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ABSTRACT

The Indiana Academy for Science, Mathematics, and Humanities provides a comprehensive academic program in a residential setting for approximately 300 academically gifted high school juniors and seniors. Operated by Ball State University, the Academy has created a curriculum with three dimensions--one for learning a core body of knowledge (the Core Curriculum), one for experiencing the process of discovery and exploration (the Exploratory Curriculum), and one for nurturing total growth and cultural enrichment (the Extended Curriculum). Planning for the curriculum involved an assessment of the Academy's context, goals, programs, and learning outcomes. The Core Curriculum includes subject areas in science, mathematics, and humanities, as well as a program of interdisciplinary colloquia. The Exploratory Curriculum consists of research seminars, apprenticeships, and elective courses. The Extended Curriculum consists of the wellness program, community service, cultural events, and other extracurricular activities. All these components work together to produce integrated learning outcomes. (Contains 10 references.) (JDD)

A MULTIDIMENSIONAL CURRICULUM FOR ACADEMICALLY GIFTED STUDENTS: EDUCATING THE WHOLE PERSON AT THE INDIANA ACADEMY

by

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Culture is activity of thought,
and receptiveness to beauty,
and humane feeling.

- Alfred North Whitehead

When Whitehead issued this maxim slightly over 60 years ago he was exhorting an education that would aim to develop all the dimensions of the human mind. He also was laying the groundwork of a multidimensional curriculum for the Indiana Academy for Science, Mathematics, and Humanities.

Begun on August 18, 1990, the Indiana Academy for Science, Mathematics, and Humanities provides a comprehensive academic program in a residential setting for approximately 300 academically gifted high school juniors and seniors. Operated by Ball State University, it is Indiana's only statewide, state-supported residential school for the academically gifted and talented. Tuition, room and board expenses are provided free to students.

Origin and Foundation of the Curriculum

Like the several states that preceded Indiana in establishing statewide residential secondary schools, the Indiana legislature created the Indiana Academy specifically to serve a residential student body of high school juniors and seniors selected for their "intellectual ability and commitment to learning." (West's Ann. Indiana Code 20-12-14.5) Therefore, the school's curriculum was designed expressly for academically gifted students; and, it was grounded in the whole spectrum of liberal arts and sciences.

Gifted pupils differ from normal pupils in three ways,

according to Joyce VanTassel-Baska (1988, p. 54). Gifted pupils are capable of learning at faster rates; they are more capable of finding, solving, and acting on problems; and they are more capable of abstract thought. Moreover, VanTassel-Baska (1988, pp. 54-75) argues convincingly for a differentiated curriculum that accommodates all of these distinguishing characteristics and integrates acceleration, enrichment, and extended learning experiences.

Planners of the Indiana Academy set out to create a curriculum that would incorporate the three characteristics described by VanTassel-Baska. As a result, three dimensions were created--one for learning a core body of knowledge, one for experiencing the process of discovery and exploration, and one for nurturing total growth and cultural enrichment. The Indiana Academy's programs needed to address all three of these dimensions in a coherent and integrative fashion. Hence, a multidimensional curriculum emerged (Green, 1990).

Multidimensional Design of the Curriculum

The planning process that produced the curriculum of the Indiana Academy is depicted in Figure 1. The dynamic nature of the relationships among the context of the institution, goals for learners, academic programs, and learning outcomes form a system for curriculum for curriculum revision as well as original design.

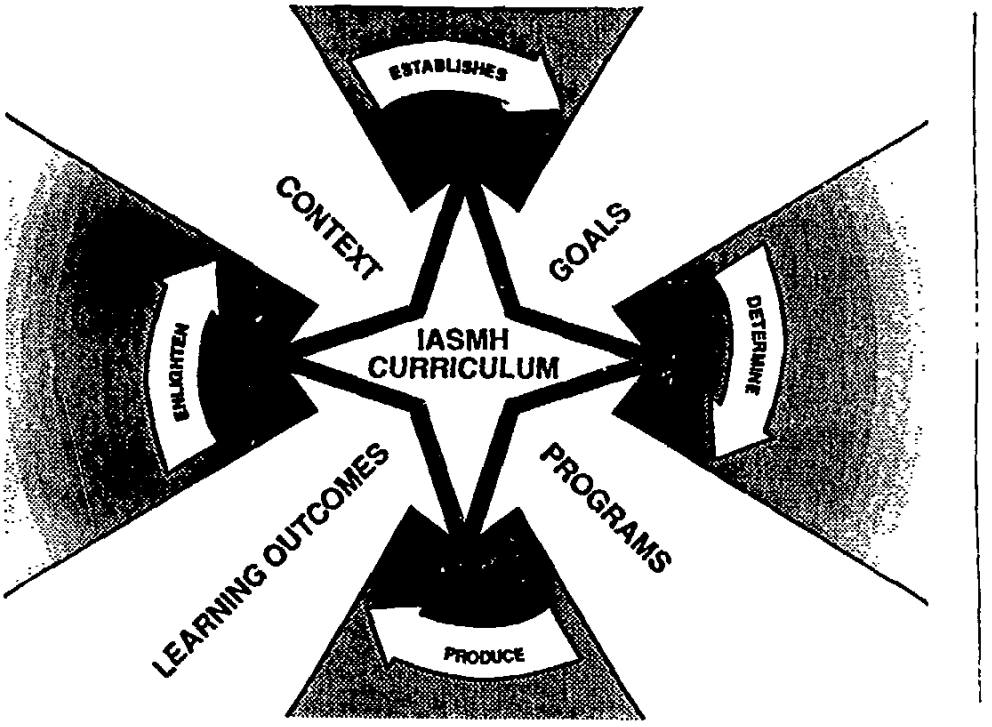

Figure 1
Curriculum Development Model

Planning for the curriculum first began with an assessment of the context. The enabling legislation determined that the academy was going to be a school for gifted high school juniors and seniors; and, as well, it also was going to be residential and coeducational. Since it was a state-wide public school, diversity would characterize the student body, and the school would operate in the same legal environment as any other public secondary school. The mission statement, the philosophy of education, and the curriculum goals grew out of this context.

The goals were grouped into five categories. The first, *personal values*, is an implicit statement that all learning begins with and ultimately affects our personal values. Three others, *creativity, knowledge and understanding*, and *critical thinking and investigation*, emphasize that critical thinking and investigative

skills or nurturing creativity can not occur in a vacuum. Learning core knowledge is necessary for the application of thinking skills or the creative process. The fifth, *personal and social development* is a reflection of the belief embedded in the mission statement and philosophy that education is for the whole person. These curriculum goals determine the school's educational programs.

Consistent with research on gifted learners, the programs address the need for accelerated learning of advanced subjects as well as the learning processes prevalent among the gifted. Therefore, the programs are designed with three dimensions in order to capture the range of the learning goals specified. The three dimensions are designated the *Core Curriculum*, the *Exploratory Curriculum*, and the *Extended Curriculum*.

Finally, since curriculum development is a continual process, assessment of the learning outcomes is necessary to enlighten understanding of the context. Indeed, the validity of some of the assumptions made about the context should be considered in light of assessment of the learning outcomes.

The resulting design of the curriculum--the three dimensional structure of the *Core Curriculum*, the *Exploratory Curriculum*, and the *Extended Curriculum* is depicted in Figure 2.

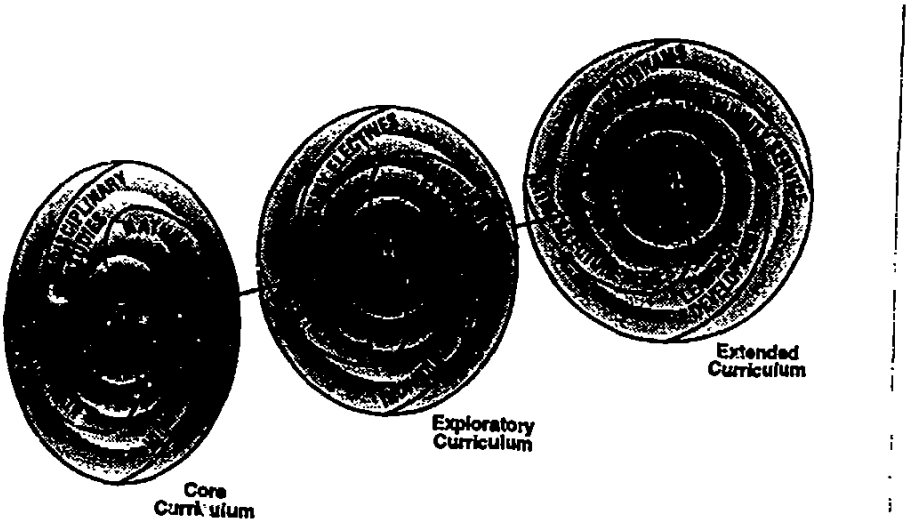

Figure 2
Curriculum Model

The three elements function simultaneously, as though they were wheels on the same axle, to create a curriculum that incorporates integration of formal disciplines, acceleration in the programming of content, emphasis on critical thinking and problem solving, and attention to the formation of the whole person.

Each of the three dimensions individually has four elements. The Core Curriculum includes subject areas in science, mathematics, and humanities, as well as a program of interdisciplinary colloquia. The Exploratory Curriculum consists of research seminars, apprenticeships, elective courses housed in the academy, and elective courses housed in the university. The Extended Curriculum consists of the academy's wellness program, community service, cultural events available on the university campus, and other traditional extracurricular activities. In practice, all the components work together to produce integrated learning outcomes.

The Core Curriculum

First, the academy requires a basic core of studies that encompasses all the traditional liberal arts and sciences.

All students take courses from prescribed sets in the English language, literature, foreign language, history, government, science, mathematics, and computer technology. Core courses include many of the traditional CEEB Advanced Placement courses in science and mathematics, as well as interdisciplinary courses in the humanities. The Core Curriculum closely resembles the accelerated study recommended in VanTassel-Baska's Content Mastery Model (1988, pp. 9-12), and is similar to many of the academic programs found in other statewide schools for science and mathematics.

The notable exception is in the area of humanities. At the Indiana Academy the study of humanities is not an afterthought to science and mathematics. Humanities is emphasized as the conscience and purpose of science and mathematics. Core courses in English language and literature, history, government, and foreign language are required of all students throughout the curriculum.

Foreign language requirements, which may be satisfied by taking classes in any of eight different languages, including Chinese, Japanese, Russian, and classical languages, specify three years in one language or two years in two separate languages.

Colloquia Series

The *Colloquia Series* bears strong resemblance to the "epistemological model" or "concept approach" discussed by

VanTassel-Baska (1988, pp. 14-16), but its actual form is unique to the Indiana Academy. During the fall semester of the junior year, three cycles, each five weeks in length, include planned programs of formal lectures, readings, and small group discussions centering on interdisciplinary ideas. Separate series of colloquia are planned for the spring semester of the senior year. Each class shares a common set of readings for the discussions and lectures.

For example, during the inaugural year the first colloquium was entitled "The Nature of Evidence." It included reading and discussing Descartes' Discourse on Method, with special attention given to the development of the maxim, *cogito ergo sum;* two lectures, including one by a Nobel laureate chemist; and several discussions of classical and modern literature related to the topic.

The standard format for a typical colloquium is contained in a five week period, with one hour of class per week scheduled (Dixon, 1991; Stuart, 1991). The first week usually is a large group meeting of the entire junior or senior class for a formal lecture on the colloquium theme by a visiting scholar. The lecture serves the purpose of providing background that informs the discussion of the readings for the rest of the cycle. The second, third, and fourth class periods are small group discussions--about 15 students for each discussion group--where the readings are considered in the context of the organizing theme of the colloquium. In these small group discussions, the role of the faculty member is crucial. Since the colloquia are

interdisciplinary, faculty members are assigned on the basis of their interest in the program rather than their subject expertise. Indeed, as discussion facilitators the faculty are not seen as "experts" on the topic under discussion, rather they are fellow discussants. In the fifth and last session of a cycle several small groups combine for a closing discussion. The perspective of one group, then, is shared with another.

The colloquia series also serves as a common thread that runs throughout the core curriculum. For example, in one colloquium titled "Freedom, Rights, and Responsibilities," Democracy in America by Alexis de Tocqueville was the primary text. The work was a common reference point for all teachers and students in the core English course for juniors--The American Literary Experience--and the core history course--The American Experiment. Similarly, when juniors read and discussed Rene Descartes' Discourse on Method, they had the advantage of common reading experiences for discussion in their math, science, and philosophy courses.

One example of a typical cycle comes from the senior series, "The Nature of Proof." The topic for the second cycle during the 1991-92 year was titled "So What About Me? The Proof of Intellectual Giftedness." The cycle focused on the expectations of and for those tapped as gifted and talented in American society. In the first week students attended a lecture by a leading authority on the education of the gifted. The second week the small groups discussed "Thinking as a Hobby" by William Golding and "The Educated Imagination" by Northrup Frye. In the third week the

discussion dealt with part of Smart Girls, Gifted Women by Barbara Kerr, as well as biographical profiles of Galileo Galilei, Albert Einstein, Issac Newton, Marie Curie, Eleanor Roosevelt, Maya Angelou, and Georgia O'Keefe. The fourth week's discussion was of selections excerpted from Bloom's Closing of the American Mind. The concluding week combined several discussion groups into one large group of approximately 45 students for a culminating discussion, where perspectives from one group were shared with the perspectives of another. The senior colloquia series included three cycles.

Writing in the Curriculum

All courses, including science and mathematics, require extensive reflective reading and formal writing through the academy's *Writing in the Curriculum Program* (Haynes, 1989). The academy's coordinator of the writing program maintains a writing portfolio for each student. Students file samples of their course related writing at the suggestion of faculty or on their own initiative. The portfolios have proven to be useful sources for students to generate new ideas, as well as providing a record of progress.

Writing in the disciplines at the Indiana Academy is characterized as having three forms: expressive, transactional, and poetic (Haynes, 1989). Instructors sequence writing assignments with these three forms in mind.

While engaged in *expressive writing* students articulate what they already know or express opinions they already hold in

preparation to discover new knowledge or insights. Journal writing, for example, is used as an expressive writing activity in many academy classes.

With *transactional writing* students write with a particular audience in mind and for the purpose of "transacting" information. Conventional assignments include research papers, formal essays, or laboratory reports. But other assignments abound. For example, before tests a calculus teacher has students write letters to friends explaining the mathematical principles that will be tested.

Poetic writing entails the creation of a particular form--such as a poem, short story, or play. Since the Indiana Academy writing program characterizes all meaningful writing as creative, the use of the term "creative writing" was deliberately avoided when defining this category of discourse. In poetic writing instructors incorporate as many of the various writing forms as possible into any given class. For example, in a chemistry class the teacher has students write short stories, using a burning candle as the narrator. Students have to make scientific observations, as well as develop their narratives. In a calculus class, "calculus poems" are written. In physics the teacher reads science fiction stories out loud, then asks students to write conclusions to the stories using their best scientific knowledge.

In the academy's writing program, the writing occurs in the least likely places. The result? Writing has become an academy-wide discipline for integrating and communicating knowledge from the entire curriculum.

The Exploratory Curriculum

The *Exploratory Curriculum* is comprised of four elements: the Research Seminar Series; an apprenticeship program; advanced courses from the Ball State University curriculum; and elective study from the academy's own advanced courses.

Research Seminar Series

The "Process/Product Approach" to curriculum planning for the gifted that is discussed by VanTassel-Baska (1988, pp. 12-14) is evident in the *Research Seminar Series*, an interdisciplinary program that emphasizes the development of research skills and the completion of a research project. During the spring semester of the junior year the emphasis is on the development of research skills and the preparation of a proposal. The program continues into the fall of the senior year where the emphasis is on conducting the research and completing a project.

Several examples of student projects completed during the inaugural year illustrate how the program works. Students in a science research seminar were taught basic research skills, including the use of data retrieval systems. The investigations involved extensive review of scientific literature, design of an experimental procedure, collection and analysis of data, formulation of conclusions, and professionally appropriate reporting of findings. One investigation, titled "A Simulation of the Origin of the Element Heavier than ^{56}Fe," was entered in the Westinghouse competition and received recognition as a semi-finalist. Another, titled "The Effects of Magnetic Fields on *Pisum*

Sativa Seed Production," was accepted for competition at the 43rd National Science and Engineering. And a third, "Mapping of Radon Concentration Results and Lung Cancer Deaths for Delaware County, Indiana," was presented at a conference of the Indiana Chapter of the Association of Physics Teachers.

Apprenticeship Program

Off-campus experiences have long been a vital element of many secondary level gifted education programs. In fact, the Secondary Triad Model (Reiss & Renzulli, 1986, p. 271) features organized experiences for students outside the school setting. With its location on the campus of a major university, the academy is ideally situated to conduct its *Apprenticeship Program*. The program is designed to encourage interaction between academy students and accomplished researchers and professional practitioners. Students are literally within walking distance of mentors, allowing the Indiana Academy to structure apprenticeship alternatives of either four or eight hours per week. In the first year of the optional program, Indiana Academy students had apprenticed Ball State University researchers or other professionals in a variety of settings. One student apprenticed the News Director for Ball State's PBS radio network affiliate. Another assisted a counseling psychologist from Ball State's Teachers College who was researching imaginary audiences among adolescents. Others assisted scientists in various university research laboratories.

Elective Courses at Ball State University

Since the Indiana Academy is a part of Ball State University, and it is located on the Ball State campus, academy students may enroll in university courses. The university course option provides many opportunities for students to explore areas not included in the academy curriculum. For example, students have enrolled in courses as varied as "Women's Studies," "Mysteries of the Sky," "Introduction to Cultural Anthropology," and "Beginning Greek." Over one third of the students in the academy enroll in at least one course from Ball State University.

Academy Elective Courses

The academy itself also offers numerous elective courses designed with the express purpose of encouraging students to explore new disciplines or advanced levels of study. Independent study in computer network technology, seminars in advanced topics such as "Mathematical Logic," and specialized courses in science and humanities, such as "Modern Physics" or "Ethics," are available for students to round out their academic schedules. Typically, juniors enroll in an average of one or two elective courses each semester, and seniors enroll in an average of three.

Specific examples of academy electives include two philosophy courses designed expressly for the academy by two Ball State University professors. The first course was "Current Trends in Philosophy." The course applied the theory of collective responsibility to three areas of inquiry: affirmative action, just war, and African philosophy. The second course, "Theories of Human

Nature," provided an interdisciplinary theory of the universe and a theory of man within this universe.

May Term

The academy's *May Term* creates additional elective offerings. The last two weeks of the academic year are reserved for specialized, intensive courses taught by academy faculty and visiting professors. Each student enrolls in only one course, which allows for focused activity for the two week period. Faculty and visiting professors design the courses expressly for the special term, giving them the opportunity to explore their special academic interests with their students. Examples from inaugural year May Term courses included "Contemporary Russian Literature," "Principles of Origin Science," "Hamlet," "Contemporary Issues in Nuclear Science," "Exploration of Careers in Biomedical Research," and "Attorney Skills and Practice."

The Extended Curriculum

The *Extended Curriculum* grows out of the Indiana Academy's desire to educate the whole person, not merely the person's intellect. Although not a discipline, affective development should have a unique place in the curriculum for the academically gifted (Silverman, 1988, p. 336). Therefore, special programs in community service, and wellness are included. And, ample opportunities for attending and participating in cultural events are structured along with opportunities for social events and athletics.

Community Service

In order to promote responsible membership in the community, students are required to donate time to both *community service* and *academy service*. A variety of opportunities abound in the community surrounding the academy. For example, some students helped construct a house for Habitat for Humanity. Many other students have chosen to work in their home communities between their junior and senior years. Academy service takes many forms. Some students work as office assistants, others as library aides or monitors in the computer labs.

Students also complete a service assignment within the academy that is scheduled for a minimum of three hours per week. Cleaning chores, grounds maintenance, and clerical tasks are included in a system for sharing responsibilities.

Wellness

A *Wellness Program* is incorporated into the students' routines and provides an individualized and holistic approach to students' overall well being. The wellness program itself is multidimensional and includes such facets as physical, nutritional, intellectual, emotional, occupational, and social wellness. Students are responsible to their respective residence counselors who monitor plans that incorporate wellness activities such as attendance at special programs on health and individual exercise regimes. Students develop their own wellness profiles after wellness screenings are conducted by Ball State University's Institute for Wellness. The individualized approach allows a

student to personally select wellness activities. The program is structured so that students complete a minimum of two activities per week, thirty minutes per activity, for the "Physical Dimension." Student choices for their activities range from the traditional, like jogging or aerobics, to the non-traditional, such as yoga. Similarly, each dimension requires a minimum number of activities per semester, with each student maintaining a Personal Wellness Profile which the student reviews regularly with a residence counselor. The Wellness Program is intended to help students to expand their concept of wellness and promote lifelong habits for maintaining wellness.

Extracurricular and Cultural Activities

The *Extended Curriculum* also includes many activities traditionally considered "extracurricular," such as interscholastic athletics, music, drama, and social events. Through the Indiana Academy's affiliation with its sister school, Burris Laboratory School, a range of activities found at a typical, small high school exists.

Of course, the cultural life of the university extends to the students of the academy. Students may attend free of charge any of the lectures, forums, plays, concerts, recitals, or art exhibitions that university students may attend free of charge. Cultural events may be incorporated by faculty into class activities, but primarily they serve as optional outlets for cultural experience.

Students enrolled in the Indiana Academy all reside in a self-contained residence hall on the Ball State University campus. In

fact, it is in the residential character of the school that the Indiana Academy curriculum finds much of its energy. Nathan Glazer (1987, p. 197) noted that "the development of excellence requires the company and competition of the excellent." A residential environment for gifted learners allows the addition of the word "cooperation" to the phrase "company and competition" in Glazer's admonishment. When a curriculum for the gifted is appropriately and sufficiently rigorous, students begin to appreciate the necessity for cooperative learning. Group projects, peer tutoring, and group study sessions have become new and valuable experiences for Indiana Academy students, many of whom had grown accustomed to learning strategies that isolated them from other pupils before coming to the academy.

Summary

The curriculum of the Indiana Academy for Science, Mathematics, and Humanities is designed for the whole student. As a consequence, the curriculum design process contains elements found in several models common in educational programs for gifted students. Content mastery, processes and products appropriate for gifted learners, and interdisciplinary organization were included. The eclecticism of the Indiana Academy approach to curriculum has produced a multidimensional framework that integrates programs of core subject studies, emphasis on the exploratory nature of learning, and extension of learning environment beyond the conventional confines of the classroom or the daily schedule. The Core Curriculum, the Exploratory Curriculum, and the Extended

Curriculum, function together to form a multidimensional curriculum designed expressly for its unique student population and learning environment.

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