrators, and CY-TAG faculty/staff. In addition, the Myers-Briggs Type Indicator (Briggs & Myers, 1983) and the Renzulli-Smith Learning Styles Inventory (Renzulli & Smith, 1978) were administered to all CY-TAG students. Data for the time-series/ longitudinal component were obtained through a mail questionnaire also developed by the researcher.

Objectives of the Study

Objectives of this study include the following:

1. To gather demographic data from CY-TAG participants through the Time One survey of the longitudinal study of Iowa gifted students.
2. To gather information regarding cognitive and affective aspects of the CY-TAG program from (a) participants, (b) their parents, (c) their school principals, and (d) CY-TAG faculty and staff.
3. To analyze that data in terms of how effectively CY-TAG met its primary goal of meeting participants' cognitive needs and its secondary goal of meeting their affective needs.
4. To use these results to make recommendations for future CY-TAG sessions.
5. To gather and present benchmark data which profiles Iowa Duke TIP finalists.

Organization of the Remainder of the Study

The review of the literature comprises Chapter II. It includes a broad overview of general program evaluation models. It also contains a description of two models designed specifically for the evaluation of programs for gifted and talented students, as well as a discussion of issues and concerns pertinent to the assessment of those programs.

Chapter III explicates the methodology and design of the study. It contains discussions and figures which describe and depict data collection procedures, instrumentation, populations, data analysis techniques, and research questions addressed in the study. In addition, Chapter III

presents the schematic model which was derived from the theoretical and empirical literature.

Results of the data analysis are contained in Chapter IV. Findings based on testing of the evaluation questions are presented and discussed.

A summary of the study is presented in Chapter V. It also contains conclusions, implications and suggestions for educators and decision-makers involved with CY-TAG and other special programs for gifted students; it also offers recommendations for further study.

Each chapter is structured to present information pertinent to each of the two components of this research project: Time One of the time-series/longitudinal study, and program evaluation of the CY-TAG session.

CHAPTER II. REVIEW OF THE LITERATURE

Introduction

The purposes of this study are to (a) gather and summarize benchmark data from Time One of a time-series/longitudinal study designed to describe characteristics and experiences of Iowa talented-and-gifted junior high students, and (b) to gather and analyze data and to make recommendations pertinent to evaluation of the first session of CY-TAG. Therefore, lacing literature on both program evaluation in general and gifted education in particular is vital to building a rationale as well as a design for the two components of this research project.

This chapter summarizes literature related to the topics of program evaluation in general and evaluation of programs for the gifted in particular. Specifically, the first section of this chapter chronicles the development of the evaluation movement and summarizes several general models which are applicable to diverse evaluation situations. It also notes current trends and purposes of program evaluation.

The second part of the chapter focuses on evaluation of gifted programs by detailing two models designed specifically for that purpose. It also synthesizes pertinent information on several factors which impact evaluation of programs for the gifted. Furthermore, this chapter provides the underpinnings for the particular evaluation design utilized in this study.

An Overview of General Program Evaluation Models

Diverse program evaluation models reflect the scope of approaches and methods which educators and researchers bring to that situation. Although some similarities across models are apparent, components of each evaluation design are intrinsic to that scheme; they are not interchangeable. Differing concepts of the purpose of assessment as well as varying assumptions of its functions serve as foundations for multiple plans and practices. These fundamental differences are depicted historically through changing definitions of evaluation and the concomitant development of new models.

The evolution of evaluation as an entity within the field of educational research may be traced to the early 1900s which marked the development of Binet's intelligence test as well as the implementation of group ability testing during World War I (Borg & Gall, 1983, p. 747). At this time, the narrow concept of evaluation was limited to the assessment of individual differences in intelligence and academic achievement.

Evaluation came to be defined in educational measurement terms with the ascendancy of that movement during the 1920s and 1930s. This perspective was typified in Ebel's (1965) description of evaluation as "a judgment of merit, sometimes based solely on measurements such as those provided by test scores but more frequently involving the synthesis of various measurements, critical incidents, subjective impressions, and other kinds of evidence" (p. 450).

The term "evaluation" itself came into popular use in the 1930s as it became associated not only with educational measurement but also with

the more specific concerns of value and purpose. With the establishment of educational accreditation standards, the concept of evaluation as "professional judgment" evolved.

Ralph Tyler's emphasis on behavioral objectives (Borg & Gall, 1983; Pace & Friedlander, 1978; Tyler, 1949) is evident in these procedural steps embodied in his program evaluation model: identify and define the general program objectives in behavioral terms; determine those situations in which behavior can be observed; develop and administer instruments designed to assess behavior in terms of program objectives; analyze the data and discuss outcomes as they relate to changes in behavior. Serving as the foundation for this prototype are the assumptions that (a) the purpose of education is to alter students' behavior, and (b) educational situations can be manipulated so that students manifest desired behaviors. Tyler's model is often referenced in conjunction with evaluation of curriculum and instruction, and with success of a program measured according to discrepancies between what was proposed and what occurred in practice (Pace & Friedlander, 1978).

Borg and Gall (1983) noted that "The Tyler model marked a shift from evaluating individual students to evaluating the curriculum. Also, the Tyler model implied that students might perform poorly not because of lack of innate ability, but because of weaknesses in the curriculum" (p. 748). Tyler's emphasis on assessment of objectives and his subsequent influence are evident in evaluation paradigms such as those developed by Stake (1967), Provus (1971), and Popham (1975).

Robert Stake's countenance model (Barnette, 1983; Borg & Gall, 1983; Pace & Friedlander, 1978; Renzulli, 1975; Stake, 1967) overlaps both Tyler's design and other later models. According to Stake, the two basic functions of formal educational evaluation are description and judgment. His model is based on the synthesis of three types of data: antecedents, which are similar to inputs, are found in situations which existed prior to the learning experience/s which may affect program outcomes; transactions are operations or interactions such as the "presentation of a film, a class discussion, the working of a homework problem, an explanation on the margin of a term paper, and the administration of a test" (Stake, 1967); outcomes "include measurements of the impact of instruction on teachers, administrators, counselors, and others....Outcomes to be considered in evaluation include not only those that are evident, or even existent, as learning sessions end, but include applications, transfer, and relearning effects which may not be available for measurement until long after" (Stake, 1967). Similar to Tyler's model, empirical analysis in Stake's design necessitates assessing congruence between what was intended and what was attained.

In conceptualizing the judgment function of evaluation, Stake distinguished between absolute and relative standards. Absolute standards of excellence refer to the degree to which program objectives themselves were met (similar to the Tyler model), while relative standards of excellence refer to the degree to which program objectives were met in comparison to other treatments. The countenance model then is utilitarian

in that it can be applied to evaluation which either includes or excludes a comparison group.

Stake's countenance model fits under the rubric of naturalistic evaluation. This particular method focuses on description and understanding through assessments of human-human or human-materials interactions (Barnette, 1983). Naturalistic evaluation views programs holistically and operates from a variable, emergent design. Inherent in naturalistic evaluation is the recognition of values as important variables to be included in the overall design. Stake's model has also been classified as "responsive" (Barnette, 1983), and as Stake (1974) himself noted, this model "orients more directly to program activities than to program intents" and "responds to audience requirements for information" (p. 14).

Daniel Stufflebeam's "Context-Input-Process-Product" or CIPP design (Barnette, 1983; Borg & Gall, 1983; Davis & Rimm, 1985; Pace & Friedlander, 1978; Renzulli, 1975; Stufflebeam et al., 1971) derived its name from the four types of educational evaluation encompassed by the model. Context evaluation occurs at the outset of a program and focuses on the identification of both needs and the means of responding to them; it defines program objectives in terms of the discrepancy between actual and desired conditions. Input evaluation is descriptive in nature and assesses resources, strategies, and implementation plans which will effectively address program objectives. Process evaluation is conducted after program implementation and involves continual data collection which is used to identify needed program modifications and improvements.

Product evaluation relates outcomes to program objectives, context, input, and process; it measures overall program effectiveness.

Educators have noted several advantages and strengths of this particular evaluation design. Stufflebeam's model marked the movement away from "arm's length" evaluation of completed programs and toward evaluation that contributes to decision-making processes and improvement of developing programs (Borg & Gall, 1983, p. 748). Inherent in this design are the assumptions that decision-makers determine the purpose and stage of evaluation, that the evaluator role is that of assisting decision-makers, and that data collected must be relevant to the needs of decision-makers (Pace & Friedlander, 1978). In addition, the model affords formative program evaluation at any particular stage of program development through continual data collection and feedback (Renzulli, 1975).

Malcom Provus's discrepancy method (Davis & Rimm, 1985; Provus, 1969; Renzulli, 1975) laces a sequence of formulated program standards, program assessment, and program improvement. Similar to other models, this system is also designed to assist the evaluator in comparing proposed intentions with actual attainments. Structurally, Provus's feedback loops allow for data collection during the various stages of program development including design formulation, design installation, actual application of the process or activities, product or outcome assessment, and product comparison. Each evaluation stage is based on comparing a predetermined standard with actual program performance, and then using discrepancy data to generate

program changes. In this way, the model builds in both formative and summative evaluation.

The evaluation design developed by Astin and Panos (Astin & Panos, 1971; Pace & Friedlander, 1978) contains three components: inputs, which include students' abilities, interests, and background factors; operations, which consist of the program experiences designed to facilitate student growth toward specified goals; and outputs, characterized by the extent to which outcomes can be credited to the intervention itself. Objective pre-program data about students is integral to their model, for as Astin and Panos (1971) noted, "Knowing how well students performed...does not by itself provide a sufficient base for evaluation. If that is all one knows, one is left with the assumption, but not the proof, that the results are due to exposure to the program" (p. 10). Ideal implementation of this model entails a research design based on the manipulation and control of variables which may be used to describe results and their causes.

Michael Scriven has contributed two significant concepts to the field of program evaluation (Borg & Gall, 1983; Mulford, Warren, Klonglan, Lawson, & Morrow, 1977; Pace & Friedlander, 1978; Renzulli, 1975; Scriven, 1967, 1973). First, he delineated the two purposes of evaluation as formative and summative in nature. Formative evaluation is "simply outcome evaluation at an intermediate stage in the development of [the program, activities, curriculum, materials, etc. being evaluated]" and role of the formative evaluator "is to discover deficiencies and successes in the intermediate versions" (Scriven, 1967, p. 51). Data are collected

for the purpose of ascertaining program strengths and weaknesses so that appropriate adjustments can be made as the program develops. Summative evaluation, however, is conducted upon completion of a program. Data are collected for the purpose of assessing the overall effectiveness and worth of a program. Renzulli (1975) observed that summative evaluation resembles the classical approach to experimental research design in that one independent variable -- the program -- is held constant so the researcher can observe changes or effects it initiates.

Scriven's second contribution is the concept of goal-free evaluation. This perspective acknowledges that an evaluator may be compromised by awareness of program goals prior to conducting the evaluation and may unwittingly ignore other program outcomes and effects. Therefore, in goal-free evaluation, the researcher remains unaware of program goals as analysis is carried out to determine the actual effects and results of program practices. Pace and Friedlander (1978) observed that "The central question is not 'What are the objectives?' The central question is 'What are the consequences?'...looking at the extent to which objectives are achieved will not answer the larger question about consequences." Scriven (1972) himself stated that goal-free evaluation does not mean "that evaluation is devoid of values but that it should not be limited or restricted to a specific set of stated goals."

The Guba and Lincoln model (Barnette, 1983; Borg & Gall, 1983; Guba & Lincoln, 1981) typifies responsive evaluation which emanates from the concerns and issues of those who have a vested interest in the evaluation being conducted. The logical, sequential steps of their plan all focus on

the stakeholders. The evaluation begins with identifying those stakeholders, the purpose of the evaluation, and political factors which may influence the process. Next, the concerns and values of the stakeholders are defined. Following data collection, summaries and recommendations in the final report are written specifically to evaluation issues previously identified as important by the stakeholders. Rather than advocating a specific research design, Guba and Lincoln suggest relying on a variable design which emerges during the course of the evaluation. Strengths of their model are that it deals with multiple realities and that it is a selective rather than an intervention approach to program evaluation (Barnette, 1983).

Current trends in program evaluation (Anderson et al., 1975; Borg & Gall, 1983; Cronbach, 1981; Renzulli, 1975; Stufflebeam & Webster, 1980) are attributable to its increasingly important role in policy-making, in decision-making, and in program management. Current trends are evidenced by increasingly greater amounts of federal, state, and local funds earmarked for evaluation. Several powerful events impacted the evaluation movement. The Elementary and Secondary Education Act of 1965 stipulated that districts which received federal monies for the education of disadvantaged students would conduct annual evaluations to determine the extent to which those funded projects had attained their stated goals. An outpouring of state and national educational assessments called for excellence and accountability. Increased attention on successes and failures of the educational system as well as increased responsibility and resources assigned to educators by society dictate the worth of continuing

evaluation in terms of clarifying issues and generating formative activities and interventions.

An overview of definitions, models, and trends in educational program evaluation illustrates evolving, expanding perspectives. While early models focused on program objectives and the extent to which they were realized, recent designs concentrate on programmatic issues, values, and decisions and serve to enhance the welfare of various publics by stimulating improved programs and services.

Evaluations of Programs for the Gifted

Program evaluation models formulated by Maurice Eash (Davis & Rimm, 1985; Eash, 1971; Renzulli, 1975) and Joseph S. Renzulli and Virgil S. Ward (Renzulli, 1975; Renzulli & Ward, 1969) address the unique structural and evaluation characteristics of programs for talented and gifted students. While Eash developed his model within the larger context of special education, it is readily adapted to gifted education. In recognition of the special problems which occur in evaluating gifted programs and the critical need for a responsive model, Renzulli and Ward created an evaluation design specific to that situation.

Eash built his evaluation framework to support the study of new and innovative programs. He posited that because gifted programs are typically characterized as flexible and innovative, the opportunity and freedom to evolve and clarify objectives in response to program experiences also must be inherent. Eash conceptualized program development and program evaluation on a parallel continuum with three

stages. The initiatory stage reflects that period when attention is focused on the formulation of goals and operations and when, therefore, assessment of effects is rarely possible. When planned activities are actually implemented, a program has moved into stage two. The full maturity or integration stage is typified by its crystallized goals, its predictable outcomes, and its potential to generate formative evaluation data. Although increased program maturity implies increased focus on outcomes, several factors are analyzed within each stage: effort (time utilization), effect (products, outcomes), and efficiency (the correlation between inputs of time and resources to results). Eash (1971) attributed the value of his model to "its allowance for modifications in program objectives over time. It makes sense -- both in theory and practice -- to differentiate evaluation procedures for the different stages in program development" (p. 24).

Joseph Renzulli, highly regarded as an educational researcher, program evaluator, and expert in gifted education, explicated his position on the application of program evaluation to gifted education: "I am not a strong advocate of the traditional pre-test/post-test approach to evaluation so far as programs for the gifted are concerned, nor do I believe that the rigid behavioral-objectives approach is especially appropriate for evaluating programs that focus on higher level objectives. In my opinion, these approaches have placed too much emphasis on evaluating students rather than the programs that should be serving students" (1975, p. vi). Renzulli proposed evaluation which assesses program impact on students in terms of their learning and motivation.

His philosphy is embodied in the Renzulli and Ward model (Davis & Rimm, 1985; Reis, 1983; Renzulli, 1975; Renzulli & Ward, 1969) titled "Diagnostic and Evaluative Scales for Differential Education for the Gifted" or DESDEG. The unifying force of the model is derived from recognition of "Key Features" (Renzulli, 1968) which are considered by various experts within gifted education to be critical requirements in sound program development and implementation: (1) existence and adequacy of a written program philosophy and objectives; (2) student identification and placement; (3) teacher selection and training; (4) curriculum (comprehensiveness, articulation, facilities); and (5) program organization and operation. These "Key Features" provide structure for observations, data-gathering instruments, and data analysis and interpretation.

Renzulli (1975) explained that "The specificity of each of these requirements and their deliberately ordered parallelism and comprehensiveness makes the diagnostic potential of the instrument especially valuable in suggesting changes and making recommendations relating to particular program practices. The program requirements may be thought of as statements of certain principles about education for the gifted that are found in the literature, and which depict ideally conceived educational practices for exceptionally able students. They do not pertain exclusively to any given pattern of program organization, but rather attempt to embrace excellent practices whatever the nature of the administrative structure of the program; practices that <u>can</u> and <u>should</u> be

inaugurated in view of the behavioral potential of superior students" (p. 28).

In general, the purposes of program evaluation in gifted education should be to improve the program (Callahan & Caldwell, 1983) and to recognize those components which are operating successfully (Renzulli, 1975). Yet various practitioners have noted the difficulty and the challenge involved in accomplishing those tasks. Based on his experiences in evaluation and gifted education, Renzulli (1975) stated that "I think that evaluation of gifted programs is the single most creative endeavor in the evaluation technology today. In a number of ways, it stands as a last great frontier for evaluation methodology and research" (p. 7).

Asking the right questions in terms of appropriateness and specificity seems to be the central issue in evaluating gifted programs (Buescher, 1983; Callahan, 1986; Carter, 1986). This concern has been expressed in a variety of ways. Callahan (1986) elaborated on the point: "If the evaluation of gifted and talented programs is to yield valid assessment data and is to have a significant impact on the improvement of gifted programs, then more serious attention must be directed toward framing evaluation questions that address the relevant, useful, and important issues facing programs....[These three concepts are] at the core of the problems facing the development of significant evaluation questions. Relevancy refers to the degree to which the questions actually address the functioning of the program under consideration, its components, its activities, its goals, and its structure. Evaluation questions are not research questions. Our purpose is not to address

generalizability, but to address specificity -- to the program under consideration....Useful questions provide data that some audience can actually use in the process of making decisions about a program" (p. 38).

A similar approach was advocated by VanTassel-Baska (1984) who observed that administrators and decision-makers responsible for gifted programs essentially seek evaluation answers to two major questions: (1) How effective are program practices and processes as they relate to continuation of the program? and (2) In what ways was the program beneficial to students? She further recommended that these general questions be translated into these more specific evaluation questions: Is there an appropriate match between the program, the students identified, and the number of students enrolled? What curricular revisions are indicated? To what extent do program activities meet student needs and interests? How effectively do faculty and staff meet program objectives? How could staff development be improved? In terms of summative evaluation, should the present program be sustained, modified, or replaced?

Similar to other special education programs, gifted education is characterized by a number of unique situations and conditions which effect the design and execution of any evaluation plan. The literature contains consistent references to four major problems encountered by those evaluating gifted programs: the need for off-level testing and instruments with a sufficiently high ceiling, accurate measurement of individualized higher level thinking objectives, meeting and assessing

affective needs, and limitations on research design. Each of those concerns is addressed separately below.

A critical criterion in selecting tests for use with gifted students is that of appropriate levels of difficulty. As long ago as 1942, Hollingworth advocated the bold use of tests written for considerably older subjects. More recently, numerous researchers (Archambault, 1983; Aylesworth, 1983; Davis & Rimm, 1985; Dettmer, 1985; Keating, 1976; Stanley, 1976b; VanTassel, 1984) have cautioned that tests used to assess abilities among the gifted population must be characterized by an appropriately high ceiling. In-grade tests often have too low a ceiling to be useful in defining ability; for a student who earns a perfect or near perfect score and whose true ability lies somewhere above that point, grade-level tests are both theoretically and practically incapable of indicating actual ability.

Researchers and educators (Aylesworth, 1983; Buescher, 1986; Callahan, 1986; Davis & Rimm, 1985; Dettmer, 1985; Renzulli, 1975; VanTassel, 1984) have called attention to related statistical problems which occur if age, grade, or percentile norms are used. These problems are compounded because, first, gifted students typically score at the upper end of the normal distribution where it is obviously more difficult to make significant gains. Second, because gifted persons tend to earn such high initial scores, statistical regression toward the mean is likely to occur upon subsequent retesting. Third, the limited time which students may spend in gifted programs also limits accurate measurement of change or benefit. Fourth, although it is inadvisable to compare gifted

students with other normed groups, exceedingly few measures have been normed on gifted populations. Fifth, since reliability is a function of group diversity, greater heterogeneity yields greater reliability; however, as a group, gifted students are highly homogeneous. Sixth, the Hawthorne effect may exert significant influence on the motivation and performance of program participants identified as "gifted."

Evaluation models described in the first part of this chapter emphasize the analysis of observable, measurable behaviors. However, gifted programs and their emphasis on higher level thinking, problem solving, decision making, creative thinking, autonomous learning, development of affective skills, etc., generate objectives which are difficult to measure. Difficulty in measuring those "higher level" objectives may in turn force an inappropriate shift in focus to more easily quantified behaviors (Dettmer, 1985; Hansen & Hall, 1985; Renzulli, 1975; VanTassel, 1984). Stake (1973) warned that testing errors increase greatly when items move from measurement of highly specific performance areas to items which attempt to assess high-level mental processes; he denigrated the behavioral objectives approach in calling it an "ill-fated attempt to substitute technical procedures for personal attention" in teaching (p. 194).

This problem is also compounded in that few valid, reliable, psychometrically sound instruments are available which assess higher level thinking objectives. In addition, those that are obtainable are often expensive and difficult to score (Archambault, 1983; Dettmer, 1985; Renzulli, 1975; VanTassel, 1984). Furthermore, since individualized

objectives for each participant tend to characterize gifted programs, and since reliability is a function of group size, it is extremely difficult to show statistically significant pre/post-test change when only a small number of students are involved in a particular testing situation (Callahan, 1983, 1986; Dettmer, 1985; Renzulli, 1975).

The literature is replete with discussions of the affective needs of gifted persons (Betts & Neibart, 1985; Clance & Imes, 1978; Colangelo & Zaffrann, 1979; Delisle, 1986; Gailbraith, 1983; Hollingworth, 1942; Horner, 1970; Janos & Robinson, 1985; Kerr, 1985; Perrone, 1986; Roedell, 1984; Treffinger, Borger, Render, & Hoffman, 1976; VanTassel-Baska et al., 1984). The responsibility of meeting those needs is also addressed. Although the emphasis in an acceleration program is on cognitive skills, Pollins (1983) described affective needs as a vital function of fast-paced programs. Holahan and Sawyer (1986) also underscored the importance of stressing affective needs in their explanation that the Duke University Talent Identification Program (based on the SMPY model) "has not attempted to move students ahead in one domain (e.g., academics) at the expense of others (e.g., social skills, affective functioning, etc.)." Although assessment of the degree to which affective needs are met also carries concomitant measurement and instrumentation problems, it is clear that those program functions must be included in any evaluation design.

Researchers (Archambault, 1983; Carter, 1986; Kulieke, 1986; VanTassel, 1984) have explicated several situations which bear upon evaluation designs applied to gifted programs. Local resources, administrative policies, funding, etc., may restrict research

possibilities to actually functioning programs and circumstances as opposed to the creation of experimental situations. Ethical considerations usually prohibit randomization of assignment or treatment since once students have been identified as in need of a particular program or service, that support cannot be denied. In addition, because few districts can afford multiple approaches to structure and activities, researchers must assess and recommend improvements for existing services. Extending these imposed conditions, it is logical that research designs are often unable to control for history or numerous other intervening variables.

Some considerations have been described as vital in both short-term or specific program evaluation and long-term or time-series/longitudinal research involving gifted subjects. Critical emphasis on individual differences is important in differentiated curricular activities for the gifted as well as in both longitudinal and evaluative studies of those programs (Fox, 1976a). In studying the students selected to participate in the first SMPY program for verbally gifted youth, McGinn (1976) stated that "The greater emphasis of the program has been on identification of verbally gifted students along with trial efforts at helping them develop to their potential. Such an approach can be justified in the short-run. However, it seems of great importance to learn more about the family and social conditions that are probably at least partially responsible for producing these children" (p. 180). VanTassel-Baska (1983) also highlighted the importance of examining factors which might influence, predict, and contribute to high academic performance.

Questionnaire items developed for the time-series/longitudinal component of this study evolved from literature reports of numerous other studies whose subjects were also gifted students. Data collection most commonly focused on the following experiences, characteristics, and factors: socio-economic status (Kaufmann, 1979; Stanley, 1976b); parental educational levels (Fox, 1976a; George & Denham, 1976; McGinn, 1976; Stanley, 1976a, 1976b; VanTassel-Baska, 1983); parental occupation (McGinn, 1976; VanTassel-Baska, 1983); educational experiences including special programs and services provided such as acceleration, grade skipping, enrichment, etc. (Kaufmann, 1979; Stanley, 1976b; VanTassel-Baska, 1983); grade point average (Kaufmann, 1979; Stanley, 1976b); choice of academic majors (Kaufmann, 1979; Stanley, 1976b); college choice (Benbow, 1983; Kaufmann, 1979); career choice (Fox, 1976a; Kaufmann, 1979; McGinn, 1976; Stanley, 1976b; VanTassel-Baska, 1983); gender differences (Benbow, 1983; Fox, 1976a; Kaufmann, 1979; McGinn, 1976; Stanley, 1976b); interest in various academic subject areas and school in general (Benbow, 1983; Fox, 1976a; McGinn, 1976; Stanley, 1976a, 1976b); awards (Kaufmann, 1979; Stanley, 1976b); activities and hobbies (Fox, 1976a; Kaufmann, 1979; McGinn, 1976; VanTassel-Baska, 1983); and values (Fox, 1976a, 1976b; McGinn, 1976; Stanley, 1976b). In addition, Buescher (1986) recommended that evaluators and researchers look beyond performance scores to consider curiosity, creativity, student-parent and student-teacher relationships, and the process of making career and other life choices.

The literature also contains documentation of items recommended for inclusion in short-term or specific program assessments, such as the evaluation of CY-TAG. In evaluation of fast-paced classes as well as other special courses for the gifted, it is important that significant publics must be encouraged to describe their feelings about experiences, course selection, teaching/learning activities, curriculum, facilities, characteristics of faculty and staff; to compare before and after attitudes about the content area; to evaluate several attributes of the fast-paced class when compared to a regular school course; and to delineate those aspects which were appreciated most (George and Denham, 1976; VanTassel-Baska, 1984).

Several evaluators (Harris, 1980; Sherer, 1981; VanTassel-Baska, Landau, & Olszewski, 1984; VanTassel, 1984) recommended that in conducting any gifted program evaluation, that several publics -- including students, parents, faculty, and school administrators -- be asked to interpret ways in which the program affected themselves and the student participants. The "publics" perspective is consistent with (a) naturalistic evaluation which, when applied to evaluation of gifted education, implies the assessment of student-student, student-instructor, student-resources, and parent-program interactions, and (b) data triangulation (Patton, 1980) which refers to the use of multiple data sources.

The success and therefore the evaluation of a fast-paced class depend on several factors. First, students must possess and practice good study habits (Fox, 1976a). Second, instructors must be knowledgeable and competent in the particular discipline (Fox, 1976a; Stanley, 1976a),

committed to teaching high-ability children (Stanley, 1976a), and demanding in terms of high homework and class performance standards (Stanley, 1976a).

Third, the understanding, cooperation, and support of school administrators is considered by several educators to be vital to program success. In summarizing her evaluation of a special summer math program for gifted girls, Fox (1976b) emphasized that "What does seem clear is that programs to accelerate the achievement of bright students will be far more effective if they have the cooperation of teachers and other school officials. Certainly some of the failure of the all-girl class to succeed in accelerating the girls at their schools seemed to result from the lack of involvement prior to the program of the individual schools in which the girls were enrolled. ...Programs for gifted students are apt to be more successful if they do not create many articulation problems with the schools. Scheduling and class offerings are a major concern to school administrators. Programs that interfere radically with the traditional system are apt to meet with great resistance" (p. 209).

Hairer and Solano (1976) echoed Fox's findings. They concluded that "Ultimately, the success and continuation of these programs [various SMPY alternatives for exceptionally gifted students] depend to a large extent on the approval and cooperation of principals, teachers, guidance counselors, and other school officials" (p. 215).

Conclusion

In spite of the availability of several well-defined evaluation models, an eclectic approach tailored to meet the unique needs of each program has been proposed as the most practical and feasible (Carter & Hamilton, 1986; Renzulli, 1975). Renzulli (1975) counseled that "While each author has made a valuable contribution to the overall thinking about program evaluation, it is probably true that no single model will serve all of the evaluation needs of a given program. Because of differences in program structures, the availability of resources, and the general orientation of evaluators and decision-making bodies, it is recommended that the prospective evaluator review all of the models and then select the most useful concepts from each according to his particular evaluation needs" (p. 19).

In designing plans for the assessment of gifted programs, evaluators must acknowledge the unique characteristics of gifted learners and programs designed specifically for them, as well as resulting measurement and statistical problems. As gifted program models and services themselves evolve to meet the needs of those persons they exist to serve, program evaluation models must also be evolutionary, flexible, and emergent.

CHAPTER III. METHODOLOGY

Introduction

This study was designed to (a) gather and analyze Time One data for the time-series/longitudinal study which examines characteristics of Iowa seventh and eighth grade students who were named finalists in the Duke Talent Identification Program; and (b) to gather and analyze data relative to formative program evaluation of CY-TAG. This chapter describes the development and distribution of instruments used in both components of the study, the subjects of both components of the study, and the statistical procedures used in analyzing the data. All forms as well as the study itself were approved by the Iowa State University Committee on the Use of Human Subjects in Research.

The Time-Series/Longitudinal Study

As described in Chapter I, this portion of the project is a response to the need for research data which describes highly gifted Iowa students, identified by a common criterion, at the age when they qualify for a regional talent search (usually seventh or eighth grade), as well as at follow-up points such as time of high school and college graduation. It also recognizes the need for time-series/longitudinal studies of participants in a gifted summer residential program.

Survey Procedures

A mail survey was deemed the most practical and economical means of gathering relevant data from large numbers of Iowa students (nearly 500 in 1987) who were finalists in the Duke Talent Identification Program. The

questionnaire designed for this study was developed consistent with Borg and Gall's (1983) seven-step survey process: defining objectives, selecting a sample, writing items, constructing the questionnaire, pretesting, preparing a letter of transmittal, and sending out the questionnaire and follow-ups. Appendix A contains copies of the survey instrument as well as the original and follow-up letters of transmittal which explained the nature of the study, requested voluntary participation, and presented brief instructions for completing and returning the questionnaire. The initial mailing occurred on June 5, 1987.

While the CY-TAG Steering Committee limited enrollment to 72 during the first session, over 180 students applied for CY-TAG; therefore, to avoid confounding survey return rate and results with positive or negative feelings about CY-TAG admission, letters of transmittal omitted any reference to the CY-TAG program. To avoid contaminating the data with results of CY-TAG experiences, participants who had not returned surveys prior to the beginning of the institute were contacted by telephone and urged to bring completed surveys to CY-TAG registration.

The 32 survey items were based on research studies and needs discussed in Chapter II and on a similar survey developed for SMPY by Dr. Camilla Benbow. The questionnaire included both closed-form and open-ended items. Several response formats were utilized in the survey. Some items were constructed with forced-choice stems, some with categorical (yes/no) replies, and several with a five-point Likert-type scale (ranging from 1 = the most negative response to 5 = the most

positive response). Also, some items called for short answer or listed responses.

Questions were arranged into three topical sections. The first section contained items which asked for demographic information regarding gender, race, grade level as of May 1987, and type of school currently attending. In addition, students signified their present level of participation in a talented-and-gifted program as well as their attendance at summer programs for gifted students.

The second section contained both closed-form and open-ended questions about education experiences. Concerning school in general as well as thirteen specific content areas, participants described the degree to which they liked or disliked each area; the degree of their own ability in each area; the degree of support and encouragement they received from parents, peers, and teachers in each content area; and the importance of specific content-related skills to projected careers. Respondents identified occupations and colleges they were currently considering as well as mother's and father's current occupational status and highest educational degree earned. Students listed school activities and hobbies. They also furnished information on current enrollment in mathematics and science courses; whether or not they had been taught study, research, problem-solving, and critical thinking skills; the extent to which they learn independently; and the topics of any independent projects they had conducted.

The third section of the questionnaire contained items related to giftedness. Respondents denoted the degree of comfort they felt in being

identified as gifted as well as what they perceived to be others' opinions of that giftedness. They signified the importance of several informational and support activities. They also marked aspects of the Imposter Phenomenon (feelings of unworthiness experienced by gifted persons who believe they do not possess talents despite evidence to the contrary; Clance & Imes, 1978) which typified their own self-perceptions. Students also designated the importance they assigned to twelve specific values. The twelve values items were taken from the research instrument developed by the Cooperative Institutional Research Program (CIRP); Dr. Kenneth Green, Director of the CIRP, granted permission for use of that list. Subjects indicated topics they would be interested in studying during a summer program for gifted students, and described what they considered to be the most important assistance which school personnel could provide to gifted students.

This instrument was pilot-tested with a group of ten Ankeny, Iowa seventh and eighth grade students who completed the survey in approximately twenty minutes and reported no difficulty in interpreting or answering the items. The researcher also invited Dr. Daniel C. Robinson, Dr. Edwin C. Lewis, and Dr. Camilla P. Benbow (as major professor and members of the graduate committee) to review the questionnaire.

Subjects

Subjects for this study included all out-of-state students who were selected to participate in CY-TAG plus the population of Iowa students who were finalists in the Duke Talent Identification Program (as described in Chapter I). Duke TIP personnel provided the latter with the stipulation

that it be used for research purposes only. Students were assigned identification numbers which were used to roster returned questionnaires. Table 1 describes the time-series/longitudinal subjects in terms of CY-TAG participants and other Duke TIP finalists with regard to gender, number of subjects, and number and percentage of returns.

Table 1. Description of the time-series/longitudinal study of the 1987 Iowa Duke Talent Identification Program finalists

	# of Subjects			# of Returns			Returns by % of original group		
Students	M	F	T	M	F	T	M	F	T
Sub-groups									
1. CY-TAG participants	48	24	72	44	24	68	91.7	100.0	94.4
2. Other Duke TIP finalists	238	178	416	193	156	349	81.1	87.6	83.9
TOTALS									
Combined subgroups	286	202	488	237	180	417	82.9	89.1	85.5

Research Questions

This component of the research project gathered baseline data for a repeated study of two dimensions. First, in examining trends among highly gifted junior high students in Iowa, a new wave of Duke TIP finalists will be surveyed each year. Second, in exploring both trends and change over a

period of time, subjects will be surveyed again at the times of their expected high school and college graduations. Therefore, a single basic research question was explored at this initial point in the study:

> What characteristics are descriptive of Iowa seventh and eighth graders who are highly gifted, as defined by criteria delineating them as finalists in the Duke Talent Identification Program?

Data Analysis

Prior to data analysis, several items were coded according to already existing classifications. School district size was coded as small, medium, or large based on an eight-tiered system developed by the Iowa Department of Education and used in the "Iowa Association of School Boards 1987-88 Administrative Salary Report." Table 2 illustrates how, in accordance with recommendations from Department of Education officials, those eight strata were collapsed into three categories.

Table 2. Classification of school district size based on enrollment

Department of Education Classification		Collapsed Categories	
Level	Enrollment	Level	Enrollment
1	500 or less		
2	501-749	Small	749 or less
3	750-999		
4	1000-1499		
5	1500-1999		
6	2000-2499	Medium	750-2499
7	2500-3499		
8	3500+	Large	2500+

In addition, coding of respondents' possible college choices was consistent with that used by Alexander Astin (1985) in his assessment of college choices of high-ability entering college freshmen. The 1987 Higher Education Directory (Torregrosa, 1987) provided documentation for categorizing colleges and universities. The ISU Research Institute for Studies in Education model for coding occupational categories was used to code survey items dealing with students' possible career choices and current parental occupations.

Data preparation involved coding all short answer or open-ended questions, correcting coding errors, and developing a code book and column book. Frequency distributions, means, standard deviations, and percentages will be appropriately used in presenting the benchmark data.

CY-TAG Program Evaluation

As described in Chapter I, this component of the study was designed to evaluate the first CY-TAG session. Four groups of subjects were surveyed for purposes of this project: (1) CY-TAG participants; (2) the CY-TAG faculty and staff; (3) parents of the CY-TAG participants; and (4) school principals of the participants. The perceptions, opinions, and experiences of these four groups of persons were deemed integral to decisions entailing continuation, modification, or elimination of program aspects.

Survey Procedures

The four groups of subjects were asked to complete evaluation questionnaires which assessed these program "Key Features" (This concept

was defined in Chapter II; details of its application to CY-TAG program evaluation are presented in Table 3.): understanding of identification criteria, cognitive growth, affective growth, appropriate classroom conditions, co-curricular environment, attitudes toward CY-TAG, receipt of credit or accelerated placement as a result of CY-TAG participation, and communication with parents and schools. Questionnaire items were developed from a review and analysis of literature focusing on program evaluation, literature assessing and summarizing gifted programs in general and summer gifted programs in particular, and evaluation materials from these gifted programs: Duke Talent Identification Program, Hillsborough (Florida) County Public Schools Academically Gifted Program, Rocky Mountain Talent Search Summer Institute, South Carolina Summer Session, State University of New York at Albany Microcomputer Summer Institute for Talented/Gifted Middle School Students.

Because CY-TAG is an academic program, primary emphasis in program evaluation was placed on those aspects which related most directly to cognitive learning experiences. Because it is also important to meet students' affective needs related to self-esteem, understanding of giftedness, and association with ability peers, those program aspects are also represented in questionnaire items. Development of the questionnaires adhered to Borg and Gall's (1983) multiple-step survey process.

Format of the forced-choice items consisted of either five-point Likert-type scales (with 5 = most positive response and 1 = most negative

Table 3. CY-TAG program evaluation: Key features and data sources

	KEY FEATURES			
DATA SOURCES	Understanding of ID Criteria	Cognitive Growth	Affective Growth	Appropriate Classroom Conditions
STUDENTS	Questionnaires	Pre/Post tests	Questionnaires	MBTI LSI Questionnaires
FACULTY/STAFF		Written assessments	Questionnaires	MBTI LSI Questionnaires
PARENTS	Questionnaires	Questionnaires	Questionnaires	
ADMINISTRATORS		Questionnaires		

Table 3. (continued)

DATA SOURCES	KEY FEATURES			
	Co-curricular Environment	Attitudes toward CY-TAG	Acceleration or Credit	Communication with Parents and School
STUDENTS	MBTI Questionnaires	Questionnaires		
FACULTY/STAFF	MBTI Questionnaires	Questionnaires		Questionnaires
PARENTS	Questionnaires	Questionnaires	Questionnaires	Questionnaires
ADMINISTRATORS		Questionnaires	Questionnaires	Questionnaires

response) or multiple-choice stems. Participants also completed a number of open-ended items.

The surveys were reviewed by CY-TAG faculty and staff, and by Dr. Camilla P. Benbow and Dr. Edwin C. Lewis, who were in charge of the offices most directly involved with the CY-TAG program. Dr. Benbow was affiliated with SMPY at Johns Hopkins and serves as Director of SMPY at ISU. She has conducted extensive research involving high-ability students and has been widely published in that area. As Associate Vice-President for Academic Affairs at ISU, Dr. Lewis has been responsible for the ISU Honors Programs and has served as ISU Director of the Duke Talent Search Awards Program; his background is in developmental psychology.

Teachers, administrators, and talented-and-gifted students and their parents from the Winterset, Iowa, Community School District field-tested the instruments and reported no difficulty in interpreting or answering questionnaire items. The Winterset district, located in a rural area of southwestern Iowa, was selected for field-testing of the questionnaires (a) because its 1987 enrollment totaled 1515 which defines it as a middle-sized and therefore representative district according to Table 2; and (b) because CY-TAG is an academic program and because identification for the Winterset talented-and-gifted program (initiated in 1980) includes as measures of academic ability scores on the Otis-Lennon Test of School Ability, scores on the vocabulary and block design subtests of the WISC-R (Weschler Intelligence Scale for Children - Revised), and scores on the vocabulary and mathematics problem-solving subtests of the Iowa Tests of Basic Skills.

To compare perspectives and experiences of all four publics, several program aspects were assessed in two or more surveys. Table 3 illustrates key features of the program, the sources of relevant data, and instruments used in data collection. This table is patterned after a form developed by Joseph S. Renzulli (1975) specifically for use in evaluation of gifted programs.

Student Questionnaire and Other Instruments

The researcher administered student evaluation instruments in each of the three classrooms on July 9, 1987, two days prior to final CY-TAG classes. Appendix B contains verbal instructions given to the students as well as a copy of the evaluation instrument.

Demographic information on participants was collected through the time-series/longitudinal questionnaire (described above) as part of the Iowa Talent Search Longitudinal Study. This instrument was mailed to CY-TAG participants on June 5, 1987; on June 18, follow-up phone calls were made to non-respondents who were urged to return their completed surveys as part of CY-TAG registration on June 20. So that responses to like items could be matched according to student, parent, and administrator, and so that demographic information gathered from CY-TAG participants as part of the time-series/longitudinal study could be merged with CY-TAG evaluation data, identification numbers assigned to CY-TAG students for the time-series/longitudinal study were also used in a parallel format across student, parent, and administrator program evaluation questionnaires.

Because they yield information useful in creating supportive learning and co-curricular environments conducive to meeting the needs of gifted adolescents, two particular instruments were completed by all CY-TAG students on June 21: the Myers-Briggs Type Indicator and the Renzulli-Smith Learning Styles Inventory. Appendix B contains sample items from these instruments as well as the verbal directions used in their administration.

The Myers-Briggs Type Indicator (Briggs & Myers, 1983) assesses variations in normal attitudes and behavior. Isabel Briggs Myers (1975) introduced the MBTI Manual with this description of the instrument:

> The purpose of the Indicator is to implement Jung's theory of type. The gist of the theory is that much apparently random variation in human behavior is actually quite orderly and consistent, being due to certain basic differences in the way people prefer to use perceptions and judgment.
>
> "Perception" is here understood to include the processes of becoming aware -- of things or people or occurrences or ideas. "Judgment" is understood to include the processes of coming-to-conclusions about what has been perceived. If people differ systematically in what they perceive and the conclusions they come to, they may as a result show corresponding differences in their reactions, in their interests, values, needs, and motivations, in what they do best and in what they like best to do.
>
> Adopting this working hypothesis, the Indicator aims to ascertain, from self-report of easily reported reactions, people's basic

> preferences in regard to perception and judgment, so that the effects of the preferences and their combinations may be established by research and put to practical use. (p. 1)

The four dimensions of type and the resultant sixteen possible combinations are briefly described in materials located in Appendix B.

MBTI results are helpful in improving educational practice through an understanding of type differences in teaching and learning styles as well as in communication, leadership, and teamwork (McCaulley, 1981; Myers, 1975). It has also been used as a means of facilitating roommate selection and supportive environments in campus residence halls. Through a large group session conducted for CY-TAG students and staff, Dr. Daniel C. Robinson, Assistant Dean and Associate Professor of Professional Studies in Education in the ISU College of Education, presented an interpretation of the results and their educational applications.

The Renzulli-Smith Learning Styles Inventory (1978) yields scores which are readily translated into student and teacher preferences for common classroom activities. The LSI manual states that "For purposes of this instrument, learning styles are defined as one or more of the following nine instructional strategies most preferred by individual students as they interact with particular bodies of curricular material: projects, drill and recitation, peer teaching, discussion, teaching games, independent study, programmed instruction, lecture, simulation" (p. 2). Results are reported in terms of each person's two most-preferred and two least-preferred learning activities as well as ranked preferences for an

entire class. The CY-TAG Program Evaluator provided results and interpretations to students and instructional staff.

Lynn H. Fox (1976b), who was involved in evaluation of the early SMPY programs, called attention to a particular educational research need: "The underlying question is how to develop instructional strategies and manipulate classroom environmental variables to maximize performance of a given population of students. In other words, how can the applied researcher utilize knowledge of individual differences to provide a better match between pupil characteristics and the demands of learning tasks and environments?...The question of the impact of learner style and interests upon achievement when aptitude is relatively constant needs more serious research" (p. 211). Administration of the MBTI and the Renzulli-Smith LSI, subsequent interpretation, and appropriate utilization of results were intended to address that particular need.

As a means of measuring academic improvement during the course of CY-TAG, content area instructors administered pre- and post-testing to all participants. Biotechnology students completed an instructor-made pre- and post-test which assessed specific knowledge of course content. Before classwork began, students enrolled in the precalculus mathematics course completed achievement tests to determine appropriate placement; as they progressed through content areas, students continued with the process of mastery testing, which is integral to the SMPY model of acceleration and final evaluation of student achievement.

Expository writing students submitted pre- and post-test writing samples which were evaluated and normed with those gathered from incoming

Fall 1987 ISU freshmen. As explained by Dr. Richard Zbaracki, Director of the ISU Freshman English Program (personal communication, February 15, 1988), direct writing assessment has been utilized to evaluate writing samples of all incoming freshman -- approximately 3500 to 4000 annually -- since 1979. Assessing criteria defined on a standardized score sheet, two faculty members read and rate each sample according to the following holistic scale which describes writing as a unit rather than as a composite of separate elements:

Rating	Interpretation
1 or 2	Placement in second semester Freshman English
3	Placement in first semester Freshman English
4	Deficient in basic skills; referred to Writing Center
5	Remediation needed
7	Off-topic

A third reader evaluates all samples scored 4, 5, or 7, as well as those marked with two inconsistent responses (such as both a 2 and a 3). Samples are replaced at random and re-scored to assess inter-rater reliability. CY-TAG expository writing students were given the same prompt as incoming freshmen and wrote under similar conditions. Their samples were mixed and scored with freshmen samples (a) to remove evaluator bias toward younger or "special program" students, and (b) to insure that evaluations of CY-TAG writing samples were consistent with standards of a large-scale well-developed assessment program.

Faculty/Staff Questionnaire

CY-TAG faculty and staff personnel completed evaluation questionnaires during the two days immediately following the closing session of CY-TAG on July 11, 1987. Due to the small sample including instructors, teaching assistants, program coordinator, and residence hall assistants (total n = 21), and in an effort to insure their freedom to respond anonymously, identification numbers were not used on this set of surveys. Appendix C contains copies of the cover letter and faculty/staff evaluation instrument.

Parent Questionnaire

To allow parents time to discuss CY-TAG experiences with their children and also so that parents were able to provide responses based on recent information and perceptions, their surveys were mailed two weeks after the conclusion of CY-TAG, on July 24, 1987 (with a second letter and survey mailed two weeks after that date, and a final postcard reminder mailed four weeks after the initial mailing). To provide consistency across responses, mothers were requested to complete the evaluation instrument. Identical cover letters were co-signed by the researcher and individual course instructors. Copies of those letters and the parent evaluation instrument are located in Appendix D.

School Administrator Questionnaire

School administrator support of CY-TAG is recognized as being crucial to the success of the program. Principals were included as subjects in this component of the evaluation because (1) they were designated recipients of summary statements of student CY-TAG course work and

accomplishments, and (2) they were likely to be involved in any decisions regarding curricular modifications which occurred as a result of CY-TAG participation. So that they had adequate time to reflect on student experiences during CY-TAG, and so that their responses would accurately reflect any curricular decisions, principal surveys were mailed on December 5, 1987, followed by a second letter and survey two weeks later and a final postcard reminder four weeks after the initial mailing. Appendix E contains copies of the letters of transmittal and the school administrator evaluation instrument.

Subjects

Subjects included the 72 CY-TAG participants, parents of participants, and school principals of participants. The group of CY-TAG faculty and staff encompassed ten instructional staff personnel and eleven support staff personnel. Table 4 describes the subjects of this component of the research project in terms of numbers by subgroups and gender, as well as number and percent of returned evaluation instruments.

Research Questions

The study explored the following research questions:

1. To what extent did students improve academically during the course of CY-TAG?
2. What practices and policies contributed to CY-TAG success or failure?
3. Is there adequate articulation between CY-TAG personnel and students, parents, and school officials?
4. What special programming was offered by school systems to CY-TAG participants as a result of their CY-TAG achievements?

Table 4. Description of CY-TAG sample groups

Groups	# of Subjects			# of Returns			Returns by % of original group		
	M	F	T	M	F	T	M	F	T
1. Students									
Biotechnology	12	4	16	12	4	16	100	100	100
Expos. Writing	5	12	17	5	12	17	100	100	100
Precalc. Math	31	8	39	31	8	39	100	100	100
TOTAL	48	24	72	48	24	72	100	100	100
2. Faculty/staff									
Instructional			10			10	100	100	100
Support staff			11			11	100	100	100
TOTAL			21			21	100	100	100
3. Parents of these students									
Biotechnology			16			16			100
Expos. Writing			17			15			88
Precalc. Math			39			36			92
TOTAL			72			67			93
4. School principals			72			44			61

5. How effectively did CY-TAG meet the goal of providing an educationally stimulating experience to highly gifted seventh and eighth graders?
6. What actions related to continuation, modification, or elimination of program aspects will strengthen the experiences offered to CY-TAG participants in the future?

Data Analysis

Data from returned surveys were coded and entered by data entry personnel; statistical tests utilized SPSS-X procedures (SPSS-X, 1983). Results were examined in terms of all participants, participants by group (biotechnology, expository writing, and precalculus mathematics), and participants by gender. Responses to like items were matched according to student and parent, and then examined for significant differences. One-way analysis of variance, t-test, chi-square, and discriminant analysis procedures were used to analyze results. Frequency distributions, means, standard deviations, and percentages will also be used appropriately to present results. The significance level was set at .05.

The t-test is an inferential statistic which compares means from two groups (Borg & Gall, 1983). Three assumptions guide its use: scores were determined on an interval or ratio scale; population scores are normally distributed; and score variances for the populations involved in the study are equal. However, the t-test is regarded as robust even if assumptions are violated substantially.

One-way analysis of variance (ANOVA) is another inferential statistic which is used to determine if three or more group means on one variable

are significantly different from each other (Borg & Gall, 1983; Hinkle, Wiersma, & Jurs, 1979). According to Hinkle, assumptions underlying its use include the following: the observations are random, independent samples from the same population; the dependent variable is measured on the interval or ratio scale; the populations from which the samples are drawn are normally distributed; and the variances of the populations are equal. He noted, however, that the ANOVA procedure is robust in the event that assumptions are violated with the exception of unequal variances with unequal sample sizes. In this study, a post hoc Duncan's multiple-range test was utilized to ascertain which group mean differed from the other/s.

The chi-square is a nonparametric test which yields information pertinent to deciding whether or not two group distributions differ significantly from each other (Borg & Gall, 1983). Chi-square procedures are appropriate if variables fall into discrete categories on a nominal scale or if continuous variables have been categorized.

Discriminant analysis involves two or more predictor variables and the single criterion variable of group membership; its equation uses scores on the various predictor variables to predict group membership (Borg & Gall, 1983). Klecka (1980) listed seven assumptions regarding its use:

1. the number of mutually exclusive groups must equal two or more;
2. the number of cases per group must equal two or more;
3. any number of discriminating variables may be used as long as that number is less than the total number of cases minus two;

4. the discriminating variables must be measured at the interval or ratio levels;
5. no discriminating variable may be a combination of other discriminating variables;
6. population covariance matrices must be equal; and
7. each group must be drawn from a population characterized by a multivariate normal distribution.

Klecka also cautioned that results can be negatively affected by substantially different sample sizes, highly correlated variables, and large amounts of missing data. He noted, however, that this procedure is robust in regard to violation of assumptions.

Data Management Guide

Table 5 clarifies procedures and compiles data collection and analysis activities. It lists information related to sources of data, data collection methods, data analysis procedures, dates of data collection, and persons responsible for that data collection. This table is based on a form developed by Joseph S. Renzulli (1975) for facilitating the implementation of evaluation models designed for talented-and-gifted programs.

The Research Design

As depicted in Figure 1, the schematic drawing of the research design, this study incorporates data from two research projects. Time One data were collected as part of a study that contains elements of both a time-series and a longitudinal study. The project incorporates time-series aspects (Borg & Gall, 1983, pp. 660-663) in that each annual

Table 5. CY-TAG Data collection and analysis guide

Source of Data	Data Collection Method	Data Analysis	Date Gathered	Data Gathered By
Duke TIP Finalists	Questionnaire	Frequencies Percents Summaries of comments	June 5, 1987	CY-TAG Program Evaluator
CY-TAG Participants	MBTI	Frequencies, Percents	June 21, 1987	CY-TAG Program Evaluator
	LSI	Frequencies, Percents	June 21, 1987	CY-TAG Program Evaluator
	Questionnaire	Frequencies Percents t-tests Paired t-tests with parent data one-way ANOVA Discriminant analysis Summaries of comments	July 9, 1987	CY-TAG Program Evaluator
	Pre-/Post-tests	Frequencies Percents t-tests	June 21, 1987 & July 10, 1987	Course instructors
CY-TAG Staff	Questionnaire	Frequencies Percents Summaries of comments	July 10, 1987	CY-TAG Program Evaluator

Table 5. (continued)

Source of Data	Data Collection Method	Data Analysis	Date Gathered	Data Gathered By
Parents of CY-TAG Students	Questionnaire	Frequencies Percents t-tests Paired t-tests with student data One-way ANOVA Summaries of comments	July 24, 1987	CY-TAG Program Evaluator
School principals of CY-TAG students	Questionnaire	Frequencies Percents Summaries of comments	December 5, 1987	CY-TAG Program Evaluator

wave of Duke TIP finalists will be surveyed at specific times during their lives (time of Duke TIP participation, time of high school graduation, time of completion of undergraduate degrees, and at times during adult years which have not yet been determined). The project incorporates aspects of a longitudinal trend study (Borg & Gall, 1983, pp. 411-412) in that year-to-year data from Iowa Duke TIP finalists (and later Duke TIP students as high school and college graduates) will be collected and analyzed to assess any major trends.

This time-series/longitudinal study (a) is based on a cohort of Iowa students identified through a reputable standardized measure (the Scholastic Aptitude Tests); (b) gathers information on those students in terms of educational experiences, preferences, goals, achievements, activities, and personal attitudes; and (c) serves as a basis for comparing these groups of students:

1. Duke TIP finalists who applied to CY-TAG, were accepted, and participated;
2. all other Iowa seventh and eighth grade students who were finalists in the Duke Talent Identification Program but did not participate in CY-TAG.

For purposes of this study, data from CY-TAG participants included in the time-series/longitudinal project also provides demographic and descriptive information useful in the CY-TAG program evaluation. For purposes of the time-series/longitudinal project, it is planned that (a) each spring, questionnaires will be mailed to the new wave of students who fall into the two groups listed above, and (b) follow-up questionnaires

will eventually be distributed to each wave of respondents at time of expected high school and college graduation.

The second component of this research project focuses on evaluation of the Summer 1987 CY-TAG program. Information pertinent to program evaluation was gathered from student participants and faculty/staff who completed surveys at the conclusion of the three-week institute. Parent evaluation data were obtained from surveys mailed two weeks after the completion of the institute. In December, 1987, surveys were mailed to school administrators to gather evaluation data and information on course placement decisions relating to participants.

Figure 2 depicts the CY-TAG Program Evaluation Design. The "Input" column lists activities and resources utilized by the CY-TAG Program Evaluator to identify and distill significant issues, concerns, and goals of the evaluation. Synthesis of this information entailed two processes: first, translation of that information into the Key Features chart (Table 3); and second, selection and construction of instruments which assessed the key features. The third column traces the steps followed in collecting and analyzing data (specific aspects of this stage are detailed in Table 5). The last column diagrams components inherent in compiling the final evaluation report. This figure is based on a form developed by Joseph S. Renzulli (1975) for facilitating the evaluation of programs for the gifted and talented.

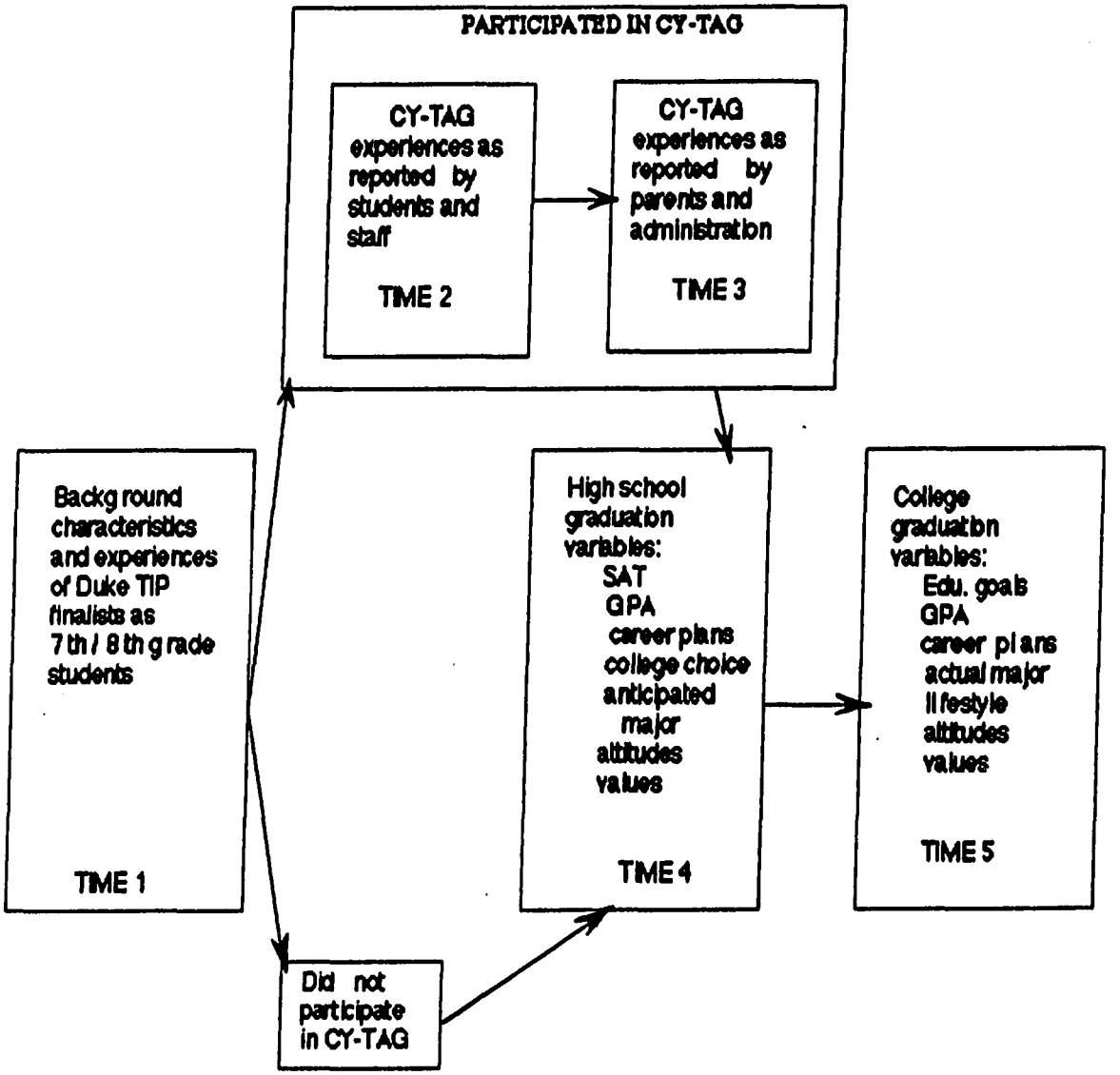

Figure 1. Schematic representation of the time-series/longitudinal study of the 1987 Iowa Duke Talent Identification Program finalists

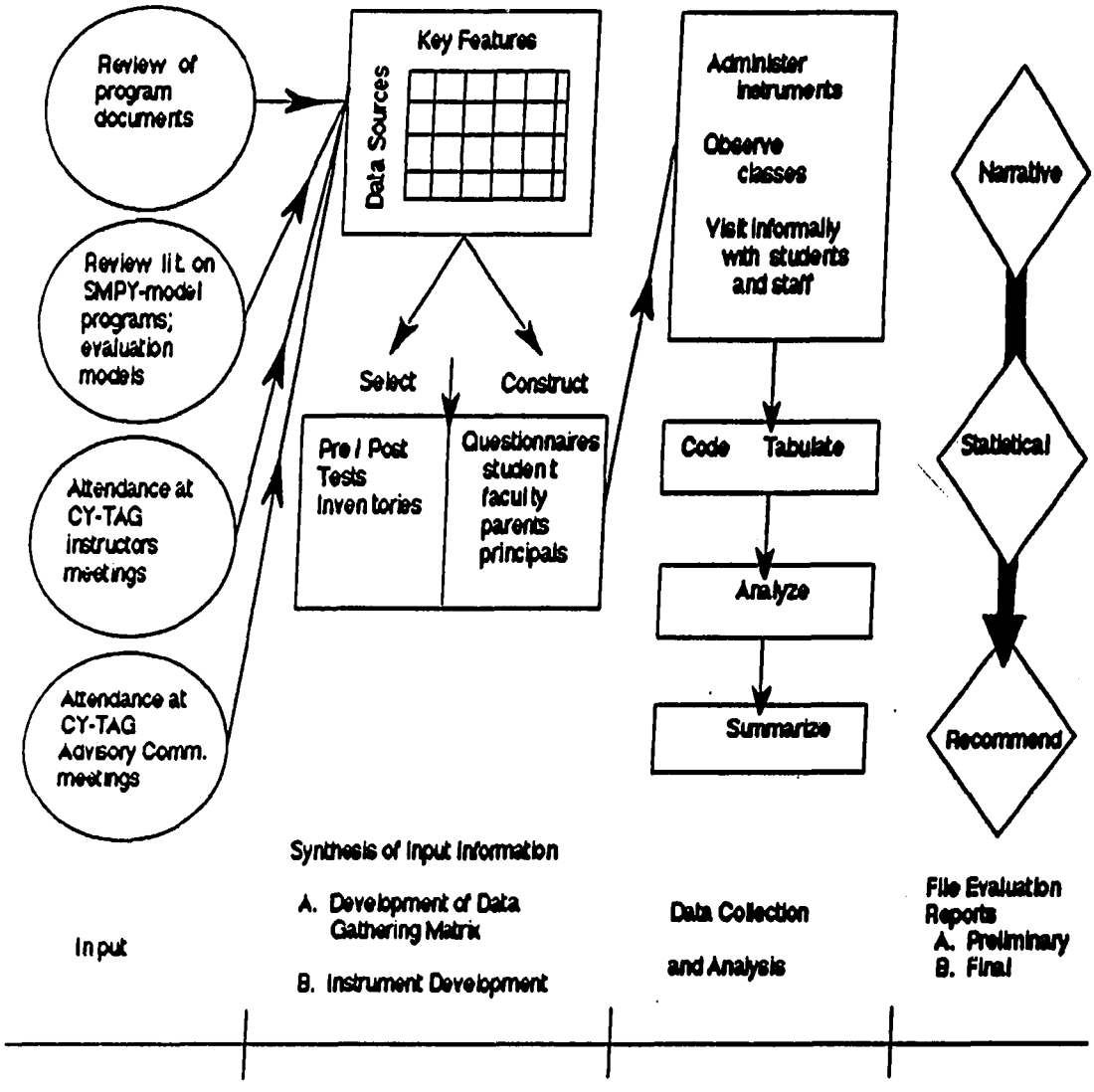

Figure 2. CY-TAG program evaluation design (Renzulli, 1975)

CHAPTER IV. RESULTS

Introduction

Two overarching purposes guided this study: (1) to collect and describe Time One benchmark data as the initial step in a time-series/ longitudinal study which focuses on characteristics of highly gifted Iowa seventh and eighth graders identified as finalists in the Duke Talent Identification Program; and (2) to conduct program evaluation for the first session of CY-TAG, a summer residential program which offers fast-paced academic work to highly gifted seventh and eighth graders also identified through the Duke TIP. Research questions pertinent to each component of the study were listed in Chapter III.

The purpose of this chapter is to present results of statistical analysis for each of the research projects. Chapter IV is therefore divided into two major sections: the purpose of the first is to present descriptive information relative to Time One of the time-series/ longitudinal study, and the purpose of the second is to present results germane to CY-TAG program evaluation. Descriptive and statistical data are presented in numerous tables.

Descriptive Results From Time One of the Time-Series/Longitudinal Study

As explicated in Chapter I, the purpose of this component of the research project was to collect baseline data for Time One of a study which will (a) survey yearly waves of Iowa students who are named Duke TIP finalists, and (b) survey each wave of finalists again at time of expected

high school and college graduations. Because the objective of this component of the research project was to gather benchmark data which profiles the first wave of subjects in the time-series/longitudinal study, only descriptive findings are presented. Appendix H lists results in terms of frequencies, valid percents (adjusted for missing data), means, and standard deviations; tabulations of short-answer and open-ended questions are also presented.

Demographics

Questionnaires were completed and returned by 237 males (82.9 percent of the subjects) and 180 females (89.1 percent of the subjects). This totaled 417 respondents which equaled an 85.5 percent rate. In terms of racial/ethnic backgrounds, 93.5 percent of the respondents were white, 3.1 percent were Oriental, and 1.2 percent were black.

Students who had completed seventh or eighth grade comprised 97.8 percent of the participants. Public school enrollees accounted for 95.6 percent of the respondents. Large Iowa school districts of 2500 or over enrollment were represented by 62 percent of the students, middle-sized districts of enrollment between 750 to 2499 were represented by 24 percent of the students, and small districts of less than 749 enrollment were represented by 14 percent of the students.

Background Factors

Ninety-six percent of the respondents were living with their natural mothers and 89 percent with their natural fathers. Occupational groups most frequently represented by female parents included professional/ technical (39 percent) and homemaker (32 percent). Occupational

categories containing highest frequencies among male parents included professional/technical (42 percent) and manager/proprietor (20 percent).

About fifteen percent of both parental groups had ended their formal education with high school graduation. Forty percent of the mothers and 30 percent of the fathers had earned bachelor's degrees. Approximately 15 percent of each group completed master's degrees, and 3 percent of the mothers and 17 percent of the fathers had earned Ph.D.'s.

School-related Attitudes and Perceptions

Subjects were asked to rate school in general as well as thirteen curricular areas (math, science, foreign languages, literature, composition, physical education, art, performing arts, and computer science) in terms of three factors. Based on a five-point Likert-type scale (with 5 = most positive response and 1 = most negative response), respondents indicated their overall attitude toward each area, their perceived ability when compared to peers, and the degree of encouragement received from mother, father, teachers, and peers in relation to each area. Respondents also indicated how important they thought each of nine content areas was to their future occupational choices.

Figure 3 shows graphically the mean responses on items assessing students' attitude and self-perceived ability in particular content areas as well as significance of the role students believe those areas will play in career activities. Students liked school in general and most content areas "moderately" well. Means for most items were 4.0 or above; only social studies, composition, and physical education had means of 3.75 or slightly less. In most cases, means on items measuring students'

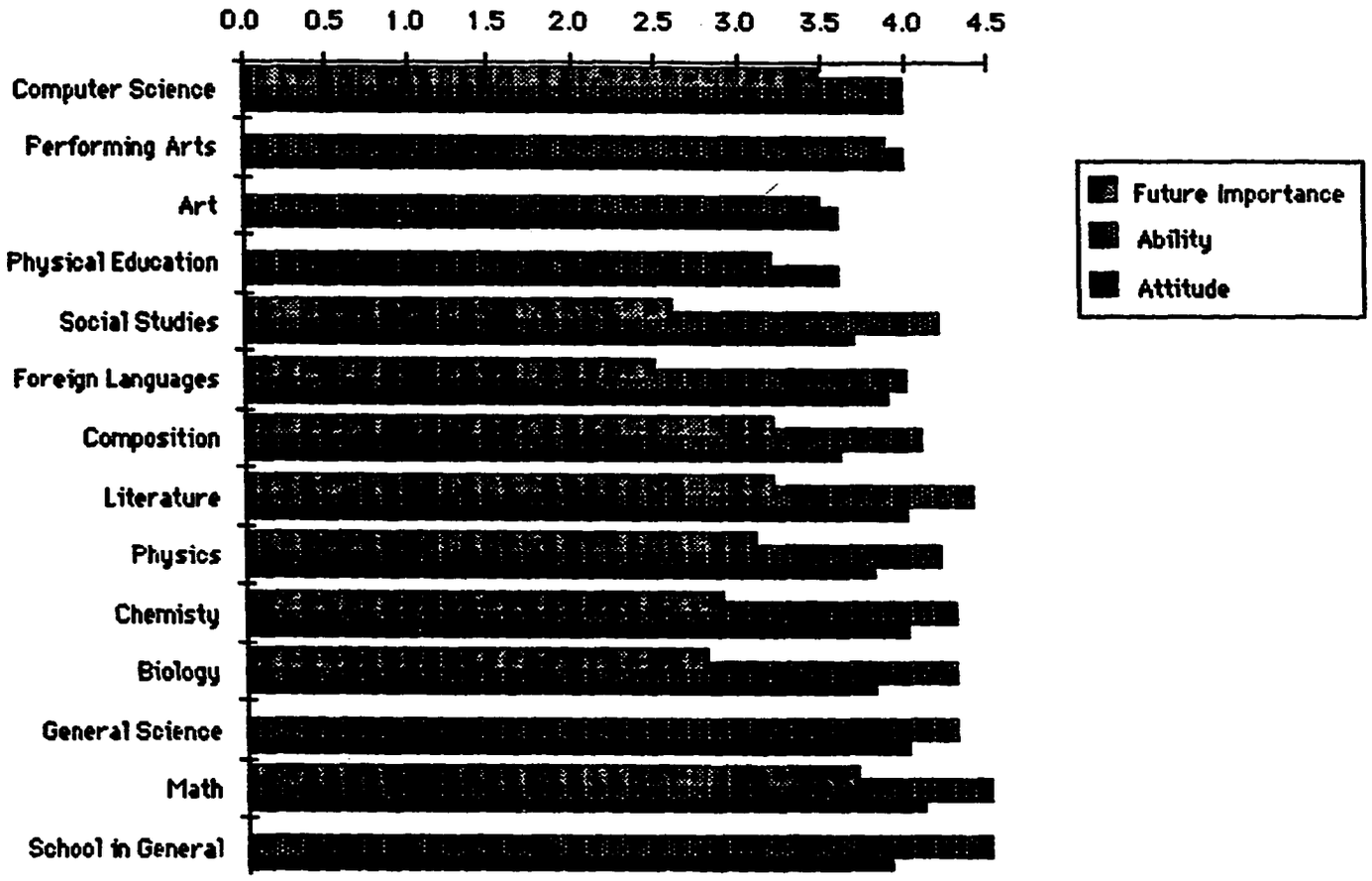

Figure 3. Mean responses of 1987 Iowa Duke Talent Identification Program finalists on items assessing school-related attitudes

perceived ability in each area were equal to or slightly higher than means on items assessing students' overall attitude toward each area; physical education, art, and the performing arts were the only subject areas characterized by lower means on self-perceived ability. In math and school in general, students seemed to rate their abilities higher than their attitudes.

Means on the importance assigned to academic areas in terms of occupational activities were consistently low. Highest ratings were given to math (3.7) and computer science (3.5); lowest means occurred on social studies and foreign language (2.8).

Respondents indicated receiving similar high degrees of encouragement from mothers, fathers, and teachers. However, in most academic areas, means for peer support were approximately one point (1.0 on a 5-point scale) lower than means for parents and teachers. Exceptions were in the areas of physical education, art, performing arts, and computer science which exhibited similar means across all four groups.

Future Plans

Career Plans

Students were asked to list three occupations or careers they were currently considering. Sixteen percent of the respondents stated they had not seriously considered any career choices. The remaining 84 percent consistently listed professional/technical occupations; 779 of the 921 responses fell into this category. Within that classification, careers most frequently named included engineer, architect, scientist (253);

dentist, physician, psychologist (132); and artist, musician, writer (107).

College Plans

Subjects were also asked to list names of three colleges they were considering attending. Only two students (0.5 percent) stated they did not plan on attending college. Forty percent indicated that they had not yet considered college selection. Ninety percent of the respondents who did list possible choices clearly prefer public institutions, and 88 percent indicated universities rather two- or four-year institutions. As seventh and eighth graders, 42 percent named colleges or universities within the state of Iowa, and 56 percent listed out-of-state schools (2 percent indicated an institution in a foreign country).

Aspects of Giftedness

Involvement in Local Programs

Subjects were asked to indicate the extent of their involvement in district talented-and-gifted programs. Slightly over half of the respondents indicated current participation in a gifted program. About one-fourth stated that their district did not sponsor such a program.

Self-esteem Factors

Identification. In assessing their reactions to being identified as gifted, about one-third of the respondents felt "very comfortable," about one-third felt "somewhat comfortable," and nearly one-fourth indicated that the label affects them neither positively nor negatively. Six percent did not consider themselves to be gifted.

Students were also asked to evaluate how being identified as gifted affected others' opinions of them. Nearly half responded "more positively than negatively," and about one-fourth responded "more negatively than positively."

Locus of control. Regarding locus of control and feelings of inferiority, respondents are best characterized as crediting their successes to their abilities and hard work but not to good luck. However, they did not attribute their failures to lack of ability, lack of effort, or bad luck.

Information needed by gifted students. Subjects were asked to indicate how important it is that "gifted students receive help and information" in each of several areas. Topics and percentages of students who believed support in particular areas to be "fairly" or "very important" are depicted in Figure 4. Planning for school and college and career were assigned greatest importance.

Values. Respondents also rated a number of values statements in terms of personal importance. Figure 5 portrays percentages of students who found each particular value to be "very important" or "essential." Greatest significance was attached to "becoming an authority in my field" (73 percent) and "helping those in difficulty (72 percent). Least importance was assigned to "writing original works" (30 percent) and "creating artistic work" (23 percent).

Challenges to educators. Students were requested to describe the most important way in which they believe educators can be supportive of talented-and-gifted students. Because many respondents described more

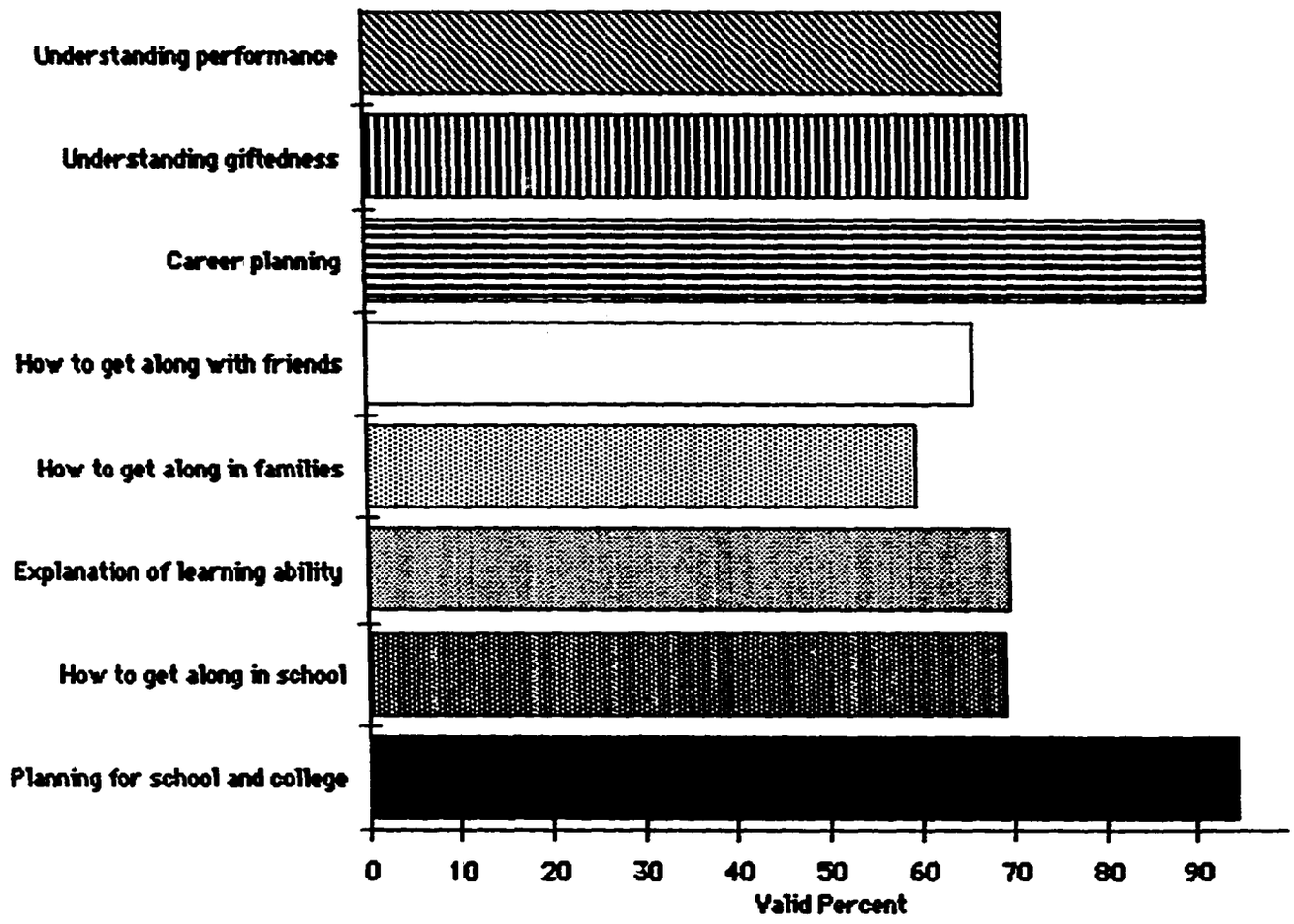

Figure 4. Percentage of 1987 Iowa Duke Talent Identification Program finalists who believed it was "fairly" or "very important" that "gifted students receive help and information" in certain areas

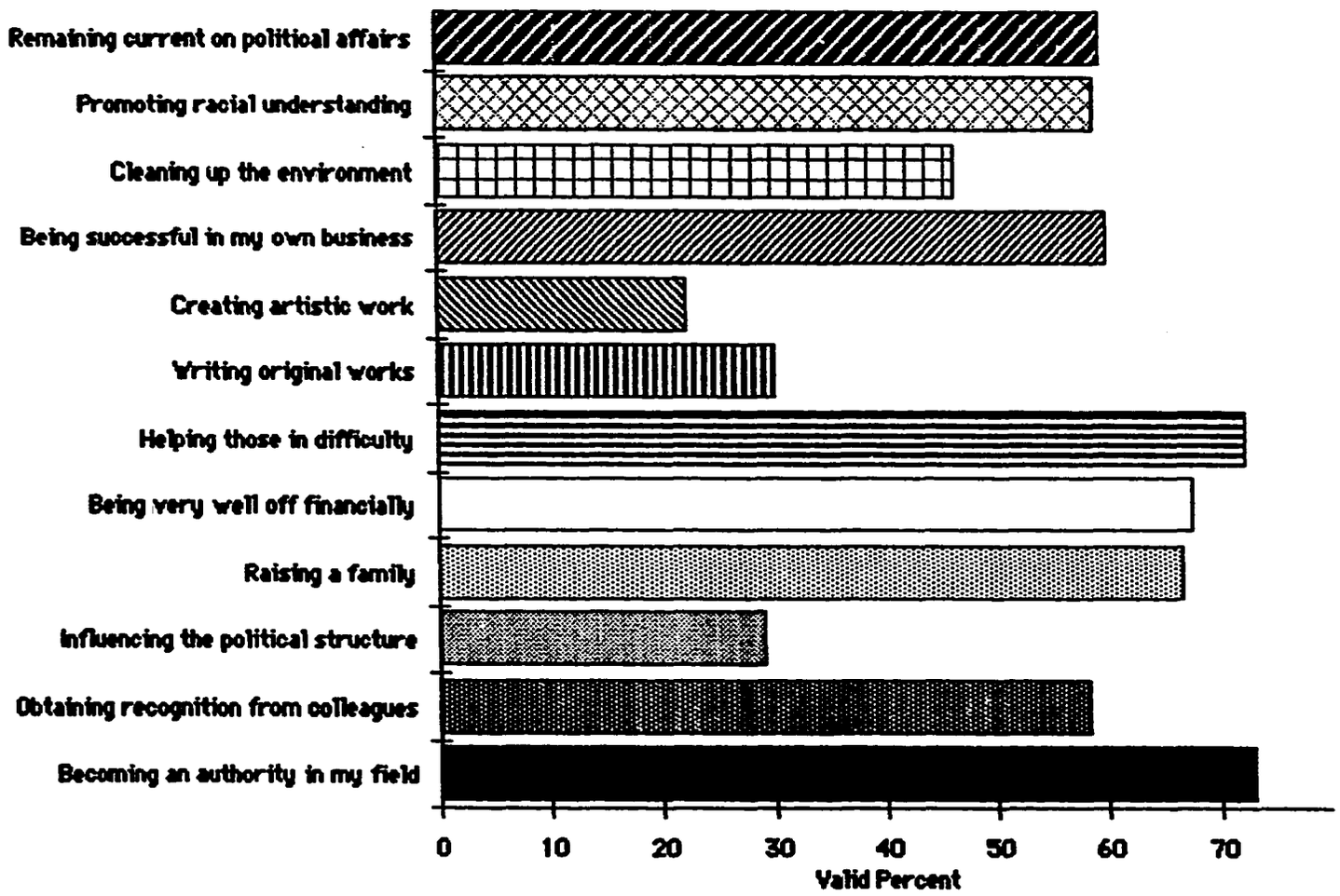

Figure 5. Percentage of Iowa Duke Talent Identification Program finalists who found particular values to be "very important" or "essential"

than one activity, up to three responses per student were coded. Most frequently, subjects discussed the need for academic challenges, their desires to be treated like "normal kids" and not stereotyped, and their suggestions for curricular changes. They also called attention to the need for improved understanding of giftedness both from their own perspective as well as that of educators, and their needs for encouragement and guidance.

The following remarks offered by respondents reveal the needs and sensitive perceptions characteristic of talented-and-gifted adolescents.

"I think that educators should speak to gifted students individually and in a group. I also feel that teachers should not depend on gifted students as a last resort of right answers. Speaking from experience, we are not always right. We are also not adults and should not be treated as such."

"Help them handle kids who make fun of them."

"Don't expect us to be perfect. Sometimes when you do make a mistake, teachers will tease you in front of the other kids. I try not to let it bother me. But I know it makes other people not try too hard because then less is expected of them."

"They can quit calling them gifted. Gifted students should not be singled out. It is helpful to be gifted, but to me it's more important to have friends and a social life. To me 'people' skills are the most important skills to learn. After college, it's all that counts."

"I think that programs for gifted students are essential. It is necessary for the teacher and student to be open-minded and to communicate

with one another. Also, making the students feel like human beings (which can be done through emotional support) instead of walking computers is very important."

"Let us be what we want to be, not what someone else says we should be."

"I think educators' main function is to encourage gifted students to do their best, but they really should let us make our own choices. They should have more programs that enable us to learn at a faster pace, instead of grouping us with average or below-average students. Sometimes, I feel like I shouldn't do well so that the other students don't resent me for doing better than they do."

"Much more emphasis on logical thought and figuring things out yourself, especially amid the growing context of 'memorize for the test." For crying out loud, DON'T EVER lengthen the school year. The 35-hour week they get from me isn't used wisely at all."

"Encourage them to enjoy the arts as well as the sciences."

"Give them opportunities to shine."

"Our school officials should realize that gifted people need help, too. I'm not in academically gifted classes, but I do take advanced classes with pre-algebra. I feel that because I do well in most subjects, I am almost ignored because I am thought not to need any help."

"Teachers need to be more understanding towards gifted students. Regular classes will get boring if students aren't challenged. Counselors need to be there when students have problems coping. Principals need to keep giving support and congratulations for good achievements. Gifted

teachers can help gifted students the most because they understand students and don't hold them back."

Results from CY-TAG Program Evaluation

CY-TAG program evaluation findings are first presented by student, parent, faculty/staff, and school administrator results in terms of demographics and statistically significant results. Second, results from all four questionnaires are synthesized to provide a discussion of findings in terms of the eight key features described in Chapters II and III. Finally, strengths of the program and the need for its continuation are documented through statements submitted by individuals in each of the four constituent groups.

Although chi-square procedures could be utilized to analyze appropriate data generated from student, faculty/staff, parent, and principal surveys, and some of the results would be significant at the .05 level, the statistical tests for these findings were not reported because of two factors. More than 20 percent of the cells were reported to have expected frequencies of less than five; also, categorical variables (such as gender and course enrollment) on which the analysis was based could not be combined. Therefore, statistical tests were not made in certain cases because statistical assumptions (Hinkle, Wiersma, & Jurs, 1979, p. 348) were not met.

Student Results

Demographic Information

The 72 CY-TAG participants included 48 males and 24 females. As of Spring 1987, one had completed fifth grade, four had completed sixth grade, 41 had completed seventh grade, and 26 had completed eighth grade. In terms of racial background, 66 were Caucasian, three were Black, two were Oriental, and one was American Indian. Iowa students numbered 51; 12 were from Nebraska, two from Virginia, and one each from Illinois, Kansas, Minnesota, Oklahoma, New York, Washington, and Wisconsin. All students were placed in their first-choice course. Sixteen students were enrolled in biotechnology, 17 in expository writing, and 39 in pre-calculus mathematics. All 72 students completed program evaluation questionnaires.

MBTI Results

Results presented in Figure 6 were generated through the "Selection Ratio Type Table PC Software" computer program (Granade, Hatfield, Smith, & Beasley, 1987). Figure 6 charts results of the Myers-Briggs Type Indicator analysis of the 72 CY-TAG students and also indicates findings based on a comparison of the CY-TAG group and a base of 1943 high schoolgraduates (Provost & Anchors, 1987). The four-by-four grid in Figure 6 lists the following information on each of the sixteen possible preference combinations: N = the number of persons in the sample characterized by a particular preference; % = the percent of persons in the sample characterized by a particular preference; I = the ratio between the percent of persons in the sample group (CY-TAG) compared to the percent of persons in the comparison group (high school graduates)

Source of data

(null)

Group tabulated:

cytag students at Iowa State U.

N = 72

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type. I = Selfselection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ	ISFJ #	INFJ	INTJ *
N= 8	N= 1	N= 3	N= 6
%= 11.11	%= 1.39	%= 4.17	%= 8.33
I= 0.62	I= 0.09	I= 1.55	I= 3.70
ISTP	ISFP "	INFP "	INTP *
N= 2	N= 0	N= 6	N= 13
%= 2.78	%= 0.00	%= 8.33	%= 18.06
I= 0.72	I= 0.00	I= 2.24	I= 10.54
ESTP	ESFP	ENFP *	ENTP *
N= 3	N= 1	N= 10	N= 8
%= 4.17	%= 1.39	%= 13.89	%= 11.11
I= 1.25	I= 0.24	I= 3.15	I= 6.31
ESTJ "	ESFJ #	ENFJ	ENTJ
N= 3	N= 0	N= 3	N= 5
%= 4.17	%= 0.00	%= 4.17	%= 6.94
I= 0.27	I= 0.00	I= 1.81	I= 2.18

			N	%	I	
J		E	33	45.83	0.97	
U		I	39	54.17	1.03	
D	I	S	18	25.00	0.32	*
G	N	N	54	75.00	3.41	*
I	T	T	48	66.67	1.35	#
N	R	F	24	33.33	0.66	#
G	O	J	29	40.28	0.58	*
	V	P	43	59.72	1.96	*
P	E	IJ	18	25.00	0.66	"
E	R	IP	21	29.17	1.93	*
R	T	EP	22	30.56	1.99	*
C	S	EJ	11	15.28	0.48	#
E		ST	16	22.22	0.55	#
P		SF	2	2.78	0.07	
T		NF	22	30.56	2.33	*
I	E	NT	32	44.44	4.99	*
V	X	SJ	12	16.67	0.28	*
E	T	SP	6	8.33	0.44	"
S	R	NP	37	51.39	4.43	*
	A	NJ	17	23.61	2.26	*
J	V	TJ	22	30.56	0.79	
U	E	TP	26	36.11	3.38	*
D	R	FP	17	23.61	1.19	
G	T	FJ	7	9.72	0.31	*
I	S	IN	28	38.89	3.75	*
N		EN	26	36.11	3.10	*
G		IS	11	15.28	0.36	*
		ES	7	9.72	0.27	*

Note concerning symbols following the seleceion ratios:
* implies significance at the .05 level, i.e., Chi-square >3.8;
# implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
high school graduates from atlas
Base total N = 1943. Sample and base are dependent.

Figure 6. MBTI profile of 1987 CY-TAG participants and results comparing them to a research pool of high school graduates

characterized by a particular type. For example, in looking at the first "ISTJ" box, results indicate that eight CY-TAG students (11.11 percent of the total CY-TAG group) expressed an "Introversion-Sensing-Thinking-Judgment" preference. The percent of CY-TAG students selecting this preference compared to the percent of high school graduates selecting this preference yielded a ratio of 0.62 (the more similar the sample and comparison groups, the nearer the ratio is to 1.0; the more dissimilar the sample and comparison groups, the nearer the ratio is to 0.0). The right-hand side-bars in Figure 6 also contain number, percent, and ratio information on single and paired MBTI dimensions. Appendix F presents number and percent of persons in the comparison group of high school graduates who selected each of the sixteen types.

CY-TAG participants were nearly evenly divided between extraversion (45.8 percent) and introversion (54.2 percent), and between judging (40.28 percent) and perceiving (59.72 percent). Differences appeared between sensing (25 percent) and intuiting (75 percent) types, and between thinking (66.67 percent) and feeling (33.33 percent) types.

The CY-TAG group is therefore dominated by intuiting and thinking preferences, and is best described as an INTP group. Intuitive learners are interested in solving new problems; in language, words, and other symbols; and in hidden meaning and possibilities. MBTI interpreters suggest that these students may act out or become lost in their own thoughts during activities that focus primarily on factual content, such as lecture, recitation, and drill; in addition, they are frequently

careless in detail work (Lawrence, 1984; McCaulley & Natter, 1974). In discussions or presentations, intuitors respond positively to introductory explanations of conceptual perspectives with a minimum of details; their productivity may occur in bursts and spurts rather than in a consistent even flow (Kummerow, 1985). They thrive on theoretical discussions and tasks requiring imagination and insight. Isabel Briggs Myers (1980) noted that intuitive types dislike repetitious activities, enjoy learning a skill more than applying it, and are impatient with routine details but patient with complicated situations.

Thinking learners are typified by a preference for cause-and-effect analysis, both achievement and task orientation, and a need to master content. Thinking types respond favorably to discussions and presentations which are concise and logical as well as objective and reasonable (Kummerow, 1985). Positive instructor response to their efforts serves as an impetus to learning among thinking types; they are likely to feel compelled to learn when they are provided with the logic and rationale underlying various activities (Lawrence, 1984; McCaulley and Natter, 1974). Myers (1980) described thinking types as impersonal decision-makers who are analytical and firm-minded.

As depicted in Figure 6, chi-square analysis revealed that CY-TAG students differed significantly from the sample of high school graduates of all ability levels on six of the eight dimensions. The CY-TAG group had fewer sensing types and more intuitive types (significant at the .001 level); more with preferences for thinking and fewer with preferences for feeling (.01); and fewer judging types and more perceptive types (.001).

Results also revealed that the academically gifted CY-TAG group differed from the comparison sample of high school graduates (whose ability levels approximated a normal distribution) on 23 of the 28 single and combined preferences analyzed; 17 of the 23 differences were significant at the .001 level.

Appendices contain additional information. Appendix F offers a definition of MBTI types and terms (as well as the type table which describes the comparison group of 1943 high school graduates). Appendix G contains two articles which offer a more detailed description of both CY-TAG MBTI results and possible applications of those results to the CY-TAG program. (Information from these papers also will be presented at the June 1988 APT [Applications of Psychological Type] regional Great Plains Conference.)

Learning Styles Inventory

To provide an activity-oriented analysis of learning style, all CY-TAG students and instructors completed the Renzulli-Smith Learning Styles Inventory. This instrument assesses respondents' two most- and two least-preferred learning/teaching styles from among discussion, drill, independent study, lecture, peer teaching, programmed instruction, projects, teaching games, and simulation. Computer-generated results (Dr. Robert Rosemier, Northern Illinois University, DeKalb, Illinois) reported each student's and instructor's two most-preferred and two least-preferred styles of learning or teaching. These results were shared with instructors and students during the first week of the CY-TAG session.

Table 6 lists in rank order the combined preferences of students enrolled in each course and the combined preferences of the three instructors.

Instructors received LSI results during the first week of classes and made appropriate adjustments in curricular activities. Students in all three groups expressed strong preferences for independent study and discussion, and preferred simulation, drill, and lecture least of all. Although students and faculty preferences differed, means on student and faculty/staff questionnaire items which assess frequency of various teaching/learning activities (Appendix I) indicate that classroom tasks generally were balanced and varied. Lecture was utilized only "somewhat," while independent activities occurred to a "moderate" or "large" extent.

Table 6. Most- and least-preferred learning/teaching styles among CY-TAG subjects by number of persons in each group

Group	Most-preferred	Least-preferred
Biotechnology	Independent study (9) Discussion (8)	Drill (11) Simulation (10) Peer teaching (9)
Expository writing	Discussion (8) Simulation (7) Independent study (6) Peer teaching (5)	Lecture (9) Drill (8)
Pre-calculus mathematics	Independent study (17) Discussion (16) Teaching games (14)	Simulation (18) Lecture (9)
Instructors	Discussion (3) Lecture (2)	Simulation (2) Teaching games (2)

Academic Accomplishments

Table 7 presents information relative to the academic accomplishments of students during the three-week CY-TAG session. Section 1 lists means and standard deviations of biotechnology pre- and post-test scores in terms of number correct, number wrong, and number not attempted. The

Table 7. Academic accomplishments during CY-TAG

BIOTECHNOLOGY - Pre- and post-test results on instructor-made test with 50 items

	No. correct (a)		No. wrong		No. not attempted (b)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Pre-test	13.37	5.75	13.37	3.52	23.25	1.39
Post-test	26.31	6.37	15.25	6.15	8.44	1.31

(a) $t = -14.14$, $p<.0001$

(b) $t = 11.19$, $p<.0001$

PRE-CALCULUS MATHEMATICS

Course successfully completed	by number of students
Algebra I	26
Algebra II	29
Geometry	11
Algebra III	7
Trigonometry	4
Analytical Geometry	2

major statistical test revealed a significant difference ($p < .0001$) between the number of items answered correctly on pre- and post-tests. Additional statistical procedures indicated that this difference was attributable to students attempting more items on the post-test rather than to fewer number of incorrect items.

Section 2 lists numbers of pre-calculus mathematics students who scored at least 85% on particular math achievement tests. Those participants therefore successfully completed the specific courses and were certified in those content areas.

All Expository Writing students earned both pre- and post-test scores of three on a five-point holistic scoring scale (with 1 or 2 = placement in second semester Freshman English at ISU and 5 = remediation needed; Chapter III contains a more detailed explanation of the scoring process and results). Those results indicate that at both program initiation and program conclusion, all junior-high students enrolled in the CY-TAG course would have been placed in first semester Freshman English at ISU. The constancy of their scores is attributable to (a) statistical regression toward the mean, particularly among highly homogeneous students, and (b) the difficulty in measuring changes in writing skill over only a three-week period.

In addition, results from student, faculty/staff, and parent questionnaires all reveal high mean responses on items assessing the amount and degree of challenge in the material covered, the ability level at which participants performed, their continued interest in the subject area, and the analysis of various instructional activities (Appendix I).

These findings all serve as indicators of the high academic quality and challenge generated through CY-TAG. Furthermore, in their responses to open-ended questions (Appendix I), students, parents, faculty/staff, and school principals discussed academic challenge and accomplishment as a strong, positive aspect of the CY-TAG program.

Significant Differences among Students by Course Enrollment

Table 8 presents results of one-way ANOVA procedures which yielded significant differences when CY-TAG students were compared on the basis of course enrollment. The Duncan range test was used to detect differences between specific groups. A significance level of .05 was established for both procedures.

When compared with biotechnology and composition students, those enrolled in pre-calculus mathematics reported they received less help from the instructor and the teaching assistants, and that the instructor and teaching assistants seemed less interested in students' ideas. Pre-calculus mathematics students also indicated that they found class less interesting and class activities less worthwhile than did enrollees in the other two classes. The finding that lecture was used to a far less extent in the pre-calculus class than in the other two courses is appropriate and consistent with the intent and design of the SMPY "DT-PI" model adhered to in that course. The Duncan range test indicated significant differences in terms of the extent to which students learned by working with peers when biotechnology students were compared to composition and mathematics students and when composition students were compared to mathematics students. Pre-calculus math students differed

Table 8. Significant differences in analysis of variance among CY-TAG students when compared by course enrollment

ITEM	N	Mean	S.D.	F-ratio	Duncan
Amount of help rec'd from instructor					
Biotechnology	16	4.63	.50	7.85	b,c
Expository Writing	17	4.53	.72		
Precalculus Math	39	3.64	1.22		
Amount of help rec'd from TA					
Biotechnology	16	4.63	.50	6.86	b,c
Expository Writing	17	4.35	.70		
Precalculus Math	39	3.59	1.29		
Instructor interested in your ideas					
Biotechnology	15	4.60	.51	11.40	b,c
Expository Writing	17	4.82	.39		
Precalculus Math	38	3.66	1.19		
TA interested in your ideas					
Biotechnology	15	4.67	.49	9.32	b,c
Expository Writing	17	4.41	.71		
Precalculus Math	38	3.53	1.20		
Class interesting					
Biotechnology	16	4.31	.70	4.68	b,c
Expository Writing	17	4.47	.51		
Precalculus Math	38	3.76	1.05		
Class activities worthwhile					
Biotechnology	16	4.37	.62	4.87	b,c
Expository Writing	17	4.59	.51		
Precalculus Math	38	3.79	1.19		

---

a At the .05 level, results of the Duncan range test indicated differences between the Biotechnology and Expository Writing groups.

b At the .05 level, results of the Duncan range test indicated differences between the Biotechnology and Precalculus Mathematics groups.

c At the .05 level, results of the Duncan range test indicated differences between the Expository Writing and Precalculus Mathematics groups.

Table 8. (continued)

ITEM	N	Mean	S.D.	F-ratio	Duncan
Lecture in class					
Biotechnology	16	4.06	.93	41.67	b,c
Expository Writing	17	3.76	1.25		
Precalculus Math	38	1.61	1.03		
Learn by working with other students					
Biotechnology	16	3.25	.86	24.32	a,b,c
Expository Writing	17	4.35	.93		
Precalculus Math	38	2.10	1.29		
Variety of activities					
Biotechnology	16	3.31	1.12	2.58	b
Expository Writing	17	4.12	1.05		
Precalculus Math	39	4.00	1.15		
Problem-solving skills in class					
Biotechnology	16	3.19	.83	4.66	b
Expository Writing	17	3.76	.97		
Precalculus Math	37	4.08	1.04		
Independent activities in class					
Biotechnology	16	4.13	.72	2.47	c
Expository Writing	17	3.94	.97		
Precalculus Math	38	4.45	.79		

from biotechnology students in that they reported greater variety in class activities and greater use of problem-solving skills in class. Pre-calculus mathematics students also indicated that they had engaged in more independent class activities but fewer small group activities than did those in expository writing; these inverted results are not only consistent with each other, they are also consistent with the intent and design of each course.

Significant Differences between Students by Gender

Results from t-test procedures. Table 9 lists significant differences on independent t-tests when students were compared by gender. It is important to note that although male means were high (approximately 3.8 on a 5-point Likert-type scale), the significant differences observed through t-test procedures were attributable to female means which were consistently higher than male means on each of the following items: amount of help received from the instructor and the teaching assistant/s; instructor's knowledge about course content and about characteristics and needs of gifted learners; resident assistants' knowledge of adolescent social and emotional needs; the extent to which instructors and resident assistants appeared interested in students' ideas; and the extent to which class activities involved critical thinking skills and peer interaction.

Results from discriminant analysis procedures. Discriminant analysis procedures were used as a method of further measuring gender differences using independent variables on which t-tests had yielded significant differences. Means and standard deviations of each of those nine variables are listed by group in Table 10. Two cases were excluded from

Table 9. Significant differences among CY-TAG students when compared by gender

ITEM	MALES			FEMALES			
	N	Mean	S.D.	N	Mean	S.D.	t-value
Amount of help rec'd from instructor	48	3.87	1.20	24	4.46	0.72	-2.57 *
Amount of help rec'd from TA	48	3.83	1.23	24	4.33	0.82	-2.06 *
Instructor knowledgeable about course materials	48	4.69	0.59	24	4.96	0.20	-2.86 **
Instructor knowledgeable about gifted learners	48	3.81	0.89	24	4.17	0.57	-2.05 *
RA's knowledgeable about giftedness	47	3.98	1.13	24	4.42	0.78	-2.04 *
Instructors interested in student's ideas	46	3.83	1.16	24	4.75	0.44	-4.78 **
RA's interested in student's ideas	46	3.87	1.09	24	4.50	0.66	-3.01 **
Critical thinking skills used in class	47	3.85	1.23	24	4.50	0.78	-2.70 **
Learn by working with other students	47	2.55	1.32	24	3.58	1.50	-2.97 **

* Significant difference at .05 level
** Significant difference at .01 level

Table 10. Discriminant analysis of CY-TAG groups by gender -- group means and standard deviations on independent variables (n=70)[a]

Variable	Males (n=46) Mean	S.D.	Females (n=24) Mean	S.D.
Amount of help rec'd from instructor	3.93	1.14	4.46	0.72
Amount of help rec'd from TA	3.89	1.18	4.33	0.82
Instructor knowledgeable about material	4.70	0.59	4.96	0.20
Instructor knowledgeable about giftedness	3.83	0.90	4.17	0.56
RA knowledgeable about giftedness	3.80	1.13	4.13	0.68
Instructor interested in my ideas	3.83	1.16	4.75	0.44
RA interested in my ideas	3.87	1.09	4.50	0.66
Critical thinking skills used in class	3.85	1.25	4.50	0.78
Learned by working with other students	2.57	1.33	3.58	1.50

[a]2 of the 72 cases were excluded from the analysis because data on at least one discriminating variable were missing

the discriminant analysis procedures because of missing data; therefore, these and other calculations were based on 70 cases.

Table 11 contains the intercorrelations of the nine variables. High correlations occurred between (a) satisfaction with the amount of help received from the instructor and the amount of help received from the teaching assistant/s, and (b) satisfaction with the amount of help received from the instructor and the amount of interest instructors showed in students' ideas. Moderate correlations existed between (a) satisfaction with the amount of interest instructors showed in students' ideas and the amount of help received from the teaching assistant/s; (b) the extent to which resident assistants were knowledgeable about gifted adolescents and the extent to which they were interested in students' ideas; and (c) the extent to which instructors were knowledgeable about

Table 11. Discriminant analysis of CY-TAG groups by gender -- intercorrelation of independent variables

	1	2
1. Amount of help received from instructor	1.00000	
2. Amount of help received from TA	0.87619	1.00000
3. Instructor knowledgeable about course material	0.27769	0.18900
4. Instructor knowledgeable about gifted learners	0.44196	0.40703
5. RA knowledgeable about giftedness	0.23144	0.17922
6. Instructor interested in your ideas	0.72526	0.67630
7. RA interested in your ideas	0.07638	0.07626
8. Critical thinking skills used in class	0.38983	0.28760
9. Learn by working with other students	0.24166	0.24910

3	4	5	6	7	8	9
1.00000						
0.43311	1.00000					
0.13029	0.21855	1.00000				
0.34318	0.57225	0.24348	1.00000			
0.08230	0.11301	0.63094	0.26430	1.00000		
0.25028	0.16108	0.02823	0.30819	-0.03999	1.00000	
0.03198	0.14739	0.02477	0.23832	0.03725	0.27600	1.00000

Table 12. Discriminant analysis of CY-TAG groups by gender -- summary of variables remaining at conclusion of analysis

Step	Source of variation	F	Wilk's Lambda	Standardized Coeffecients	Significance Level
1	Instructor interested in my ideas	14.0606	.82	0.8223	.0004
2	Learned by working with other students	9.0537	.79	0.4898	.0003
3	RA interested in my ideas	6.9057	.77	0.3345	.0004
4	Amount of help received from TA	5.4737	.76	-0.3607	.0007

Chi square = 19.160 ***, Canonical correlation = .502 ***

*** p < .0001

gifted students and the extent to which they were interested in students' ideas.

The nine variables were allowed to enter in a step-wise fashion. At each step, the variable with the highest F value entered the analysis; SPSS-X default values set the F to enter at $F \geq 1.0$ and the F to remove at $F \leq 1.0$. Wilks' Lambda was used to establish the point at which the F-approximation would not be affected by the entry of another variable. Four of the nine variables remained at the end of the analysis. Table 12 reports these variables, the step at which each variable entered the analysis, standardized coefficients, and the significance level at each step.

The four variables entered into the final linear discriminant function with a chi-square value of 19.160, significant at the .0007 level, indicating that a linear combination of those four variables significantly discriminates between participants by gender. The canonical correlation of .502 indicates that the function accounts for 25 percent of the variance in group membership. The variable which contributed most to the discriminant function was amount of instructor interest in students' ideas.

Table 13 presents correlations between the discriminating variables and the function. Again, instructor interest in ideas (with a correlation of .86) was highly correlated with the discriminating function and contributed most to group differences.

Table 13. Discriminant analysis of CY-TAG groups by gender -- correlations between the discriminating variables and the function

Variable	Correlation
Instructor interested in my ideas	0.78
Learned by working with other students	0.61
RA interested in my ideas	0.54
Instructor knowledgeable about gifted students	0.43
Amount of help rec'd from instructor	0.42
RA knowledgeable about gifted persons	0.36
Amount of help rec'd from TA	0.34
Use of critical thinking skills in class	0.27
Instructor knowledgeable about material covered	0.26

Table 14 lists group centroids. On the average, males were represented by smaller discriminant function scores (-0.41) than females (0.79). The groups are well discriminated by group centroids of opposite direction.

Table 14. Discriminant analysis of CY-TAG groups by gender -- group centroids

Group	Group centroid
1. Males	-0.41
2. Females	0.79

Classification results are presented in Table 15. Among the male group, 38 of the 46 cases (82.6 percent) were classified correctly, and only eight (17.4 percent) were incorrectly assigned to the female group. Among the female group, 11 of the 24 cases (45.8 percent) were classified correctly and 18 (54.2 percent) were classified incorrectly. Overall,

72.86 percent of the cases were classified correctly. The function provided the greatest amount of accuracy in identifying male students and was considerably less accurate in identifying female students. In summary, the discriminant analysis results support the observation that there were significant differences between CY-TAG students when compared by gender on affective variables.

Table 15. Discriminant analysis of CY-TAG groups by gender -- results of classification analysis in cross-validation testing

Group	Prior probability (pct)	Actual number of cases[b]	Predicted group membership[a]	
			Males	Females
Males	65.71	46	38 (82.6%)	8 (17.4%)
Females	34.29	24	11 (45.8%)	13 (54.2%)

[a] Overall, 72.86% of the cases were correctly classified.

[b] Based on 70 cases used in analysis. Two cases were excluded from analysis because data on at least one discriminating variable were missing

Student Responses to Open-ended Questions

Appendix I contains tabulations of student responses to open-ended questions. Most frequently cited as program aspects liked best were the academic challenge, the co-curricular activities, and the opportunities to meet new friends. Program features which students liked least included rules and regulations, psychological testing, and required attendance at co-curricular activities. Students felt that CY-TAG impact in the coming

school year would be evidenced by their acceleration; they also believed they would find school work easier as a result of their CY-TAG experiences. Participants would recommend CY-TAG to other TIP finalists because "You learn a lot" and "It's fun." Many suggested that in the future, participants receive their roommate's name and address prior to CY-TAG to facilitate both becoming acquainted and making travel and packing arrangements.

Students were asked to describe the most important change in themselves which could be attributed to CY-TAG. Comments frequently dealt with academic improvement, development of self-responsibility and social skills, and an enhanced understanding of giftedness.

Parent Results

Demographics

Sixty-seven parents returned surveys. Fifty-eight of these were completed by participants' mothers and eight were completed by legal guardians (fathers or grandmothers); missing cases equaled one.

General Findings

Appendix I contains means, standard deviations, frequencies, and valid percents for each item on the parent questionnaire. Parental satisfaction with the program is illustrated by results which reveal means of at least 4.1 on all five-point Likert-type items (1 = most negative response and 5 = most positive response). No significant differences were revealed by t-tests when parents were grouped and compared by gender of the students.

Significant Differences between Students and Parents

Student and parent data were merged and their responses were contrasted through paired t-tests. Table 16 presents findings which indicate significant differences between the two groups. Each of the sixteen items described statistically on that table is characterized by a lower mean on student responses and a higher mean on parent responses.

Table 16. Significant differences between students and parents

ITEM	N	Students Mean	Students S.D.	Parents Mean	Parents S.D.	t-value
Satisfaction with:						
Amount of material covered	63	4.048	1.184	4.825	.423	.0001***
Variety of activities	63	3.089	1.216	4.508	.914	.0001***
Amount of help rec'd from instr.	60	4.100	1.115	4.500	.928	.008 **
Amount of help rec'd from TA	59	4.017	1.152	4.559	.815	.0001***
Degree to which:						
Instructor knowledgeable about course material	58	4.741	.548	4.897	.307	.038 *
Instructor knowledgeable about gifted learners	50	3.940	.843	4.320	.913	.009 **
Instructor knowledgeable about social/emotional needs	53	3.830	1.105	4.245	.979	.016 *
TA knowledgeable about course material	55	4.491	.573	4.709	.458	.009 **
RA knowledgeable about gifted	55	3.891	1.048	4.291	.875	.004 **
Class interesting	63	4.079	.885	4.524	.820	.0001***
Class activities worthwhile	59	4.153	.979	4.491	.796	.010 **
Homework assignments worthwhile	51	3.765	.929	4.294	.923	.001 **
Problem solving used in class	45	3.756	1.069	4.444	.725	.0001***
Critical thinking used in class	52	4.135	1.067	4.500	.754	.040 *
Still interested in course topic	65	4.461	.849	4.708	.072	.017 *
Understand why selected	64	3.828	1.077	4.313	.941	.005 **

* Significant differences at .05 level
** Significant differences at .01 level
*** Significant differences at .001 level

Items assessed satisfaction with the amount of material covered in classes, the variety of class activities, and the amount of help received from the instructor and teaching assistant/s. On additional items where significant differences are apparent, students and parents indicated the extent to which the instructor was knowledgeable about course material, about gifted learners, and about the social and emotional needs of adolescents; teaching assistants were knowledgeable about course material; resident assistants were knowledgeable about giftedness; class was interesting; class activities and homework assignments were worthwhile; problem solving and critical thinking skills were used in class; students remained interested in the content area; and the extent to which students and parents understood the CY-TAG selection process. Although statistical analysis revealed significant differences at the .05 level, caution should be exercised in the attention assigned to results; in several instances, the lack of practical significance overshadows statistical significance.

Parent Responses to Open-ended Questions

Appendix I contains tabulated responses to open-ended items on the parent survey. When asked to describe aspects of CY-TAG which they liked best and to list reasons they would recommend CY-TAG to other gifted students and their parents, respondents most frequently discussed their child's interaction with ability peers and faculty/staff personnel, as well as the opportunities for independence and academic challenge afforded the participants. Program features least liked included residence facilities (particularly the lack of air conditioning), restrictions on communicating with participants, and students' need for more sleep and

study time. Three-fourths of the parents credited CY-TAG with improved self-esteem that was evident in their children following the session; one-fourth had noted no change in self-esteem. About one-half of the respondents found local school perceptions of CY-TAG to be positive; about one-fifth felt their administrators were uninformed about CY-TAG. Consistent with student requests, parents asked that in the future, roommate and scheduling information be provided in the weeks prior to CY-TAG.

Faculty/Staff Results

Demographics

CY-TAG faculty consisted of course instructors and their teaching assistants (one in expository writing, two in biotechnology, and four in pre-calculus mathematics). Support staff consisted of the program coordinator, the head resident, and residence hall assistants. Results are presented in the aggregate for a total of twenty-one respondents.

Descriptive and Statistical Findings

Appendix I displays means, standard deviations, frequencies, and valid percents for Likert-type and other closed-form items on the faculty/staff program evaluation questionnaire. The number of Likert-type items addressing curricular and co-curricular aspects and having calculated means of at least 4.0 on a five-point scale (5 = most positive response) document overall effectiveness and satisfaction with the program. Items with slightly lower means assessed teaching and resident assistants' knowledge of the needs of both adolescents and gifted students.

Appendix I summarizes faculty/staff responses to open-ended questions. Aspects of the program which CY-TAG personnel liked most included cooperation among staff members, interaction with students, and the teaching situation itself. They least liked what appeared to be an unorganized chain of command and the psychological testing required of students. When asked to describe what CY-TAG participation had meant to them personally, faculty and staff most frequently discussed improved teaching skills, association with respected colleagues, and a better understanding of giftedness.

School Administrator Results

Demographics

Completed questionnaires were returned by forty-four school principals. CY-TAG participants were proportionately represented both in terms of gender and course enrollment. Small-, middle-, and large-sized districts (classified by 1987 enrollment as defined in Chapter III) were equally represented.

Descriptive Findings

Appendix J lists school administrator responses in terms of item frequencies and valid percents. Most principals reported that they had visited with both CY-TAG students and their parents about the information; they also indicated that parents had presented them with timely information about the program. The most helpful sources of information about the program were, in rank order, CY-TAG program materials, the district talented-and-gifted teacher, and CY-TAG students and parents.

One-fourth of the students were re-tested by local school officials as a basis for credit/acceleration decisions. One-fourth of the respondents stated that their CY-TAG students had been granted high school credit for CY-TAG work; one-half reported that their CY-TAG students were placed in advanced courses as a result of CY-TAG achievements.

Regarding local efforts to meet the academic needs of gifted students, two-thirds of the administrators reported that their CY-TAG students were currently participating in local gifted programs. Nineteen indicated that students were involved in independent study topics, seven were working with mentors, four were enrolled in college or correspondence courses, and only one was enrolled in an Advanced Placement course (a College Entrance Examination Board program through which students can earn simultaneous high school and college credit). In terms of program options, most administrators prefer a combined enrichment/acceleration approach as opposed to either model by itself. While CY-TAG represented initial experience with an acceleration program for over half of the principals, nearly all of the respondents believed that high-ability students are capable of the fast-pace, accelerated coursework typified by CY-TAG.

The respondents perceived the academic challenge and motivation to be CY-TAG strengths. They expressed a desire for improved communication and coordination between CY-TAG officials and local school officials. More specifically, as constructive remedies, they suggested in-service for local administrators and gifted coordinators, earlier transmittal of information, and follow-up possibilities for credit and placement options.

Assessment of Key Features of the CY-TAG Program

Understanding of Identification Process

CY-TAG students and parents were asked to indicate the extent to which they understood the selection and identification process; faculty/staff were asked to indicate their perception of students' understanding of that procedure. Results are documented in Appendix I. Responses were selected along a Likert-type scale characterized by a 1-5 range representing the most negative to the most positive choices. Calculations yielded identical student and faculty means of 3.79 (where 3 = "to a moderate extent"). Parent understanding of the identification process was slightly higher with a mean of 4.31 (where 4 = "to a large extent").

Cognitive Growth

Cognitive growth among CY-TAG participants is supported by a number of results. First, pre- and post-test scores (particularly in biotechnology) as well as the number of mathematics courses completed indicate significant academic achievements. Second, while most students and parents characterized students as working below their abilities in regular school classes, nearly two-thirds of the students and parents felt participants had worked at their ability level during CY-TAG and about one-third indicated that students had worked above their ability level during the session. In addition, faculty and staff personnel characterized students as working at their ability level during CY-TAG. Third, free-form responses provided by persons in all four constituent

groups contained references to academic challenge and growth as integral to CY-TAG experiences.

Affective Growth

While mean responses to most questionnaire items were above 4.0 on a five-point scale, student responses to items dealing with affective needs of gifted students generally yielded slightly lower ratings (between 3.0 and 3.9). Informal evaluations offered by instructional and support staff members during the first half of CY-TAG also revealed that they experienced some difficulty in adapting to the needs and characteristics of students who were both young adolescents and highly gifted. The need to specifically address affective needs is also highlighted by somewhat lower means on staff responses to items assessing faculty and staff understanding of giftedness and adolescence. However, strong support of affective development is found in written observations offered by students, parents, staff, and administrators regarding student improvements in self-esteem, self-responsibility, and understanding of giftedness which were apparent following attendance at CY-TAG. Persons in all four groups also noted the benefits of association with ability peers.

Appropriate Classroom Conditions

The presence of appropriate classroom conditions is indicated by the academic achievement of participants; by the variety of learning activities; through comments regarding the fast pace as well as the high degrees of challenge and motivation evident; and by estimations of the quality of work expected from students.

Co-curricular Environment

While students, parents, and staff were generally satisfied with the variety of co-curricular activities offered, specific changes were requested for subsequent sessions. First, students, parents, and staff asked that, rather than requiring all students to participate in all events, a number of activities be optional or elective. Second, students requested more free time to spend with their ability peers. Third, students chafed at a number of rules and regulations. Fourth, parents expressed a concern about problems in communicating with their children during out-of-class hours.

Attitudes toward CY-TAG

In general, all four publics expressed very positive attitudes about the staff, structure, and academic and cognitive growth which characterized CY-TAG. School administrators acknowledged the value of the program and encouraged its continuation. Students and parents alike stated that they would recommend CY-TAG to other Duke TIP finalists and their parents. While mean responses on Likert-type items dealing with student-staff interaction were generally quite high, there is some indication that when they were compared to male students, females felt they received more help and attention from staff members and that staff members were more interested in their ideas. Also, students, parents, and staff expressed dissatisfaction with the amount of psychological testing required of participants.

Acceleration or Credit

One biotechnology student, three expository writing students, and eighteen mathematics students were placed in advanced courses in their local schools as a result of CY-TAG accomplishments. Eleven students were granted high school credit for their CY-TAG work. However, results indicate local concerns related to credit/placement issues which are attributable to (a) local parameters for granting credit, (b) lack of resources and advanced placement possibilities in the large number of small Iowa school districts, and (c) an expressed need for support from the CY-TAG staff in terms of follow-up credit/placement possibilities as well as methods of integrating CY-TAG achievements into the regular school curriculum.

Communication with Parents and School Officials

Overall, parents were quite satisfied with information they received prior to CY-TAG and the evaluation summaries they received following the session. School principals, however, emphasized the need for greater cooperation and communication between CY-TAG personnel and local school administrators. They also asked for more specific information on written summaries and suggested an in-service session directed at local administrators and gifted teachers to facilitate that cooperation.

Strengths of the Program; Need for its Continuation

The strengths of the CY-TAG program, the need for its existence and continuation, and the personal benefits which accrued as a result of CY-TAG participation are best expressed in the words of those most

directly involved with the program. Listed below are specific comments taken from individual evaluation questionnaires.

Student Comments

"I feel that I have become more open with people and can share my feelings better."

"I've grown up; my writing and thinking skills have matured and so have I."

"No, I wouldn't recommend CY-TAG to other students. I want to make sure I get to come back next year!"

"I feel more positive about writing. I don't know exactly how to say it, but I feel like a switch has been thrown inside me and now I feel with all my heart that writing is something I want to do."

"I think I changed most in learning how to use my time wisely. At home, I didn't have to worry because I could get everything done in a snap. Here, I actually had to study."

"I now know that there are a lot of people about as smart as me, and they can't spell eather [sic]."

"I have a different outlook about gifted people. I now see that they are normal people, just like everyone else, and not weird or strange."

"I realized my potential and found how much I can accomplish if I try."

"Tell other kids to come to CY-TAG! Tell them they will never NEVER experience the academic challenge or the terrific people they'll find here."

"I learned more about science than I ever knew."

Faculty/Staff Comments

"CY-TAG has been a very enriching and refreshing part of my summer. We cannot help but feel good with the knowledge that we have touched students and helped them learn and grow. It has been a very positive experience for me."

"It has given me the opportunity to experience gifted kids in action. I had never worked with them before. I also learned what it was like to work closely with another teacher. I learned a lot about myself, and I accumulated some new ideas for teaching strategies."

"I have learned from my students and enjoyed them thoroughly. This has been one of the most rewarding and stimulating teaching experiences of my life -- so much so that I have been considering the teaching of gifted students as a serious professional interest."

School Principal Comments

"Strengths of the program are (1) its attention to intelligence -- we claim to be excellent in education but we're behind in this area, and (2) the confidence it builds in participants."

"Our student's writing skills improved significantly after participation. Fantastic academic challenge for gifted students."

"CY-TAG provides recognition to talented students and gives them a chance to be with many other talented students. Please continue the program!"

"Our student thoroughly enjoyed her experiences -- both the academic work and the social interaction."

"CY-TAG meets the needs of extremely gifted students by allowing appropriate content and pace. The prescriptive approach is great. I appreciate the fact that there is another option for these kids. Keep up the good work."

Parent Comments

"She feels more confident in herself and the fact that she is gifted. She was relieved to meet so many other gifted children to whom she could relate and with whom she could become friends. The program for her was in many ways an 'I'm OK - You're OK' experience."

"His self-esteem has been strengthened. He's not afraid of being different from his classmates. The instructors, RA's, and other CY-TAG participants treated him as an equal. Thank you for the tremendous amount of work that went into this three weeks. It was truly worth every second!"

"He is more self-directed, more aware that learning is a personal responsibility - not a teacher's requirement to be avoided if possible. Congratulations!"

"It's a unique and wonderful experience for both child and parents. The attitude of staff and counselors was so uplifting...I have never felt more proud to be included in a group....[Our daughter] loved the college atmosphere and really looks forward to college in a few years. She leans toward ISU as her choice now."

"He acts like a young swallow that has discovered why God gave him such large wings -- he wants to soar."

CHAPTER V. DISCUSSION, SUMMARY, AND CONCLUSIONS

This chapter briefly summarizes the research project, discusses results detailed in Chapter IV, and presents conclusions and implications based on those results. It also contains recommendations for further study.

Summary of the Research Project

The research design for this study involved two components and their individual goals: the collection of Time One data for a time-series/ longitudinal study which profiles the characteristics of highly gifted Iowa seventh and eighth graders; and data collection and analysis conducted for program evaluation of the first session of CY-TAG, a three-week ISU summer residential program which offered fast-paced courses in pre-calculus mathematics, biotechnology, and expository writing to 72 academically precocious seventh and eighth graders. Implementation of this research project was based on a synthesis of (a) general program evaluation models and theories, (b) models, theories, and issues pertinent to evaluation of programs for talented-and-gifted students, and (c) research and evaluation needs within talented-and-gifted education.

A two-fold purpose also characterizes the study. First, it provides benchmark information on Iowa gifted students which will later serve as the basis for comparative studies and trend analysis as additional data are collected from a new wave of Duke TIP finalists each year, and through follow-up surveys at the time of subjects' high school and college graduations. Second, it provides program evaluation information to

various constituencies involved with or influenced by the CY-TAG program, including the CY-TAG Advisory Committee, outside funding agencies, and CY-TAG faculty/staff, students, their parents, and their school administrators.

The over-arching need for the study, as discussed in the introductory chapter, arose from several current situations. Although ISU has served as the site for the annual Iowa Duke TIP awards recognition ceremony for seven years, the only descriptive information on those finalists has been their SAT scores; no definitive data had been collected from this population. Also, because the State of Iowa Code delineates identification of gifted students as a matter of local district control, it had not been feasible to undertake a longitudinal study of Iowa gifted students since the identification variable could not be controlled. In addition, this study recognizes the importance of formative evaluation, particularly in conjunction with an initial program effort. Both components of the research project recognize the need of every gifted student to have access to an appropriate educational environment which promotes personal growth as well as constructive contributions to society.

The general program evaluation models which served as the foundation for this study fall within the genre of educational decision-making models which serve to enhance the welfare of various publics. As highlighted in the literature review section, these models stimulate the evolution of improved programs and services through emphasis on programmatic issues and values. Previous studies of gifted students provided the underpinnings for the content and focus of the time-series/longitudinal study. The

CY-TAG program evaluation model closely adheres to the Renzulli design which focuses on key features of the particular program undergoing evaluation. The research plan also addresses design and statistical issues specific to gifted programs, such as appropriate assessment measures, appropriate norms, and the question of whether program evaluation should focus on the students served or on the services provided.

Data collection for the time-series/longitudinal study was facilitated through a questionnaire completed by 417 Duke TIP finalists. Since Time One data were gathered for the purpose of generating a baseline profile of the subjects, only descriptive statistical procedures were utilized. Multiple data sources for the CY-TAG program evaluation included questionnaires administered to participants, faculty and staff, students' parents, and their school principals. Data analysis involved t-tests, one-way analysis of variance, chi-square, and discriminant analysis procedures.

Discussion

The Time-Series/Longitudinal Study

A single basic research question guided the time-series/longitudinal study at this initial stage: What characteristics are descriptive of Iowa seventh and eighth graders who are highly gifted, as defined by criteria delineating them as finalists in the Duke Talent Identification Program?

Results indicated that most respondents attended public schools with over 2500 enrollment. Over half of them were participating in a district

talented-and-gifted program at the time of the study. Nearly all students were living with their natural parents who were characterized by high levels of education and employment in professional and technical occupations.

Students expressed positive attitudes toward school in general and toward specific content areas. They also recorded positive self-assessment of their abilities in those areas. However, average responses were somewhat lower when subjects reported the importance they assigned to those content areas in terms of future occupations. Also regarding those content areas, respondents indicated that they received a high degree of encouragement from their mothers, fathers, and teachers but somewhat less support from their peers.

Specific questions elicited information about students' future occupational and educational plans. As seventh and eighth graders, most respondents anticipated career choices in the professional and technical categories. Nearly all subjects reported plans to attend college, with public universities being named most often. Students were evenly divided on their choices of in- or out-of-state colleges and universities.

Participants also expressed attitudes related to self-esteem and giftedness. Two-thirds of the students felt "somewhat" or "very comfortable" with that identification; nearly half felt that being identified as gifted affected others' opinions of them more positively than negatively. When asked what information gifted students needed to receive through school, students assigned greatest importance to planning for school, college, and career. A current profile of their values

indicated that as young adolescents these gifted students attached greatest significance to becoming recognized authorities in a particular field and helping others in difficulty; they assigned least importance to creating original writing or other artistic work. Students also listed recommendations for ways in which educators can be supportive of talented-and-gifted students. Most frequently, they described the need for academic challenges, their desires to be treated like "normal kids" and not stereotyped, and their suggestions for curricular changes. They also called attention to their need for encouragement and guidance as well as the need for improved understanding of giftedness, both from their own perspective as well as that of educators.

CY-TAG Program Evaluation

The program evaluation component of this research project as well as this discussion of the results have been guided by the following evaluation questions:

1. To what extent did students improve academically during the course of CY-TAG?
2. What practices and policies contributed to CY-TAG success or failure?
3. Is there adequate articulation between CY-TAG personnel and students, parents, and school officials?
4. What special programming was offered by school systems to CY-TAG participants as a result of their CY-TAG achievements?
5. How effectively did CY-TAG meet the goal of providing an educationally stimulating experience to highly gifted seventh and eighth graders?

Academic Accomplishments

Results document the excellent academic accomplishments realized by participants during the CY-TAG session. Biotechnology students showed significant gains ($p < .0001$) in achievement on pre- and post-tests in terms of numbers of items marked correctly. Although assessments of expository writing students' holistically scored writing samples remained constant on both pre- and post-tests, students were judged competent as seventh and eighth graders to enter first semester freshman English at ISU; the lack of change in scores is attributable first of all to the difficulties inherent in evaluating writing samples objectively, and second to statistical regression toward the mean among a highly homogeneous group. Large numbers of pre-calculus mathematics students were certified in Algebra I and Algebra II over the three-week period; others successfully completed geometry, Algebra III, trigonometry, and analytical geometry.

Perceptions of impressive academic achievement are further substantiated by results from student, faculty/staff, and parent questionnaires. High mean responses characterized items assessing the amount and degree of challenge in the material covered, the ability level on which students performed, students' continued interest in the content area following CY-TAG experiences, and the analysis of various instructional activities. In addition, when students, parents, faculty/staff, and school administrators were asked to discuss CY-TAG strengths, responses across all four groups consistently spoke to the academic challenge and accomplishment exhibited through CY-TAG. Parents

and students also referred to lasting influences in commenting that because of CY-TAG, students would be able to accelerate their coursework as well as exercise improved skills. These findings provide definitive documentation for the high quality of academic standards and accomplishments typified by CY-TAG.

Factors Contributing to CY-TAG Success/Failure

The success or failure of any educational endeavor is dependent to a large extent on the competence and commitment of program personnel who create the curricular and co-curricular environment. CY-TAG successes are no exception. Expertise and experience characterized program administrators, instructional staff, and support personnel. Analysis of teaching/learning activities revealed that instructors were flexible and responsive in providing a variety of challenging, interesting activities. Students and parents alike commented on the interesting, stimulating environment. Support staff also offered a number of co-curricular activities in an effort to meet the diverse interests of gifted adolescents. Parents and administrators reflected on the need for appropriate content and pace in classes for gifted students, and noted not only the academic accomplishments but also the improved self-esteem which were evident among CY-TAG participants.

Students and parents also remarked about the benefits which accrued as a result of interaction with ability peers, a program feature inherent in the CY-TAG model. Students, parents, and program personnel commented on improved understanding of giftedness and other gifted persons which came about through CY-TAG experiences. The three-week residential

framework also afforded developmental opportunities in terms of enhanced self-responsibility and self-confidence.

Statistically significant results direct attention to several areas of concern. First, significant differences apparent when CY-TAG participants were compared by course enrollment suggest that more deliberate application of MBTI and LSI results may result in making pre-calculus mathematics course activities and student-instructor interaction more appropriate to the learning styles and preferences which typify the student group. Second, t-test and discriminant analysis procedures revealed significant differences between male and female participants on several affective measures. This finding points to the need for increased faculty/staff awareness of the social and emotional needs of gifted adolescents as well as their learning characteristics. Again, more deliberate application of MBTI and LSI profiles may contribute to a more appropriate and responsive environment.

Caution must be exercised in interpreting and applying these results, however. As noted in Chapter IV, male means on affective items were high (generally 3.8 or above on a 5-point Likert-type scale); statistically significant findings resulted from female means (approximately 4.5 or above on a 5-point Likert-type scale) which were consistently higher than male means. This trend suggests evidence of gender bias in that higher female responses may be attributable to their concerns for relationships and nurturance, and may be reflective of generally more positive evaluation ratings assigned by females.

Third, although significant differences were detected between student and parent perceptions of the program, these results do not warrant program modifications. High mean responses of both students and their parents were indicative of CY-TAG program success. However, the finding that parent mean responses were higher than those of students may be essentially attributable to the plea frequently expressed by these advocates of gifted children for more appropriate special programs. Parent ratings may reflect not only the positive remarks about CY-TAG shared by their children, but also their own enthusiasm that a program characterized by academically challenging courses and ability-peer interaction was offered to meet the needs of their gifted children.

Adequate Articulation

Areas of concern generated during the first session of CY-TAG focus on communication needs. Students, staff, and parents voiced opposition to the psychological testing and research components of CY-TAG. Parents also mentioned difficulty in communicating with their children by phone during out-of-class hours. Responses from students, staff, and parents consistently suggested that students were unsure of the CY-TAG identification and selection process. Staff expressed their desires for a more clearly defined chain of command. School administrators asked for earlier and more detailed information regarding CY-TAG coursework and requested placement and acceleration suggestions for returning students. Statistical analyses revealed that female participants often felt they had received more understanding and attention from faculty and staff than did male participants, suggesting a need for more empathetic communication

between staff and gifted adolescents. While these topics point to areas which should be addressed in planning for future CY-TAG sessions, it is important to note that over-all success of the program is indicated in results showing that all but one of the 72 students and all but one parent would recommend CY-TAG to other TIP finalists.

Special Programming

Integral to CY-TAG design and goals is fast-paced instruction which facilitates gifted students' cognitive development and acceleration in academic areas. While CY-TAG offers accelerated and advanced coursework, a key question regarding program effectiveness is that of special programming decisions made in local districts in response to CY-TAG accomplishments. Results of the school administrator questionnaires revealed that, although for half of the principals CY-TAG was the first acceleration experience they had encountered, nearly one-third of the CY-TAG participants were granted high school credit for their CY-TAG work and over half were placed in an advanced course.

Providing an Educationally Stimulating Experience

Results discussed above and detailed in Chapter IV support the conclusion that CY-TAG personnel were extremely successful in providing an educationally stimulating experience for academically precocious seventh and eighth graders. Remarkably few issues or problems evolved during in this first-year effort. High standards of expectation and performance characterized the session, as did positive expressions of cognitive growth evidenced by participants.

Conclusions and Recommendations

The Time-Series/Longitudinal Study

Although this component of the research project generated only benchmark data, several implications emerge in terms of perspectives and approaches advocated in supporting talented-and-gifted adolescents. Results support current concern about the "brain drain" affecting the state of Iowa. Even though higher education facilities are readily accessible in a small state which supports three Regents' institutions, a large number of small private colleges, and an extensive community college system, 56 percent of the schools listed by respondents as possible college choices were located outside the state. Further, 91% of the students expressed a clear preference for public institutions and 88 percent a clear preference for universities, suggesting problems for small private institutions interested in recruiting high-ability students. Results underscore the need for focused programs and activities aimed at retaining gifted persons in the state as they pursue college degrees.

A related need is evidenced by the large number of students anticipating professional and technical careers. A state characterized by a problematic economy and dwindling population base faces serious difficulties in retaining gifted persons intent on professional and technical occupations. Results again highlight the need for retention efforts directed at heightening students' awareness of other high-ability adults who have achieved success and satisfaction in their Iowa-based careers, and encouraging those persons to serve as mentors to younger gifted persons in the state.

The need for career guidance interventions specifically developed for gifted students is also supported by these benchmark data. Although literature on the talented-and-gifted population is replete with references to career indecision well into adulthood, results indicate that the problem is not one of awareness, but rather one of making appropriate decisions. Only 16 percent of the respondents had not yet considered career options; the other 84 percent were able to generate several possibilities. In addition, when students were asked to rate various types of information typically of value to gifted individuals, the items rated most highly were those relating to planning for school, college, and career. These findings suggest that gifted students would be most receptive to benefits derived from coupling further exploration of those career possibilities with extensive assessment of interests and abilities, with decision-making skills, with creative career choices based on combinations of skills and interests, and with role-modeling and mentoring experiences.

Student responses also reflected the influential roles played by parents and educators in academic pursuits. Because these persons provide high degrees of encouragement and support, it is imperative that they also receive information and guidance which will facilitate meeting those responsibilities. Local school gifted coordinators as well as local area education agency consultants can provide valuable sources of printed material and other resource services.

Educators should also heed students' suggestions for offering greater supportiveness and incentive to gifted students. Their comments

consistently revealed their longing to be treated with sensitivity, their need to understand their own giftedness and have others around them also understand that giftedness, and their eagerness to respond to academic challenges.

Further similar studies might address additional factors. First, although their over-representation in the time-series/longitudinal study is attributable to local efforts encouraging large numbers of gifted students to participate in the Duke Talent Identification Program, large districts of over 2500 are the exception rather than the rule in Iowa. Gifted students in small rural districts also should be profiled in terms of characteristics and needs.

Due to the nature of the Duke TIP and its SAT-based criteria, the sample consists essentially of academically gifted students. In recognition of other types of giftedness encompassed by the federal definition, further studies might assess characteristics of adolescents who are gifted in the areas of creativity and leadership. The adequacy of the educational system in meeting their needs represents a critical research problem in gifted education.

Finally, although numerous other studies have documented problems of self-esteem among the gifted population, those responding to the Time One questionnaire exhibited very positive self-esteem in terms of their self-perceived abilities, their comfort in being labeled "gifted," and their perceived locus of control. It is also noteworthy that over half of them were enrolled in local gifted programs. Few studies have examined the long-term benefits of participation in talented-and-gifted programs;

nor is it yet apparent whether or not that participation is a factor in the positive self-esteem voiced by these respondents. However, further documentation and assessment of the relationship between self-esteem and participation in gifted programs will be a vital function of the time-series/longitudinal study initiated as part of this research project.

CY-TAG Program Evaluation

It is obvious that CY-TAG personnel successfully met the program's stated goal of providing an educationally stimulating experience for academically precocious seventh and eighth graders. This was attributable to the expertise and commitment of the administrative, instructional, and support staffs as well as to the caliber and commitment of the participants. In terms of program evaluation, this research project generated positive exciting findings; however, in terms of detecting statistical significance, it was problematic! The following implications and recommendations are offered with the intent of assisting an already excellent program to become even stronger.

Recommendations for future CY-TAG sessions center basically on communication issues. First, based on student and staff responses and comments, it appears that faculty and staff (as well as CY-TAG Advisory Committee members) would benefit from in-service sessions which would heighten their awareness and understanding of gifted adolescents and effective strategies and approaches in teaching and living with them. Results of the Learning Styles Inventory and MBTI (Myers-Briggs Type Indicator) could be utilized during these sessions to structure both academic and extracurricular activities, to match roommates, and to

evaluate effective procedures for residence hall groups. In addition, these persons should be encouraged to attend off-campus seminars and conferences on gifted education throughout the year in an effort to generate new ideas and remain aware of current developments.

Second, results point to the need to communicate and explain rules and regulations to both students and parents. Since several parents reported difficulty in communicating with their children during CY-TAG, particularly by phone, those procedures should be reviewed.

Third, regarding extra-curricular activities, parents, students, and staff requested occasional alternative or optional events rather than mandatory attendance at all activities. While persons in all three groups appreciated the variety of activities and the staff supervision, they also presented a need for greater flexibility and more student choices.

Fourth, it appears that staff, students, and parents would benefit from a more detailed explanation of the purposes and benefits of research testing and its role within the CY-TAG program and the university setting in general.

Fifth, to enhance communication between CY-TAG staff and school principals, program personnel might distribute clarifications of CY-TAG achievements, possible options for granting high school credit or approving acceleration, and ways to integrate CY-TAG learning in the regular school curriculum. Because school administrators noted that post-test results on standardized achievement tests would be useful in credit/acceleration decisions, it is further recommended that such measures be utilized for pre- and post-testing whenever possible. Local

school/CY-TAG relationships could also be improved by providing parents with suggestions on presenting information and requests to school administrators. Program personnel might also offer a late spring and/or early fall in-service for principals and talented-and-gifted coordinators of participants, perhaps on-campus or via the Telenet system. In addition, a high school principal might be asked to join the CY-TAG Advisory Committee to improve communication and cooperation with that constituent group.

Sixth, all program personnel might keep logs of questions and concerns raised by students, parents, and school administrators. This would facilitate both the analysis of communication needs and the generation of ways to meet those needs.

Whether it evolves from research which seeks to profile characteristics and needs of gifted students or whether it evolves from specific programs designed to address the needs of talented-and-gifted persons, the over-arching goal of gifted education is to provide a differentiated environment which challenges and fosters growth in both cognitive and affective dimensions, which develops creative life-long autonomous learners, and which facilitates the development of self-actualized adults. An excerpt from "The Chambered Nautilus" by Oliver Wendell Holmes speaks to that challenge:

> "Build thee more stately mansions, O my soul,
> As the swift seasons roll!
> Leave thy low-vaulted past!
> Let each new temple, nobler than the last,
> Shut thee from heaven with a dome more vast,
> Till thou at length art free,
> Leaving thine outgrown shell by life's unresting sea."

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My gift to each of you is my sincere pledge to continue to share -- both personally and professionally -- not only the talents and abilities with which I was blessed, but also the gifts which you have so freely bestowed.

APPENDIX A.

TIME-SERIES/LONGITUDINAL STUDY FORMS:

COVER LETTERS AND QUESTIONNAIRE

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Iowa State University *of Science and Technology* *Ames, Iowa 50011*

Office of the Dean
College of Education

June 1, 1987

Dear Student:

We are interested in gathering information on Iowa talented and gifted students. Your fine SAT scores indicate that you are an academically gifted person. For that reason, we are asking for your help.

For four years, I enjoyed working as K-12 talented-and-gifted teacher. My commitment to gifted students is an important part of the graduate work I am doing now at ISU. The information we gather will be used in planning special courses and programs for gifted students. It will be useful to people who work with gifted students on state and local levels as well as to people at Iowa State who care about gifted education. You can help just by completing this questionnaire. Although the survey is several pages long, it should take you no more than 15-20 minutes to finish.

There are no "right" or "best" answers to questions in the survey. Results of this study will be helpful to educators and in turn to other gifted students only if those completing the survey answer as honestly as possible.

Your answers will be kept confidential. Your name will never be used in connection with your answers. Results of the study will be described only in terms of large groups -- for example, "all seventh graders" or "students from medium-sized school districts." The number at the top of the survey will help us keep track of returned and unreturned surveys; it will also be used for follow-up mailing and data analysis.

Please complete and return this questionnaire as soon as possible. When you have finished answering the questions, just place the survey in the enclosed envelope. It is already addressed and stamped.

We care very much about gifted students, and we will certainly appreciate your help in this project. If you or your parents have any questions, please write us at the address listed above, or call us at 515-294-7009. Thank you for your time and your thoughts!

Sincerely,

Linda D. Parker

Linda Delbridge Parker
Graduate Student in Education

Daniel C. Robinson

Daniel C. Robinson
Assistant Dean, College of Education
Associate Professor

Iowa State University of Science and Technology Ames, Iowa 50011

Office of the Dean
College of Education

June 25, 1987

Dear Student:

Recently you received a letter asking for your help in gathering information on Iowa talented-and-gifted students. This letter is just a reminder that we still hope to hear from you!

We know you enjoy a break from school and time to get involved in summer activities. We also think you might want to provide information that will be important in making decisions about programs for gifted students on local and state levels, as well as here at Iowa State University. For that reason, we are enclosing another questionnaire (in case the first one got misplaced!) and asking you to take 15-20 minutes to complete it.

Remember that your answers will be kept confidential. Your name will never be used in connection with your answers. Results of the study will be described only in terms of large groups -- for example, "all seventh graders" or "students from large schools." The number at the top of the survey is used to help us keep track of returned and unreturned surveys; it is also used for follow-up mailing and data analysis.

Also, please remember that there are no "right" answers to questions in the survey. Your responses will be most helpful if you simply answer as clearly and honestly as possible.

How about taking a few minutes now to complete the survey? Then just put it in the enclosed envelope (which is already addressed and needs no postage) and mail your survey today!

We care very much about gifted students, and we care very much about your experiences and your thoughts. We will certainly appreciate your participation in this study. Thank you for your time! We hope to hear from you soon.

Sincerely,

Linda Delbridge Parker
Graduate Student in Education

Daniel C. Robinson, Ph. D.
Assistant Dean, College of Education
Associate Professor

Iowa State University of Science and Technology 

DIRECTIONS: PLEASE CIRCLE THE APPROPRIATE NUMBER AS YOU ANSWER EACH ITEM. THE FIRST SET OF QUESTIONS ASK FOR PERSONAL INFORMATION.

Gender
1. Male
2. Female

Race
1. White or Caucasian
2. Black or Afro-American
3. American Indian or Alaskan Native
4. Hispanic
5. Oriental, Asian-American, or Pacific Islander
6. Puerto Rican
7. other

Your grade level as of May 1987
1. 6th
2. 7th
3. 8th

What type of school do you currently attend?
1. public
2. independent or private (non-church)
3. church

In what school district do you attend school?_____

Are you currently participating in a talented-and-gifted program?
1. My school does not have a talented-and-gifted program for students my age.
2. My school has a program for students my age, but I have not been asked to participate.
3. My school has a program for students my age, and I am currently participating.
4. My school has a program for students my age. I have been asked to participate but I have chosen not to.
5. I am participating in a program that is <u>not</u> part of a school program. (Please describe:_____

_____)

Have you ever attended a special summer camp or summer program specifically for gifted students?
1. No
2. Yes -- Please explain.

THE NEXT SET OF QUESTIONS ASK FOR INFORMATION ABOUT SCHOOL.

Please list the school activities and organizations you have participated in from fourth grade through this past school year. Also, list your hobbies and special interests.

Using the following scale, circle the number that best describes your attitude toward each of the following areas whether or not you have taken a course in it.

1 = Strongly dislike
2 = Moderately dislike
3 = Neutral
4 = Moderately like
5 = Strongly like

school in general	1	2	3	4	5
math	1	2	3	4	5
general science	1	2	3	4	5
biology	1	2	3	4	5
chemistry	1	2	3	4	5
physics	1	2	3	4	5
reading & literature	1	2	3	4	5
writing (composition)	1	2	3	4	5
foreign languages	1	2	3	4	5
social studies, history	1	2	3	4	5
physical education	1	2	3	4	5
art	1	2	3	4	5
performing arts -- dance, music, drama	1	2	3	4	5
computer science	1	2	3	4	5

Is there a female in your family who is
1. your mother.
2. your step-mother.
3. your adoptive mother.
4. No female parent resides with my family.

If you answered 1, 2, or 3 above, please list the current occupation of that person.

The highest educational degree this parent has earned is

1. high school diploma.
2. some college.
3. community college or trade school degree.
4. bachelor's degree.
5. master's degree.
6. Ph.D.
7. Other -- Please describe_____

Have you been taught in school about the following?

		No	Yes
Research skills:	Library skills	1	2
	Scientific method	1	2
Study skills		1	2
Problem-solving skills		1	2
Higher level thinking skills (analysis, synthesis, evaluation)		1	2

When you compare yourself to other students in your grade, how do you rate your own ability in the following areas? Use this response scale:

1 = Far below average
2 = Somewhat below average
3 = Average
4 = Somewhat above average
5 = Far above average
N = I have no idea.

school in general	1	2	3	4	5	N
math	1	2	3	4	5	N
general science	1	2	3	4	5	N
biology	1	2	3	4	5	N
chemistry	1	2	3	4	5	N
physics	1	2	3	4	5	N
reading & literature	1	2	3	4	5	N
writing (composition)	1	2	3	4	5	N
foreign languages	1	2	3	4	5	N
social studies, history	1	2	3	4	5	N
physical education	1	2	3	4	5	N
art	1	2	3	4	5	N
performing arts -- dance, music, drama	1	2	3	4	5	N
computer science	1	2	3	4	5	N

Is there a male in your home who is

1. your father.
2. your step-father.
3. your adoptive father.
4. No male parent lives with our family.

If you answered 1, 2, or 3 above, please list the occupation of that parent.

The highest educational degree this parent has earned is

1. high school diploma.
2. some college.
3. community college or trade school degree.
4. bachelor's degree.
5. master's degree.
6. Ph.D.
7. Other -- Please describe_____

What math courses have you taken, or are you taking this year? Circle all that apply.

1. general math -- 7th grade
2. general math -- 8th grade
3. pre-algebra
4. algebra
5. Algebra I
6. Algebra II
7. Algebra III
8. Geometry
9. Analytic geometry
10. Trigonometry
11. Other:_____

What science courses have you taken, or are you taking this year? Circle all that apply.

1. general science -- 7th grade
2. general science -- 8th grade
3. earth science
4. biology
5. chemistry
6. physics
7. other: Please list below.

_____

To what extent do you learn on your own or conduct your own projects outside of school? (Do not include homework or class assignments.)

1. Frequently
2. Often
3. Seldom
4. Never

For each of the following areas, how much support and encouragement have you received from these persons? Use the following response scale:

1 = No support or encouragement
2 = Very little support or encouragement
3 = Neutral
4 = Some support or encouragement
5 = A great deal of support or encouragement

Math					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other: _____	1	2	3	4	5
Science					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5

1 = No support or encouragement
2 = Very little support or encouragement
3 = Neutral
4 = Some support or encouragement
5 = A great deal of support or encouragement

Foreign Languages					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Reading, literature					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Writing, composition					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Physical education, sports					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Art					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Performing arts -- music, drama, dance					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5
Computer science					
Mother	1	2	3	4	5
Father	1	2	3	4	5
Teachers	1	2	3	4	5
Students	1	2	3	4	5
Other:_____	1	2	3	4	5

If you have studied on your own (independently), describe the topics you studied or the projects you completed.

When you think about a future occupation, how important do you think each of these skills will be? Use this rating scale:

4 = Very important
3 = Fairly important
2 = Only slightly important
1 = Not important

math	4	3	2	1
biology	4	3	2	1
chemistry	4	3	2	1
physics	4	3	2	1
reading & literature	4	3	2	1
writing/composition	4	3	2	1
social studies	4	3	2	1
foreign languages	4	3	2	1
computer science	4	3	2	1

List any occupations that you are are most interested in right now as possible occupations. Rank the most preferred choice first, second most preferred second, etc.

1st choice:

2nd choice:

3rd choice:

___I haven't considered any occupations yet.

List any colleges you have considered applying to, with your first choice listed first, second choice second, etc.

1st choice:

2nd choice:

3rd choice:

___I do not plan on attending college.

___I plan to go to college but have not thought about possible schools.

THE LAST SET OF QUESTIONS DEAL WITH YOUR THOUGHTS AND OPINIONS ABOUT GIFTEDNESS.

How do you feel about being identified as gifted?

1. Very comfortable
2. Somewhat comfortable
3. Very uncomfortable
4. Does not affect me either way
5. I don't consider myself to be gifted.

How do you think others' opinions of you are affected by your abilities?

1. Very positively
2. More positively than negatively
3. Not at all
4. More negatively than positively
5. Very negatively

How important is it that gifted students receive help and information in each of these areas? Use this response scale:

4 = Very important
3 = Fairly important
2 = Only slightly important
1 = Not important

Planning for school & college courses	4	3	2	1
How to get along in school	4	3	2	1
Explanation of learning ability	4	3	2	1
How to get along in families	4	3	2	1
How to get along with friends	4	3	2	1
Career planning	4	3	2	1
Understanding giftedness	4	3	2	1
Understanding why I do some things well and some things not so well	4	3	2	1

Are these statements true or not true of you?	True	False
When I succeed, it's usually because of my abilities.	1	2
When I succeed, it's usually because of hard work.	1	2
When I succeed, it's usually because of good luck.	1	2
When I fail, it's usually because I lack ability.	1	2
When I fail, it's usually because I didn't work hard enough.	1	2
When I fail, it's usually because of bad luck.	1	2

If you were to select courses you wanted to take at a summer camp for gifted students, would you choose the following?

	Yes	No
Chinese	1	2
Russian	1	2
Computer programming	1	2
Computer languages	1	2
Science (biology, biotechnology, chemistry)	1	2
Math (algebra, geometry, etc.)	1	2
Writing/composition	1	2

Please list other courses you would be interested in taking.

Use this scale to indicate the importance to you personally of each of the following statements:

1 = Not important
2 = Somewhat important
3 = Very important
4 = Essential

Becoming an authority in my field	1	2	3	4
Obtaining recognition from my colleagues for contributions to my special field	1	2	3	4
Influencing the political structure	1	2	3	4
Raising a family	1	2	3	4
Being very well off financially	1	2	3	4
Helping others who are in difficulty	1	2	3	4
Writing original works (poems, novels, short stories,)	1	2	3	4
Creating artistic work (painting, sculpture, decorating)	1	2	3	4
Being successful in a business of my own	1	2	3	4
Becoming involved in programs to clean up the environment	1	2	3	4
Helping to promote racial understanding	1	2	3	4
Keeping up to date with political affairs	1	2	3	4

What do you think is the most important thing people in school (teachers, counselors, principals, gifted teachers) can do for gifted students?

APPENDIX B.

CY-TAG PROGRAM EVALUATION -- STUDENT FORMS

VERBAL INSTRUCTIONS TO ACCOMPANY ADMINISTRATION OF THE LEARNING STYLES INVENTORY

Information from this Learning Styles Inventory will be used in two ways. First, results will be grouped according to all biotech students, all writing students, and all math students. This information will help your instructors make sure the class activities they have planned are similar to the ways most of you prefer to learn.

Second, so this information is helpful to you, and to help you be aware of situations in which you are likely to learn best, we will share individual results with you during an evening session next week. You will receive a printout of your learning styles profile which you may take home to share with your parents and teachers.

Your participation in completing this inventory is voluntary.

Do you have any questions before we begin?

Please listen carefully to directions for completing the inventory.

SAMPLE ITEMS FROM THE LEARNING STYLES INVENTORY
by Joseph S. Renzulli and Linda Harris Smith
1974, Creative Learning Press, Inc.

Indicate whether each of the following school activities is
A very unpleasant for you,
B rather unpleasant for you,
C neither pleasant nor unpleasant for you,
D rather pleasant for you, or
E very enjoyable for you.

Going to the library with a committee to look up information.

Having a friend help you learn material you are finding difficult to understand.

Studying on your own to learn new information.

Hearing the teacher explain new information.

Learning about an historical event such as the signing of the Declaration of Independence by acting it out in class.

VERBAL INSTRUCTIONS TO ACCOMPANY ADMINISTRATION OF THE MYERS-BRIGGS TYPE INVENTORY

One of the special out-of-class activities planned for you during CY-TAG will deal with making decisions related to career planning. Results of this inventory will give you useful information to consider in making career plans. Also, we will combine results of this inventory with those of the Learning Styles Inventory you completed earlier to give you some helpful information about your own personal learning style. You will be given printed information about your own results to take home and share with your parents.

Your participation in completing this inventory is voluntary. If you are willing to participate, please write your name and class (biotech, writing, or math) on the front. Let's read the directions on the front of the inventory.

Do you have any questions before you begin?

SAMPLE ITEMS FROM THE MYERS-BRIGGS TYPE INDICATOR
by Katharine C. Briggs and Isabel Briggs Myers
1983, Consulting Psychologists Press, Inc.

PART I. Which answer comes closer to telling how you usually feel or act?

In doing something that many other people do, does it appeal to you more to

a. invent a way of your own, or
b. do it in the accepted way?

Does following a schedule

a. appeal to you, or
b. cramp you?

PART II. Which word in each pair appeals to you more?

Facts -- Ideas

Peacemaker -- Judge

VERBAL INSTRUCTIONS TO ACCOMPANY ADMINISTRATION OF THE STUDENT EVALUATION OF CY-TAG

As you know, this was the first summer that Iowa State University offered CY-TAG. Many people spent a great deal of time planning so that you would have three good weeks here. But we want to make sure that next summer's CY-TAG is just as good or even better. We are asking you to complete this evaluation and give us your thoughts about the courses, the activities, the food, and some other things that happened at CY-TAG. You can help us decide what we should keep the same and what we should change for another CY-TAG session.

Your answers will be kept confidential: they will not be shown to your instructors, teaching assistants, or RAs. I need your name on the form for two reasons: (a) I may need to call you later to get some additional information on comments or suggestions you have offered, and (2) I will mail to all students who complete this survey a summary of the results so that you know how participants evaluated CY-TAG. As soon as I have made lists of those to be called and those to be mailed summaries, I will remove all names from the surveys. When I report the results of your evaluations, it will be in terms of groups -- for example, "all math students," or "all seventh graders," or "all females."

By sharing your thoughts and suggestions, you will help us make improvements in CY-TAG which will benefit other gifted students and yourselves as well if you choose to return to CY-TAG as we expand the program to add other courses and grade levels.

You can use pen, pencil, or marker on the questionnaire. All your answers should be placed directly on these pages.

Your participation in completing this evaluation is voluntary. If you are willing to participate, please go ahead and begin the questionnaire. Hand it in to me when you are finished.

STUDENT EVALUATION OF

CY-TAG 1987

THE FOLLOWING SET OF QUESTIONS ASKS HOW SATISFIED YOU WERE WITH VARIOUS ASPECTS OF CY-TAG. TO ANSWER EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO HOW YOU FEEL. USE THIS SCALE:

5 = extremely satisfied
4 = somewhat satisfied
3 = neutral (neither satisfied nor dissatisfied)
2 = somewhat dissatisfied
1 = extremely dissatisfied

How satisfied were you with					
the food	5	4	3	2	1
your roommate	5	4	3	2	1
your dorm room	5	4	3	2	1
your classroom	5	4	3	2	1
the amount of material covered in your course	5	4	3	2	1
the variety of evening and weekend activities	5	4	3	2	1
the amount of help you received from your instructor	5	4	3	2	1
the amount of help you received from your teaching assistant/s	5	4	3	2	1

THIS SET OF QUESTIONS ASKS TO WHAT DEGREE YOU SAW CERTAIN THINGS OCCURRING DURING CY-TAG. FOR EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO YOUR OBSERVATION. USE THIS RATING SCALE:

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all

To what extent was your instructor knowledgeable about					
the course material	5	4	3	2	1
what gifted learners are like	5	4	3	2	1
how to work with junior high students	5	4	3	2	1
To what extent were the teaching assistants knowledgeable about					
the course material	5	4	3	2	1
what gifted learners are like	5	4	3	2	1
how to work with junior high students	5	4	3	2	1

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all

To what extent were the residence hall assistants knowledgeable about how to work with gifted persons	5	4	3	2	1
how to work with junior high students	5	4	3	2	1
To what extent were each of the following persons interested in your ideas? the course instructor	5	4	3	2	1
the teaching assistant/s	5	4	3	2	1
the residence hall assistants	5	4	3	2	1
To what extent was the material covered in your classes new to you (not covered in regular school classes)?	5	4	3	2	1
To what extent was your class interesting?	5	4	3	2	1
challenging?	5	4	3	2	1
well-organized?	5	4	3	2	1
To what extent were class activities worthwhile?	5	4	3	2	1
To what extent were homework assignments worthwhile?	5	4	3	2	1
In your classes, to what extent were you expected to participate in activities?	5	4	3	2	1
did you use problem-solving skills?	5	4	3	2	1
did you use critical thinking skills (analyze, pull information together, evaluate)?	5	4	3	2	1
did you learn through lecture?	5	4	3	2	1
did you learn by doing an activity yourself?	5	4	3	2	1
did you learn by working with other students?	5	4	3	2	1
did you learn through individual help from the instructor or teaching assistant?	5	4	3	2	1
To what extent are you still interested in the topic (math, science, or writing) which you have studied during CY-TAG?	5	4	3	2	1
To what extent do you understand why you were selected to participate in CY-TAG?	5	4	3	2	1

I first learned about CY-TAG through

1. the media -- TV, newspapers.
2. my parents.
3. school counselor, principal, or teachers.
4. a letter from the CY-TAG coordinator.
5. a friend.
6. Educational Opportunity Guide.
7. The Iowa Stater.
8. other. Please explain:_____

On the average, how many hours did you spend each night on homework and studying?
_____hours per night

The amount of time I needed each evening for studying and homework was

1. too little.
2. just right.
3. too much.

The material covered in class each day was

1. too easy for me.
2. just right in difficulty.
3. too hard for me.

The textbook(s) used in class was

1. too easy.
2. just right.
3. too difficult.

In regular school classes, I work

1. below my ability level.
2. right at my ability level.
3. above my ability level.

During CY-TAG, I worked

1. below my ability level.
2. right at my ability level.
3. above my ability level.

At CY-TAG, I learned

1. less than in my regular school classes.
2. the same amount as in my regular school classes.
3. more than in my regular school classes.

What courses would you be interested in taking if you attended CY-TAG another summer? Circle all that interest you.

1. French
2. German
3. Spanish
4. Latin & Greek in Modern-day Use
5. Computer science - Pascal
6. Psychology
7. Economics
8. Journalism
9. American Literature
10. Fast-paced high school biology
11. Fast-paced high school chemistry
12. Fast-paced high school physics
13. Fast-paced high school math
14. Composition
15. Chinese
16. Russian
17. Zoology (study of animals)

Please list any other suggestions you have for possible courses.

_____

_____

Which of the following best describes the quality of academic work expected from you at CY-TAG?

1. Too little was expected of me.
2. The quality of work expected from me was appropriate.
3. Too much was expected of me.

What three things did you like best about CY-TAG?

1.

2.

3.

What three things did you like least about CY-TAG?

1.

2.

3.

What additional information do you wish you had received before arriving at CY-TAG?

Do you think your coursework during CY-TAG will make a difference to you during the coming school year? Please explain your answer.

If another Talent Search finalist asked you why he or she should attend CY-TAG, what would you answer?

What is the single most important way in which you have changed as a result of CY-TAG?

APPENDIX C.

CY-TAG PROGRAM EVALUATION -- FACULTY/STAFF FORMS:

COVER LETTER AND QUESTIONNAIRE

Iowa State University of Science and Technology Ames, Iowa 50011

Vice President
For Academic Affairs
110 Beardshear Hall
Telephone 515-294-8036

July 13, 1987

Dear CY-TAG Staff Member,

Students and staff alike learned a great deal during our first CY-TAG session! Your patience, creativity, understanding, and commitment were vital in attaining our goal of providing an educationally stimulating experience for CY-TAG participants.

While the activities of the last three weeks are still vivid, we would appreciate your perceptions, reactions, and suggestions. Early this fall, the CY-TAG Advisory Committee will begin planning next summer's session, and your input will be critical in their decision-making.

Your responses will be kept confidential. Please note that you are not asked to place your name on the form and that there are no identification numbers on the survey. Results of this evaluation will be reported in general group terms, such as "those extra-curricular activities."

You have already given a great deal of your time, your abilities, and yourself to CY-TAG; we will certainly appreciate your good thoughts as well as these last few minutes needed to complete the survey.

Sincerely,

Edwin C. Lewis
Associate Vice President
for Academic Affairs

Linda D. Parker
Research Assistant

FACULTY/STAFF EVALUATION

CY-TAG 1987

IN ANSWERING EACH ITEM, CIRCLE THE NUMBER OF THE MOST APPROPRIATE RESPONSE. IF YOU DID NOT HAVE ENOUGH CONTACT WITH A PARTICULAR ASPECT OF CY-TAG AND DO NOT FEEL YOU CAN GIVE A VALID RESPONSE, CIRCLE "NA" (not applicable).

In which role did you serve?

1. a course instructor
2. a teaching assistant
3. a residence hall assistant
4. in an administrative capacity

If you worked with a particular course, which was it?

1. biotechnology
2. composition
3. math
4. not applicable

THE FOLLOWING SET OF QUESTIONS ASKS HOW SATISFIED YOU WERE WITH VARIOUS ASPECTS OF CY-TAG. TO ANSWER EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO HOW YOU FEEL. USE THIS SCALE:

5 = extremely satisfied
4 = somewhat satisfied
3 = neutral (neither satisfied nor dissatisfied)
2 = somewhat dissatisfied
1 = extremely dissatisfied
NA = not applicable

How satisfied were you with

your classroom (facilities, equipment, etc.)	5	4	3	2	1	NA
the amount of material covered in your course	5	4	3	2	1	NA
the variety of evening and weekend activities	5	4	3	2	1	NA
the amount of help students received from instructors	5	4	3	2	1	NA
the amount of help students received from teaching assistants	5	4	3	2	1	NA
the amount of help instructors received from TAs	5	4	3	2	1	NA

THIS SET OF QUESTIONS ASKS TO WHAT DEGREE YOU SAW CERTAIN INTERACTIONS OR ACTIVITIES OCCUR DURING CY-TAG. FOR EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO YOUR OBSERVATION. USE THIS RATING SCALE:

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all
NA = not applicable

To what extent were instructors knowledgeable about the course material	5	4	3	2	1	NA
what gifted learners are like	5	4	3	2	1	NA
social and emotional needs of gifted adolescents	5	4	3	2	1	NA
To what extent were the teaching assistants knowledgeable about the course material	5	4	3	2	1	NA
what gifted learners are like	5	4	3	2	1	NA
social and emotional needs of gifted adolescents	5	4	3	2	1	NA
To what extent were the residence hall assistants knowledgeable about how to work with gifted persons	5	4	3	2	1	NA
social and emotional needs of gifted adolescents	5	4	3	2	1	NA
To what extent was the material covered in classes new to students (not covered in regular school classes)?	5	4	3	2	1	NA
In your classes, to what extent did you expect students to participate in activities?	5	4	3	2	1	NA
did you expect students to use problem-solving skills?	5	4	3	2	1	NA
did you expect students to use critical thinking skills (analysis, synthesis, evaluation)?	5	4	3	2	1	NA
did you lecture?	5	4	3	2	1	NA
did you utilize independent assignments or projects?	5	4	3	2	1	NA
did you utilize small group projects?	5	4	3	2	1	NA
did students learn through individual help from the instructor or teaching assistant?	5	4	3	2	1	NA

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all
NA = not applicable

To what extent do you think students found classes interesting?	5	4	3	2	1	NA
challenging?	5	4	3	2	1	NA
well-organized?	5	4	3	2	1	NA
To what extent did students find class activities worthwhile?	5	4	3	2	1	NA
To what extent did students find homework assignments worthwhile?	5	4	3	2	1	NA
To what extent did students understand why they were selected to participate in Cy-Tag?	5	4	3	2	1	NA

The amount of study time each evening was
1. too little.
2. just right.
3. too much.

The amount of homework each night was
1. too little.
2. just right.
3. too much.

The material covered in class each day
1. was too easy for most students.
2. just right in difficulty.
3. too difficult for most students.

The textbook(s) used in class was
1. too easy for most students.
2. just right.
3. too difficult for most students.

During Cy-Tag, I felt most students worked
1. below ability level.
2. right at ability level.
3. above ability level.

Please list additional courses you think students might be interested in taking if the program were to be expanded.

Which of the following best describes the quality of academic work expected from Cy-Tag students?

1. Too little was expected of them.
2. The quality of work expected from them was appropriate.
3. Too much was expected of them.

What three aspects of the program did you like best about Cy-Tag?

1.

2.

3.

What three aspects of the program did you like least about Cy-Tag?

1.

2.

3.

What 3 activities did students seem to enjoy most?	*	least?
1.	* 1.	
	*	
2.	* 2.	
	*	
3.	* 3.	

What improvements could be made for opening and closing days?

What additional information should we give students/parents before their arrival at Cy-Tag?

What other improvements/changes do you recommend for next year's Cy-Tag?

What has participation in Cy-Tag meant to you personally?

APPENDIX D.

CY-TAG PROGRAM EVALUATION -- PARENT FORMS:

COVER LETTERS AND QUESTIONNAIRE

CY-TAG
(Challenges for Youth—Talented and Gifted)
Iowa State University
Special Programs Office
Osborn Cottage
Ames, Iowa 50011-1150
515-294-0573

July 27, 1987

Dear CY-TAG Parent:

We enjoyed three exciting, challenging weeks with 72 CY-TAG students! Please know that we appreciate your planning, your preparation and travel time, and your financial commitment which made it possible for your child to participate in CY-TAG.

Because this was our first CY-TAG institute, because we want to continually improve our services to gifted students, and because we value parents' perspectives and insights, we are asking parents of CY-TAG participants to share their reactions and suggestions. You can help us in evaluating the 1987 CY-TAG session as well as have input in planning future CY-TAG sessions by completing the enclosed questionnaire. So that a consistent point-of-view is represented in the evaluation results, we are requesting that, whenever possible, mothers of CY-TAG students answer the survey items.

Your answers will be kept strictly confidential. Your responses will never be associated with your name, that of your child, or that of your school district. Results will be reported only in the aggregate (for example, parents from large districts, or parents of female participants, etc.). The number at the top of the questionnaire is for record-keeping purposes only; it allows us to account for returned and unreturned surveys.

Please take a few minutes now and complete the survey while your child's comments and your own reactions are still easy to recall. After you have finished the survey, simply place it in the enclosed self-addressed, pre-stamped return envelope.

We are eager to begin planning for next summer's CY-TAG! But before we begin that step, we want to carefully consider parents' observations and comments regarding our first program. We believe parental involvement is vital to sound programming for the gifted; we will value your responses.

Sincerely,

Linda D. Parker
CY-TAG Program Evaluator

Dr. Andrea Heiss
Writing SKills Instructor

CY-TAG
(Challenges for Youth—Talented and Gifted)
Iowa State University
Special Programs Office
Osborn Cottage
Ames, Iowa 50011-1150
515-294-0573

August 12, 1987

Dear CY-TAG Parent:

Recently you received a letter asking for your help in evaluating the 1987 session of CY-TAG. This letter is just a reminder that we still hope to hear from you!

We know that the last few weeks of summer are an important and busy time. We also think you might want to provide information that will be important in assessing the first CY-TAG session as well as in making decisions about future summer institutes. For that reason, we are enclosing another questionnaire (in case the first one got misplaced) and asking you to take 15-20 minutes to complete it. So that a consistent point-of-view is represented in the evaluation results, we are requesting that, whenever possible, mothers of CY-TAG students answers the survey items.

Remember that your answers will be kept confidential. Your name will never be used in connection with your answers, your child, or your school district. Results of the evaluation will be described only in the aggregate -- for example, "parents of all seventh grade students" or "parents of all female students." The number at the top of the survey is used for record-keeping purposes; it allows us to account for returned and unreturned surveys.

If your completed survey and this follow-up letter have crossed in the mail, please accept our thanks for sharing your time and your perceptions about CY-TAG. If you have not yet completed the questionnaire, please take a few minutes now to do so. Then just place it in the enclosed self-addressed stamped envelope and drop it in the mail today.

Because we care very much about gifted students, we are deeply committed to providing challenging worthwhile educational experiences for them. Because we believe parental involvement is vital in attaining that goal, we will appreciate your time, your thoughts, and your suggestions. We hope to hear from you soon.

Sincerely,

Linda D. Parker
CY-TAG Program Evaluator

Dr. Andrea Heiss
Writing SKills Instructor

PARENT EVALUATION

CY-TAG 1987

Your child's gender
1. male
2. female

CY-TAG course your child was enrolled in
1. biotechnology
2. composition
3. math

THE FOLLOWING SET OF QUESTIONS ASKS HOW SATISFIED YOU ARE WITH VARIOUS ASPECTS OF CY-TAG. TO ANSWER EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO HOW YOU FEEL. IF YOU AND YOUR CHILD HAVE NOT DISCUSSED A PARTICULAR ITEM AND YOU FEEL THAT YOU CANNOT GIVE A VALID RESPONSE, CIRCLE "N" (no opinion/unable to answer). USE THIS SCALE:

5 = extremely satisfied
4 = somewhat satisfied
3 = neutral (neither satisfied nor dissatisfied)
2 = somewhat dissatisfied
1 = extremely dissatisfied
N = no opinion/unable to rate

How satisfied are you with

the amount of material covered in your child's course	5	4	3	2	1	N
the variety of evening and weekend activities	5	4	3	2	1	N
the amount of help the instructor gave your child	5	4	3	2	1	N
the amount of help the teaching assistant/s gave your child	5	4	3	2	1	N

THIS SET OF QUESTIONS ASKS TO WHAT DEGREE YOU PERCEIVE CERTAIN RELATIONSHIPS AND EVENTS OCCURRED DURING CY-TAG. FOR EACH QUESTION, CIRCLE THE NUMBER THAT CORRESPONDS MOST CLOSELY TO YOUR PERCEPTION. USE THIS RATING SCALE:

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all
N = no opinion/unable to rate

To what extent was your child's instructor knowledgeable about

the course material	5	4	3	2	1	N
characteristics of gifted learners	5	4	3	2	1	N
social and emotional needs of gifted adolescents	5	4	3	2	1	N

5 = extremely so
4 = to a large extent
3 = to a moderate extent
2 = somewhat
1 = not at all
N = no opinion/unable to rate

To what extent were the teaching assistants knowledgeable about the course material	5	4	3	2	1	N
characteristics of gifted learners	5	4	3	2	1	N
social and emotional needs of gifted adolescents	5	4	3	2	1	N
To what extent were the residence hall assistants knowledgeable about how to work with gifted persons	5	4	3	2	1	N
how to work with junior high students	5	4	3	2	1	N
To what extent was the material covered in your child's classes new to your child (not covered in regular school classes)?	5	4	3	2	1	N
To what extent was your child's course interesting?	5	4	3	2	1	N
challenging?	5	4	3	2	1	N
To what extent were class activities worthwhile?	5	4	3	2	1	N
To what extent were homework assignments worthwhile?	5	4	3	2	1	N
In your child's classes, to what extent did he/she use problem-solving skills?	5	4	3	2	1	N
use critical thinking skills (analysis, synthesis, evaluation)?	5	4	3	2	1	N
To what extent is your child still interested in the topic (math, science, or writing) studied during CY-TAG?	5	4	3	2	1	N
To what extent do you understand why your child was selected to participate in CY-TAG?	5	4	3	2	1	N

I/We first learned about CY-TAG through

1. the media -- TV, newspapers.
2. my child.
3. school counselor, principal, or teachers.
4. a letter from the CY-TAG coordinator.
5. a friend.
6. Educational Opportunity Guide.
7. The Iowa Stater.
8. other. Please explain:_____

The amount of study time each evening was

1. too little.
2. just right.
3. too much.
4. No opinion/unable to rate.

The amount of homework each night was

1. too little.
2. just right.
3. too much.
4. No opinion/unable to rate.

The material covered in class each day was

1. too easy for my child.
2. about right in difficulty.
3. too difficult for my child.

In regular school classes, my child works

1. below ability level.
2. right at ability level.
3. above ability level.

During CY-TAG, my child worked

1. below ability level.
2. right at ability level.
3. above ability level.

At CY-TAG, my child learned

1. less than in regular school classes.
2. the same amount as in regular school classes.
3. more than in regular school classes.

What additional courses would your child be interested in taking if he/she were able to attend CY-TAG another summer? Circle all that apply.

1. French
2. German
3. Spanish
4. Latin & Greek in Modern-day Use
5. Computer science - Pascal
6. Psychology
7. Economics
8. Journalism
9. American Literature
10. Fast-paced high school biology
11. Fast-paced high school chemistry
12. Fast-paced high school physics
13. Fast-paced high school math
14. Composition
15. Chinese
16. Russian
17. Zoology (study of animals)

Please list any other suggestions you have for possible courses.

Which of the following best describes the quality of academic work expected from your child at CY-TAG?

1. Too little was expected of him/her.
2. The quality of work expected was appropriate.
3. Too much was expected of him/her.

As a result of CY-TAG experiences, my child's self-esteem has

1. become more negative.
2. remained unchanged.
3. become more positive.

What three aspects of the program did you like best about CY-TAG?

1.

2.

3.

What three aspects of the program did you like least about CY-TAG?

1.

2.

3.

What additional information do you wish you had received before your child arrived at CY-TAG?

Do you think your child's coursework during CY-TAG will make a difference to him/her during the coming school year? Please explain your answer.

What is your perception of the attitude school personnel have regarding CY-TAG?

If parents of another Talent Search finalist asked you why their child should attend CY-TAG, what would you answer?

What is the single most important way in which your child has changed as a result of CY-TAG?

This evaluation was completed by the participant's

1. mother.
2. other: please explain._____

APPENDIX E.

CY-TAG PROGRAM EVALUATION -- SCHOOL ADMINISTRATOR FORMS:

COVER LETTERS AND QUESTIONNAIRE

CY-TAG
(Challenges for Youth—Talented and Gifted)
Iowa State University
Special Programs Office
Osborn Cottage
Ames, Iowa 50011-1150
515-294-0573

November 5, 1987

Dear Principal:

We enjoyed three exciting, challenging weeks with 72 CY-TAG students during last summer's session! We appreciate the participation and contributions made by each young gifted person.

Because this was our first CY-TAG session and because we want to continually improve our services to gifted students, we are asking for your reactions and suggestions. You can help us in evaluating the 1987 CY-TAG session as well as have input in planning future CY-TAG sessions by completing the enclosed questionnaire.

Your answers will be kept strictly confidential. Your responses will never be associated with your name, that of your student, or that of your school district. Results will be reported only in the aggregate (for example, administrators from large Iowa districts, principals of junior high students, etc.). The number at the top of the questionnaire is for record-keeping purposes only; it allows us to account for returned and unreturned surveys.

We realize that there are many demands on your time; please know that we appreciate the thought, effort, and time you give in completing the survey. After you have finished the questionnaire, simply place it in the enclosed self-addressed, postage-paid return envelope.

We have already started planning for next summer's CY-TAG! But as we look ahead, we want to carefully consider principals' observations and comments regarding our first program. We believe local school administrators' evaluation of CY-TAG is vital to sound program decisions; we will value your responses.

Sincerely,

Linda D. Parker

Linda Delbridge Parker
CY-TAG Program Evaluator

Dr. Camilla P. Benbow
CY-TAG Co-Director

Dr. Lynn W. Glass
CY-TAG Co-Director

Iowa State University of Science and Technology Ames, Iowa 50011

Precollegiate Programs
for Talented and Gifted
CY-TAG
SMPY

Lagomarcino Hall - N151
515-294-7327

January 6, 1988

Dear Principal:

Recently you received a letter asking for your help in evaluating the 1987 session of CY-TAG. This is just a reminder that we still hope to hear from you.

We know that the end of the semester is an important and busy time. We also think you might want to provide information that will be important in assessing the first CY-TAG session as well as in making decisions about future summer institutes. For that reason, we are enclosing another questionnaire (in case the first one got misplaced) and asking you to take 10-15 minutes to complete it.

Remember that your answers will be kept confidential. Your answers will not be used in connection with your name, that of your school or district, or that of your CY-TAG student. Results of the evaluation will be described only in the aggregate. The number at the top of the survey is used for record-keeping purposes; it allows us to account for returned and unreturned surveys.

If your completed survey and this follow-up letter have crossed in the mail, please accept our thanks for sharing your time and your perceptions about CY-TAG. If you have not yet completed the questionnaire, please take a few minutes now to do so. Then just place it in the enclosed self-addressed stamped envelope and drop it in the mail.

Because we care very much about gifted students, we are deeply committed to providing challenging worthwhile education experiences for them. Because we believe input from school officials is vital in attaining that goal, we will appreciate your time, your thoughts, and your suggestions. We hope to hear from you soon.

Sincerely,

Linda D. Parker
CY-TAG Program Evaluator

Dr. Camilla P. Benbow
CY-TAG Co-Director

Dr. Lynn W. Glass
CY-TAG Co-Director

Enclosure

PRINCIPAL EVALUATION: CY-TAG 1987

Number of K-12 students enrolled in your district_____

PLEASE INDICATE WHETHER OR NOT EACH OF THE FOLLOWING STATEMENTS REPRESENTS YOUR PERCEPTIONS OR EXPERIENCES RELATIVE TO CY-TAG. CIRCLE "1" TO INDICATE "NO" AND "2" TO INDICATE "YES."

	NO	YES
1. I have visited with the participant about last summer's CY-TAG experiences.	1	2
2. I have visited with the student's parents about last summer's CY-TAG experiences.	1	2
3. Parents provided school personnel with adequate notice and information so we could make appropriate placement decisions prior to the beginning of the fall semester.	1	2
4. Local school personnel have re-tested the student on material covered during CY-TAG.	1	2

If "YES," what reason or need prompted the re-testing?

If "YES," please list
a) the name and form of the instrument/s used.

b) date of re-testing.

c) results of the re-testing.

5. We have decided to grant high school credit for work completed during CY-TAG.	1	2

If "YES," please list the course/s for which the student has received credit.

6. We have placed the student in an advanced course as a result of work completed during CY-TAG. 1 2

   If "YES," please specify the name and level of the advanced course. Also, how was that acceleration accomplished in terms of administrative and policy decisions ?

7. Please indicate whether or not your CY-TAG student is currently participating in the following special programs:

a. talented-and-gifted program	1	2
b. independent study	1	2
c. mentorship	1	2
d. Advanced Placement (College Board program)	1	2
e. enrollment in a college course	1	2
f. correspondence study supervised by local teacher	1	2
g. other - please describe:		

   If you answered "YES" to any b-f items, please describe.

	NO	YES
8. I believe highly gifted students are capable of successfully completing the accelerated coursework offered through CY-TAG.	1	2

   If "NO," please explain.

9. CY-TAG was our first experience with an accelerated academic program for gifted students. 1 2

10. From which sources did you receive CY-TAG information?

a. from the CY-TAG participant	1	2
b. from parents of the participant	1	2
c. from the school counselor	1	2
d. from the gifted teacher/coordinator	1	2
e. through the AEA gifted consultant	1	2
f. through the media (newspaper, TV)	1	2
g. through CY-TAG program materials	1	2
h. other - please specify:		

   Which was the most helpful source of information? _____

FOR THE FOLLOWING ITEMS, PLEASE CIRCLE THE LETTER OF THE APPROPRIATE RESPONSE.

11. What is your preference for meeting the academic needs of gifted students?
    a. enrichment/pullout programs
    b. acceleration
    c. combination of both enrichment and acceleration
    d. neither - regular curriculum is adequate

12. The CY-TAG evaluation information which summarized student accomplishments was
    a. completely satisfactory.
    b. somewhat satisfactory.
    c. not at all satisfactory.

    If the evaluation was not completely satisfactory, please explain any additional information you would have found helpful.

13. Based on the following scale, please circle the number which indicates your overall perception of CY-TAG.

    5 = extremely positive
    4 = somewhat positive
    3 = neutral
    2 = somewhat negative
    1 = extremely negative

14. What do you perceive to be a strength of the CY-TAG program?

15. What do you perceive to be a weakness of the CY-TAG program?

16. Please know that CY-TAG personnel are eager to provide support to participants, their parents, and their school administrators. What additional services or information could CY-TAG personnel provide that would be helpful to you as the principal of a CY-TAG student?

17. Please list any other pertinent comments, suggestions, questions, or perceptions.

APPENDIX F.

ADDITIONAL MBTI INFORMATION

APPENDIX G.

ARTICLES SUBMITTED FOR PUBLICATION

Type and Academically Gifted Adolescents

While the literature in talented-and-gifted education offers a great deal of information on identification of talented-and-gifted students and appropriate curricular designs, it appears that few studies have assessed personality types prevalent among gifted adolescents. This article reports on results of a study designed (a) to explore the four type preferences of a small group of highly gifted young adolescents, and (b) to provide type information relative to subjects' learning styles.

Literature on applications of MBTI preferences to learning situations is readily available. Theoretical frameworks relating type to educational environments as well as practical translations of those concepts are provided by Jensen (1987), Lawrence (1982), McCaulley and Natter (1974), and Myers and McCaulley (1986). Lawrence (1984) also summarized research lacing MBTI preferences and learning style preferences. In addition, a recent book by Provost and Anchors (1987) addressed a variety of MBTI applications possible in higher education.

Background Information

During June 20 - July 12, 1987, Iowa State University offered the initial session of CY-TAG (Challenges for Youth - Talented And Gifted), a three-week summer residential program for academically gifted junior high students. CY-TAG integrates accelerative and enrichment curricular approaches to education for the gifted. Its precalculus mathematics component is based on the SMPY (Study of Mathematically Precocious Youth)

model developed by Julian Stanley at Johns Hopkins University and directed at ISU by Dr. Camilla P. Benbow. In addition to being associated with SMPY at Johns Hopkins, Dr. Benbow has conducted extensive research involving high-ability students and has been widely published in that area. During its first session, the CY-TAG enrichment component consisted of one composition and one science course; this portion of the program was directed by Dr. Edwin C. Lewis, Associate Vice-President for Academic Affairs. Dr. Lewis, a developmental psychologist, has been responsible for the ISU Honors Programs and has served as ISU Director of the Duke Talent Search Awards Program.

During the 1987 session, CY-TAG offered concentrated fast-paced coursework in precalculus mathematics, biotechnology, and expository writing to a total of 72 participants. In conjunction with this program, the MBTI was used to provide information to students and faculty regarding the learning styles preferences of CY-TAG participants.

Methods

The sample included 16 biotechnology students, 17 expository writing students, and 39 precalculus mathematics students (n=72) who participated in the 1987 CY-TAG session. Criteria for admission included scoring at the seventh grade level a minimum of 500 on the mathematics subtest of the SAT (Scholastic Aptitude Test) to be eligible for the precalculus math course, 430 on the SAT-Verbal subtest to be eligible for the expository writing course, and/or a composite of 930 to be eligible for the biotechnology course (scores were age-adjusted for both younger and older

students). All students were placed in their first-choice class, and all participants met the criteria described above.

Forty-eight males and 24 females comprised the sample. At the time of the study, one had completed fifth grade, four had completed sixth grade, 41 had finished seventh grade, and 26 had completed eighth grade. Sixty-six of the students were Caucasian, three were Black, two were Oriental, and one was American Indian. Most participants were from the Midwest (51 were from Iowa, 12 from Nebraska, two from Virginia, and one each from Illinois, Kansas, Minnesota, New York, Oklahoma, Washington, and Wisconsin).

The MBTI was administered to all participants on the first day of the summer session. Form AV, an abbreviated version of the MBTI, was utilized in light of the age and attention span of the subjects.

Results

Data were analyzed through the CAPT SRTT program (Granade, Hatfield, Smith, & Beasley, 1987). Table 1 presents the type distribution of the 72 CY-TAG subjects as well as results of a comparison between CY-TAG students and a pool of high school graduates.

Based on the distribution of type preferences as well as dominant representation within each category (derived from percentages reported in the type table and side-bar in Figure 1), CY-TAG participants are best described as an INTP group. Additional analyses revealed no significant differences among the three subgroups of math, composition, and biotechnology students.

While population estimates suggest a 75 percent/25 percent split between Extraverts and Introverts (Myers & McCaulley, 1986), the CY-TAG group was evenly divided on those two dimensions with 45.83 percent indicating preferences for Extraversion and 54.17 percent indicating preferences for Introversion. The CY-TAG sample, therefore, is characterized by an over-representation of Introverts.

The normal distribution of Sensing-Intuiting types indicates a 75 percent predominance of Sensors (Myers & McCaulley, 1986). However, an inverse ratio typified the CY-TAG group, with one-fourth (25 percent) reporting Sensing processes compared to three-fourths (75 percent) reporting Intuiting processes.

Results on the Thinking-Feeling dimension were consistent with projections based on normal distributions among the general U.S. population. Gender differences indicate that about 60 percent of males prefer Thinking and about 65 percent of females prefer Feeling (Myers & McCaulley, 1986). Among the CY-TAG group in which males outnumbered females in a two-to-one ratio, 66.67 percent of the sample preferred Thinking and 33.33 percent preferred Feeling.

While it has been suggested that 55 - 60 percent of the population reports Judging preferences (Myers & McCaulley, 1986), 40.28 percent of the gifted students reported that type. The CY-TAG sample therefore contains a slight under-representation of persons whose life style is characterized by Judging preferences.

Generalizability of these findings is supported by the high degree of similarity found to exist between the CY-TAG group and a sample of 1001

National Merit Scholarship finalists (CAPT-MBTI Atlas, 1986). Analyses comparing these two high-ability groups revealed the only significant difference to be on the ST combination (CY-TAG = 22.22 percent; NMSF = 10.79 percent; I ratio = 2.06; $p < .01$).

Because the CY-TAG participants represent a subset of a larger group of students of varied ability levels, the CY-TAG group was also compared to a base of 1943 high school graduates (Provost & Anchors, 1987). As illustrated in Table 1, the CY-TAG group differed from the comparison group on 23 of the 28 single or combined preferences reported. Furthermore, 17 of the 23 differences were significant at the .001 level.

A comparison of numbers of IN types in each group further documents the substantial differences between gifted students and normal population parameters. Lawrence (1982) suggested that the IN combination might be found among only nine percent of the student population. Consistent with that estimation, about 11 percent of the high school graduates reported IN preferences. However, that combination is over-represented among the CY-TAG participants, with nearly 40 percent indicating the IN combination. Similarly, 46 percent of the National Merit Scholarship Finalists were characterized by IN preferences.

Among CY-TAG students, Intuitors outnumbered Sensors, thinking types outnumbered Feeling types, and Perceivers outnumbered Judgers. On all three of these preferences, CY-TAG students were significantly different from the comparison population. The groups also differed significantly on nine of the 16 psychological types.

Discussion and Implications

Results support the hypothesis that the distribution of psychological types among highly gifted students differs significantly from that of a larger group of students characterized by varied abilities. Results also indicate the need for pertinent approaches in designing programs and activities pertinent to the characteristics of gifted students.

In terms of learning style, the even distribution between Introverts and Extraverts implies that instructors must provide a balance of learning situations for Extraverted students who learn most efficiently in classrooms characterized by action, talk, and group or cooperative activities, as well as for Introverts who learn most efficiently if they are given time to reflect in solitude, and if they are given the opportunity to plan their classroom involvement rather than if they are forced to participate (Lawrence, 1984; McCaulley & Natter, 1974). CY-TAG program evaluation results (Delbridge-Parker, 1988) indicated that high student satisfaction with coursework may have been attributable to the variety of activities generated by instructors, ranging from lecture and drill to independent study, small group projects, and simulation.

A further demand imposed by the nature of the fast-paced program itself was the intensity and constant pace expected of students if they were to master an extensive amount of academic coursework in just three weeks. While the participants were admitted to CY-TAG because of their demonstrated academic ability, the large number of Introverted students indicates a need for time to reflect and synthesize and an aversion to constant activity. Similarly, Perceptive gifted learners are likely to

find the structure of a fast-pace course too confining; instructors should seek opportunities to build flexibility and to allow spontaneity even in courses which must adhere to a close schedule in meeting goals. Further, because of their strong INTP preferences, the gifted students are likely to focus more on tasks than on relationships; faculty and staff roles include making these students more responsive to the effects of decisions and activities on other persons.

A frequently discussed goal in gifted education is that of facilitating development of those skills which result in self-actualized adults who are life-long autonomous learners. Students who are characterized by their INTP preferences may need special assistance in communicating effectively with mentors and in interviewing persons they do not know well. They may need help in selecting worthwhile goals and activities from among numerous possibilities, in completing scheduled objectives, and in reaching closure so they are able to be both efficient consumers and producers of knowledge.

As evidenced in the 1987 CY-TAG Program Evaluation Report (Delbridge-Parker, 1988), an awareness of type preference is also critical in planning the evening and weekend extracurricular activities which are a vital component of a residential program. In designing the first CY-TAG session, program officials felt a responsibility to keep participants busy and involved during out-of-class time rather than allowing too much unstructured free time for bright, creative adolescents. However, evaluative comments submitted by students, their parents, and CY-TAG staff indicated that many of the students, consistent with their INTP

preferences, wanted greater flexibility and more possibilities in extra-curricular activities. Students disliked being "over-scheduled" and requested that future CY-TAG sessions build in more free time and optional or alternative activities which would allow students to pursue independent reading, friendships, and other individual or small group interests. Several students also requested that creative opportunities be offered, such as music, art, and drama.

Affective needs must also be addressed in designing programs for gifted students. It is important that faculty and staff working with this population recognize the self-esteem problems frequently experienced by gifted students, and that they acknowledge INTP tendencies to keep feelings and thoughts sheltered within, to focus on tasks rather than relationships, and to emphasize product over process. In response, educators should facilitate student awareness and appreciation of varied individual contributions, as well as greater responsiveness to the needs of other ability-peers.

Other important aspects of a residential program focus on the quality of residence hall experiences. In matching roommates, residence life professionals recommend pairing individuals who share similar MBTI preferences and state that "In practice, this translates into...sharing one or more of the middle two letters of the MBTI score, that is, sharing S or N and/or T or F" (Scott Anchors, personal communication, March 31, 1988). Benefits of using MBTI results to match roommates include reduced conflict and improved communication in a residence environment. CY-TAG roommate assignments were made prior to administration of the MBTI on the

basis of similar hobbies and interests; later examination of those assignments based on knowledge of type revealed that 30 of the 36 pairs met the criterion of having in common one of more of the two middle letters of MBTI type results. Using MBTI results to match roommates would have resulted in all 36 of the pairs meeting that criterion. Awareness of type also carries implications for residence hall staff in terms of communicating with individual students, in facilitating or chaperoning small groups, and in improving communication between and among students.

Additional topics might be presented to gifted students from the perspective of their MBTI-type preferences. Because career indecision is often problematic among this population, career counseling could be offered from this point-of-view. Creative and critical thinking, problem solving, decision-making, and autonomous learning -- all integral elements of education for the gifted -- could also be approached through understanding and application of varied contributions and strengths based on type preference.

Table 1. Type distribution of CY-TAG students and comparisons with a sample of high school graduates

Source of data

(null)

Group tabulated:

cytag students at Iowa State U.

N = 72

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type.
I = Selfselection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ	ISFJ #	INFJ	INTJ *
N= 8	N= 1	N= 3	N= 6
%= 11.11	%= 1.39	%= 4.17	%= 8.33
I= 0.62	I= 0.09	I= 1.55	I= 3.70
ISTP	ISFP "	INFP "	INTP *
N= 2	N= 0	N= 6	N= 13
%= 2.78	%= 0.00	%= 8.33	%= 18.06
I= 0.72	I= 0.00	I= 2.24	I= 10.54
ESTP	ESFP	ENFP *	ENTP *
N= 3	N= 1	N= 10	N= 8
%= 4.17	%= 1.39	%= 13.89	%= 11.11
I= 1.25	I= 0.24	I= 3.15	I= 6.31
ESTJ "	ESFJ #	ENFJ	ENTJ
N= 3	N= 0	N= 3	N= 5
%= 4.17	%= 0.00	%= 4.17	%= 6.94
I= 0.27	I= 0.00	I= 1.81	I= 2.18

		N	%	I	
J	E	33	45.83	0.97	
U	I	39	54.17	1.03	
D I	S	18	25.00	0.32	*
G N	N	54	75.00	3.41	*
I T	T	48	66.67	1.35	#
N R	F	24	33.33	0.66	#
G O	J	29	40.28	0.58	*
V	P	43	59.72	1.96	*
P E	IJ	18	25.00	0.66	"
E R	IP	21	29.17	1.93	*
R T	EP	22	30.56	1.99	*
C S	EJ	11	15.28	0.48	#
E	ST	16	22.22	0.55	#
P	SF	2	2.78	0.07	
T	NF	22	30.56	2.33	*
I E	NT	32	44.44	4.99	*
V X	SJ	12	16.67	0.28	*
E T	SP	6	8.33	0.44	"
S R	NP	37	51.39	4.43	*
A	NJ	17	23.61	2.26	*
J V	TJ	22	30.56	0.79	
U E	TP	26	36.11	3.38	*
D R	FP	17	23.61	1.19	
G T	FJ	7	9.72	0.31	*
I S	IN	28	38.89	3.75	*
N	EN	26	36.11	3.10	*
G	IS	11	15.28	0.36	*
	ES	7	9.72	0.27	*

Note concerning symbols following the seleceion ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
high school graduates from atlas
Base total N = 1943. Sample and base are dependent.

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Learning Style Preferences of Academically Gifted Students

In designing appropriate programs for academically gifted students, it is vital to understand their preferences not only in terms of learning activities, but also their preferred methods of problem-solving, critical and creative thinking, and communicating with others. A particularly useful instrument which addresses these aspects of the learning process and is easy to administer is the Myers-Briggs Type Indicator (Briggs & Myers, 1983).

The MBTI assesses variations in normal attitudes and behavior. Isabel Briggs Myers (1975) introduced the MBTI Manual with this description of the instrument:

> The purpose of the Indicator is to implement Jung's theory of type. The gist of the theory is that much apparently random variation in human behavior is actually quite orderly and consistent, being due to certain basic differences in the way people prefer to use perceptions and judgment.
>
> "Perception" is here understood to include the processes of becoming aware -- of things or people or occurrences or ideas. "Judgment" is understood to include the processes of coming-to-conclusions about what has been perceived. If people differ systematically in what they perceive and the conclusions they come to, they may as a result show corresponding differences in their reactions, in their interests, values, needs, and motivations, in what they do best and in what they like best to do.

> Adopting this working hypothesis, the Indicator aims to ascertain, from self-report of easily reported reactions, people's basic preferences in regard to perception and judgment, so that the effects of the preferences and their combinations may be established by research and put to practical use. (p. 1)

The four dimensions of type are briefly described in Table 1. Table 2 lists descriptions of the possible 16 type preferences which result from the various combinations of the four dimensions. In understanding and applying type results, it is important to remember that (a) each individual possesses the ability to function in all dimensions, and (b) each individual relies on psychological preferences much as each utilizes a preferences for right- or left-handedness.

MBTI results are helpful in improving educational practice through an understanding of type differences in teaching and learning styles (Jensen, 1987; Lawrence, 1982, 1984; McCaulley & Natter, 1974; Myers & McCaulley, 1986; Provost & Anchors, 1987). Type preference is also a useful tool in considering vocational choices, time management, communication, leadership, teamwork, problem-solving, and interpersonal relationships (McCaulley, 1981; Myers, 1975).

Methods

Subjects

Subjects were 72 students who participated in the first session of CY-TAG (Challenges for Youth - Talented and Gifted), a three-week summer residential program for academically gifted youth sponsored by Iowa State University. The CY-TAG paradigm includes both acceleration and enrichment

Table 1. Psychological type as defined by the Myers-Briggs Type Indicator

---

Direction of Interest: Does it flow mainly to the outer world of actions, objects, and persons, or to the inner world of concepts and ideas?

> **Extroverted types** are regarded as primarily orienting to the outer world of people, objects, and actions, tending to become caught up with whatever is happening around them.
>
> **Introverted types** have more of an inward orientation and tend to detach from the external world in favor of attending to concepts, thoughts, and internal images.

Perception: Is more importance attached to the immediate realities of direct experience, or to the inferred meanings, relationships, and possibilities of experience?

> **Sensing types** focus on perceptions received directly through the sense organs, noticing concrete details and practical aspects of a situation.
>
> **Intuitive types** rely on a more impressionistic approach in order to maximize spontaneous hunches from the unconscious. They like to deal with abstract, inferred meanings, and the hidden possibilities in a situation.

Decision making: In making judgments, is more reliance placed on logical order and cause & effect or on priorities based on personal importance and values?

> **Thinking types** rely on logical structures to clarify and order particular situations: they are skilled at objectively organizing material, weighing the facts, and impersonally judging whether something is true or false.
>
> **Feeling types** are adept at understanding other's feelings and analyzing subjective impressions, based on their judgments of personal values.

Life style: Is there a preference for living systematically, planfully, and attempting to control events or spontaneously, curiously, awaiting events and adapting to them?

> **Judging types** are organized and systematic, living in a planned, orderly way, aiming to regulate life and control it.
>
> **Perceptive types** are more curious and open-minded, going through life in a spontaneous way aiming to understand life and adapt to it.

adapted from:
M. Carlyn: An Assessment of the MBTI.
Journal of Personality Assessment, 1977, 41, 5.

Table 2. Descriptions of the 16 Preferences/Psychological Types Generated by the MBTI (Reprinted from People Types and Tiger Stripes by Gordon Lawrence, 1982)

ISTJ	Analytical manager of facts and details; dependable, decisive, painstaking and systematic; concerned with systems and organization; stable and conservative.
ISFJ	Sympathetic manager of facts and details; concerned with the welfare of others; dependable, painstaking and systematic; stable and conservative.
INFJ	People-oriented; innovator of ideas; serious, quietly forceful and persevering; concerned with the common good, with helping others develop.
INTJ	Logical, critical, decisive innovator of ideas; serious, intent, highly independent, concerned with organization, determined and often stubborn.
ISTP	Practical analyzer; values exactness; more interested in organizing data than situations or people; reflective, a cool and curious observer of life.
ISFP	Observant, loyal helper; reflective, realistic, empathetic; patient with details, gentle and retiring; shuns disagreements; enjoys the moment.
INFP	Imaginative, independent helper; reflective, inquisitive, empathetic, loyal to ideals; more interested in possibilities than practicalities.
INTP	Inquisitive analyzer; reflective, independent, curious; more interested in organizing ideas than situations or people.
ESTP	Realistic adapter in the world of material things; good-natured, tolerant, easy-going; oriented to practical first-hand experience; highly observant of details.
ESFP	Realistic adapter in human relationships; friendly and easy with people, highly observant of their feelings and needs; oriented to practical, first-hand experience.
ENFP	Warmly enthusiastic planner of change; imaginative, individualistic; pursues inspiration with impulsive energy; seeks to understand and inspire others.

Table 2. (cont.)

ENTP	Inventive, analytical planner of change; enthusiastic and independent; pursues inspiration with impulsive energy; seeks to understand and inspire others.
ESTJ	Appreciates facts; practical organizer; aggressive, analytic, systematic; more interested in getting the job done than in people's feelings.
ESFJ	Practical harmonizer, works well with people; sociable, expressive, orderly, opinioned; conscientious, realistic and in tune with the present.
ENFJ	Imaginative harmonizer, works well with people; sociable, expressive, orderly, opinioned, conscientious; curious about new ideas and possibilities.
ENTJ	Intuitive, innovative, organizer; aggressive, analytic, systematic; more tuned to new ideas and possibilities than to people's feelings.

experiences. The precalculus mathematics component parallels the SMPY (Study of Mathematically Precocious Youth) model developed by Julian Stanley at Johns Hopkins University; Dr. Camilla P. Benbow directs the SMPY program located at Iowa State. During its initial 1987 session, CY-TAG offered one enrichment course in composition and one in science; that aspect of the program was directed by Dr. Edwin C. Lewis, Associate Vice-President of Academic Affairs. Dr. Lewis, a developmental psychologist, has been responsible for the ISU Honors Programs and has served as director of the Iowa Duke Talent Identification Awards Program.

Program participants had been named finalists in the Duke Talent Identification Program by scoring as seventh graders a minimum of 500 on the SAT-Math subtest (Scholastic Aptitude Test), a minimum of 430 on the SAT-Verbal subtest, and/or a combined score of at least 930. Scores were adjusted for both older and younger students.

Participants included 48 males and 24 females. As of Spring 1987, one had completed fifth grade, four had completed sixth grade, 41 had completed seventh grade, and 26 had completed eighth grade. In terms of racial background, 66 were Caucasian, three were Black, two were Oriental/Asian, and one was American Indian. Iowa students numbered 51; 12 were from Nebraska, two from Virginia, and one each from Illinois, Kansas, Minnesota, Oklahoma, New York, Washington, and Wisconsin. All students were placed in their first-choice course. Sixteen students were enrolled in biotechnology, 17 in expository writing, and 39 in precalculus mathematics.

Procedure

All CY-TAG participants completed the MBTI during the first day of the session. Form AV (Briggs & Myers, 1983), an abbreviated version, was administered in light of the subjects' age and attention span. The instrument contained 50 forced-choice items. Part I asked respondents to indicate "Which answer comes closer to telling how you usually feel or act," such as "When you go somewhere for the day, would you rather (a) plan what you will do and when, or (b) just go?" Part II required that subjects choose which word in a pair was more appealing, such as "Imaginative or Matter-of-fact" and "Calm or Lively." Validity and reliability are discussed in the Manual (Myers & McCaulley, 1986).

Results and Discussion

Results presented in Table 3 were generated through the "Selection Ratio Type Table PC Software" computer program (Granade, Hatfield, Smith, & Beasley, 1987). The table incorporates two sets of results. First, findings which are descriptive of the 72 CY-TAG participants are reported. Second, because they are a subgroup of the larger group of students characterized by a variety of ability levels, CY-TAG students were compared to a sample of 1943 high school graduates (Provost & Anchors, 1987); the results of that comparison are also reported.

The four-by-four grid in Table 3 presents each of the 16 possible preference combinations in these terms: n = number of CY-TAG students expressing that particular type preference; % = percent of CY-TAG students represented by each particular type; I = the ratio resulting when the percent of the CY-TAG group expressing a particular preference is compared

Table 3. MBTI preferences of the CY-TAG sample and results comparing the CY-TAG sample to a normally distributed group of high school graduates

Source of data: (null)

Group tabulated: cytag students at Iowa State U. N = 72

MBTI Type Table
Center for Applications of Psychological Type

Legend: % = percent of total choosing this group who fall into this type. I = Selfselection index: Ratio of percent of type in group to % in sample.

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ	ISFJ #	INFJ	INTJ *
N= 8	N= 1	N= 3	N= 6
%= 11.11	%= 1.39	%= 4.17	%= 8.33
I= 0.62	I= 0.09	I= 1.55	I= 3.70
ISTP	ISFP "	INFP "	INTP *
N= 2	N= 0	N= 6	N= 13
%= 2.78	%= 0.00	%= 8.33	%= 18.06
I= 0.72	I= 0.00	I= 2.24	I= 10.54
ESTP	ESFP	ENFP *	ENTP *
N= 3	N= 1	N= 10	N= 8
%= 4.17	%= 1.39	%= 13.89	%= 11.11
I= 1.25	I= 0.24	I= 3.15	I= 6.31
ESTJ "	ESFJ #	ENFJ	ENTJ
N= 3	N= 0	N= 3	N= 5
%= 4.17	%= 0.00	%= 4.17	%= 6.94
I= 0.27	I= 0.00	I= 1.81	I= 2.18

		N	%	I	
J	E	33	45.83	0.97	
U	I	39	54.17	1.03	
D I	S	18	25.00	0.32	*
G N	N	54	75.00	3.41	*
I T	T	48	66.67	1.35	#
N R	F	24	33.33	0.66	#
G O	J	29	40.28	0.58	*
	V	P	43	59.72	1.96	*
P E	IJ	18	25.00	0.66	"
E R	IP	21	29.17	1.93	*
R T	EP	22	30.56	1.99	*
C S	EJ	11	15.28	0.48	#
E	ST	16	22.22	0.55	#
P	SF	2	2.78	0.07	
T	NF	22	30.56	2.33	*
I E	NT	32	44.44	4.99	*
V X	SJ	12	16.67	0.28	*
E T	SP	6	8.33	0.44	"
S R	NP	37	51.39	4.43	*
A	NJ	17	23.61	2.26	*
J V	TJ	22	30.56	0.79	
U E	TP	26	36.11	3.38	*
D R	FP	17	23.61	1.19	
G T	FJ	7	9.72	0.31	*
I S	IN	28	38.89	3.75	*
N	EN	26	36.11	3.10	*
G	IS	11	15.28	0.36	*
	ES	7	9.72	0.27	*

Note concerning symbols following the seleceion ratios:
" implies significance at the .05 level, i.e., Chi-square >3.8;
implies significance at the .01 level, i.e., Chi-square > 6.6;
* implies significance at the .001 level, i.e., Chi-square > 10.8.
_ (underscore) indicates Fisher's exact probability used instead Chi-square.

Base population used in calculating selection ratios:
high school graduates from atlas
Base total N = 1943. Sample and base are dependent.

to the percent of the high school graduates group expressing that preference (the more similar the two groups, the nearer the ratio approximates 1.0; the more dissimilar the groups, the nearer the ratio approximates 0.0).

Side-bars on the right also present number of CY-TAG students, percent of CY-TAG students, and ratio of CY-TAG students to the comparison group in terms of single and combined preferences. Statistically significant differences revealed through chi square procedures are notated.

Comparing percentages of CY-TAG group preferences to percentages of types expected among the general population is helpful in assessing the degree to which the gifted sample deviates from population parameters. It is estimated that the normal distribution contains 75 percent Extraverts and 25 percent Introverts (Myers & McCaulley, 1986). CY-TAG participants, however, were nearly evenly divided between Extraversion (45.83 percent) and Introversion (54.17 percent). This over-representation of Introverts suggests that the gifted group may have a larger than usual number of students who feel more comfortable with teacher-oriented instruction and solitary learning activities; because Introverts tend to think before they act, these students may be slower to contribute ideas and comments (Jensen, 1987).

The CY-TAG students differed markedly from general population samples on the Sensing-Intuiting function. While the normal distribution is characterized by a 75 percent predominance of Sensors (Myers & McCaulley, 1986), the gifted sample was characterized by an inverse predominance of

Intuitors (75 percent). The CY-TAG sample, then, contained an unusually high number of students who are imaginative, impatient with routine, and therefore likely to prefer open-ended assignments. Intuitive learners also are drawn to theories, concepts, and general impressions rather than concrete details and facts. While Sensing learners tend to master and apply information just as they have learned it, Intuitive learners tend to master information and then innovate in application activities.

Intuitive learners are interested in solving new problems; in language, words, and other symbols; and in hidden meaning and possibilities. MBTI interpreters suggest that these students may act out or become lost in their own thoughts during activities that focus primarily on factual content, such as lecture, recitation, and drill; in addition, they are frequently careless in detail work (Lawrence, 1984; McCaulley & Natter, 1974). In discussions or presentations, Intuitors respond positively to introductory explanations of conceptual perspectives with a minimum of details; their productivity may occur in bursts and spurts rather than in a consistent even flow (Kummerow, 1985). They thrive on theoretical discussions and tasks requiring imagination and insight.

Proportions of CY-TAG students expressing Thinking-Feeling preferences were similar to those of the general population. Gender differences have been documented on this affect-related domain, with 60 percent of the males selecting Thinking and 65 percent of the females selecting Feeling (Myers & McCaulley, 1986). Similarly, among the CY-TAG sample in which males outnumbered females in a 2:1 ratio, Thinking

preferences characterized 66.67 percent of the subjects. Thinking learners respond most positively in an educational environment which provides a systematic rationale and clear criteria. In contrast to Feeling types whose focus is process, people, and values, Thinking types focus on product and may therefore offer conclusions too quickly or too bluntly in problem-solving and communicating with others (Jensen, 1987).

Myers (1980b) described Thinking types as impersonal decision-makers who are analytical and firm-minded. They are typified by a preference for cause-and-effect analysis, both achievement and task orientation, and a need to master content. Thinking types respond favorably to discussions and presentations which are concise and logical as well as objective and reasonable (Kummerow, 1985). Thinking types also tend to focus on tasks more than relationships, to attend to product rather than process. Positive instructor response to their efforts serves as an impetus to learning among Thinking types; these students are likely to feel compelled to learn when they are provided with the logic and rationale underlying various activities (Lawrence, 1984; McCaulley & Natter, 1974).

Results indicate that about 55-60 percent of the general population prefers the Judging to the Perceiving function (Myers & McCaulley, 1986). The gifted sample, however, is described as under-represented by Judging types, with 40.28 percent of the students indicating that preference. Tendencies of Judging learners to view progress in terms of actual accomplishments, to set goals, and to attain closure are translated into high degrees of organization and motivation, and perhaps overachievement

(Jensen, 1987). While Perceivers are fluent in generating numerous possibilities, they may experience difficulty in attaining closure. They respond most favorably in a flexible learning environment, and may feel confined if too much structure is imposed.

In People Types and Tiger Stripes, a book which offers theoretical and practical applications of type to educational settings, Lawrence (1982) noted that the IN combination is likely to be distributed among only nine percent of the student population. Consistent with that observation, eleven percent of the 1943 high school graduates used as a comparison group in this study (see Table 3) indicated IN preferences. In contrast, however, 40 percent of the CY-TAG students and 46 percent of the National Merit Scholarship Finalists expressed IN preferences. The gifted samples, then, contain an over-representation of IN-type learners.

Generalizability and further substantiation of these differences between the gifted sample and the normal population is supported by a comparison of the CY-TAG group and a sample of National Merit Scholarship Finalists (CAPT-MBTI, 1986). This comparison yielded only one statistically significant difference among the 44 chi square procedures executed, indicating that characteristics of the CY-TAG group are also consistently descriptive of a larger sample of highly gifted students.

As depicted in Table 3, the CY-TAG group was dominated by Intuiting and Thinking preferences, and is best described as an INTP group. The 1987 CY-TAG Program Evaluation Report (Delbridge-Parker, 1988) contains examples of how knowledge and understanding of type can be utilized in

designing programs which are responsive to needs and preferences of gifted participants.

Evaluative comments from students, parents, and staff indicated strong student dislike for the psychological testing which constituted a CY-TAG research component. In light of group type characteristics and factors which comprised the testing environment, the program evaluator recommended that (a) future participants might be more receptive and cooperative, and (b) conflict could be reduced if, prior to testing, students were made aware of the importance of the testing in relation to the CY-TAG model, to the research institution which sponsors CY-TAG, and to the body of knowledge about talented-and gifted students. Further, it was suggested that students might be more motivated participants if they were assured that following the testing sessions, they would receive summaries of previous related research, reports of their own performance, and comparisons of their performance with that of earlier subjects. Similarly, students' opposition to policies and procedures might be alleviated by presenting to them the logic and rationale behind rules which are necessary when junior high students reside on a university campus with enrollment of 25,000.

The even distribution between Introverts and Extraverts points to the importance of offering a balanced variety of classroom activities. Instructors must create learning situations for Extraverted students who learn most efficiently in classrooms characterized by action, talk, and group or cooperative activities. They must also be responsive to Introverts who learn most efficiently if they are given time to reflect in

solitude, and if they are given the opportunity to plan their classroom involvement rather than being forced to participate (Lawrence, 1984; McCaulley & Natter, 1974). CY-TAG program evaluation results (Delbridge-Parker, 1988) indicated that high student satisfaction with coursework may have been attributable to the variety of activities generated by instructors within each academic area.

The CY-TAG Program Evaluation Report (Delbridge-Parker, 1988) also documented the importance of applying knowledge of type preference in designing co-curricular activities. Program personnel deliberately structured participants' out-of-class hours in lieu of allowing too much unstructured free time for bright, creative adolescents. In keeping with their INTP preferences, students recommended on program evaluation instruments that future sessions be characterized by greater flexibility and more possibilities in extra-curricular activities. They chafed at being "over-scheduled" and suggested more free time and optional or alternative activities which would facilitate opportunities for independent reading and study, friendships with ability peers, as well as other individual or small group interests. Several students also inquired about the possibility of offering optional co-curricular activities in the creative arts.

Quality of residence life is vital to the success of a residential program. Because of its effectiveness in college and university settings, roommate selection based on matching at least one of the two middle letters of the four-letter type preference (Dr. Scott Anchors, personal communication, April 28, 1988) can also be utilized in a summer

residential program for gifted students. Major benefits of matching roommates in this manner include reduced conflict and improved communication. In addition, positive residence experiences shared among gifted students would facilitate improved self-esteem, understanding of giftedness, association with ability peers, and interpersonal skills. Awareness of type also carries implications for residence hall staff in terms of communicating with individual students, in facilitating or chaperoning small groups, and in improving communication between and among students.

Because creative problem solving is an appropriate activity for gifted students, understanding of type and creative problem solving is also an integral component in designing educational strategies for the gifted. Descriptions of type implications for creative problem solving (Myers, 1980a) also carry implications for in- and out-of-class group dynamics. The CY-TAG sample was rich in equal numbers of Introverts who are better at generating ideas, "dreaming" of possibilities, and reflecting, as well as Extraverts who are better at communicating and enacting ideas. The sample was also evenly balanced in terms of Judging types who are methodological, cautious, decisive planners who work toward closure, and who bring order and control to situations, as well as perceptive types who are procedural, flexible, adaptable adventurers who contribute input and who delay closure in favor of obtaining additional data. The CY-TAG sample was dominated (a) by Intuitors who are likely to develop theory, generate designs, rely on Intuitions, and display ingenuity in solving problems, and (b) by Thinkers who are likely to

generate reforms, to serve as logical organizers of knowledge, and to display creativity with impersonal data and objects.

In considering implications of the statistical results presented in Table 3, it is important to assess not only the descriptive characteristics of academically gifted adolescents, but also the ways in which they differ from a large sample of students with varying degrees of academic ability. CY-TAG students differed from the comparison group on nine of the 16 type preferences. They also differed on 23 of the 28 single or combined preferences reported; 17 of those 23 differences were significant at the .001 level.

If the purpose of education is to provide equal opportunity rather than generate equal results, then these findings substantiate the need for differentiated curriculum and pertinent programs for gifted students. They also point to factors which may account in part for problems among high-ability high-risk students who are bored in traditional classrooms, who are unmotivated underachievers, or who are dropouts from the educational system. These results underscore the need for appropriate challenges and appropriate learning opportunities if students who differ significantly from the norm are to be well served.

Findings from this administration and analysis of the Myers-Briggs Type Indicator yield descriptions and practical applications in relation to academically gifted students. Results also support the hypothesis that the distribution of psychological types and learning styles among highly gifted students differs from that of a larger group of students characterized by varied abilities. In addition, results indicate the need

for pertinent approaches in designing programs and activities which meet the cognitive and affective needs of gifted students.

It is important to exercise caution in applying MBTI results. Obviously, this instrument cannot generate all the information needed in designing a learning environment which is appropriate and responsive to the learning preferences of gifted students. However, if used in combination with a more traditional inventory which perhaps describes learning behavior, the MBTI can be a valuable tool in profiling both students and instructors as well as an efficient educational environment.

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APPENDIX H.

TIME-SERIES/LONGITUDINAL STUDY:

TOTAL ITEM RESPONSES OF 1987 IOWA DUKE TIP FINALISTS

IN FREQUENCIES, VALID PERCENTS, MEANS, AND STANDARD DEVIATIONS

ITEM	N	Valid percent
Gender		
Male	237	56.8
Female	180	43.2
Grade May 1987		
5th	1	0.2
6th	5	1.2
7th	237	51.1
8th	169	40.7
9th	3	0.7
Type of school attended		
Public	394	95.6
Independent or private	7	1.7
Church	11	2.7
School size		
Large -- over 2500	242	61.9
Middle -- 750 to 2500	95	24.3
Small -- under 750	54	13.8
Participation in gifted program		
No TAG program	114	27.7
Not asked to participate	29	7.0
Currently in program	234	56.8
Chose not to participate	26	6.3
In a program not part of school	9	2.2
Activities		
Academic clubs, courses, computers	140	33.7
Animals, pets	27	6.5
Art, photography, crafts	70	16.8
Athletics	276	66.3
Church	27	6.5
Collections, models	81	19.5
Competitions	141	33.9
Cooking, sewing	23	5.5
Dance	33	7.9
Drama, debate	68	16.3
Gifted activities	174	41.8
Music	230	55.3
Puzzles, games, chess	31	7.5
Reading	110	26.4
Scouts, 4-H	87	20.9

ITEM	N	Valid percent
Activities (continued)		
Student council, leadership	54	13.0
Summer camp, camping	17	4.1
Writing, journalism	66	15.9
Female parent		
Relationship		
Mother	399	97.1
Stepmother	1	0.2
Adoptive mother	10	2.4
No female parent	1	0.2
Education		
High school diploma	62	15.3
Some college	75	18.5
Community college or trade school	37	9.1
Bachelor's degree	165	40.6
Master's degree	51	12.6
Doctorate	12	3.0
Other	4	1.0
Male parent		
Relationship		
Father	368	88.9
Stepfather	15	3.6
Adoptive father	9	2.2
No male parent	22	5.3
Education		
High school diploma	55	13.2
Some college	47	11.3
Community college or trade school	25	6.0
Bachelor's degree	116	27.9
Master's degree	74	17.8
Doctorate	67	16.1
Other	8	1.9
Learned in school about		
Library skills	406	98.8
Scientific method	310	76.4
Study skills	379	92.4
Problem solving skills	383	94.6
Higher level thinking	249	61.5

ITEM	N	Valid percent
Course completed		
7th grade general math	251	60.5
8th grade general math	125	30.1
Pre-algebra	218	52.5
Algebra	112	27.0
Algebra I	117	28.2
Algebra II	23	5.5
Algebra III	2	0.5
Geometry	76	18.3
Analytic geometry	5	1.2
Trigonometry	14	3.4
7th grade general science	324	78.1
8th grade general science	141	34.0
Earth science	147	35.4
Biology	103	24.8
Chemistry	34	8.2
Physics	18	4.3
Learn independently		
Frequently	75	18.2
Often	162	39.2
Seldom	154	37.3
Never	22	5.3
Feelings about being gifted		
Very comfortable	140	33.9
Somewhat comfortable	136	32.9
Very uncomfortable	13	3.1
Does not affect me	97	23.5
Don't consider myself gifted	27	6.5
Others' opinions affected by my giftedness		
Very positively	46	11.2
More positively than negatively	200	48.5
Not at all	72	17.5
More negatively than positively	87	21.2
Very negatively	6	1.6
Important to learn in school about		
Planning for school and college		
Not important	9	2.2
Slightly important	14	3.4
Fairly important	104	25.4
Very important	283	69.0

ITEM	N	Valid percent
How to get along in school		
Not important	45	10.9
Slightly important	82	19.9
Fairly important	143	34.7
Very important	142	34.5
Explanation of learning ability		
Not important	37	9.0
Slightly important	87	21.2
Fairly important	131	32.0
Very important	155	37.8
How to get along in families		
Not important	76	18.6
Slightly important	89	21.8
Fairly important	123	30.1
Very important	121	29.6
How to get along with friends		
Not important	66	16.1
Slightly important	74	18.0
Fairly important	120	29.3
Very important	150	36.6
Career planning		
Not important	7	1.7
Slightly important	28	6.8
Fairly important	91	22.2
Very important	284	69.3
Understanding giftedness		
Not important	39	9.5
Slightly important	75	18.3
Fairly important	131	32.0
Very important	165	40.2
Understanding performance		
Not important	47	11.5
Slightly important	78	19.0
Fairly important	119	29.0
Very important	166	40.5

ITEM	N	Valid percent
Locus of control		
Succeed because of abilities	372	90.3
Succeed because of hard work	309	75.0
Succeed because of good luck	42	10.2
Fail because of lack of ability	85	20.7
Fail because didn't work hard enough	364	88.6
Fail because of bad luck	40	9.8
Values		
Becoming an authority in my field		
Not important	21	5.1
Somewhat important	90	22.0
Very important	168	41.0
Essential	131	32.0
Obtaining recognition from colleagues		
Not important	32	7.8
Somewhat important	138	33.7
Very important	162	39.5
Essential	78	19.0
Influencing political structure		
Not important	140	34.1
Somewhat important	150	36.6
Very important	83	20.2
Essential	37	9.0
Raising a family		
Not important	40	9.9
Somewhat important	95	23.5
Very important	138	34.1
Essential	132	32.6
Being very well off finacially		
Not important	23	5.6
Somewhat important	110	26.8
Very important	165	40.2
Essential	112	27.3
Helping those in difficulty		
Not important	12	2.9
Somewhat important	101	24.7
Very important	174	42.5
Essential	122	29.8

ITEM	N	Valid percent
Writing original works		
Not important	151	36.9
Somewhat important	134	32.8
Very important	63	15.4
Essential	61	14.9
Creating artistic work		
Not important	196	48.0
Somewhat important	120	29.4
Very important	58	14.2
Essential	34	8.3
Being successful in own business		
Not important	52	12.7
Somewhat important	111	27.1
Very important	140	34.1
Essential	107	26.1
Cleaning up environment		
Not important	47	11.5
Somewhat important	172	42.0
Very important	133	32.4
Essential	58	14.1
Promoting racial understanding		
Not important	38	9.3
Somewhat important	129	31.5
Very important	51	36.8
Essential	92	22.4
Keeping up-to-date on political affairs		
Not important	38	9.3
Somewhat important	127	31.0
Very important	131	32.0
Essential	114	27.8

ITEM	Mean	S.D.
Attitude toward		
School in general	3.9	0.8
Math	4.1	1.0

ITEM	Mean	S.D.
Attitude toward (continued)		
General science	4.049	0.897
Biology	3.811	0.947
Chemistry	3.971	0.974
Physics	3.804	1.007
Literature	3.993	1.088
Composition	3.638	1.233
Foreign language	3.915	0.957
Social studies	3.720	1.071
Physical education	3.582	1.224
Art	3.645	1.182
Performing arts	3.963	1.182
Computer science	3.967	0.911
Ability in		
School in general	4.548	0.532
Math	4.520	0.631
General science	4.347	0.641
Biology	4.252	0.714
Chemistry	4.278	0.723
Physics	4.236	0.750
Literature	4.370	0.707
Composition	4.083	0.837
Foreign language	3.978	0.833
Social studies	4.180	0.758
Physical education	3.221	0.978
Art	3.514	0.959
Performing arts	3.888	1.040
Computer science	3.962	0.885
Influence in content areas		
Math		
Mother	4.366	0.853
Father	4.331	0.961
Teacher	4.231	0.890
Peers	3.095	1.096
Science		
Mother	3.981	1.033
Father	3.988	1.130
Teacher	4.039	0.935
Peers	2.983	1.063

ITEM	Mean	S.D.
Influence in content areas (continued)		
Foreign language		
Mother	3.682	1.236
Father	3.487	1.271
Teacher	3.371	1.277
Peers	2.751	1.157
Literature		
Mother	4.321	0.970
Father	3.980	1.145
Teacher	4.182	0.964
Peers	2.906	1.096
Composition		
Mother	4.186	1.049
Father	3.857	1.163
Teacher	4.162	1.019
Peers	3.069	1.170
Physical education		
Mother	3.755	1.117
Father	3.920	1.150
Teacher	3.436	1.138
Peers	3.511	1.225
Art		
Mother	3.672	1.175
Father	3.418	1.237
Teacher	3.514	1.166
Peers	2.995	1.139
Performing arts		
Mother	4.141	1.161
Father	3.779	1.300
Teacher	3.784	1.227
Peers	3.175	1.274
Computer science		
Mother	3.627	1.152
Father	3.718	1.231
Teacher	3.529	1.107
Peers	2.938	1.140

ITEM	Mean	S.D.
Importance of each in future career		
Math	3.713	0.563
Biology	2.780	1.002
Chemistry	2.867	0.976
Physics	3.077	0.978
Literature	3.232	0.835
Composition	3.174	0.887
Social studies	2.600	0.912
Foreign language	2.549	0.949
Computer science	3.484	0.748

Tabulated responses to short answer/open-ended questions

ITEM	N	Valid percent
Mother's occupation		
Professional, technical	156	38.8
Homemaker	130	32.3
Clerical	39	9.7
Service provider	29	7.2
Manager	23	5.7
Sales	12	3.0
Craftsperson, operative	9	2.2
Farming	2	0.5
Unemployed, disabled	1	0.2
Sports	1	0.2
Deceased/single parent	1	0.2
Father's occupation		
Professional, technical	157	42.0
Manager, proprietor	75	20.1
Craftsman, operative	45	12.0
Farming	26	7.0
Salesperson, agent	25	6.7
Deceased/single parent	15	4.0
Service provider	14	3.7
Clerical	9	2.4
Unemployed, disabled	6	1.6
Retired	2	0.5

ITEM	N	Percent of respondents
List 3 possible career choices (based on 83.9% of respondents)		
Professional, technical	779	
General	52	
Manager, proprietor	48	
Service provider	32	
Craftsperson, operative	4	
Clerical	3	
Farming	2	
Full-time homemaker	1	
Haven't considered occupational choice	67	16.1
List 3 possible college choices (based on 60.1% of respondents)		
Type of college		
Public	573	91.4
Private	50	8.0
Proprietary	4	0.6
Scope of degree program offered		
Two-year	6	1.0
Four-year	70	11.2
University	551	87.9
In or out-of-state		
Iowa	264	42.0
Out-of-state	355	56.4
Do not plan on attending college	2	0.5
Most frequent independent study topics		
Science	75	
Computers	36	
Literature	26	
History	20	
How educators can best support gifted students		
Challenge them academically	146	
Treat them like "normal kids"	115	
Make curricular changes	99	
Encourage them	79	
Understand them better	68	
Provide guidance, supportiveness	27	
Provide special learning opportunities	16	

APPENDIX I.

CY-TAG PROGRAM EVALUATION:

TOTAL ITEM RESPONSES OF CY-TAG STUDENTS, PARENTS, AND FACULTY/STAFF

IN FREQUENCIES, VALID PERCENTS, MEANS, AND STANDARD DEVIATIONS

Survey Item	Students (N=72) No.	Students (N=72) Valid percent	Parents (N=67) No.	Parents (N=67) Valid percent	Faculty/Staff (N=21) No.	Faculty/Staff (N=21) Valid percent
Learned about CY-TAG from:						
CY-TAG letter	29	40.8	28	41.8	NA	NA
School personnel	16	22.5	13	19.4	NA	NA
Amount of time studying each night						
Too little	14	19.4	13	26.5	9	69.2
Just right	47	65.3	36	73.5	4	30.8
Too much	11	15.3	NA	NA	NA	NA
Hours spent on homework each night						
One hour or less	50	69.4	NA	NA	NA	NA
From one to two hours	16	22.2	NA	NA	NA	NA
More than two hours	6	8.3	NA	NA	NA	NA
Amount of homework each night						
Too little	NA	NA	7	15.6	7	50.0
Just right	NA	NA	31	68.9	7	50.0
Too much	NA	NA	7	15.6	--	--
Ease of material covered						
Too easy	2	2.8	--	--	--	--
Just right	65	90.3	62	93.9	14	100.0
Too difficult	5	6.9	4	6.1	--	--
Ease of textbook						
Too easy	1	1.4	NA	NA	--	--
Just right	65	90.3	NA	NA	14	100.0
Too difficult	6	8.3	NA	NA	--	--

Survey Item	Students (N=72)		Parents (N=67)		Faculty/Staff (N=21)	
	No.	Valid percent	No.	Valid percent	No.	Valid percent
In regular school classes, student works						
Below ability level	46	63.9	28	43.1	NA	NA
At ability level	13	18.1	19	29.2	NA	NA
Above ability level	13	18.1	18	27.7	NA	NA
During CY-TAG, student worked						
Below ability level	3	4.2	4	6.1	2	16.7
At ability level	43	59.7	44	66.7	10	83.3
Above ability level	26	36.1	18	27.3	--	--
Amount learned in CY-TAG compared to school						
Less than in regular school	1	1.4	--	--	NA	NA
Same as in regular school	2	2.8	1	1.6	NA	NA
More than in regular school	69	95.8	63	98.4	NA	NA
Quality of work expected during CY-TAG						
Too little expected	7	9.7	2	3.0	2	11.8
Appropriate	56	77.8	62	93.9	15	88.2
Too much expected	9	12.5	2	3.0	--	--
Self-esteem following CY-TAG						
Unchanged	NA	NA	17	25.4	NA	NA
More positive	NA	NA	50	74.6	NA	NA

Survey Item	Students (N=72) frequency	Parents (N=67) frequency	Faculty/Staff (N=21) frequency
Three aspects of CY-TAG students liked best			
Academic challenge	54	NA	8
Extra-curricular activities	31	NA	19
Meeting new friends	30	NA	--
Independence	18	NA	--
Working with peers	14	NA	--
RA's	14	NA	--
Field trips	6	NA	8
Free time	--	NA	10
Three aspects of CY-TAG parents liked best			
Working with peers	NA	30	NA
Staff	NA	29	NA
Independence	NA	21	NA
Academic challenge	NA	20	NA
Coursework	NA	20	NA
Three aspects of CY-TAG Faculty/Staff liked best			
Interaction with students	NA	NA	9
Interaction among students	NA	NA	6
Staff cooperation	NA	NA	11
Teaching situation	NA	NA	9
Three aspects of CY-TAG students liked least			
Rules	39	NA	1
Psychological testing	29	NA	20
Required activities	18	NA	15
Dorm facilities	15	NA	2
Early bedtime	14	NA	--
Class	13	NA	4

Survey Item	Students (N=72) frequency	Parents (N=67) frequency	Faculty/Staff (N=21) frequency
Three aspects of CY-TAG parents liked least			
Dorm facilities	NA	13	NA
Restrictions on communication with my child	NA	11	NA
More study/sleep time	NA	11	NA
Required activities	NA	10	NA
Three aspects of CY-TAG Faculty/Staff liked least			
Unorganized chain of command	NA	NA	11
Psychological testing of students	NA	NA	9
Will CY-TAG make a difference in coming year?			
Yes -- will be accelerated	27	24	NA
Will make school work easier	23	9	NA
Will improve skills	7	4	NA
Will be bored with regular classes	5	5	NA
Why would you recommend CY-TAG to a friend?			
You learn a lot	23	--	NA
It's fun	22	4	NA
You get to be with your peers	9	19	NA
You can accelerate in school	5	--	NA
Challenging	--	19	NA
Growth	--	12	NA
Opening/Closing day suggestions			
Shorten orientation time	NA	NA	7
Reorganize testing	NA	NA	6
More staff/parent time	NA	NA	4

Survey Item	Students (N=72) frequency	Parents (N=67) frequency	Faculty/Staff (N=21) frequency
Most important change as result of CY-TAG			
Academic improvement	23	11	NA
Developed social skills	13	--	NA
Learned more about self and other gifted	12	6	NA
Learned more responsibility	10	--	NA
Self-confidence	2	30	NA
Self-esteem	--	11	NA
Perception of school attitude toward CY-TAG			
Positive	NA	29	NA
Negative	NA	8	NA
Uninformed	NA	12	NA
Additional information useful to parents			
Roommates	22	6	1
Course information	9	2	3
Schedules	7	6	--
Activities	--	--	4
Do not force an unmotivated child to attend	--	--	5
Define rules	5	1	6
CY-TAG participation has meant personally			
Improved teaching skills	NA	NA	8
Enjoyed colleagues	NA	NA	5
Better understanding of giftedness	NA	NA	5

NA = Question was not included on this particular survey
-- = No response

Survey Item	Students (N=72) Mean	S.D.	Parents (N=67) Mean	S.D.	Faculty/Staff (N=21) Mean	S.D.
Satisfaction with:						
Food	3.569	0.962	NA	NA	NA	NA
Roommate	3.514	1.332	NA	NA	NA	NA
Dorm room	3.528	1.061	NA	NA	NA	NA
Classroom	4.139	0.827	NA	NA	3.455	1.214
Material covered in class	4.056	1.137	4.825	0.423	4.300	0.483
Variety of activities	3.875	1.162	4.516	0.908	4.000	0.739
Help student rec'd from instructor	4.069	1.092	4.450	0.928	4.273	1.009
Help student rec'd from TA	4.000	1.126	4.559	0.815	3.846	1.068
Help instructor rec'd from TA	NA	NA	NA	NA	4.100	0.994
Extent to which:						
Instructor knowl about course materials	4.778	0.510	4.897	0.307	4.833	0.577
Instructor knowl about gifted learners	3.931	0.811	4.320	0.913	4.167	0.718
Instructor knowl about social/emotional needs	3.736	1.061	4.245	0.979	4.167	0.718
TA's knowl about course materials	4.569	0.552	4.709	0.458	4.727	0.467
TA's knowl about gifted learners	3.958	0.731	4.292	0.824	4.000	0.632
TA's knowl about social/emotional needs	3.958	0.895	4.152	0.842	3.818	1.168
RA's knowl about giftedness	3.901	1.002	4.286	0.868	3.769	0.832
RA's knowl about social/emotional needs	4.070	1.046	4.317	0.873	3.769	0.832
Instructor interested in your ideas	4.143	1.067	NA	NA	NA	NA
TA interested in your ideas	3.986	1.097	NA	NA	NA	NA
RA interested in your ideas	4.086	1.004	NA	NA	NA	NA
Course material new to student	4.408	0.667	4.571	0.588	4.000	1.128
Class interesting	4.056	0.924	4.500	0.836	4.235	0.664
Class challenging	4.704	0.545	4.703	0.706	4.353	0.606
Class well-organized	4.056	1.054	NA	NA	4.063	0.772
Class activities worthwhile	4.113	1.008	4.492	0.796	4.067	0.594
Homework assignments worthwhile	3.671	0.989	4.269	0.931	4.071	0.616
Expected to participate in class activities	4.014	0.933	NA	NA	4.818	0.405

Survey Item	Students (N=72)		Parents (N=67)		Faculty/Staff (N=21)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Problem solving skills used in class	3.800	1.030	4.444	0.725	4.545	0.688
Critical thinking skills used in class	4.070	1.138	4.500	0.754	4.545	0.820
Lecture used in class	2.676	1.565	NA	NA	2.100	0.994
Independent activities used in class	4.254	0.840	NA	NA	3.727	1.348
Small group activities used in class	2.901	1.456	NA	NA	2.091	1.221
Rec'd individual help from instructor	3.609	1.060	NA	NA	4.000	0.775
Still interested in course topic	4.451	0.824	4.701	0.578	NA	NA
Students understand selection process	3.789	1.094	4.318	0.931	3.786	1.122

APPENDIX J.

CY-TAG PROGRAM EVALUATION:

TOTAL ITEM RESPONSES OF CY-TAG PARTICIPANTS' SCHOOL PRINCIPALS IN FREQUENCIES, VALID PERCENTS, MEANS, AND STANDARD DEVIATIONS

ITEM	(n = 44) YES Frequency	YES Valid %	NO Frequency	NO Valid %
Visited with student about CY-TAG	40	90.9	4	9.1
Visited with parents about CY-TAG	33	75.0	11	25.0
Parents provided school with timely information	35	81.4	8	18.6
Local school has retested CT student	10	25.6	29	74.4
Granted H.S. credit for CT work	11	28.9	27	71.1
Student in advanced course as a result of CT work	22	52.4	20	47.6
Believe students capable of CT acceleration	42	95.5	2	4.5
CT was first experience with acceleration	24	57.1	18	42.9
Rec'd CT info from student	26	59.1	18	40.9
Rec'd CT info from parents	25	56.8	19	43.2
Rec'd CT info from school counselor	6	13.6	38	86.4
Rec'd CT info from TAG coordinator	18	40.9	26	59.1
Rec'd CT info from AEA gifted consultant	2	4.5	42	95.5
Rec'd CT info from Media	11	25.0	33	75.0
Rec'd CT info from CT progam material	23	52.3	21	47.7

ITEM	Frequency	Valid percent
Most helpful source of information		
Student	3	12.0
Parent	3	12.0
Counselor	1	4.0
District gifted coordinator	9	36.0
Media	1	4.0
CY-TAG program materials	7	28.0
Preference for meeting the academic needs of gifted		
Enrichment-Pullout	6	14.0
Acceleration	3	7.0
Combination	34	79.1

ITEM	Frequency	Valid percent
Satisfaction with CY-TAG summary information		
Completely satisfied	26	60.5
Somewhat satisfied	13	30.2
Not at all satisfied	1	2.3
Did not see	3	7.0

ITEM	Frequency
Strengths of CY-TAG	
Challenge, Motivation	16
Individual attention	7
Accelerated work	6
Weaknesses of CY-TAG	
Need better communication/coordination with school	9
Follow-up ideas on credit/placement options	4
Expense	4
Additional information CY-TAG could provide to school	
In-service	4
Earlier information	4
Follow-up suggestions	3
Better communication	3
Explanations of courses	2