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Is there a difference between private and public education on college performance?

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Abstract

This article examines the impact of private high schools vs. public high schools on the academic performance of 15,270 undergraduate students registered at Ball State University. Students who went to religious high schools seem to outperform their private and public school counterparts. However, the impact of this advantage is a relatively small increase (0.055–0.073) in GPA on a four-point scale. Also, the impact of going to a religious high school seems to lessen as students proceed through college, disappearing entirely by the junior and senior years.
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1. Introduction

School vouchers have become one of the most contentious issues in educational reform. Most voucher proposals would allocate monetary stipends to the parents of school-aged children. These stipends would allow parents to send their children to the schools they find the most suitable. Following the lead of Milton Friedman (1962: Chap. VI), advocates of vouchers hypothesize that vouchers would improve education in two ways. First, to the degree that private school students outperform public school students, vouchers would allow more parents to send their children to the better private schools. Second, private school competition for the education dollar would force public schools to improve in order to attract students. Others, such as

Eysenbach (1974), Levin (1987), and Frey (1992) suggest that vouchers would fail on either equity grounds, efficiency grounds, or both, due to the quasi-public good aspect of education.

This controversy has spawned a tremendous amount of literature over the years.[1] This research can, perhaps, be placed into three main categories. First, there is the research that examines the experimental voucher programs that exist in such cities as Milwaukee and Cleveland. Second, many researchers have compared private schools to public schools in terms of parents' preferences, educational achievement, and per student costs. Private schools are used as proxies to the voucher schools that would exist should a voucher plan be enacted. Finally, there has been a substantial amount of

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[1]See Greene, Peterson, and Du (1998), Rouse (1998), Witte (2000), Hoffer, Greeley, and Coleman (1985), Evans and Schwab (1995), Goldhaber (1996), Arum (1996), and Hoxby (2002).

research aimed at determining whether private school competition improves public schools. Despite this abundance of research, a consensus has yet to be reached in any of these areas. For example, while Greene, Peterson, and Du (1998) and Rouse (1998) found substantial benefits in student achievement from the Milwaukee voucher experiment, Witte (2000) does not. Likewise, while Hoffer, Greeley, and Coleman (1985) and Evans and Schwab (1995) found that private schools outperform public schools, Goldhaber (1996) does not. Finally, Hoxby (2002) finds private school competition leads to better public schools, but Arum (1996) suggests that this is only due to increased funding for public schools rather than the competition itself.[2]

While this research is very valuable, the problems with looking at high school achievement on standardized examinations or graduation rates are well documented. They include teaching for the examinations, easier passing qualifications, test bias and the potential lack of correlation between what is considered to be academic achievement and what might be called academic knowledge (Greene, 2001; Westerlund & West, 2001; Popham, 2001; Bauer, 2000).[3] A better indication of the success of a given high school might be how its students perform after leaving high school.[4] After all, high schools are supposed to prepare their students for ''success'' after they leave high school. While students who leave high schools pursue several different endeavors, the focus of this paper is on their performance in college. To this degree, this paper considers the choice controversy from a longer run perspective.

Specifically, we examine the impact of private vs. public high schools on the academic performance of the 15,270 undergraduate students who were registered at Ball State University during the Spring semester of 2002. Ball State University is a state-supported regional doctoral institution located in Muncie, IN, a mid-sized Midwestern city one hour northeast of Indianapolis and draws most of its students from the surrounding area.

2. Descriptive statistics

Ball State University and Muncie might be an especially appropriate site to test the difference between students' college performance. Between 1924 and 1927, Muncie, IN, was the location of Robert S. and Helen Merrell Lynd sociological study of community life. They published their findings in Middletown: *A Study in Contemporary American Culture* (Lynd & Lynd, 1929) which became a national bestseller. Because of the Lynd's book, Muncie became ''Middletown'', the representative mid-sized community in America.

Since then researchers have studied Muncie to determine social attitudes and behavior in the American heartland and to see how American attitudes have changed.[5] Furthermore, Ball State University is a fairly typical university, being neither an elite, high powered research institution, nor an university that accepts any student willing to pay tuition.

Table 1 describes the students at Ball State University and indicates that they are average in most respects.

The average age of a BSU undergraduate is 19 years old. Approximately, 55% of undergraduate students are female. Over 92% of undergraduate students are Indiana residents and international students make up less than half a percent of undergraduate students.

The number of BSU students who graduated from public high schools is similar to the national average. 90.6% of BSU students graduated from public high schools, while nationally, 91.72% of students attended public high schools.[6]

Those students who did not graduate from public high schools, either graduated from a religious school (5.5%), graduated from a non-religious non-military private school (1.68%), earned their GED (1.07%), were international students (0.456%), or graduated from a military school (0.02%). In this article, we focus on the public schools (90.6%), the religious schools (5.5%) and the private non-religious schools (1.69%). In 2000, 7.39% of secondary school students in the United States attended religious schools and 0.89% attended non-sectarian private schools.[7]

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[2]This is, of course, a very limited discussion of a vast amount of literature. The authors suggest, that those interested in this subject, should consult the articles in Cohn (1997) as well as Belfield and Levin (2002).

[3]This might be particularly true in recent years where there is more competition for students. One way to attract students is to promise ''results'' in terms of these indicators of ''success''. Both private and public schools might suffer from ''success inflation'' in this regard.

[4]This is somewhat analogous to the college professor who would like to be evaluated according to how much her students remember some years after they have taken her course, rather than at the end of the semester.

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[5]Lynd and Lynd (1937) and Caplow, Bahr, Chadwick, Hill, and Williamson (1982).

[6]According to The Statistical Abstract of the United States 2001 (2002), total public high school enrollment is 14.4 million and total private high school enrollment is 1.3 million.

[7]According to Table 242 in The Statistical Abstract of the United States 2001 (2002), 89.22% of private school students attended religious secondary schools and 10.78% of private school students attended nonsectarian private schools in 1999–2000. Applying these percentages to the 8.28% of students who went to private schools, then 7.39% of all students went to religious schools and 0.89% went to private schools.

Table 1
The number of observations, mean, standard deviation, minimum and maximum for various variables at Ball State University—spring 2002

Variable	N	Mean	National averages	Standard deviation	Minimum	Maximum
Age	15,270	19.3406680	—	3.9228249	16.00	61.00
Female	15,270	0.5539620	0.5621	0.4970958	0.00	1.00
IN resident	15,270	0.9218075	—	0.2684831	0.00	1.00
International	15,270	0.0045842	—	0.0675532	0.00	1.00
Public	15,270	0.9061559	0.9172	0.2916213	0.00	1.00
Religious	15,270	0.0551408	0.0739	0.2282624	0.00	1.00
Military	15,270	0.0001965	—	0.0140156	0.00	1.00
Private	15,270	0.0168304	0.0089	0.1286398	0.00	1.00
GED	15,270	0.0107400	—	0.1030794	0.00	1.00
SAT Verbal	13,234	51.162763[a]	506	8.18337[a]	20.0[a]	80.0[a]
SAT Math	13,234	51.144476[a]	514	8.53554[a]	20.0[a]	80.0[a]
ACT	4720	22.0351695	21	4.0341875	9.00	35.00

[a]BSU moves the decimal on the SAT scores one place to the left (this is equivalent to multiplying the SAT scores by 0.1).

Table 2
ACT and SAT scores for Ball State students from public, private, and religious high schools

Variable	N	Mean	Standard deviation	Minimum	Maximum
CT					
Public	4219	21.9955	4.0246	9.00	35.00
Religious	363	22.4573	4.1942	12.00	33.00
Private	92	21.7826	4.0160	9.00	30.00
SAT Verbal					
Public[a]	12211	51.1109	8.1830	80.00	80.00
Religious[a]	712	51.9958	8.1969	26.00	80.00
Private[a]	230	51.0826	7.7897	33.00	77.00
SAT Math					
Public[a]	12211	51.1563	8.5295	20.00	80.00
Religious[a]	712	50.9579	8.5501	24.00	75.00
Private[a]	230	50.5870	8.6094	33.00	71.00

[a]BSU moves the decimal on the SAT scores one place to the left (this is equivalent to multiplying the SAT scores by 0.1).

BSU students average SAT Verbal and SAT Math scores are similar to the national averages. For Ball State students, the average SAT Verbal score is 511.627 and the average SAT Math score is 511.44. The National Center for Educational Statistics (NCES)[8] reports that the average SAT Verbal score is 506 and the national average math score is 514. Ball State also accepts the ACT for admission. Of the 15,270 undergraduate students, 3410 students submitted their ACT scores. The national average for the ACT is 21 while the average at Ball State is 22.

Table 2 breaks down the ACT, SAT Verbal, SAT Math, and GPA scores for all Ball State students by the type of high school they attended. In the case of the

ACT, students who attended religious high schools had statistically significantly higher ACT scores than students who attended public high schools. However, those who attended religious high schools only scored half a point higher than students who attended public high schools (22.5 vs. 22.0). There was no statistically significant difference between the ACT scores of private high school students and public high school students.

On the SAT Verbal test, public school students earn a 511.1 while religious school students earn 519.96. However, on the SAT Math test, public school students earn 511.56 and religious school students earn 509.58.

Difference of means tests showed that there was a statistically significant difference between the SAT Verbal scores of Ball State students who attended public high schools and those who attended religious high schools. However, there was no statistically significant

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[8]Table 137 in Digest of Educational Statistics (2002). Also, see The College Board (2002).

Table 3
Percent of public and religious high school students who chose various colleges

College	N	% of public HS grads who chose college	% of private religious HS grads who chose college	College GPA	Standard deviation
Applied science and technology	1817	13.63	12.47	2.7639	0.6336
Architecture	591	4.21	6.50	3.0538	0.5851
Business	1783	13.14	14.78	2.7261	0.6574
Fine arts	900	6.70	6.77	3.0383	0.5685
Science and humanities	3940	29.55	27.07	2.7853	0.7153
Education	1746	13.16	11.22	2.9182	0.6394
Telecommunication	1635	12.01	13.98	2.6697	0.6604
General studies	388	2.89	2.85	2.5241	0.5355
Undecided	629	4.71	4.36	2.3978	0.8811

difference between the SAT Math scores. And there is no statistically significant difference in average SAT scores between the students who attended public high schools and the students who attended private high schools.

Table 3 (columns 3 and 4) shows the percentage of public high school graduates and the percentage of private religious high school graduates that have chosen majors in each of the seven colleges, general studies, and those who are undeclared. The differences in these percentages are all less than 2.5 percentage points. Given the size of the population being studied, however, these differences are statistically significant, even though their practical significance is likely to be negligible.

A larger percentage of public high school graduates have chosen a major within applied science and technology, science and humanities, education, general studies, and undecided. The grade point average (GPA) of students in these colleges was 2.77. A higher percentage of private religious high school graduates have chosen a major in architecture, business, fine arts and telecommunications. The average grade point in these colleges was 2.80.

The 0.03 higher GPAs in colleges where a greater percentage of private religious high school graduates enroll may occur because the religious high school graduates are slightly better students or there is more grade inflation in these colleges, or both. But since the differences in both the percentages and grade points are so small, any real impact of these differences will be slight.[9]

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[9]Another problem is that some of these colleges have courses that all of the college's students are required to take. In many cases, the grade points in these core classes do not reflect the grade point of majors in these subjects. For example, the GPA in principles of economics classes are very low, but economics majors have GPAs that are above the College of Business GPA. This is because only the very best of these students go on to major in the subject and very few students fall into this category.

3. Econometric results

In order to examine the potential long-run effects of vouchers, a simple linear model is used to test whether there is a difference between students who attend public, private, or religious high schools with respect to their performance in college. College performance is measured using the student's GPA.

We do not pretend that GPA represents the total benefits from a college education any more than SAT scores or graduation rates represent the total benefits from a high school education. Nor do we argue that college performance is the only long-run aspect that needs to be considered. However, the purpose of this regression is not to determine the factors that completely explain students' college performance. Rather, we want to focus on the private/public/religious school question, so we have estimated a fairly parsimonious model. Also, an advantage of using GPA as an achievement variable is that it is common for students of all classes.

As shown in Eq. (1), GPA is the dependent variable. The independent variables include the age of the student (AGE), the number of credits the students has taken (HRS), gender (GEN), whether the student attended a religious high school (REL), whether the student attended a non-religious private school (PRIV), and the percentage of correct answers the student earned on the ACT or SAT entrance exam the student took (ENT).[10] The estimated model is then,

$$\text{GPA} = \alpha_0 + \alpha_1 \text{AGE} + \alpha_2 \text{HRS} + \alpha_3 \text{GEN} + \alpha_4 \text{REL} + \alpha_5 \text{PRIV} + \alpha_6 \text{ENT}, \tag{1}$$

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[10]The variable ENT was chosen so that all members of the student body would be represented. Ball State University allows applicants to submit either SAT or ACT scores or both in their entrance application. While some students took both SAT and ACT exams, most students did not. When students did take both the SAT and ACT, ENT was calculated as the mean percentage right on both the SAT and the ACT.

Table 4
Regression of GPA on entrance test and other variables for all classes

Parameter	df	Estimate	Standard error	t value	$P\hat{r} > |t|$
Intercept	1	0.36217	0.05479	6.61	<0.0001
AGE	1	0.00748	0.00200	3.74	0.0002
HRS	1	0.00472	0.00012026	39.28	<0.0001
GEN	1	0.30070	0.00963	31.24	<0.0001
REL	1	0.05462	0.02057	2.66	0.0079
PRIV	1	0.02633	0.03683	0.71	0.4746
ENT	1	2.84736	0.05068	56.18	<0.0001

F value = 908.69, $R^2 = 0.2747$, adjusted $R^2 = 0.2744$.

with GEN = 1, if female, 0 otherwise, REL = 1, if student attended a religious high school, 0 otherwise, and PRIV = 1, if student attended a non-religious private high school, 0 otherwise.

Table 4 presents the regression results for the entire undergraduate student body at BSU.

The above regression shows that students who attended religious schools had significantly better GPAs, by 0.055, than those who went to public schools.[11] On the other hand, those who went to private schools did no better than those who went to public schools. While we do not know the exact reason for this difference, two possible explanations follow. First, private schools are likely to be newer, on average, than religious schools, and therefore, it is possible that the market has yet to exclude the ineffective private schools. And second, religious and private schools are likely to operate under two different educational models, the private schools are probably more similar to the public schools than to religious schools.[12]

AGE and HOURS are positively related to GPA, but very slightly. In fact, the only two variables that have a substantive impact on GPA are ENT and GEN. A 1% increase in one's entrance exam will lead to a 2.847% increase in one's GPA, while females, on average, have a GPA that is 0.30 higher than males. The R^2 and adjusted R^2 are both around 0.27.[13,14] They are almost identical due to the large sample size.

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[11]The results for private, public and religious high schools were basically the same when college dummies were added. Thus, we did not include these regressions in the paper.

[12]Of course, these are conjectures and deserve further investigation. However, the differential impacts of religious and private schools should certainly be considered in any policy discussion.

[13]While these R^2s are substantial, a large part of the variance of GPA is unexplained. Variables such as effort, outside commitments, family background, and attitude toward college would likely raise these R^2s substantially but are, for all practical purposes, unmeasurable.

[14]Whenever one compares two groups the question of selection bias might come into play. This is unlikely to be a problem in this study since all students self-selected into BSU and income was not a prohibitive factor.

Table 5
Regression of GPA on entrance test and other variables for junior and senior classes

Parameter	df	Estimate	Standard error	t value	$P\hat{r} > |t|$
Intercept	1	0.87820	0.05804	15.13	<0.0001
AGE	1	0.00184	0.00189	0.97	0.3308
HRS	1	0.00181	0.00016	11.03	<0.0001
GEN	1	0.27603	0.01008	27.39	<0.0001
REL	1	0.03511	0.02159	1.63	0.1040
PRIV	1	−0.05068	0.03856	−1.31	0.1888
ENT	1	2.69856	0.05098	52.93	<0.0001

F value = 584.18, $R^2 = 0.2918$, adjusted $R^2 = 0.2913$.

Since freshmen and sophomores have taken fewer courses than juniors and seniors, they could have a disproportionate impact on our regression results. Therefore, the above model was estimated for just juniors and seniors. The results of this estimation is in Table 5.

The regression results for juniors and seniors show that neither the religious nor the private variables are statistically significant. This could occur if the poor public students have dropped out of college in a higher proportion than the poor students from private or religious schools. Ceteris paribus, if this were the case, one would expect to find that the percentage of public school students in the junior and senior class to be substantially smaller than for the university as a whole. An examination of Table 6 indicates that this is not the case.

This table shows that the junior and senior classes are remarkably similar to the student body as a whole.[15] Females still represent about 56% of the junior and senior classes, private school students still represent about 1.7% of the junior and senior classes and religious school students still represent about 5.5% of the junior and senior classes. Thus, it appears that public school

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[15]However, Ball State has increased its admission standards slightly over the last five years. This might account for the slightly higher SAT and ACT scores.

Table 6
The means and standard deviations for all students and for only juniors and seniors

Variable	All students			Juniors and seniors only			% difference between means
	N	Mean	Standard deviation	N	Mean	Standard deviation	
Age	15,270	19.34	3.923	9007	19.61	4.191	1.41
Female	15,270	0.554	0.497	9007	0.561	0.496	1.25
IN resident	15,270	0.922	0.268	9007	0.914	0.281	−0.86
Public	15,270	0.906	0.292	9007	0.917	0.276	1.18
Religious	15,270	0.055	0.228	9007	0.055	0.228	−0.53
Private	15,270	0.017	0.129	9007	0.017	0.129	0.27
GED	15,270	0.011	0.103	9007	0.009	0.094	−16.27
SAT Verbal[a]	13,234	511.63	8.183	7712	513.82	8.423	0.43
SAT Math[a]	13,234	511.44	8.536	7712	513.33	8.906	0.37
ACT	4720	22.04	4.034	2848	22.18	4.119	0.67

[a]BSU moves the decimal on the SAT scores one place to the left. (This is equivalent to multiplying the SAT scores by 0.1).

students, religious school students, and private school students do not differ in their attrition rates.

However, as shown in row 8, 1.1% of all students earned their GED while 0.9% of juniors and seniors earned their GED. This implies that students who graduated from high school with a GED have a higher attrition rate than public, private, or religious high school graduates. Even though GED students have a higher attrition rate, most do become juniors and seniors.

Given the similarity between the entire student body and the junior/senior classes, Table 5 indicates that any impact of the religious school experience seems to die out over time. Thus, it appears that there is some socialization occurring that dampens the impact of the high school variable. Another possibility is that the poor public school students and the good religious school students left the university in the same proportions.

It should also be noted that an examination of the other variables in the regressions yields similar, but less striking, results. A 1% increase in the entrance exam increases GPA by about 2.84% for the entire student body and 2.7% for juniors and seniors. The same can be said about gender. Women's GPA is 0.30 better for all students but only 0.276 better than the average GPA of juniors and seniors.

4. Conclusions

The results of our empirical examination is somewhat mixed. Much of the evidence seems to support the hypothesis that those who go to religious high schools outperform their public school counterparts. However, the impact of this religious school experience seems to lessen as one proceeds through college. Perhaps this is due to non-religious school students learning to become

better students.[16] In fact, at Ball State, this advantage disappears entirely when students become juniors and seniors. Second, if one calculates the impact of this advantage for the entire student body, it is found to be relatively small from 0.055 to 0.073 on a four-point scale. These results almost echoes Witte's (1996) conclusions concerning the relative achievements of different high schools.

> These studies generally concluded that private schools had a marginally significant effect on achievement, but that the effects were small enough that they may be irrelevant for policy purposes. (Witte, 1996, pp. 160–161)

While these results are only valid for students who attended Ball State University in the spring of 2002, they do have three important implications with respect to educational policy and the possible introduction of educational vouchers. First, since religious high school students do slightly better than public or private high school students, vouchers may be most beneficial if they were used to attend religious high schools. However, many taxpayers object to using taxes to support religious schools. Thus, the political considerations are at odds with the educational considerations.

Second, since any advantage of religious schools on college achievement seems to die out after two years, any advantage that religious students have may stem from environmental differences between the public, private, and religious high schools. For example, it is possible that religious schools are more structured and disciplined. Thus, policy makers might consider educational policies aimed at changing public and private high

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[16]Another possibility is that the religious school students are becoming more like the public school students.

school environments to more closely reflect the religious school experience.

Third, while religious students do better than both private and public students, at least in the first two years of college, the differences are very small. This might suggest that the discussion concerning the efficacy of vouchers would be better focused on other factors such as per student costs.

Finally, when considering the above policy implications, it must be remembered that the United States may be different than East Central Indiana. Further research should be performed using panel data which includes several types of universities from various locations around the United States. In doing so, more general conclusions for the United States can be made, concerning the relationship between the type of high school students attended and their college performance and any policy implications this relationship implies.

Acknowledgements

References

Arum, R. (1996). *Do private schools force public schools to compete? American Sociological Review*, *61*, 29–46.

Bauer, S.C. (2000). Should achievement tests be used to judge school quality? *Educational Policy Analysis, 8*.

Belfield, C. R., & Levin, H. M. (2002). The effects of competition between schools on educational outcomes: A review for the United States. *Review of Educational Research*, *72*, 279–341.

Caplow, T., Bahr, H. M., Chadwick, B. A., Hill, R., & Williamson, M. H. (1982). *Middletown families: Fifty years of change and continuity*. Minneapolis: University of Minnesota Press.

Cohn, E. (1997). *Market approaches to education*. Tarrytown: Elsevier Science Ltd.

Digest of educational statistics, 2001. (2002). National Center for Educational Statistics, US Department of Education. Available: http://nces.ed.gov/pubs2002/digest2001/tables/dt137.asp.

Evans, W. N., & Schwab, R. M. (1995). Finishing high school and starting college: Do Catholic schools make a difference?. *Quarterly Journal of Economics*, *110*, 941–974.

Eysenbach, M. L. (1974). Voucher plans, voting models, and the efficiency of local school finance. *Journal of Political Economy*, *82*, 863–871.

Frey, D. (1992). Can privatizing education really improve achievement? An essay review. *Economics of Education Review*, *11*, 427–438.

Friedman, M. (1962). The role of government in education. In: Friedman (Ed.), *Capitalism and freedom*. Chicago: University of Chicago Press.

Goldhaber, D. D. (1996). *Public and private high schools: Is school choice an answer to the productivity problem? Economics of Education Review*, *15*, 93–109.

Greene, J.P. (2001). High school graduation rates in the United States, Center For Civic Innovation.

Greene, J.P., Peterson, P.E., Du, J. (1998). School choice in Milwaukee: A randomized experiment. In: P.E. Peterson, B.C. Hassel (Eds.), *Learning from school choice*. Washington, DC: Brookings Press.

Hoffer, T., Greeley, A. M., & Coleman, J. S. (1985). Achievement growth in public and Catholic high schools. *Sociology of Education*, *58*, 74–97.

Hoxby, C. M. (2002). *Does competition among public schools benefit students and taxpayers? American Economic Review*, *90*, 1209–1238.

Levin, H. M. (1987). Education as a public and private good. *Journal of Policy Analysis and Management*, *6*, 628–641.

Lynd, R. S., & Lynd, H. M. (1929). *Middletown: A study in contemporary American culture*. New York: Harcourt Brace and Company.

Lynd, R. S., & Lynd, H. M. (1937). *Middletown in transition: A study in cultural conflicts*. New York: Harcourt Brace and Company.

Popham, J. (2001). Teaching to the test? *Educational Leadership, 58*.

Rouse, C. E. (1998). Private school vouchers and student achievement: An evaluation of the Milwaukee parental choice program. *Quarterly Journal of Economics*, *113*, 553–602.

Statistical abstract of the United States 2001. (2002). Washington, DC: US Bureau of the Census.

The College Board. (2002). Table 8, in 2002 College Bound Seniors: A profile of SAT program test takers, Princeton, NJ. Available: http://www.collegeboard.com/prod_downloads/about/news_info/cbsenior/yr2002/pdf/2002_TOTAL_GROUP_REPORT.pdf.

Westerlund, J.F., West, S. (2001). The use of the national science standards to critique a standardized high school biology examination. *Electronic Journal of Science Education, 6*.

Witte, J.E. (1996). School choice and student performance. In: Ladd (Ed.), *Holding schools accountable*. Washington, DC: The Brookings Institution.

Witte, J. E. (2000). *The market approach to education*. Princeton: Princeton University Press.