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ABSTRACT

Research on individualized instruction for the gifted is reviewed, and several instructional models or techniques which may have potential for allowing teachers to individualize instruction for the gifted or all students are considered. Support is offered for the accelerated class model. Among the educational methods reviewed are internships, telecommunications, computer assisted instruction, and simulations and games. An instructional model which involves longitudinal teaching teams is proposed. (SBH)

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Instruction for the Gifted

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Gallagher (1976) and others have argued that the provision of appropriate content is the crucial issue in gifted education. Certainly it is true that the best teaching strategies or delivery systems for curriculum can only be effective if the curriculum is appropriate. We should not overlook, however, the possibility that some instructional strategies can be more efficient than others in delivering the appropriate content within homogeneous classes of gifted students and within more heterogeneous groupings. In the current issue of the Gifted Child Quarterly, Renzulli (1980) notes that gifted programs are too often patchwork collections of random practices and activities; he further suggests that a differentiated program for the gifted must include modification to the ways in which advanced material is presented.

Basic instructional methods are processes, applicable to various subject matters, and usable by more than one teacher. These range from teacher behaviors such as lecturing to delivery systems for curriculum such as computer-assisted instructional and include organizational patterns such as tutoring and small group discussion (Berliner and Gage, 1976). With the exception of grouping, instructional methods, the basis of any educational program for any and every group, have not been well-studied in the research literature in gifted education. Of course much of the research literature on the efficacy of different instructional methods ignores the possible relevance of learner characteristics such as giftedness.

There is of course a body of research literature on treatment-aptitude interactions (Cronback and Snow, 1977) but this research has generally not been designed or conducted in terms of gifted versus non-gifted students in accordance with current definitions of giftedness.

Research on teaching has been approached in two different ways. In the generalist approach subject-matter is ignored and effective behaviors or strategies that cut across content areas and age groups are sought. In the specific approach research is focused on one content area but may or may not cut across age/grade groups. Gage (1979) has argued that both approaches are necessary and has proposed a hierarchial model ranging from the general to the specific. At the fifth level of the hierarchy one would consider student characteristics, such as ability, motivation, social class within subject within a grade range as shown in Figure 1.

A quick glance at the model suggests that we are still a long way from having specific evidence to support or refute any claims as to the "best" method for teaching the gifted, at any age, or in any subject area. This might give us pause for thought about efforts to institute program models for the gifted on a wide-scale basis. It seems we must distinguish carefully those program models for the gifted for which there is strong evidence of differentiated need from those which are generally good for all students. We need to identify instructional methods that can be used in ways to accomodate the gifted while also benefiting all children and separate those from teaching strategies or instructional methods that are uniquely necessary for the gifted child.

Recent studies of student learning have emphasized the importance of academic learning time (ALT), that is the real time in which the learner is engaged in productive and meaningful learning as opposed to sitting and waiting time, etc (Berliner, 1979). What seems to have been overlooked is that for many gifted students much of the observed ALT time may be wasted time because it involves the "practice" or "learning of" material with which the students are already familiar. Thus a discussion of instructional modes for the gifted should focus on ways to increase their real ALT time.

In a classroom in which students are grouped by age but not abilities the strategies for increasing ALT would seem to be those in which individualization of instruction occurs. Individualization of instruction may also be necessary to increase ALT for classes of students grouped by abilities.

Research on Individualizing Instruction for the Gifted

Individualized instruction is a broad concept that can include many teaching modes or delivery systems. It can include a diagnostic testing approach to identifying individual learning needs with perscriptive instruction for individuals or small groups. Also it can include tutoring, self-paced programmed study, independent projects, and so forth. While there is general agreement among educational psychologists that individualization of instruction would be desirable the mechanics of how this can best be accomplished are not well described.

Over the past nine years the Study of Mathematically Precocious Youth (SMPY) and the Intellectually Gifted Child Study Group (IGCSG) have worked to identify ways to provide appropriate educational experiences for mathematically talented youth. SMPY has developed the concept of a smorgesboard of educational opportunities to allow students to individualize their programs and move quickly through basic mathematics curriculum. Research efforts have included experimentation with special classes and tutoring programs. SMPY has conducted a dozen special programs at the Johns Hopkins University. Some examples follow.

In the summer of 1977 the IGCSG conducted a fast-paced accelerated mathematics program f end-of- ear seventh graders (Fox, 1978). In this program student met w structors for three hours a day for three days a week over a week period. Students studied Algebra II and plane geometry concurrent e trigonometric topics and computer programing were included w ne instruction of Algebra II. Thus, there were only 36 hours of formal instruction for each subject. Supervised homework sessions, however, were provided for two hours each afternoon. At the mid-point of the program students who were having difficulty with the fast-pace of one or both courses were counseled about dropping one of the classes and focusing on completing only one of the topics at a high level. Successful completion of courses were based on scores at or above the 85th percentile standardized tests from the co-operative mathematics series along with performance on teacher-made-tests. Sixteen students completed both courses successfully, six completed only Algebra II, and six completed only plane geometry. Only one person failed to complete either course.

There are two factors which make these accelerated classes different from most homogeneously grouped programs for the gifted. First, selection of students for the program is based on measures of specific aptitude for the subject being taught, in this case mathematics, rather than on a global measure of general intelligence. Motivation and interest are also factors as students have the opportunity to self-select into the program and the work-load is heavy. This is carefully explained to the students in advance. One mother confided to me that at the end of the second week of the program she urged her son to drop-out because she felt the program was ruining his summer opportunities for fun and relaxation.

"Mother!", he said, "you don't understand. This is the most exciting thing I've ever done!" "Apparently", she said, "the long homework assignments are as challenging and exciting to him as tennis and bridge are for me."

The second aspect of the model that sets it apart from other programs is the maximal use of ALT in the classroom. The material is presented at a rapid-fire-pace and at a high level of abstraction and complexity. No class time is spent on drill or practice and classroom management activities were at a minimum. Although class time activities are not individualized, the homework assignments are often adjusted for individual needs for practice. The program demands a great deal of intensive self-study and regulation of learning by the students.

Clearly the students who participated in the program were successful in achieving the cognitive goals but how did they feel about the experience? Twenty-seven students responded to a questionnaire during the following school year. Nineteen students felt the summer course was far more stimulating than their regular mathematics courses in school and 13 found the course more enjoyable than their regular school classes. Parents also completed a questionnaire. Parents of 16 students felt the program had increased their child's self-confidence in general; and parents of 14 students felt that their child's self-confidence in mathematics was increased as a result of the program. Eleven said the program increased their child's enthusiasm for studying mathematics. Seven parents felt their children had improved study habits and skills and were taking far more initiative and interest in planning their own educational experiences for the future.

At professional meetings of educators I have sometimes been told that the fast-paced class model is not really very important for gifted education because it is not generalizeable to subjects other than mathematics. I have always felt that the model could be used for other more verbal subjects, especially foreign languages, but until recently I had no data to support my claim. Two years ago the Program for Verbally Gifted Youth (PVGY) was begun at the Johns Hopkins University on a small scale as a combined effort of the Departments of German, the Humanities, and the Writing Seminars. Efforts to apply the fast-paced model have been successful for eighth and ninth grade students selected on measures of verbal reasoning, basic writing competency, and interest. Three courses have been developed and found satisfactory: Writing skills, German, and Latin and Greek in current use. Details of this program are provided in the February-March issue of the Roeper Review (Durdin, 1980). The model in the verbal area deviates from its mathematical parent in that the content and skills presented are not duplicating topics generally available in the high school curriculum. These courses stress the mechanics of language and writing at a college level but do not require interpretative thinking at that same level.

Another criticism of the model has been that it is not practical and could not be translated into a school program. This is simply not the case. The model has been effectively adopted to a variety of schools and school system settings throughout the United States. I recently studied the achievement and course-taking outcomes and attitudinal effects of programs which employed the SMPY model in five different school systems. These programs were as successful as the Hopkins-based experimental classes in terms of achievement test results and later course-taking of students and they were more successful in recruiting and retaining female participants than the Hopkins classes (Fox, Brody, and Tobin, 1979).

There is, however, a valid criticism of the model in that the fast-pacing of the classes has not been totally individualized so that for the most able students the pace and depth of instruction may still be less than they are capable of and for the less task-committed the amount of work may at times be too great and lead to drop-outs. To rectify this problem Professor Julian C. Stanley, founder and director of SMPY, has experimented with a newer more individualized approach he has termed DP → PI for diagnostic testing followed by prescriptive instruction (Stanley, 1980; Stanley and George, 1980). In this program piloted in the summers of 1979 and 1980 the grouping of students is based on more intensive diagnostic analysis of achievement and skills beyond the initial assessment of mathematical and verbal aptitudes. The instructional component has been individualized by providing a small group tutor for topics ranging from Algebra I through analytical geometry and trigonometry. One master tutor and an assistant work with 10 to 12 students for 35 hours of instruction and five or so hours of diagnostic testing. For the 96 students in the 1979 summer program the typical gain was two years beyond where he or she had begun.

Although this model has not yet been tested in a school setting, it shows even greater promise for practical adaptation as it does not require that there be a sizeable number of students ready for group instruction at the same level.

Of course, the concept of the individual or small group tutor is not really new, indeed it was the only instructional model prior to the availability of free public education for all. It passed out of use because it was deemed too expensive but experienced a rebirth in the late sixties as a solution for the underachieving or disadvantaged child (Ellson, 1976).

Although recent research on tutoring has focused on its use for remediation, some of the findings are probably generalizeable to gifted programs. In a 1976 review of the research on tutoring Ellson concluded:

1. While tutoring presents the teacher with a classroom management problem, programs in which teachers delegate tutoring responsibilities can be very effective and tutors need not be professional educators.
2. Programs in which tutors are given well-structured guides including content objectives and diagnostic-feedback systems are more effective than unstructured tutoring. Individual attention per se is not enough.
3. Tutoring programs that use non-professionals can be more cost-effective than traditional classroom teaching.
4. Programs in which other students are used as tutors often find achievement gains for tutors are greater than for tutees.

Promising Practices

There are several other instructional models or techniques which may have great potential for allowing teachers to individualize instruction for the gifted or all students. Unfortunately, there is not very much research concerning these approaches in which their value for gifted education is addressed so I will describe them very briefly.

Internships. Few would challenge the value of an experience in which a student is placed in a close working relationship with a professional; indeed it could be viewed as a modern day version of an apprenticeship program. Although this type of program has potential value for all students, it may be appropriate for gifted students at an earlier age than for other students and the nature of the placements might be different for the gifted. How such experiences should be structured to maximize learning outcomes is not clear.

Tele-communications. The term tele-communications seems to encompass a variety of uses of the telephone and television to provide instruction. One could envision a lively seminar conducted by means of telephone conference calls in which gifted students could interact with each other and with stimulating teachers or lecturers. The advantage of this over more traditional seminars would be in the possibilities for overcoming geographic barriers. Such conference calls are already used in some school systems with home-bound or hospitalized students.

Television also offers the possibility of overcoming geographic barriers. Consider the problems for some gifted students to gain access to advanced placement courses or college courses because there are too few students in their school who need such a course. Soon we will be able to connect terminals with televisions to make interaction with the teacher possible.

These approaches to instruction may be more efficient and effective for some subject areas than for others. We might also explore the ways in which the television might be used for instruction in a more creative manner than a standard lecture.

Computer Assisted Instruction. It has been predicted that the use of the computer for instruction will be adopted more rapidly by the military and industry than by the schools (Bunderson and Faust, 1976). Computer assisted instruction (CAI) is generally viewed as a subset of Programmed Instruction (PI). PI was enbraced as an educational panacea in the early 1960's but has almost been abandoned now because the implementation of PI programs preceeded systematic and empirical development of such a technology and the problems of social change in educational institutions was not anticipated (Bunderson and Faust, 1976).

Simulations and Games. In a review of the literature on simulations and games Seidner (1976) concluded that we have a diverse array of such materials, developed in a theoretical void, and while they appear to work we are not quite sure why. When compared with other teaching methods they appear as effective but not necessarily more effective for teaching cognitive skills, but they may effect more change in the affective domain by changing negative sterotypes or attitudes and increasing empathy. It has been suggested but not empirically verified that since simulations encourage divergent solutions they would nurture creativity. Some studies have found that simulations are more efficient with above-average ability students but other studies have not. Although students in general enjoy the games, it has been suggested that high ability students are the ones who are most able to make analogies between the game model and real life situations. Seidner (1976) suggests that more research be conducted in which the level of learning objectives are classified and studied in conjunction with learner characteristics.

Conclusions and Directions For Research

Stanley (1980) has suggested a total reorganization of students and teachers within the schools to allow for more efficient individualization of instruction. He has called for longitudinal teaching teams that span Kindergarten through 12th grade. Such teams might be school wide or school system wide for each subject-skill area such as mathematics. Although students could be grouped for instruction, the groupings would be made along pedagogical dimensions rather than chronological status of students. This would allow for greater clarification and articulation of goals and objectives for individuals throughout their entire school program than is possible today. Some team teachers might specialize in techniques for working with slow learners while others focused on the rapid learner. One team member might become a talent broker and counselor who directed students in field experiences, internships, and to other community resources such as college courses and academies of science. While minimal mathematical competencies might be specified for all students, some students would master these at ages eight or nine and go far beyond into advanced mathematics courses and experiences.

Within such a design a variety of instructional modes could be provided and matched with learner needs and preferences. Some teachers could specialize in directing computer-assisted-programs while others developed games and simulations or group discussion techniques. Clearly such a model could be applied to the content and skills in social studies, physical and biological sciences, language arts, music, art, physical education, and so on. In such a system content, instructional method, learner and teacher preferences could all be matched, shifted and resorted on a continual basis.

A longitudinal teaching approach as envisioned by Stanley might at last allow us to provide an integrated approach to the education of gifted and talented students. Content, rate, and instructional mode could all be manipulated without regard to traditional barriers of the age-grade and self-contained class lockstep.

For such an ideal system to work efficiently, it would seem that we need to address many basic issues about instruction as proposed in Gages's heirarchical chart for research. For those of us interested in the education of the gifted there remain three large questions we must address:

1. Given classes of gifted students who are grouped with respect to a particular ability can we specify the most efficient and effective instructional methods for promoting cognitive and affective growth at various developmental levels? Some examples of specific researchable questions are as follows:
   a. To what extent does a process approach differ from a product approach in terms of short and long term outcomes in any particular subject area at each developmental level?
   b. Can we show that gifted students need less concrete and manipulative experience at the piagetian levels of pre-operational and operational thought in order to learn new materials than do their peers?
2. Given heterogeneous groups of students in which the number of gifted students might be fairly small can we identify instructional methods or classroom management systems that maximize growth opportunities for the gifted student without placing special burdens on the teacher or taking time away from the other students in the group? Example of some researchable questions are as follows:
   a. Is computer assisted instruction (CAI) an efficient vehicle for individualizing the learning of basic arithmatic skills?
   b. Can an individualized tutoring program in reading be designed to benefit gifted students as well as the disadvantaged and the underachieving?

3. Are there instructional methods which are uniquely effective and efficient for gifted students at a particular development level and subject area? Specific examples of research questions include:
   a. Can we demonstrate that gifted students need internship and mentor experiences in different areas and at earlier ages than less gifted students?
   b. Can we justify grouping students by ability for small discussion groups such as for a Junior Great Books Seminar?

Many of us I'm sure "feel" that we "know" the answers to these questions but I contend that we need more empirical verification in order to rationally defend our program "prototypes" for gifted and talented education now and for the future.

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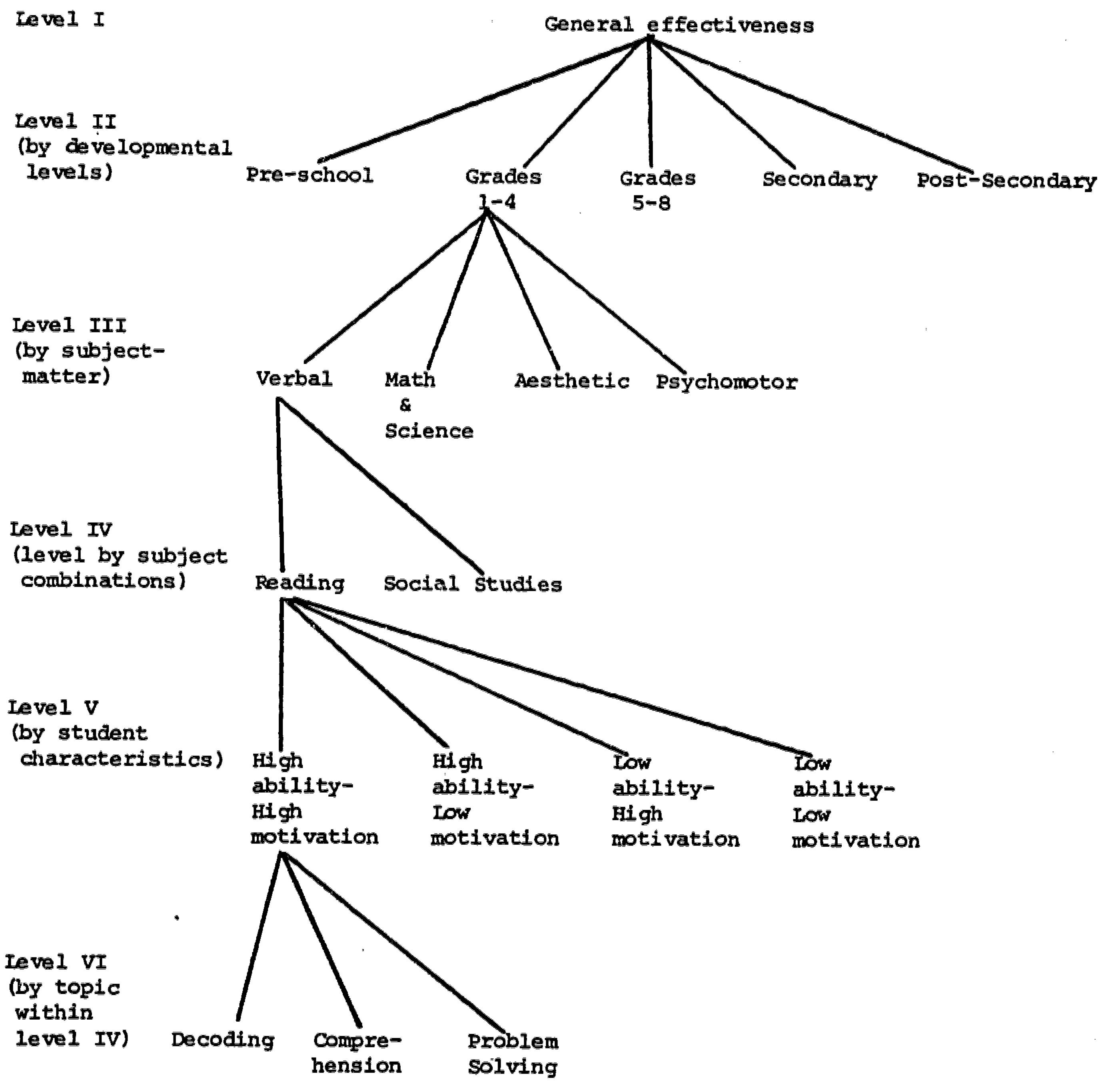
Figure 1: Directions for Research on Teaching and Instructional Methods



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