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SYNTHESIS OF RESEARCH ON THE EFFECTS OF TUTORING

The tutoring programs offered in elementary and secondary schools today differ from yesterday's tutorial programs in an important way. In most modern programs, children are tutored by peers or paraprofessionals rather than by regular school teachers or by professional tutors. This change has dramatically affected the availability of tutoring programs in schools. No longer a luxury open only to the few who can afford to pay, tutoring programs are today available to nearly all students in public schools throughout the country.

Hundreds of teachers and researchers have already written reports on the effects of such programs on children. Although some of the reports are based on subjective impressions and thus are of limited scientific value, other reports describe sound experimental studies in which an investigator compares the performance of equivalent groups of students assigned to classrooms with and without tutoring programs. Comparisons often focus on learning gains in the two types of classrooms, and sometimes also cover affective growth of tutored and nontutored students.

Several major reviews of such studies have appeared in recent years (Devin-Sheehan and others, 1976; Ellson, 1975; Fitz-Gibbon, 1977; Rosenshine and Furst, 1969). Each of these reviews concluded that tutorial programs contribute to the academic growth of the children who are tutored and probably to the growth of the children who provide the tutoring as well. Two of the reviews (Ellson, 1975; Rosenshine and Furst, 1969) cautioned, however, that these contributions have been clearly demonstrated only for well-structured and cognitively-oriented programs. Since each of the reviews used informal narrative and box-score methods to summarize findings, the reviewers were not able to make precise statements about the size of the gains to be expected from tutoring programs or about the conditions under which strong effects are most likely to occur. To reach more precise conclusions, reviewers must use more formal techniques of research synthesis.

In 1977 Hartley applied more powerful review methods to the literature on tutoring. Her methodology, called "meta-analysis," was first described by Glass (1976). Meta-analysis is simply the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings. Applying this method to findings on mathematics teaching in elementary and secondary schools, Hartley showed not only that the effects of tutoring were positive, but that they were stronger than effects from such other individualized teaching methods as computer-based instruction, programmed instruction, and instruction with individual learning packages. Hartley also showed that the effects of tutoring were especially strong in some types of studies and relatively weak in other types.

Since Hartley examined studies only from the area of mathematics education, however, she was unable to determine whether strength of findings varied as a function of the subject being taught. In addition, since her analysis was restricted to cognitive gains, she could not determine whether tutoring had positive effects on attitudinal and affective outcomes of teaching. Finally, her analysis suffered from some possible methological weaknesses. For example, she aggregated effects on those being tutored and on those providing tutoring; she based her analysis on far more findings than independent studies; and she included in her pool of results some findings that came from studies without control groups.

Our own attempt to integrate findings on tutoring built on Hartley's work. Like her study, our project used Glass's meta-analytic method. Unlike her study, however, our analysis covered effects of tutoring in different subject areas, and described results separately for different kinds of outcomes. We also treated separately outcomes for student tutors and tutees, and included only studies that met reasonable methodological standards.

Method

The data for the meta-analysis came from 65 objective, comparative studies of tutoring that we located through computer searches of the educational literature. The 65 studies differed in experimental design, course setting, and publication history, and they covered several different types of programs: structured and nonstructured, programs with cross-aged and same-aged tutors, programs where tutoring substituted for and supplemented conventional teaching, and programs using trained and untrained tutors. We created categorical variables, similar to those we used in previous meta-analyses (Kulik and others, 1980), to classify the 65 studies according to such features.

The 65 studies described educational outcomes in three different areas: learning, attitudes, and self-concept. To quantify effects of tutoring in each area, we used Glass's (1976) index of Effect Size (*ES*). This index gives the number of standard-deviation units that separate the group averages being compared. The index is defined as the difference between the means of two groups divided by the standard deviation of the control group.

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Effects on Tutees

Tutoring programs had pronounced effects on learning and attitudes of tutees but not on self-concepts.

Learning. Fifty-two of the 65 studies described effects of the programs on examination scores of students who received tutoring. In 87 percent of these studies, students from classes with tutoring programs outperformed students from control classes. Of the studies reporting statistically significant differences between teaching approaches, 95 percent favored the students in classes with tutoring programs. Clearly, a distinct majority of studies reported a positive effect of tutoring programs on tutee achievement.

We used Glass's *ES* to describe with greater precision the influence of tutoring on examination scores. The average *ES* in the 52 studies was .40. This implies that in a typical study, tutoring raised the performance of students by two-fifths of a standard-deviation unit, or from the 50th to the 66th percentile. It also implies that 66 percent of the students from classrooms with tutoring programs outperformed the average student in a control classroom.

Further examination of the data showed that studies with certain features consistently produced strong effects. For the most part, the critical study features turned out to be the ones singled out for special mention by other reviewers. Like Ellson (1975) and Rosenshine and Furst (1969), we found that structured programs produced stronger positive effects than did nonstructured programs. Like Fitz-Gibbon (1977), we found that the degree of effectiveness of tutoring programs depended on whether standardized or locally developed tests were used in the evaluations. Effects were stronger when measured with locally developed tests.

Our results on study features agreed especially closely with results reported by Hartley (1977). She reported, for example, an *ES* of .6 for tutoring studies in mathematics. Our results were identical for mathematical teaching, but we found somewhat smaller tutoring effects in the areas of reading instruction. Hartley also reported that some additional factors influenced the size of program effects,

HIGHLIGHTS FROM RESEARCH ON TUTORING

Students who participate in tutorial programs—both as tutors and as tutees—show greater cognitive and attitudinal gains than do students who are not involved in such programs. However, the common belief that tutorial programs can greatly enhance participants' self-esteem appears to be groundless. Specifically,

- Regarding academic achievement, tutored students perform better and student tutors perform significantly better than do students who are not tutorial participants.
- Regarding attitudes toward the subject matter being studied, both tutored students and student tutors are somewhat more positive than nontutorial students.
- Regarding self-concept, tutored students have no higher regard for themselves as learners than do nontutored students. Student tutors do exhibit more self confidence, but only to a slight degree.

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including the type of report (dissertation vs. public school report) and the type of examination (local vs. standardized). Our meta-analysis also showed that these two factors had a significant influence on size of effects.

Attitude toward subject matter. Eight studies reported results on students' attitudes toward the subject matter they were taught. In all eight of these studies, student attitudes were more positive in classrooms with tutoring programs. Only one of these eight studies, however, reported an effect large enough to be considered statistically reliable. The average *ES* was .29. Even though the number of studies available was small, results were consistent enough for us to conclude with statistical confidence that tutoring programs had a positive effect on the tutored students' attitudes toward the subject being taught.

Self-concept. Nine studies described effects of tutoring programs on tutee self-concept. In seven of these studies, self-concepts were more favorable for students in classrooms with tutoring programs; in the other two studies, self-concepts were more favorable in the classrooms without tutoring programs. The average effects size in the nine studies, however, was only .09. Clearly, this effect was not large enough to be considered statistically reliable.

Effects on Tutors

Tutoring programs also made positive contributions to the learning and attitudinal growth of student tutors. The programs had, however, little effect on the self-concepts of these tutors.

Learning. In almost 90 percent of the 38 studies investigating effects in this area, students who served as tutors performed better than did control students on examinations in the subject matter they were teaching. Ten of the 38 comparisons reported statistically significant results, and in each case the difference favored students serving as tutors. The average *ES* in the 38 studies was .33, large enough to move tutors from the 50th to the 63rd percentile on examinations in the subject matter they were teaching.

Attitude toward subject matter. In four of the five studies investigating effects in this area, attitudes were more positive among those serving as tutors; in the other study, the students who did not serve as tutors held the more positive attitudes. Only one study showed a statistically significant difference in subject matter attitudes of tutors and conventional students, and this study favored tutors. The average *ES* for attitude toward the subject was .42, an effect of moderate size.

Self-concept. A total of 16 studies reported findings on self-concepts of student tutors. In 12 studies, self-concept was higher for tutors than for conventional students; in the remaining 4 studies, self-concept was higher for conventional students. Four studies showed statistically significant differences, and in each case the difference favored student tutors. The average *ES* for self-concept was .18, a small effect.

The message from the educational literature on tutoring programs seems clear enough. These programs have definite and positive effects on the academic performance and attitudes of those who receive tutoring. Tutored students outperform their peers on examinations, and they express more positive attitudes toward the subjects in which they are tutored. Tutoring programs also have positive effects on students who serve as tutors. Tutors not only develop more positive attitudes toward the subjects that they are teaching, but they also gain a better understanding of these subjects. Tutoring programs, however, have much smaller effects on the self-concepts of children. Neither tutors nor tutees change in self-esteem as a result of tutoring programs.

Our meta-analysis thus confirmed some things that have long been suspected about tutoring. It demonstrated, for example, that tutoring benefits both tutors and tutees on both the cognitive and attitudinal levels. But our analysis also failed to confirm other widely held notions, especially the idea that involvement in tutoring programs often produces dramatic changes in the self-concepts of tutors and tutees. The unique contribution of meta-analysis, however, was to specify the size of effects of tutoring, and to identify settings and conditions where these effects were strongest. Meta-analytic results of this sort should be useful both to policy makers and to researchers in the future. ■

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