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Research Synthesis

Prof. Karen B. Rogers updates (1999) her 1991 research synthesis regarding gifted education provisions

"ESSENTIAL" GIFTED educational provisions have been tabulated as follows:

Instructional management services

- Individualization
- Grouping Permutations
- Acceleration permutations

Instructional delivery services

- Projects - Independent Study, Small group
- Self Instructional Materials
- "Hands On" Activities - Games, Simulations
- Lecture, Discussion, Mentoring
- Pacing, Instructional Modifications of Process

Curricular services

- Content Modifications
- Product Modifications.

The results of research studies in each of these categories have been synthesized to derive general results. These have been presented as quantified measures of the effect of the provision when these effects are statistically significant.

The reported quanitification is called ES (for "effect size"), referring to how much effect a particular adaptation has in terms of the time required to complete the curriculum for that year.

For example, an effect size (ES) of .38 for non graded classrooms (ie multiple grade/age) means if only the effect of non graded classroom is studied, gifted children in a non-graded classroom would gain .38 of a school year through use of this adaptation alone as compared with their gifted peers in a regular classroom. Thus in slightly less than 3 years a student would have completed more than 4 years of work based on this adaptation alone. Effect sizes of .30 or higher have a substantial impact on a student's learning levels as three years down the road the student will be one full year ahead of a regular class.

Please remember the studies are comparing gifted students in particular situations to gifted students in normal classes and not to "normal" students in normal classes. This difference shows up in effect sizes for grade skipping where if students are skipped they gain an effect of .49 as compared to *gifted* students in a regular class who are not skipped. Those in a regular class who are not

skipped also accomplish higher than normal scores for the year. This "lowers" the effect size for students who skip to the year above. The references to LO mean the study is based on Literature Only and there is no research available on that practise.

Research on Instructional Management: Individualization

Non graded classrooms (ES=.38)

Multigrade classrooms (ES= .19)

One-to-one mentoring tutoring (ES= .57)

Compacting (ES=.83, .26)

Credit for prior learning (ES= .56)

Talent development (LO)

IEPs or ILPs (LO)

Independent Study (ES= 0)

The two compacting effect sizes are for separate subjects. The .83 refers to studies on math and science where students gain almost two years in one if the subject is compacted. .26 is for "softer" curriculum such as social studies.

Independent Study has an effect size recorded of 0 as being independent projects it was not measurable against standard classroom knowledge gain.

The multigrade studies (split classes) were for elementary schools and the compacting studies were based on elementary to grade 8 studies.

Research on Instructional Management: Grouping Permutations

Full-time ability grouping (ES= .49, .33)

Regrouping for specific instruction (ES= .34, .79)

Cluster grouping of GT students (ES= .62)

Pull-out grouping (ES= .65, .44, .32)

Within class ability grouping (ES= .34)

Cross-graded classes (ES= .45, .46)

Mixed ability co-operative groups (ES= 0)

Like ability co-operative groups (ES= .28)

Full time ability grouping has an effect size of .49 for elementary students, .33

for secondary students.

Regrouping by performance level is .34 generally but one study based on math and reading for elementary students had an effect size of .79 which was related to the curriculum taught.

Cluster grouping involves the top 5 to 8 children in a class with a teacher who wants to work with them. The effect size reported here is based on four studies for elementary school.

The pullout groupings reported different effect sizes depending on what was being taught. .65 is the effect if the pullout focuses on a direct extension of work in the regular classroom. .44 is from pullouts which focus on critical thinking skills. .32 is the effect when the pullout was focused on creativity grouping.

Within Class ability grouping refers to subgroups in a classroom, the bluebirds, robins, eagles etc.

Cross-graded class effects (math hour etc.) are for all students, not specifically the gifted. .45 is for reading, .46 is for math.

Research on Instructional Management: Acceleration Permutations

Grade skipping (ES= .49, .31)

Early entrance to school (ES= .49)

Subject acceleration (ES= .57)

Grade telescoping (ES= .40)

Concurrent enrolment (ES= .22)

Advanced placement courses (ES= .27)

Early admission to college (ES=.30)

Credit by examination (ES= .59)

For grade skipping, .49 is for academics, the .31 effect is for socialization. These effects are based on 68 studies of grade skipping. These effects are for gifted children only. For gifted children grade skipping and early entrance show a 1/2 year gain per year.

Subject acceleration demonstrates approximately 1 3/5 years growth for each 1 year's time. All except one of these studies were done in the area of math.

Concurrent enrolment studies were most often done where the students transferred to another building (high school) for a particular class. Most of the testing done here was with on level testing which may not have had sufficient ceiling levels to show the true effect size.

Advanced placement courses need more research.

Early admission to college involved studies where students were not finished high school but were going on to college.

Statistically significant data also exists to support the following information when comparing gifted to regular students.

Research on Instructional Delivery: Projects, Independent Study, Hands On

Gifted students demonstrate the following at a statistically significant level when compared to normal students:

- Preference for self-structured tasks and self-imposed deadlines
- Preference for working on projects alone or with one like ability peer
- Preference for self-instructional tasks (programmed instruction), games or simulations
- Greatest preference for independent study projects that are reading/ content acquisition-based
- Greater interest in learning "something new and different, " rather than doing hands on things.

Research on Instructional Delivery: Lecture, Discussion, Mentoring Tutoring

- In lecture situations, gifted students tend to be multi-modal (visual and auditory) in their acquisition, processing
- For auditory gifted students, there is a love of discussion; for more visual GTs, discussion is not a favorite
- Mentorships among gifted students, which further their understanding in a specific field result in socialization effects (ES=.47) and self-esteem effects (ES=.42), as well as academic effects (ES=.57)
- One-to-one tutoring, with a focus on advancing, not remediating knowledge, results in an ES of 2.00

Research on Instructional Delivery: Pacing, Process Modifications

- The learning rate of children above 130 IQ is approximately 8 times faster than for children below 70 IQ
- Gifted students are significantly more likely to retain science and mathematics content accurately when taught 2-3 times faster than "normal" class pace.
- Gifted students are significantly more likely to forget or mislearn science and mathematics content when they must drill and review it more than 2-3 times
- Gifted students are decontextualists in their processing, rather than constructivists; therefore it is difficult to reconstruct "how" they came to an answer.

Research on Instructional Delivery: Instructional Process Modifications

- Gifted students tend to use more higher order thinking even without

training, but benefit significantly from being trained in these skills
- Gifted students prefer a structured learning environment (desks, tables, etc.) but open-ended tasks and assignments
- Academically or intellectually GT students tend to be uncomfortable taking risks or dealing with ambiguity; therefore there is a need for teaching creative thinking and encouraging divergent production.
- The greatest academic benefits of "discovery" learning have been attained with gifted students, particularly if the learning was Brunerian (teaching of major ideas and concepts)
- Gifted students tend to mistrust the benefits of small group learning; care must be taken that the tasks demonstrate that the group can "do better" than the individual
- Gifted students perform significantly more highly when the majority of their time is spent in true peer interactions (academic core areas only)
- Teachers who are extensively trained in gifted education produce significantly higher academic and self-esteem effects for gifted students

Effective Teachers of the Gifted

Based on questionnaire data and needing more thorough research, effective teachers of the gifted have the following characteristics:

- High degree of intelligence, intellectual honesty
- Expertise in a specific intellectual or talent area (mathematics, writing, etc.)
- Self-directed in own learning , with a love for new, advanced knowledge,
- Equanimity, level-headedness, emotional stability
- A genuine interest in, liking of gifted learners
- Recognition of the importance of intellectual development
- Strong belief in individual differences and individualization
- Highly developed teaching skill and knowledge

Student responses suggest effective teachers of the gifted need to:

- Be patient
- Have a sense of humour
- Move quickly through material
- Treat each student as an individual
- Avoid being a "sage on the stage" all the time
- Consistently give "accurate" feedback

Research on Curriculum for the Gifted: Content modifications

- There are powerful academic effects when gifted learners are given abstract and/or complex content
- There are powerful academic effects when gifted learners are telescoped or progressed rapidly through the "regular" curriculum
- Gifted learners tend to be analogical in their processing and therefore "get" the themes of true interdisciplinary curriculum more successfully
- Gifted learners as decontextualists tend to learn most successfully when they are given the whole concept, in depth, up front and then allowed to break it down through analysis
- Gifted boys, in particular, and to some extent, girls are motivated by learning the way things work and the ways professionals work (Methods of

Inquiry); gifted students are more successful with "practising professionals" tasks than are other students
- Gifted girls, in particular, and to some extent, boys are motivated by learning about the famous people, career paths, and people-oriented issues of a content area; biography reading often provides "role models" for gifted learners
- Of the three forms of enrichment (Kaplan)," concept development" (In-depth exploration of a concept) is the most effective, followed by "extension"(going broader and deeper with the regular curriculum), followed by "exposure" curriculum (introduction to new ideas and interest areas). No matter which form is implemented, however, it must be programmatic (an integral part of the school curriculum and day), not provisional (an add-on) (Tannenbaum)
- Affective support and small group self-esteem building sessions are not supported by research (LO)
- Career and college placement counselling are significantly beneficial and are research supported
- Direct training in creative thinking skills results in significant divergent production effects

Research on Curriculum for the Gifted: Product Modifications

- "Real World" problems and products are supported by literature only
- A variety in production requirements improves motivation and self-direction (LO)
- "Real audiences" as the form of evaluation of products and performances are supported by literature only, but "realistic," corrective feedback produces significant positive effects for gifted learners
- High, but specific, expectations for performance result in significant "cognitive dissonance" but with significant rises in academic self-esteem

Research and Standards-Based Education

- A standards-based philosophy of education has been in vogue approximately every 15-20 years, since 1912
- We are *just beginning* to conduct research on the efficacy of standards-based education
- Anecdotal evidence from US states' recent efforts with standards-based education and assessment suggests that more teachers are "teaching to the test". Hence, the standards are changing *what* teachers teach about. It might be concluded that performance packages would change *how* they teach about it. In some states assessment based on state standards has been used "punitively"
- Actual research has been conducted on National Council for Teachers of Mathematics standards / teaching methods. Conclusions are that higher socio-economic status students do significantly better in these courses than do lower achieving and minority students, BUT the key to the interaction is the *quality* of the standards and *methodology* for teaching to the standards (Mayer, 1998, Educational Evaluation and Policy Analysis, V.20)
- There is a need for more research on standards-based approaches in other academic areas. Until we have such research, it continues to be important to judge the *quality* and *complexity* of the standards proposed. Although we don't know if these standards will work better than previous

methodologies have for average and below average learners, we do know that these students will "get" what they're taught and little more

- For above average and gifted students, we may run a risk of providing too little for their optimum development, if the standards are "pitched" toward "all learners." US teachers tend to aim content towards the 19th percentile which is 7 or 8 times lower than gifted students need
- Thus, gifted educators need to judge state standards against the educational needs and best practices research in gifted education. Alternative pathways may need to be created when the standards do not match this research base.

Dr Karen B. Rogers is Professor at the School of Education at the University of St. Thomas, Minneapolis. She is a keynote speaker at the AAEGT 9th National Conference in Brisbane, 2-5 July 2000. *This research has been published with her permission and follows her 1991 seminal "A best-evidence synthesis of research on accelerative options for gifted students" in N Colangelo, SG Assouline & DL Ambroson (eds) Talent Development: The Proceedings from the 1991 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development (pp406-409), University of Iowa, Trillium Press.*

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