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ABSTRACT

This research brief describes the findings of a study to determine which of the High Schools That Work (HSTW) practices appear to be most effective in raising student achievement. The study explored the effects of six clusters of practices: (1) curriculum standards; (2) academic and career/technical integration; (3) teacher practices; (4) instructional goals; (5) guidance counseling of students; and (6) work-based learning. The analysis incorporated data from test scores and surveys from the 1996 and 1998 HSTW assessments of 424 schools involved in the program. Following are some of the key findings. The career-oriented high school graduates gained in achievement as more of them committed to a solid academic core, even after controlling for socioeconomic and racial variables. On average, schools raised the proportion of students completing the recommended mathematics curriculum by 16 points and the science curriculum by 17 points. Aggregating student scores and other information at the school level, on average, there was a gain in achievement of 13 points in math, 9 points in science, and 4 points in reading. Work-based learning, measured by internship participation and the use of outside experts to review student work, appeared to have a negative effect on achievement, especially in mathematics. (WFA)

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2003

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HIGH SCHOOLS THAT WORK

Research Brief

SREB

MAKING MIDDLE GRADES WORK

MAKING SCHOOLS WORK

Effects of *High Schools That Work* Practices on Student Achievement

by Denise Bradby and Ann Dykman[1]

Key Findings

The results of the study demonstrate that from 1996 to 1998 the career-oriented high school graduates from 424 high schools became higher achieving as more students completed a solid academic core even after controlling for socioeconomic and racial variables.

- On average, schools raised the proportion of students completing the recommended mathematics curriculum by 16 points (from 59 percent to 75 percent) and the science curriculum by 17 points (from 35 percent to 52 percent). These increases had a large impact on achievement gains in science, mathematics and reading — especially in mathematics.
- Aggregating the student scores and other information at the school level, on average there was a gain in achievement of 13 points in mathematics, 9 points in science and 4 points in reading. These were small, but not inconsequential, gains.
- Work-based learning, measured by internship participation and the use of outside experts to review student work (a fairly rare occurrence), appeared to have a negative effect on student achievement — especially in mathematics.

Challenging coursework, good working relationships between academic and career/technical teachers, and better communication among students and guidance counselors are associated with higher test scores in schools that belong to *High Schools That Work*, a network focused on raising the academic achievement of career/technical students.

Some of the major findings that emerged from the exploratory study, *High Schools That Work and Whole School Reform: Raising Academic Achievement of Vocational Completers through the Reform of School Practice*, are summarized in this brief. This study[2] was commissioned by the Southern Regional Education Board to determine which of its *High Schools That Work* (*HSTW*) practices appear to be most effective in raising student achievement. *HSTW* stands out as one of the few school-improvement consortia that have emphasized data collection and analysis in their programs. Since *HSTW* began in 1987, the network has tested students in mathematics, science and reading every other year, and it has surveyed students and teachers on course-taking patterns, attitudes and characteristics in an effort to continually measure the success of the effort.

SREB and the more than 1,100 schools in the *HSTW* network know how well their students perform on the tests and which courses they take. But determining which components of the program seem to be more effective than others required a different kind of study — one that would help SREB analyze its school reform practices to find quantitative evidence to support specific approaches. The research presented here — while limited — does provide a basis for further study about how to isolate effective education strategies.

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[2] The study was completed by MPR Associates Inc. on behalf of the National Center for Research in Vocational Education of the University of California at Berkeley and supported by the Wallace-Reader's Digest Funds. A copy of the complete report is available at the following address of the Web site for the Southern Regional Education Board: http://www.sreb.org/programs/hstw/publications/special/NCRReport.asp.

The Study Method

This study explored the effects of the following six clusters of *HSTW* practices on student achievement:

- Curriculum standards
- Academic and career/technical integration
- Teacher practices
- Instructional goals
- Guidance counseling of students
- Work-based learning

These clusters represent the core of *HSTW*'s philosophy: that students concentrating in a career/technical area will benefit from higher expectations in their academic studies and that all students should be given sound career guidance and opportunities to relate their learning to the world of work.

Schools in the *HSTW* network implement practices that are closely related to one another, such as setting high expectations for students and replacing a general curriculum with a solid academic core curriculum. This analysis looks at the association of the six independent clusters noted above with school improvement, **after controlling for such variables as the percentage of the school's minority students.**

This study is limited since it was not a scientific study that evaluated control and experimental groups. The data used to assess *HSTW* practices were already collected, and all schools in the *HSTW* sample are theoretically receiving the same treatment. Furthermore, the data represent the performance of different groups of students, not one group of students over time. For those reasons, readers are cautioned against over-interpreting these findings. It cannot be stated with certainty that one practice clearly supports gains in student achievement and should be favored above others.

Examining the Data

The analysis incorporated test score and survey data from the 1996 and 1998 *HSTW* Assessments of 424 schools involved in the network. Aggregating the student scores and other information to the school level, **the study found an average achievement gain of 13 points in mathematics, 9 points in science and 4 points in reading.** These are small, but not inconsequential, gains. In fact, the 13-point gain in mathematics is one full standard deviation, or a 16 percent increase.

Looking at the clusters individually, **the study found that taking the recommended *HSTW* curriculum — essentially college-prep academics and high-quality career/technical studies in grades 9-12 — was associated with gains in test scores. So were increased communication between students and their counselors and students' perceptions that their academic and career/technical teachers were working together.** Work-based learning, measured by internship participation and the use of outside experts to review student work, appeared to have a negative association. The remaining clusters (teacher practices and instructional goals) seemed to have little substantial measurable effect.

■ The Curriculum Students Take Matters

The *HSTW*-recommended curriculum calls for at least three credits each in mathematics and science. Two of the credits in each subject must be at the college-preparatory level.

The percentage of students who completed the recommended coursework in science and mathematics increased substantially between 1996 and 1998. On average, schools raised the proportion of students completing the recommended mathematics curriculum by 16 points (from 59 percent to about 75 percent) and the science curriculum by 17 points (from 35 percent to 52 percent).

These increases had a large impact on achievement gains in science, mathematics and reading — especially in mathematics. **A 1-point change in the percentage of students completing the recommended mathematics curriculum was associated with a 1.1- to 1.6-point increase in science, mathematics and reading test scores.** For example, if a school increased by 10 percent the proportion of students completing the recommended curriculum, the data suggest that school also would increase its average test score by about 11 to 16 points (depending on the subject being tested).

■ Academic and Career/Technical Integration Appears to Be an Effective Strategy

Integrating more rigorous academic subject matter into career/technical education is one strategy for reaching students who do not thrive in traditional academic settings. *HSTW* has long made this a main component in its reform effort. To determine how much a change in the level of blended instruction affected test scores, the researchers looked at items on the 1996 and 1998 student surveys that asked for students' perceptions of how well their academic and career/technical teachers worked together to help them learn math, reading and science.

According to the students, most *HSTW* schools were engaged in a high degree of academic and career/technical integration in 1996. About 71 to 75 percent of the students said their academic and career/technical teachers worked together to improve their academic skills. Between 1996 and 1998, this cooperation appeared

to increase even more — between 2 and 6 percentage points.

This perceived increase in the level of academic and career/technical teacher collaboration had a great effect on student achievement. **A 1-point increase in the proportion of a school's students who said their academic and career/technical teachers worked together to help improve their math skills resulted in a predicted 1.2-point increase in mathematics achievement. In reading, that same 1-point increase translated into an increase of also about 1.2 points.**

■ Guidance Counseling Also Helps

Data from the student surveys also supplied the researchers with a way to measure the impact of guidance counseling on achievement. If students said they spent more time talking to their guidance counselors between 1996 and 1998, would that result in academic gains? This is an important question because SREB strongly believes both guidance counselors and teachers play an essential role in advising students on career planning and in encouraging them to take more challenging courses that will help them achieve their ultimate goals.

The study found a strong association between achievement gains and career guidance: schools in which students talked more often with their teachers and counselors about their high school program increased their average scores. The reverse was also true — schools with students spending less time talking with their teachers and counselors showed decreases in test scores.

A 1-point change on the 3-point scale for the average amount of time talking with counselors (from "not at all" to "somewhat" or from "somewhat" to "a great deal") was associated with a significant 8- to 11-point increase in academic achievement.

■ Changes in Instructional Goals Were Too Small to Have Substantial Effects

Changing the content and instructional delivery practices of teachers also is a major goal of *HSTW*. The network places great emphasis on meeting the needs of all students through challenging academic and career/technical courses that actively engage each student in the learning process. To study the effect of this cluster on student achievement, the researchers reviewed answers on 1996 and 1998 teacher questionnaires that asked about the level of importance of seven goals — such as helping students in their social development, helping them think critically, and helping them make plans for what they will do after graduation.

On average, teachers' answers varied little between 1996 and 1998, essentially because nearly all teachers felt all the goals were either "very important" or "important." For this reason, it was difficult to note any relationship between instructional goals and student achievement. **However, a higher ranking of the importance of one goal — helping students pursue a program of study geared to their post-high-school plans — resulted in an increase of 4 to 5 percentage points in math scores.**

■ Changes in Teaching Practices Were Inconclusive

Changes in the way teachers approached instruction between 1996 and 1998 did not have an appreciable impact on student achievement, largely because very little changed. The teacher questionnaires from those years included an item that asked teachers to rate whether their emphasis in certain areas, ranging from amount of homework assigned to using hands-on experiments in class, had shifted since their school became a member of *HSTW*. Response categories ranged from 1 (*much less*) to 5 (*much more*), with 3 representing no change.

On the 5-point scale used for these variables, average change was less than 1/4 of one point. Even the maximum change was only about 1-1/2 points. Given this stability in teacher perceptions of their practices, it was not surprising to find little association between this cluster and student achievement.

■ Work-based Learning May Negatively Impact Academic Achievement

HSTW supports the philosophy that many students learn more effectively within a "real-world" context — that is, within a "structured system of work-based and school-based learning" that involves schools and local community employers. Again using the student surveys as a basis for the analysis, the researchers reviewed the responses of students to questions about their participation in internships and how often their teachers had an outside expert review their work.

About a third of the career/technical completers participated in a work based-internship (about 31 percent in 1996; about 35 percent in 1998.). On the other hand, having career/technical work or projects reviewed by outside experts was rarer, relatively speaking. Students in most schools said this never occurred or that it happened only once or twice a year.

Holding the demographic variables constant, increases in the proportion of work-based internships and increases in the time career/technical teachers spent using outside experts to evaluate student work were associated with *decreases* in achievement in mathematics. These findings suggest that schools that are implementing work-based training or internships should proceed carefully because these efforts may not pay off in terms of gains in achievement.

SREB has found in other analyses that the following work-based experiences are associated with higher student achievement: observing and assisting veteran workers; being taught how to do the work; having the employer instruct students on developing good work habits; and having the employer instruct students on developing good customer relations. Students who had all four of these work-based learning experiences had higher average achievement scores than did those who did not have this combination of experiences. Merely having a job is not enough to improve a student's academic achievement; however, the quality of the worksite experience determines the magnitude of the impact.

Conclusion

This study found that increases in the proportion of students meeting *HSTW* curriculum standards had a positive impact on achievement gains in reading, science and mathematics. Changes in the proportion of students perceiving that their academic and career/technical teachers were working together to improve students' mathematics, reading and writing skills had a positive effect on achievement gains. Likewise, increases in the amount of time that students spent talking to their guidance counselors and teachers about their school program were directly associated with increases in the schools' mean assessment scores.

Although the other broad clusters seemed to have little or no power for predicting school changes in student achievement, educators should not ignore certain practices just because they were not specifically linked to higher student achievement. Neither should the results of this limited analysis be over-interpreted. The study did not look into how well the practices were actually carried out, and the data were not collected for the purpose of an overall evaluation of the theoretical underpinnings of the *HSTW* reform effort.

In any analysis of schools, the direction of cause and effect can be difficult to determine. In general, the findings of the study are fairly consistent with other research that has found links between certain practices and higher achievement. In the hands of an effective educator and in the right school environment, these practices can affect student achievement positively. Perhaps this study and related research will spark others to collect similar data and further explore how well schools carry out the practices. These efforts will help not only the *High Schools That Work* initiative but all of those concerned with education to determine what works — and what does not — to increase the academic achievement of all students.

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