



The AERA Research Grants Program: Key Findings of Selected Studies

A Report to the AERA Grants Board

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All of the articles reviewed in this document were published in peer-reviewed, refereed journals. In nearly all instances, authors have been contacted to confirm the contents of the summaries of their work.

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I. Introduction and Overview

The AERA grants program has been in existence for 11 years. Originally designed to conduct secondary analyses of large-scale national data sets in mathematics and science learning, the focus of the program has expanded to include studies in learning, professional development, economics, and a series of other topics. During the course of the grants program, over 533 investigators have been funded, which includes the awarding of 107 research grants and 97 dissertation grants.¹ The AERA grants program is somewhat different from other funding programs, in that the grants are small. Research grants are typically \$25,000² and dissertation grants are \$10,000.³ Each grant that is made is carefully evaluated by a 15-member panel of distinguished scientists, one of whom is assigned to mentor the investigator. All persons awarded grants are required to file both interim and final reports.

Although relatively limited in scope, the AERA grants have in fact generated a wealth of findings that have tremendous significance for educational policy. The importance of this research can be traced to the type of work that is funded. All grants rely on large-scale data sets that are drawn from multistage probability samples, which makes it possible to make predictions about the future, or evaluate programs and then describe the likelihood of what might happen if certain organizational, institutional, or instructional reforms were implemented on a larger scale. Secondary data analysis of federal data sets, particularly data sets that obtain information on individuals and institutions over time, continues to provide perhaps the richest scientific source for educational policy evaluation we have to date.

The following is a report of some of the major findings from the AERA grants program. Focusing on those areas for which the major work has been conducted, these findings were abstracted from top-tier refereed journals. Such journals rely on unbiased peer review and serve as the standard for what is considered by the field as high quality research that would stand up to rigorous review by scientists and policy makers.

We have organized the content of this report into seven topical areas: mathematics and science learning and the social organization of schools, curricular differentiation, teaching and the profession, parent involvement, economics of education, race and gender, and methodology.

¹ Since inception the program has also funded: 11 AERA Senior Fellows, 24 Research Fellows, 1 Post-Doctoral Fellow, 25 Evaluation Training Program participants, 7 Evaluation and Dissemination Internship Program participants, and 261 Statistical Institute participants.

²This is the case for seven out of every ten research grants. The remaining three out of ten are for \$15,000.

³ This is the case for eight out of every ten dissertation grants. The remaining two out of ten are for \$20,000.

II. Impact of the AERA Grants Program

In our review of 101 articles that appeared in refereed journals, several policy recommendations emerged from the findings. Although somewhat disparate in content, the findings pointed to several practices that could potentially improve the quality of education for all students and especially those in families and schools with limited economic and social resources. Areas where the policy implications seemed especially clear focused on ways to improve educational achievement in elementary and secondary schools, enhance teacher effectiveness, promote access to postsecondary institutions, reduce inequities in school resources for females and ethnic and racial minorities and identified instances where allocating more resources to education would be beneficial. Finally, the extensive research on methodology underscores the value of large datasets for providing accurate and reliable measures of individual and school level performance.

The findings strongly indicate what should happen in schools that serve young people from families with severely limited economic and social resources. Here, the results show that the schools for these students should be small, the content of the curriculum challenging, the teachers certified in the subjects they teach; more time should be given to instruction in mathematics and science, parents should be informed of school mission, goals, and activities, and a strong professional community should be maintained in the school. These features are also important for students in families where resources are not as constrained; however, the effects seem to be more important for those students whose families and schools have limited resources.

The effects of grade retention continue to be one of the strongest predictors for dropping out of high school. To reduce dropout rates in both middle and high school, studies show that changing grade retention policies, strengthening disciplinary policies, and limiting school transfer options are critical. Changing schools once in high school is likely to have a substantial negative impact on students' cognitive growth and increases the likelihood of dropping out of high school. Instead of preparing students for the world of work, even for those expecting to obtain full-time employment after high school, there appear to be no beneficial effects on mathematics or science achievement from paid employment even for those students who work less than four hours each week.

The evidence on tracking suggests that it is the content of what is taught that appears to matter most to students, particularly those who are female and minority. Identifying course sequences within subjects gives a stronger understanding of the effects of school organization on student performance than conventional measures of tracking. Students in academic courses or tracks have significant positive growth in achievement. Minority students appear to have the least chance of changing tracks and are more likely to drop down to a lower track. The research seems to show that it is minority and low-ability students who appear to fare the least well when tracking policies are implemented.

Gender gaps in achievement on science exams do not seem to result from general or scientific reasoning ability, nor do they seem to result from male-biased teaching methods. Rather it appears that boys score higher on items that require knowledge learned outside of school. For tests designed to measure the effectiveness of schools or teachers, material that relies heavily on outside-of school experiences should be de-emphasized. The more science courses completed

during high school, the larger the growth rate for science achievement across all racial-ethnic and gender subgroups. Educational factors that have a significant effect on mathematics achievement include teacher expectations, track placement, student/teacher ratio, and the race/class composition of the schools. Students who the teacher believes will eventually attend college are shown to score significantly higher than those who teachers believe will not attend college. Research on achievement and the black-white gap, in particular, would benefit from acknowledging that important influences, whether they are at the family or educational institutional level, are vulnerable to local conditions.

Student performance in school also appears to be related to religious involvement and academic attitudes and behaviors that persist through high school. Catholic schools continue to show positive effects for average students whose families have limited resources. All students appear to benefit from complex neighborhoods where teenagers are exposed to a wide range of experiences and opportunities. However, parent involvement seems less important with respect to cognition than parents' high educational expectations for their children. Parent involvement does seem to have a greater influence on behavioral outcomes, such as misbehavior in school.

Transitions to college appear very dependent on the course work a student takes in high school, and attendance at private religious or non-religious schools increases the probability of attending a selective college and staying in college. Attending an elite college increases the probabilities of attending graduate school at a major research institution. Minority students are least likely to apply to college in public high schools. When African Americans do apply, they are significantly less likely than whites to report attending their first choice college. Institutions of higher education should expand their collaborative activities with K-12 schools to better prepare students for college. Programs geared at early outreach, such as encouraging discussions among eighth graders regarding college attendance and preparation activities, have a positive effect on students' level of preparation for college.

Research on higher education shows that compared to white men, white women, black men, black women, Asian men, and Asian women face a ten to fifteen percent wage disadvantage even when controlling on the same type and quality of education. This finding suggests that discrimination exists in hiring practices for recent college graduates. Females continue to earn less than the average male graduate; however, females with technical degrees make more money on average than do other female graduates. Policies aimed at increasing the participation of women in technical colleges are likely to be effective at increasing the relative wages of female college graduates, labor market discrimination notwithstanding.

Among first-year teachers, supportive school leadership and culture, together with teacher autonomy and discretion, are strongly associated with high morale, commitment to a career path and intention to stay in the profession. School climate has the largest effects on teacher commitment. Shared beliefs and rules among teachers, cooperative effort, and help with instruction exerted the largest direct effect on the professional commitment of teachers regardless of the number of years they worked. Teachers are more likely to move out of schools with higher minority and low SES enrollments. It is suggested that teacher retention would be improved by implementing policies that provide incentives to teach in socially disadvantaged schools, create a career ladder for these teachers, and empower teachers to make school and classroom decisions.

One area of concern was the aging population of high school science teachers. More college graduates, particularly highly qualified science majors, need to be encouraged to enter the profession and stay.

Money matters but not perhaps as much as we would hope. Low-income families are more likely to take advantage of preschool opportunities where there is a larger supply of preschools and they are given access to subsidies. Allocating additional dollars to students whose gains in mathematics achievement are smaller than average has more beneficial effects than if dollars were allocated to other groups with larger gains. Higher educational standards increase the earnings of all workers. However, if standards are set too low it may make it possible for the least able to accrue benefits without putting forth much effort to raise their achievement. Recent increases in the college wage premium indicate not only that college degrees have become more valuable, but that students are obtaining more valuable degrees.

The methodology papers use a wide variety of methods and datasets. With respect to NAEP, it was found that changes in NAEP scores over time seem to be related to changes in the curriculum, with 8th grade mathematics scores being more closely related to each other across states than with 4th grade scores within states. Constructing self-esteem scales using NELS data points to a need for more comprehensive state-of-the-art designs in developing survey items for large-scale studies. Researchers, when examining topics such as tracking, are cautioned not to rely on goodness of fit as the sole, or even the most important, determinant when depicting a social process. Again using NELS, researchers show mixed effects models only seem to apply in situations where the data are subject to more than one random component, such as when sampling occurs at two levels of a study design. The use of mixed effects models in situations where only one random component exists may lead to model mis-specification and the generation of statistical artifacts. Finally multi-level structural equation modeling with NELS science data shows that science achievement seems to increase slightly when there is no ability grouping, teachers have bachelor's degrees in science, and there is an increase in the total time spent in science class—results that are consistent with less sophisticated methods. Such methodological innovations are best demonstrated with large-scale nationally representative datasets where effects are consistent and robust.

III. Key Findings Organized by Substantive Area

1. Science and Mathematics Learning and the Social Organization of Schools

Main Issues

Student achievement is a key component of educational success and the majority of our grantees have focused their work on those factors that are related to improving achievement in mathematics and science throughout all levels of the schooling system, pre-kindergarten through postsecondary school. Studies of this type move inside the school, investigating not only the teachers and students but also other relevant actors, including parents, peers, and administrators, to understand the interrelationship between the social structure and student performance. Often using sophisticated multilevel analytic techniques, these investigations examine the relative influence that family background characteristics, individual motivation, and instructional strategies have on the academic achievement, social skills, and psychological development of young people through adulthood. Searching for levers that can change the ways that schools operate, these studies are often targeted at identifying what school-level variables are most closely related to gains in academic performance. The findings presented below are grouped by their contextual focus – that is, families and schools, communities, and cross-national comparisons of achievement.

Key Findings

Family Context

Pong (1997; 1998)⁴ NELS

- Children who live in single-parent families and stepfamilies tend to perform more poorly on standardized tests.
- In schools with a high concentration of students from single parent families and step families, mathematics and reading achievement scores at eighth and tenth grade tend to be lower than in schools with fewer students in these same family contexts. This suggests that independent of the negative effect for living in a single- or step family, if one attends a school where most of the other students have similar family situations, being in such a school has an *additional* detrimental effect on achievement.

⁴Winner of the Willard Waller Outstanding Paper Award of the Sociology of Education section of the American Sociological Association, 1998.

- The negative effect on achievement of being in a school with high concentrations of single-parent families and step-families can be countervailed when social relations among the parents are strong.
- For students attending schools in which more than half the student body resides with single-parents, the number of mutual parent acquaintances positively affects mathematics and reading achievement in elementary and high school.
- Parental social relations are particularly important for single-parents who have less time to participate in school meetings, events, and parent-teacher organizations.
- Schools that encourage parent networking through newsletters, evening social events, or buddy systems for new parents with longer-term residents will enhance overall student achievement.

Morgan and Sørensen (1999) NELS

- Gains in academic achievement from grades ten to twelve are sensitive to parents' social networks, but the relationships differ between public and Catholic schools.
- "Horizon-expanding" public schools, where student and parent networks include access to people outside the community, promote more learning than "norm-enforcing" public schools, where student and parent contacts are mainly centered around the school.

Cooley and Shen (1998) SASS

- About half of suburban first grade teachers report that family poverty, lack of parental involvement, and alcohol and drug abuse among parents impair their students' learning. Fewer teachers in urban and rural schools reported similar problems among their parents.
- These student and parent problems are more likely to occur in urban schools with more than fifty percent minority students.
- During the past seven years, teachers report that first-graders are increasingly being placed in environments where there is a high incidence of absenteeism, physical conflict among students, student tardiness, vandalism, and verbal abuse of teachers. These conditions are more likely to be reported by suburban teachers than those who teach in urban and rural schools respectively.
- Schools alone can no longer educate the students they serve, and there has to be more communication between the school and family. The lack of dialogue as it exists today contributes to deleterious school-family relationships which negatively affects students' readiness and performance in school.

Pong and Ju (2000) NELS

- Disruption in a two-parent family increases the child's odds of dropping out of high school.
- With respect to dropping out, the detrimental educational effect of family change from two-parent to stepparent family appears to be unrelated to income.

- The increased risk of dropping out of middle school or high school is due to divorce or separation, but largely because such family change drives children into economic hardship.

School Context

Lee and Loeb (1995) NELS

- Eighth graders who participated in Head Start are significantly more likely than other students who would have qualified for Head Start to attend middle schools that ranked lower in terms of school average socio-economic status, average school achievement, and school safety.
- Former Head Start students are significantly more likely than former participants in other types of pre-school programs to attend middle grade schools that rank lower in terms of academic climate.
- Those with Head Start experience are significantly more likely than students who do not attend pre-school to attend middle schools that rank lower in terms of student-teacher relations.
- After participating in Head Start programs, these children are likely to attend low-quality elementary and middle schools primarily as a consequence of living in low-income neighborhoods that are served by low-quality public schools.

Lee and Smith (1997) NELS

- High schools having student bodies of 600-900 produce the highest overall gains in reading and math achievement over the four years of high school, on average.
- The effects of optimal size are especially dramatic for schools in which the students' families have limited economic and social resources and in schools where the students are predominantly minority.
- On the other hand, the smallest schools produce somewhat better outcomes in terms of equity. That is, low-income students in these schools, compared to their high-income counterparts, have higher gains in achievement than would be expected.
- The size of the high school influences how much students learn. This seems to matter most for students who are minority and have families with limited resources.

Wiley (2001) NELS

- In U.S. high schools, increased learning in mathematics is associated with the presence of inspirational school administrator leadership in combination with strong professional community among teachers.
- For U.S. high schools with high minority student enrollment, the association of the combination of quality administrative leadership and strong professional community with increased student performances is greater than for the average U.S. high school.

- In U.S. high schools, in which the family social status of half or more of the students is below the national average, a higher school average for student performance in mathematics is associated with administrator leadership that develops shared values and beliefs, supports instructional development, and communicates respect and value of teachers.

Rumberger (1995) NELS

- Being retained in school for a grade or more has the largest substantive effect on the odds of dropping out of middle school.
- Other factors that increase the odds of dropping out of middle school include high absenteeism, low family socio-economic status, being female, low parental academic support and supervision, low educational expectations, changing schools, misbehavior, poor grades, and test scores.
- The individual-level factors that predict dropping out of middle school vary from one racial or ethnic group to another. This suggests that a “one size fits all” approach to the problem would not work, particularly at the national level.
- Among middle schools with a low average socio-economic status, important factors that increase the odds of dropping out include a high concentration of minorities, larger school size, *lower* student-teacher ratio, lower average amount of homework, and lower perceptions of a fair discipline policy.
- Schools can reduce dropout rates by strengthening their disciplinary policies, changing grade retention policies, and limiting policies on school transfers, all of which affect whether students are more likely to stay in school.

Swanson and Schneider (1999) NELS

- Most students who move to a new residence during high school do not also change schools.
- Approximately 12 percent of students in grades ten through twelve will have made non-routine movements between public schools, that is, transferring to a magnet school or a public school of choice.
- Students who experience a non-routine school move between tenth and twelfth grade are more likely to have lower mathematics achievement and to have a higher risk of behavioral problems and dropping out.
- On the other hand, educational mobility that takes place between the eighth and tenth grades is beneficial in terms of math achievement and the long-term risk of dropping out. (However, such students are at a higher short-term risk of dropping out.)
- Changing schools after the tenth grade, regardless of a student’s family background or academic history, rarely results in beneficial educational outcomes and is likely to have a substantial negative impact on a student’s cognitive growth.

Eide and Showalter (1998a) HS&B

- Increasing the length of the school year has an greatest effect on those who score in the highest quartile, meaning that the brightest students are the main beneficiaries of a longer year.
- Per pupil expenditures raise achievement only at the bottom of the distribution, meaning that increasing school spending mainly benefits low-achieving students.
- Higher enrollment has a positive effect on achievement for all quartiles with the exception of the top quartile.
- For the group of students whose gains in mathematics achievement are smaller than average, allocating additional dollars to this group has more beneficial effects than if dollars were allocated to other groups with larger gains.

Coker, J.K. and Borders, L.D. (2001) NELS

- The values of peers served as a mediating factor between all other variables in the analysis.
- Parental support and school climate influence the formation of peer relationships.
- Parental control and community involvement have little affect on binge drinking as mediated by peer values.
- School counselors and other positively influencing adults, by fostering relationships with students, can promote positive values that guard against binge drinking.

Community Context

Muller and Ellison (2001) NELS

- Adolescent religious involvement at grade ten is positively associated with higher parental education expectations, parent-child interactions, intergenerational closure, and relations with academically oriented peers.
- There is a link between religious involvement and academic attitudes and behaviors that persist through high school.
- There is a positive influence of religious involvement on the accumulation of advanced math credits, obtaining a high school diploma, spending more time on homework, and cutting fewer classes.
- While religious involvement has been related to improved performance in Catholic schools, these results suggest that religious involvement may have a meaningful role for public school students as well.
- The beneficial links between religious involvement and adolescent outcomes appears to be similar regardless of race and ethnicity, immigrant status, and socioeconomic status.

Blau, Lamb, Stearns, and Pellerin (2001) NELS, Census Data

- Students who attend schools in neighborhoods in which there are no pronounced racial household inequalities are likely to make gains in social studies.
- Low achievers in tenth grade who remain in school work especially hard during the last two years of high school and their teachers provide them with encouragement and learning resources.
- Neighborhood context effects matter less for reading, science, and mathematics gains.
- Socially complex environments expose teenagers to a wider range of experiences and opportunities that not only expand their horizons but also increase their learning in specific subjects.

Grogger (1997) HS&B

- If school violence were cut in half, college attendance rates would rise by 5 percent.
- Moderate levels of violence reduce the likelihood of graduation by 5.1 percent on average, and lower the likelihood that a student will attend college by 6.9 percent.
- Local violence affects youths' human capital acquisition, and consequently is likely to affect their lifetime earning potentials.
- Violence in and around schools may be a particularly costly form of crime.

Special Focus on Higher Education

Figlio and Stone (2002) NELS

- Neither religious nor non-religious private schools have a significantly positive treatment effect on either test scores or high school completion.
- African Americans fare much better in private schools than in public schools in terms of test score improvements.
- Private schools, and in particular non-religious private schools, increase the probability of attending a selective college and the probability of staying in college.

Eide, Brewer and Ehrenberg (1998) NLS, HS&B

- Attendance at an elite private college significantly increases not only the chance of attending graduate school but also the chance of attending graduate school at a major research institution.
- Since one of the advantages of attending an elite private college is the likelihood of attending graduate school, it may be that the high costs of selective private colleges may be offset by higher earnings after graduate school.

Cross-national Comparisons

Pong and Pallas (2002) TIMSS

- Although researchers in the United States consistently find that small classes promote academic achievement in the early grades, data from nine other nation-states show that large eighth grade math classes either have higher average test scores than small classes, or that class size does not matter.
- Small classes do not appear to be characterized by individual instruction in the U.S. and in the nine other nation-states.
- Whole-class instruction is unrelated to class size in every country studied except for Hong Kong, where whole-class instruction produces *positive* effect on student's mathematics achievement.
- The U.S. is the only country which shows a negative association between class size and math achievement even taking into account teacher characteristics and instructional practices.
- The smallest 20 percent of all math classes have relatively low achievement in Hong Kong and Singapore. The reason seems to be that small classes are nearly always remedial classes in these East Asian nations.

Wang (1996; 1998a, 1998b) TIMSS

- Methodological difficulties with past cross-national science achievement data make it uncertain whether a "learning gap" truly exists between the United States and other nations.
- Data from the TIMSS study show that the learning gap at least in China has yet to be confirmed through empirical studies because of methodological problems, including comparisons on mean tests, issues of selection bias among the nations' samples, and assessment scale properties.
- Although the proportion of students taking AP classes is greater in the U.S. than in China, no dramatic differences were found between the U.S. and China for those students with average scores.

Wang and Staver (1996) TIMSS

- Estimating what predicts science achievement in the U.S. using non-linear models is more complicated than the Chinese model since it contains more significant predictors and has higher degrees of interactions among the variables.
- Differences in statistical models for these two nations need to be considered because of variations in the student body, curricula, funding levels, and testing regimes.

Post and Pong (2000a, 2000b) TIMSS, NELS

- In the U.S., for boys and to a lesser extent for girls, there are negative effects on math and science achievement that are associated with adolescent employment, even after controlling for family background and prior achievement.
- In over half of the nation-states studied, there are negative effects of employment on mathematics achievement for boys. In slightly fewer nation-states, these effects were also shown for girls.
- In *no country* was there a beneficial effect on mathematics or science achievement from paid employment even for those students who worked less than four hours each week.

2. TEACHING AND THE PROFESSION

Main Issues

Studies of teachers and the profession fall into two major groups. First are those investigations that examine what teachers do in their classrooms and the consequences it has on student performance. Second are those studies that explore the occupational structure of the profession, including professional training; teacher beliefs, commitments, and collegial and student interactions; and incentives for enhancing teacher effectiveness. Teachers continue to be held chiefly accountable for the failures of student learning. Recent school-based reforms target their efforts at both of these areas with the expectation that by addressing both what teachers do in class and the nature of the profession itself, student performance will improve.

Key Findings

Weiss (1999) SASS

- Supportive school leadership and culture, together with teacher autonomy and discretion, are strongly associated with high morale, commitment to a career path, and intention to stay in the profession, among first-year teachers.
- How new teachers' perceive workplace conditions is often as important as the conditions themselves. For example, dissatisfaction with class size, rather than actual class size, was associated with low morale among new teachers.
- The perception that student behavior interferes with teaching was associated with lower morale among new teachers.
- Salary and perceptions of salary did not appear to affect first-year teachers' morale.
- First-year middle-school teachers had lower morale than elementary or secondary teachers.
- Given the importance of workplace conditions to teacher morale and commitment, district and state-level support is needed to provide more responsive working environments for new teachers, which will in turn support them in becoming more responsive to their students. Induction programs for new teachers that provide professional supports for beginning teachers, mentoring programs that feature collaboration between new and

experienced teachers, and state policies emphasizing teacher preparation would help to ensure that new teachers experience smoother transitions from beginning teaching to full-fledged teaching.

Singh and Billingsley (1998) SASS, Public School Teachers' File (1987-88)

- Peer support (measured by items assessing shared beliefs and rules among teachers, cooperative effort, and help with instruction) exerted the largest direct effect on professional commitment.
- Principal support/leadership (measured by items assessing clarity of expectations, communication and goals, teacher evaluation, staff recognition, principal support and encouragement, and principal help with teaching and instruction) influenced professional commitment not only directly but also indirectly through peer support.
- Background variables—gender, education, and experience—showed small but significant effects on teacher commitment. Among the background variables, gender had the strongest effect, indicating that female teachers feel more committed than male teachers.
- The results of the study suggest the importance of clear expectations on the part of the principal and the communication of a vision and goals for the school. The influence of principal support/leadership on peer support in turn suggests that when principals foster shared goals, values, and professional support, a supportive learning environment is likely to result.

Riehl and Sipple (1996) SASS

- Little association was found between number of students taught, schedule of classes, and total preparation time and teacher's work effort.
- School climate was linked to professional commitment.
- Female and minority teachers were more committed to their reported school goals.

Richard Ingersoll (1996) SASS

- The amount of decision-making power held by teachers has a substantial association with cohesion and conflict among the staff.
- The strongest predictors of decreases in conflict among teachers and between teachers and principals are teachers autonomy and faculty influence over student socialization.
- School conflict is related to how much power teachers have over social and normative decisions in schools, such as discipline, selecting textbooks, policies on grouping.
- Results suggest that efforts to reform schools should decentralize power over social policies such as establishing curriculum setting policy on grouping, and determining disciplinary policies.

Borman and Rachuba (1999) Prospects Study of Educational Growth and Opportunity

- The vast majority of teachers are certified and experienced and hold bachelors or masters degrees.

- No systematic differences by school poverty level were found with regard to teacher education.
- Teachers with above and below average qualifications did not differ in their use of reformed instructional methods or with regard to their instructional efficacy.
- Supportive in-service programs, collaboration among school staff, teacher involvement in decision making and leadership roles, and a supportive work environment are important to the ongoing learning and professional growth of teachers and are linked to efficacy and implementation of instructional reforms. These factors are found to be generally lacking and are lacking most in high poverty schools.
- Giving increased autonomy and agency to teachers would help them to develop and implement their own reforms and to participate in professional development. Such changes would in turn benefit students.

Shen (1998) SASS

- Alternative certification attracts a significantly higher portion of minority teachers for predominantly minority urban schools.
- As many as 80% of the minority teachers who receive alternative certification are female.
- Alternative certification does not recruit a higher percentage of minority males into teaching, but it does recruit a higher percentage of white males.
- Alternative certification is successful in attracting older candidates among minorities, but not so with white candidates.
- Alternative certification recruits a higher percentage of teachers with employment backgrounds in other fields, particularly among minorities.
- Alternative certification policies recruit minorities with advanced degrees more successfully than it does white teachers with similar backgrounds.
- Alternative certification attracts more math and science teachers, though many AC teachers do not have the necessary qualifications or background in these fields.
- Alternative certification teachers, especially minority teachers, are less likely to consider teaching a life-long career than other teachers.

Shen (1997c) SASS

- Comparisons between alternative certification (AC) teachers and traditional certification teachers showed that AC policies attracted more minorities to teach and contributed to racial diversity among teachers, but did not impact gender or age composition.
- AC teachers were more likely to have undergraduate degrees in science and mathematics and to teach in those fields, though they held fewer advanced degrees and were not on average significantly more experienced.
- AC teachers were more likely to teach in urban, predominantly minority secondary schools, thus alleviating the teacher shortage. However, AC teachers also considered teaching to be a life-long career less frequently than their traditionally certified counterparts -- an attitude which may exacerbate long-term attrition.

Shen (1997a, 1997b) SASS

- Personal characteristics of race, sex, background before teaching, advanced education, subject matter of undergraduate studies, level of teaching, bilingual status, or number of breaks in teaching does not influence teacher retention, though both the number of years teaching and salary level positively correlate with teacher retention.
- On the school level, starting salaries for inexperienced bachelor's degree holders, enrollment, school location, mentoring programs, or classroom organization were not predictive of whether a teacher will stay or leave.
- Teachers are more likely to move out of schools with higher minority and low SES enrollments, schools without a career ladder and differential salary structure, and schools with higher percentages of less experienced teachers.
- Teachers are more likely to stay in a school where they perceive that they have influence over school policy, that the administration understands their problems, and when they believe that teaching has more advantages than disadvantages.
- The author proposes that teacher retention will be improved by implementing policies which provide incentives to teach in socially disadvantaged schools, create a career ladder for the teaching profession, and empower teachers in school and classroom policy decisions.

Shen (1998) NCES Surveys on Leadership in Public Schools

- Principals' feelings of influence over school-wide issues and new full-time faculty hiring has increased. However, principals' feelings of leadership with regard to setting the curriculum is unchanged.
- Teachers feel their influence is unchanged and remains confined to the classroom. For the three time periods of the survey, 35% reported a great deal of influence on discipline and curriculum policies, 31% on the content of in-service programs, 55% on instructional materials, 61% on content, topics, and skills, 69% on discipline, 87% on teaching techniques, 87% on homework amounts.
- Principals reported greater teacher influence than teachers did. Teachers reported their influence as static, whereas principals reported a great increase in teacher influence.
- Principals perceive the popular rhetoric of teacher empowerment as having a real impact, whereas teachers do not.

Shen (1997) SASS

- In 1987-88 more than 25% of teachers considered verbal abuse of teachers and student drug and alcohol abuse as serious or moderately serious; this grew to 34% in 1993-94.
- Between 1987-88 and 1993-94 the percentage of teachers who viewed student possession of weapons as serious or moderately serious problems nearly doubled, rising from 6.4% to 11.5%.
- Discussions of school violence usually center on students, but given the increasing severity of abuse of teachers, their needs for a safer workplace should also be considered.

Lindauer and Queitzsch (1996) SASS

- Of the 7th-12th grade biology teachers in a national sample of teachers, 57% were male. However, in southeastern U.S., most biology teachers were female, while in the northeast most were male. The gender distribution also varied by grade level; in grades 7 and 8 the distribution was about equal (49% male; 51% female); in grades 9 through 12, however, over 60% of teachers were male.
- The majority of biology teachers were white (92%), 5% were African American, and 3% represented other ethnicities.
- Approximately two-thirds of junior high school science teachers had obtained a bachelor's degree. Among those whose primary responsibility was to teach biology, 37% had obtained a bachelor's degree with biology as a major, but 64% had obtained a degree in either mathematics or a science-related field.
- One-half of junior high school science teachers had earned an master's degree in science; of those teachers who primarily taught biology, 48% held master's degrees. The fields in which degrees were earned, however, varied widely.
- Among high school biology teachers, 54% had obtained bachelor's degrees in biology; another 32% had obtained their bachelor's degrees in another science-related field.
- Almost 60% of high school biology teachers had earned master's degrees; however the field in which the master's degrees was completed varied widely, and only 16% had earned master's degree in the field of biology.
- Twenty-seven percent of high school biology teachers had completed 1-6 undergraduate biology courses; 45% had completed 7-12 courses; and 23% had completed 13 or more courses.
- Among 9th-12th grade biology teachers, 63% had completed at least one graduate biology course; 21% had completed 1-3 courses; 18% had completed 4-6 courses; and 23% had completed seven or more graduate biology courses.
- Approximately 43% of high school biology teachers were 46 years of age or older, and 63% were 41 years of age or older. The percentage of teachers over the age of 41 was also high among high school teachers of physics and chemistry, suggesting that there is an aging population of science teachers in the U.S.
- Given the aging population of science teachers in the U.S., more college graduates, particularly highly qualified science majors, need to be encouraged to enter the profession and stay. The need to attract biology teachers from a broader range of racial and ethnic groups is also noted particularly given the increasing diversity of today's high school students.

Valadez and Anthony (2001) NSOPF 1992-1993

- Fifty-eight percent of faculty members at two-year colleges strongly agreed that they would still choose an academic career; 29% agreed somewhat. These results seem to indicate that their experiences have not "turned them" off to academe all together.
- Salary, benefits, job security, tenure, advancement opportunities, greater teaching opportunities, instructional facilities, and greater administrative responsibility are more frequently cited by two-year than by four-year part-time faculty as reasons which influence

decisions to leave their positions. Both groups appear to be equally concerned with the job security, benefits, and salary.

- Part-time faculty at two-year colleges are less satisfied with autonomy levels than part-time faculty at four-year colleges.
- While neither group is particularly satisfied with their students, part-time faculty at two-year colleges are found to be less satisfied. Both groups are equally satisfied with their jobs overall.
- Part-time faculty at two-year colleges play a major instructional role in community colleges. Consequently, policy makers and institutions should pay more attention to the factors involved in their faculty's job satisfaction, commitment, and working conditions.

3. CURRICULAR DIFFERENTIATION

Main Issues

The concept of curricular differentiation describes how learning opportunities in classrooms are unequally dispersed among students—and what gets learned either formally or informally through this process. Studies on curricular differentiation often explore how the teacher organizes the class for instruction, on what basis students are grouped for instruction, how instruction and content varies among these groups, and what effect being in one group versus another has on achievement, friendship patterns, postsecondary attendance, and occupational success. One area of curricular differentiation that has received considerable attention is “curricular tracking,” – that is how program or course placements in elementary, high school, and college have enduring effects on subsequent student outcomes. The stratification issues related to curricular differentiation bring questions of equality and equity to the forefront. Essentially, investigators try to determine not only the consequences of tracking but to uncover how resources are being allocated among groups to pinpoint possible inequities. The majority of studies in this section focus on this concept of tracking and its consequences on student achievement and postsecondary attendance. Also in this section are studies that examine extracurricular participation, including community service and its effect on attitudes toward civic participation.

A third topic in this section concerns the affect students experience in different subjects. Components of affect often include interest and enjoyment, motivation, and anxiety. If students are not motivated or interested, then learning is sometimes compromised. Increasingly, investigators are turning to issues of affect to learn how feelings toward a subject are influenced by teacher actions and peer group attitudes and then how these feelings are related to learning and achievement.

Key Findings

- **Hallinan and Kubitschek (1999) The Ability Grouping Project Data, NELS**
High school students who were in vocational tracks had a statistically significant negative growth in achievement in both English and math compared to students who reported being in the general track.

- Students reporting an academic track position had a statistically significant positive growth in achievement in both subjects.
- Assignment to the academic track had a positive and significant effect on achievement for males in both English and mathematics relative to those in regular tracks.
- Assignment to the academic or vocational track produced lower achievement for females than for males.
- Track level did not have a statistically significant differential effect on the performance of blacks and whites in English or mathematics.
- Study results do not conclude that tracking be discontinued but rather that instructional resources be directed towards females and minority groups to promote higher achievement.

Hallinan (1996) Ability Grouping Project

- In English, there is a high level of track mobility; in mathematics, there is less track mobility.
- Track changes are much more likely to occur between school years than in the midst of them. Track mobility within the school year is not uncommon, although change in the middle of the year appears more often for math classes.
- Track changes occur more often in grades eleven and twelve than in ninth and tenth grades.
- Upward track mobility is less likely for females than for males.
- Student achievement, ability, and background all have an effect on track mobility.
- Black students are more likely to drop mathematics than whites.
- Low-income students are more likely to move to a lower English track or drop English or mathematics than higher income students.
- Strong performance leads to upward track mobility; however, it is constrained by track placement, and it is lower track students who are more likely to move up.
- Patterns of track mobility reveal a different source of inequity, mainly an effect of student background characteristics on the direction of track change.

Schneider, Swanson, and Riegle-Crumb (1998) NELS

- The courses students take in elementary school on through high school have important consequences for achievement and postsecondary attendance.
- Math sequences are strongest predictors of attendance at a four-year college.
- Students who change schools are more likely to end up in lower course sequences than students who do not transfer.
- Black students appear not to receive the same benefits that course sequences provide to other students. While they are more likely to be enrolled in high level courses, controlling on background characteristics, their test gains are smaller than those of white students in suburban schools.
- Course titles can be misleading, and the disjuncture between course title and course content appears particularly problematic in urban schools that serve minority populations.

Friedkin and Thomas (1997) HS&B

- Efforts that encourage female minority and low socioeconomic students to enter more academically rigorous programs of study lessen the negative effects of status characteristics on their achievement.
- Private school education offers no distinctive advantage to students except when students are unable to get the same kind of high-quality programs in public school as they are in private schools.
- Students who take the same science classes in public school as those in private school have higher mean gains in performance.
- Curricular positions in high school, that is, identifying courses within subjects, give a stronger understanding of the effects of school organization on student performance than conventional measures of tracking.

Betts and Shkolnik (2000a, 2000b) LSAY

- Ability grouping does not have a great differential effect on student achievement. This may be due to the fact that this study controls for the students' initial achievement.
- Ability grouping appears to slightly disadvantage middle students and to slightly benefit top students.
- Ability grouping does not appear to produce large differential effects; that is, it does not seem to exacerbate existing inequalities with respect to school resources.
- Estimated effects of ability grouping on test scores in some of the earlier literature appear to be substantially overstated.
- From these results, it would appear that we do not understand what de-tracking schools would mean for gains in student performance among students who initially vary in their levels of student achievement.

Kubitschek and Hallinan (1998) The Ability Grouping Project Data

- Students whose higher track placement gives them status are more likely to be chosen as friends than those of lower track and lower status.
- In small schools, track creates little or no barriers to in-school friendship choices.
- Student ability grouping and track placement appear to have similar consequences on in-school friendship choices.
- The similarities that cause students to be placed in the same track are not the same as those which cause them to become friends.
- School programs, including extracurricular programs—track, extracurricular clubs, and sports – will moderate or exaggerate friendship choices depending on the overlap in the membership of such groups.

Huang, Weng, Zhang, and Cohen (1997) HS&B

- Students in rural areas who take academic programs are more likely to relocate than students who take vocational programs.
- Vocational education appears to retain youth in rural communities in contrast to academic programs.

- Students whose parents had a college education and did well in school were more likely to relocate.

Marsh and Yeung (1996) NELS

- Eighth grade students' affective responses—that is their interest and enjoyment, motivation, and anxiety – vary by subjects (mathematics, science, social studies, and English).
- A student who has low interest and enjoyment, low motivation, and high anxiety in mathematics may not experience these same feelings in English class.
- Test scores in a given subject are more highly correlated with affect in that subject than with affect in other subjects.
- Students' affect is stronger for mathematics than for any other subjects. That is, students feel either more positive or negative about the mathematics classes in comparison to science, English, or social studies.
- Providing academically weak students with praise about school in general or in subjects where their feelings are negative may not be credible to the student; however, providing students with praise in subjects where their feelings are most positive may be more effective.
- A better understanding of the complexities of academic affect should lead to more effective teaching.

Ma and Kishor (1997) Meta-analysis

- The relationship between attitude toward mathematics and achievement in mathematics is similar for both male and female students.
- The relationship between attitude toward mathematics and achievement in mathematics declines through the grades.
- Attitude toward mathematics and achievement in mathematics did not seem important for white students; however, there was a positive relationship for Asians and blacks.
- Research designs using random samples were more powerful in detecting the relationship between attitude toward mathematics and achievement in mathematics than other research design.
- No reliable evidence showed that interactions among gender, grade, and ethnicity affected the magnitude of the relationship between attitude toward mathematics and achievement in mathematics.
- The overall finding was that relationship between attitude toward mathematics and achievement in mathematics is slightly significant but not strong.
- Few studies examining the relationship between attitude toward mathematics and achievement in mathematics use structural equation modeling or HLM, both of which may produce different results.

Niemi, Hepburn, and Chapman (2000) NHES

- Half to two-thirds of high school students participate in some community service in any given year.

- The amount of participation is minimal; the overwhelming majority participate once or twice or a few hours total.
- Students who were less active received lower grades, and their parents were less likely to be involved in community service.
- When service is regular and sustained, students most often absorb the lessons related to community service, such as political knowledge, attention to politics, and participation in civics.
- While it has considerable potential, community service as practiced by today's high school students is not a civic education cure-all.

Hepburn, Niemi, and Chapman (2000) NHES

- Service learning programs which are linked to public policy issues by having students address social service needs or political processes result in significantly enhanced classroom achievement in political science relative to those students who receive traditional classroom political science instruction only.
- Effective service learning programs are longer in duration, lasting one or even two semesters. Intermittent, isolated, and short-term programs do not result in any particular benefit in either academic achievement or attitudes toward civic engagement.
- Research suggests that in order to maximize benefits, the classroom experience which is linked to the service program should include a "reflective" component in which students discuss and write about their service activities.
- The findings on service learning's impact on student attitudes towards tolerance and social justice and political participation are ambiguous, as is the effect of compulsory service learning.

Marks and Kuss (2001) NELS

- A student's prior participation in community groups and institutions continues to have a positive influence on community service participation in high school.
- A high school student's academic achievement has a positive influence on community service participation, although it is not as influential as a student's plans for postsecondary education.
- Placement in an academic or vocational educational track increases the chances of a student's community service participation relative to a student in a general educational track.
- Optimism and self-concept among high school students do not significantly influence community service participation rates.
- Student values such as religiosity, community responsibility, and not placing excessive value on money increase service participation rates.
- Positive peer attitudes towards community service have particularly strong positive influences on high school students' participation rates.
- Among high school students spending time watching television or working for pay detracts from community service participation, while spending time on extracurricular activities and homework increases participation.

- Attending a private school, and in particular a Catholic school, significantly increases community service participation.

Stage (In Press) NSF Fellow, video-taped segments, interviews of students and professor

- Low achieving students were able to abstractly describe the meaning of mathematics symbols; however, they were the least successful in terms of their tests scores and final grades.
- Students who earned high grades for the test provided verbal responses that were weaker and more accurate.
- An important question that remains to be solved is should success in a college-level class require demonstration of an ability to communicate understanding of problems as well as an ability to solve them.

4. PARENT INVOLVEMENT

Main Issues

Parental involvement and its relationship to key educational outcomes from childhood through young adulthood is of major concern for both policy makers and researchers in education. While there is broad consensus that the actions, attitudes, and resources of parents affect, in important ways, their children's academic success, often the magnitude of these effects, their various dimensions, and the precise mechanisms by which they operate remain unclear. Current trends in the parental involvement literature focus on the following major research questions: At what point in a child's development does parental involvement have the greatest positive effect on learning and achievement outcomes? How are parental resources, such as friendship or kin networks and household income, transmitted to their children in ways that foster higher attainment and academic achievement? What are the specific involvement practices that help contribute to increased achievement and attainment, and how are these effects distributed in the student population? In other words, do the same involvement practices have similar effects for students of low-, middle-, and upper-class families? For students from minority populations? For students from single-parent households? How do the efforts of parents to promote their children's achievement reinforce similar efforts by teachers and school administrators to provide a positive learning environment in the classroom?

One of the major weaknesses of previous research has been the scarcity of reliable empirical data. Scholars are increasingly turning to longitudinal data sets to track students' achievement over long periods of time and to produce findings that can be generalized to targeted populations of students, e.g., attainment differentials among minority students. Analyses of data from NELS:88, for example, have been used to investigate such diverse topics as parent involvement and its relationship to reducing truancy and in promoting positive school-related behaviors among their children. Scholars are also developing innovative research methodologies to generate new findings and address the demand for research that can be used to support effective reform strategies. For example, recent research on early non-parental childcare, which is

widely believed to shape, at least indirectly, early cognitive development, has adopted survival analysis techniques developed to analyze mortality data to determine, for the first time, the age at which children typically enter non-parental care for the first time. Other projects are using the latest technology to link data sets containing a wide range of data, e.g., administrative records and self-reported measures of parental involvement, and, thereby, to produce more powerful results.

Key Findings

Singer, Fuller, Keiley, Wolf, (1998) NCCS

- One half of the nation's children begin their first regular care arrangement before they turn three (by age 33 months). Before age five, approximately 60% have done so.
- There are major differences in the timing of initial placement into non-parental care by geographic region. The odds that a child born in the South will enter care during the first six months are 2.1 times higher and the odds that a child born in the Midwest will enter care are 1.8 times higher than a child born in the northeast. As children age, regional differences between the South and both the Northeast and West diminish, and the Midwest begins to stand out with especially low probabilities of placement.
- There is a positive relationship between mother's education and child-care use. Mothers with only an 8th grade education are so unlikely to use child care that a median age at first placement cannot even be estimated. College-educated mothers, in contrast, are so likely to use child care that the estimated median age at placement for their children is 19 months. By the time these children turn five, more than two thirds have been in care.
- The older a mother was when she began her family, the less likely she is to place her children in care.
- Controlling for the effects of geographic location, maternal demographics, and ethnicity, the odds of initial entry into care for children from single-parent families are nearly twice as high as those for children from two-parent families.
- The odds that a child who is black will be placed into care are 1.3 times higher than the odds for a peer who shares all other demographic characteristics, but who happens to be white or Latino.

McNeal (1999) NELS

- Parent involvement reduces incidents of problematic behavior while showing inconsistent effects on achievement. PTO involvement and monitoring are associated with reduced likelihoods of truancy and dropping out, while inversely related to science achievement, suggesting that parent involvement has a greater influence on behavioral outcomes than on cognitive outcomes.
- Parent involvement consistently positively affects behavioral outcomes for whites, has a more limited negative effect for blacks, and has no effect on Hispanic achievement but a significant positive effect on truancy, and a negative effect on Asian dropouts.
- Parent involvement is more effective for students in families with higher socioeconomic status.

- Parent involvement is sometimes a mediating factor in reducing misbehavior among students already having problems in school.

Fan (2001) NELS

- Parent involvement is multidimensional, including, rules, communication, contact with school, participating in school events, volunteering, supervision, and educational aspirations.
- At the high school level there appear to be few differences in parent involvement when taking into account the students' race and ethnicity and socioeconomic characteristics.
- Parent educational expectations are a more powerful predictor of student academic success than are parent involvement activities.

Fan and Chen (2001) NELS

- Reviewing twenty-five studies of parent involvement, it was found that parental aspiration/expectation for their children's education achievement has the strongest relationship, whereas parental home supervision has the weakest relationship, with students' academic achievement.
- To obtain a "true" effect for parent involvement, it is imperative that researchers partial out the effect of socioeconomic class from student achievement both before and after examining the effects of parent involvement.

Yan (1999) NELS

- African American parents are more likely than white parents to have frequent contacts with the school and participate in discussion with their children about school-related courses and activities.
- African American parents are more likely to have rules regarding school-related activities than white parents after taking into consideration family background factors.
- Parents of successful African American students were more likely to report positive relationships with their teens than were the parents of non-successful African American students.
- Families of successful African American students demonstrate equal or higher levels of parent involvement than do those of white students, despite having fewer economic and social resources in the home and at school.

Morgan and Sorensen (1999) Also see Section 1

- Friendship density may foster learning in both public schools and Catholic schools. The most effective public schools are characterized by horizon-expanding patterns of social relations while the most effective Catholic schools are characterized instead by alternative norm-enforcing patterns of social relations.
- In public school, information from friends' parents can be routed directly through students' friends. Access to information outside a student's peer network is also enhanced through the ties that a student's parents build to sources that are independent of a student's peer network.

- The most powerful explanation of the Catholic school effect on learning is that Catholic schools force all students through a more challenging curricula by offering only college preparatory courses. This research shows that up to 60% of the baseline Catholic school effect can be accounted for by differences in course-taking patterns.

Morgan 2000 NELS

- Parent involvement is often understood as a mechanism for building social capital among the families and the school.
- Social capital is defined by social ties that transmit norms and information.
- What has received little attention is the cumulative effect of having multiple norms within a network and sources of information and how that affects the behavior of the social group.

Zvoch (1999) NELS

- Biological parents in comparison to step-families are more likely to begin financial preparations for postsecondary schooling earlier than stepparent families.
- Biological parents in comparison to step-families are more likely to place aside more money for supporting higher education and to actually spend more to support the first year of college.
- Stepchildren are less likely than children in biological families to receive parent support for pursuit of postsecondary education.

5. RACE AND GENDER

Main Issues

Race and ethnicity and gender are often considered as factors that influence student learning. These socially constructed terms are used to compare differences in learning opportunities and outcomes among students depending on their gender and their membership in one particular racial or ethnic group. Research on gender continues to show differences in performance among females and males on different tests particularly those in mathematics and science. Several of the articles reviewed here focus on these differences.

The race and ethnicity studies reported here use self-identified racial and ethnic categories to examine differences in group membership as they relate to educational expectations, achievement, postsecondary attendance, occupation, and earnings. The studies reported here focus on how resources primarily in schools are allocated differently to individuals based on their ascriptive characteristics and how these processes produces unequal outcomes. Special attention is given to how discrimination operates within the schools and the job market.

Key Findings

Bielinski and Davison (2001) NAEP, TIMSS, NELS:88

- For grades, 4, 8, 10, and 12, easy items tend to be easier for females than males, and hard items tend to be harder for females than males.
- Item difficulty accounts for two to three times more of the variance in the sex difference in item performance on the mathematics items than does item content or item complexity.
- Findings suggest a link between variance differences and the sex-by-item difficulty interaction supporting earlier work that shows that the math test score distributions for males have larger variances than the math test score distributions for females.
- As one goes from easy to hard problems, there is a shift in the degree to which successful performance depends on the ability at which females are better at reading accuracy rather than ability at which males are better at mathematical reasoning.

Hamilton (1999) NELS

- Boys consistently scored higher than girls on questions containing visual or spatial content and on questions requiring knowledge learned outside of school.
- Gender gaps in achievement on science exams do not seem to result from general or scientific reasoning ability, nor do they seem to result from male-biased teaching methods.
- For tests designed to measure the effectiveness of schools or teachers, material that relies heavily on outside-of-school experiences should be deemphasized.

Roscigno (1998) NELS, Common Core of Data

- There is a significant interconnection between both family and peer group influence and educational influences in reproducing racial educational disadvantages.
- There is a connection between family background and processes such as ability grouping and the formation of teacher expectations.
- Family and peer group effects on mathematics achievement are, for the most part, significant and consistent with expectations and past empirical findings.
- Among influential educational factors on mathematics achievement are teacher expectations, track placement, student/teacher ratio, and the race/class composition of schools. Students whom the teacher believes will eventually attend college are shown to score, on average, 6.8 points higher in mathematics achievements than their peers whom teachers believe will not attend college. Students on a high academic track score 4.7 test points higher, on average, than other students, when other factors are held constant.
- Achievement and the black-white gap, in particular, would benefit from acknowledging that important influences, whether they are at the family or educational institutional level, are fluid and vulnerable to local conditions.

Roscigno (1995) Theoretical Framework

- Educational racial inequality is conceptualized as occurring within racial and local-political economic contexts.
- High levels of racial antagonism and material inequality are likely to lead to, among other

things, higher family dissolution rates for black families, different learning styles between black and white students, development of peer subcultures that are antagonistic to educational achievement, and less resources because school funding relies on a smaller tax base.

- Studies of racial processes should take into consideration political-economic situations and histories, and analyses of educational outcomes in studies of racial inequality should examine the different processes which produce them.

Muller, Stage, and Kinzie (2001) NELS

- The more science courses completed during high school, the larger the growth rate for science achievement across all racial-ethnic-by-gender subgroups.
- With the exception of African American females and Latino males, being in an academic track, as opposed to a general or vocational track, significantly increases students' science achievement growth rates.
- With the exception of Latino males, the growth rates of those students traditionally underrepresented in science, engineering, and mathematics fields is so minimal that these students' final twelfth grade achievement levels still fall well below the initial eighth-grade achievement of whites and Asian Americans.
- For research aimed at improving science achievement and growth rates, it is important to disaggregate data by race-ethnicity *and* gender.

Huang and Weng (1998) HS&B

- School racial composition does not change the effects of socioeconomic status on postsecondary school attendance rates, though minority students with high socioeconomic status in schools with a high average socioeconomic status fared better than students with similar backgrounds in low average socioeconomic schools.
- Racial desegregation in high school does not raise a student's chance of attending postsecondary school, and in fact, slightly lowered post-secondary minority attendance. On an individual level, however, sustained enrollment in desegregated schools prior to high school does raise a minority student's chances of attending postsecondary school.
- School racial composition does affect postsecondary attendance when curriculum placement is taken into account. Minority students placed in inferior curricular programs in desegregated schools were less likely to attend postsecondary school than minority students placed in similar programs in segregated minority schools. This may be because the former group of students has weaker educational motivation and lower confidence.
- Desegregation is important only when it is considered in connection with curriculum provision. In a school of relatively few minority children, program placement could be vitally important because it could signal student grouping by race. If alternative programs are provided for a small group of students, a particularly strong commitment would be required to remove the stigma and isolation associated with such alternative grouping.

Hurtado, Inkelas, Briggs, and Rhee (1997) NELS, Beginning Postsecondary Student Longitudinal Study

- Over half of all 12th grade students expect to attend a four-year college, but this expectation is not reflected in application behavior.
- Large proportions of African American (45%) and Latino students (47%) do not even apply to college during the 12th grade, nor do approximately 20-25% of high achieving students in these groups.
- Latino students are least likely to engage in an extensive search and choice process. They have the lowest expectations for degree attainment, are least likely to enroll in college immediately after high school, and tend to apply to fewer colleges than other students. High achieving Latinos tend to fare much better regarding college choice behaviors, but among the high achieving groups, they remain least likely to apply to college during high school.
- African Americans are second only to Latinos in terms of the proportion who had not applied to college at the end of 12th grade, but among college applicants they are about as likely as white students to apply to several colleges. However, African Americans were significantly less likely than white students to report that they were attending their first choice institution.
- Institutions of higher education should expand their collaborative activities with K-12 schools to better prepare students. Programs geared at early outreach, such as encouraging discussions among eighth graders regarding college attendance and preparation activities, have a positive effect on students' level of preparation for college.

Baker, Riordan, and Schaub (1995) SIMS

- The effect of sex-grouped schooling on achievement varies depending on whether the predominant form of schooling in a country is co-educational or single-sex.
- Achievement differences are largest in countries where there are few single-sex schools.
- There are distinct patterns among students selecting schools with particular sex groupings in countries with a small number of single-sex schools.
- The less standardization in schooling there is, the greater the differences in resource allocation and the more homogeneous the makeup of the student body of a given school.
- As single-sex schools become more common, achievement advantages or disadvantages may disappear. Single-sex schools may enhance achievement among students, but much of this effect may be a function of factors related to less centralized control of learning environments and the ability of students to choose special schools.

Lee (1998) NAEP

- There is a weak relationship between overall student performance and the closing of the achievement gap among racial and social groups.
- States experience greater difficulty in improving overall student performance and narrowing the racial gap at higher grade levels.
- States that raised standards for students and teachers in the 1980s tend to get relatively bigger achievement gap differences between minority and white students as the students

receive more schooling.

- Active reform states are likely to get relatively smaller achievement gaps between high and low socioeconomic students as the students receive more schooling.
- In striving for academic excellence, states may have a difficult time meeting the needs of culturally diverse minority students.

Weinberger (1998) 1985 Survey of Recent College Graduates

- Among recent college graduates, white women, black men, black women, Asian men, and Asian women all face the same 10 to 15 percent wage disadvantage relative to white men with the same type and quality of college education.
- White, black, and Hispanic women are much more likely than men to have a degree in low-paying fields. Asian women, however, are at least as likely as white men to have studied engineering, math, computer science, or science; they still earn lower wages than white men.
- Differences in parents' education has no effect on the wage differentials between any of the groups when college major and college attended are taken into account.
- If labor market discrimination causes individuals with the same productive characteristics but different ascriptive characteristics to be valued differently in the labor market, then these results provide very strong evidence that discrimination operates in the market for recent college graduates.

Weinberger (1999) 1985 Survey of Recent College Graduates

- The average female graduate makes 17% less than the average male graduate.
- College graduates with degrees in fields with high mathematical content make significantly more money than other graduates.
- Female graduates with technical degrees make more money on average than do other female graduates.
- However, females with the most math intensive majors, such as engineering and physical sciences, do not experience a wage gap that is significantly different in size than female graduates with less math intensive majors.
- Policies aimed at increasing the participation of women in technical college majors are likely to be effective at increasing the relative wages of female college graduates, labor market discrimination notwithstanding.

Grogger (1996b) NLS, HS&B

- High schools have significant and important effects on students' wages, well in excess of students' educational attainment.
- However, characteristics of schools typically thought to measure educational equality—such as class size, pupil-teacher ratio, length of the school year, teacher education, and racial segregation—do not explain these effects, nor do explain the break in the wage convergence of whites and blacks that occurred around 1980.
- Researchers and policy makers need to identify the educational inputs that currently account for such wage differentials.

Perna (2001) National Study of Postsecondary Faculty

- Having earned a bachelor's degree or a doctoral degree from a Historically Black College or University [hereafter referred to as HBCUs] is unrelated to the preparation of African Americans for faculty careers, as measured by research productivity and satisfaction with the work setting, after controlling for background characteristics, undergraduate and graduate school experiences, and current employment experiences.
- HBCUs produce greater percentages of African American full-time faculty working in the fields of education, science, math, and engineering than do non-HBCUs. There is a greater percentage of African American full-time faculty holding doctorates from HBCUs (46%) working in the fields of science, math and engineering than other African American full-time faculty (20%).
- A large proportion of African Americans who were educated at HBCUs return to such institutions to teach, although they (African American full-time faculty at predominantly black colleges and universities) may be less likely to have a refereed publication in a 2-year period and may be less satisfied with their work setting than their counterparts who work in research institutions.
- HBCUs play an important role in preparing African Americans for faculty careers. The results of this study should guide future research on ways to further increase the flow of African Americans along the educational pipeline.

Fuller, Eggers-Piérola, Holloway, Liang, and Rambaud (1996) National Household Education Survey

- Even when income, education, family structure, and parenting practices are accounted for, Latinos select pre-schools at lower rates than other groups.
- The development of Spanish language skills and the ability to effectively communicate, a sense of personal connection with the child-care provider, and the social development of their children according to established norms of "independence" are important factors in Latinos' assessment of their children's preschooling.
- Preschool programs need to be sensitive to the cultural norms of the groups they serve.

6. ECONOMICS OF EDUCATION

Key Findings

If you spend more on programs do you get better results? What is the relationship between schooling and higher earnings? These are the key issues in education research focusing on school finance and economics. Research has pretty consistently shown that with more education is associated with higher earnings and lifestyle improvements. More recently evidence points to the fact that additional years of schooling also translates into higher earnings, particularly after receiving a college degree.

One of the controversies in education has been over whether spending more money on school translates into higher achievement. In the past most of the gains in performance have been

largely attributable to family characteristics and the link between additional resources and achievement, such as reducing the teacher/student ratio or capital building improvements, increasing the number of books in the library or providing better lab equipment, appears to be negligible. However, recent evidence suggests that targeted resources for specific educational reforms may be beneficial and have a significant direct effect on student achievement.

Key Findings

Fuller and Liang (1996) Census Data

- Counties with higher median incomes and greater concentrations of well-educated professionally employed parents display more robust preschool markets.
- Working-class and rural counties dominated by larger families display lower levels of availability of preschools.
- Supply of preschools is consistently higher in communities with higher income supplements from welfare supplements.
- Low-income families are more likely to take advantage of preschool opportunities when there is a larger supply of preschools and they are given access to subsidies.

Grogger (1996) HS&B

- The effect of school expenditures on later wage earnings is significant but small. A 10% increase in per-pupil spending would raise adult wages by 0.68% which implies an internal rate of return on the additional school expenditures of less than 1%.
- Given current spending patterns, increasing expenditures on public schools would have a very low social return.
- School spending matters but it matters too little.

Elliott (1998) NELS

- More money is spent per pupil in urban schools, in larger schools (for math but not for science), and in schools with larger proportions of students in special education programs or who are LEP. However less money is spent in schools where more students qualify for free lunches.
- Higher per-pupil expenditures in public high schools indirectly increase students' achievement by giving students access to educated teachers who use effective pedagogies in the classroom.
- Among science students, expenditures are negatively related to being in the vocational track and positively related to being in the academic.
- More money is spent in schools where the teachers tend to be more educated and more experienced, classes tend to be smaller, teachers tend to put a greater emphasis on higher order thinking in math, to make greater use of computers in math, and to have greater access to science equipment.
- In schools where less money is spent, classes tend to be larger and teachers are more likely to emphasize the relevance of math and science and memorizing facts in math, and to make greater use of calculators.

- To realize the highest gains in achievement, money must be allocated not only for hiring quality teachers but also for helping those teachers use the most effective strategies in their math and science classrooms.

Betts (1998) Simulated Models

- Higher educational standards increase the earnings of both the most-able and the *least-able* workers. The only workers whose earnings fall are those workers who, after the increase, fail to continue to meet the standard.
- A policy of higher educational standards will not increase the earnings of all workers, given that lowest-ability students are likely to reduce both their effort and their earnings. But the majority of students, who are above and below the average ability level, will see increases in their earnings.
- Such considerations suggest that in the case of educational standards, the trade-off between equity and efficiency may not be as severe as commonly thought.
- Setting standards that are too low may make it possible for the least able to accrue benefits without putting forth much effort to raise their achievement.

Georges (2001) NLS

- Women with a GED certificate have a significantly higher probability of entering poverty than high school graduates.
- Women with a GED are also less likely to exit poverty than high school graduates after controlling for differences in ability, employment, and demographic characteristics.
- The probability of entering poverty for GED certificate holders is lower than that for a female high school dropout.
- Women with a GED certificate have a higher probability of exiting poverty than high school dropouts.
- Greater investment in human capital, such as education beyond a high school diploma or the GED certificate, is likely to yield higher growth in income and hence a lower poverty rate among women.

Grogger and Eide (1995) NLS, HS&B, CPS

- The economic return to a recent college degree (also known as the “college wage premium”) rose throughout the 1980s. Explanations for this phenomenon usually focus on the labor needs of employers.
- Students’ choices of major changed from the late 1970s to the mid 1980s, with more students choosing lucrative fields such as science, engineering, and business. Furthermore, these fields were becoming relatively more lucrative at the same time they became increasingly popular. The change in the distribution of majors accounts for 25% of the rising wage premium for men, and a similar percentage for women.
- Increased levels of high school mathematics ability, as measured on standardized tests, also account for part of the rising wage premium. This is especially true for women.
- The college wage premium works differently for women than for men. Recently graduated men suffer a wage penalty, relative to members of their cohort without a

college degree. However, the returns to most degrees increase rapidly with experience. Women realize an immediate college wage premium, but receive little additional benefit over time.

- A substantial portion of the change in the college wage premium reflects not only that college degrees have become more valuable, but that students are obtaining more valuable college degrees.

Bellas (2001) B&B

- One year after college graduation, graduates more than forty years old were less likely to be employed full-time and slightly more likely than younger graduates to be employed part-time, to be unemployed, and to be out of the labor force.
- Among those employed, the largest percentage were in the professional sector and this was much more likely to be the case for older graduates.
- Older graduates on average had fewer job offers than younger graduates.
- Older graduates were employed in better jobs one year after graduation, and their higher average salaries are not explained by sociodemographic, educational, or employment-related variables.
- It appears that college graduates over the age of forty face fewer age-related barriers related to employment than previously thought.

Eide and Showalter (1999, 2000) HS&B, PSID

- Fathers' education is likely to explain some of the effects for sons' earnings, particularly for those at the top of the income distribution.
- While fathers' income has an important role in explaining intergenerational linkages in earnings, there still remains an unexplained family effect, particularly for those sons at the highest income distribution.
- Intergenerational earnings mobility models are a function not only of fathers' earnings but also a consequence of error terms across generations that are sometimes unaccounted for.
- Explanations for sons' earnings are easier to determine at the lower end of the distribution than for sons who are in the highest income level.
- Increasing educational attainment for sons at the bottom of the earnings distribution would help to lessen earnings inequalities.

Morgan, Kruytbosch, and Kannankutty (2001) NSF Workforce Surveys

- Although a large percentage of patent activity by scientists and engineers in the U.S. occurs in industry, university personnel are also involved to a considerable extent. In academe, more than two in five of the scientists and engineers named as inventors on at least one patent application in the five years since April, 1990 also received at least one patent grant during the same period.
- Older scientists and engineers in academia report equivalent or greater patent productivity, as measured by patent activity rates, than younger scientists and engineers.
- The patent activity rate for older academic scientists and engineers is greater than for their colleagues in younger cohorts.

- Female scientists and engineers are more likely to have their highest degrees in fields with lower patenting activity rates than males.
- The graying of the faculty combined with elimination of a mandatory retirement age for tenured faculty may be having a positive effect on patent productivity.

Gerber and Finn (1998) National Adult Literacy Survey (NALS)

- Individuals with greater years of schooling are better at using a variety of documents typically found in workplace situations.
- The frequency of performing literacy tasks at work depends to a large extent on the type of work; occupations systematically vary in the literacy practices they demand and in the educational background required.
- Both schooling and occupational skills contribute uniquely to document proficiency among U.S. adults.
- Even among individuals who have the same occupational classification and the same educational attainment, more practice at work is associated with greater skill in using documents.

7. METHODOLOGY

Main Issues

Large data sets by the very nature of their construction, invite methodological analyses, whether it is to improve the quality of the data sets themselves – including the construction of items and scales, reliability of scores – or to experiment with new approaches for analyzing various outcomes. The studies in this section address both of these strands focusing on comparing different types of assessments, scoring techniques, scale reliabilities, and simultaneous equation techniques with multi-level data.

Key Findings

Kifer (1997) SIMS, NAEP

- What is learned disproportionately by students in international studies is newly introduced content (algebra and geometry) where a solution requires little more than rote calculation.
- Comparing scores across countries is more a curriculum coverage comparison than a knowledge one.
- Changes in NAEP scores over time seem to be related to changes in the curriculum, with 8th grade mathematics scores being more closely related to each other across states than with 4th grade scores within states.

Hamilton (1999) NELS

- Constructed-response items on the NELS science test show that one item displayed a large male advantage and contributed to the gender difference on the total score.

- Results from constructed-response items were similar to those obtained from multiple-choice tests.
- Gender differences were largest on items that involved visualization and knowledge obtained outside of the classroom.
- Combining interview and test results, it appears that male and female difference on item scores is directly attributable to knowledge learned outside of school by males rather than gender differences in visual or spatial reasoning.
- Constructed-response items do not necessarily reduce the male advantage in science and may, in fact increase it.
- Magnitude of gender difference is also affected by the content and reasoning requirement of the test items and is subject to change depending on the items in the test.
- Conclusions concerning gender differences on tests needs to be informed by careful student of the achievement measure and the items it comprises.

Wang (1998) TIMSS

- Not all free-response scores reflect student science achievement, because the free-response item allows a range of answers with different categories for different responses. Different responses do not account for variations in the quality of the responses.
- Not all science items have only one correct response. Several items had more than one correct choice.
- Not all TIMSS scores are grounded in the students' levels of cognitive development.
- Not all TIMSS items reflect a sound relationship between science and mathematics learning.

Marsh (In Press) NELS

- Confirmatory factor analysis models of intrinsic motivation, extrinsic motivation, and anxiety in mathematics, science, social studies, and English show that the affect scores for each school subject on the NELS survey were contaminated so that simple scale scores are not appropriate.
- Employing multitrait-multimethod models, the authors found that the students were able to differentiate their attitudes in relation to different school subjects.
- Attitudes toward mathematics, science, English, and social studies were validated in relation to standardized test scores and school grades for each of these subjects.
- The use of more comprehensive, state-of-the-art designs for constructing survey items for large-scale studies is recommended.

Marsh (1996) NELS

- Results of confirmatory factor analysis on the seven item global measure of self esteem from the base year and first follow-up of NELS show the existence of a single latent construct.
- Negatively worded items are problematic, especially for students with reading difficulties.

- If surveys use negatively worded items, it is suggested that investigators employ confirmatory factor analysis to evaluate the psychometric properties of responses to the rating scales.
- Results indicate that the positively worded items should be given more weight in the computation of a global self-esteem score.
- Using positive and negative items in follow-up administrations can inflate the correlations between measures of the same construct over time.

Kubitschek and Hallinan (1999) NELS and Ability Grouping Project

- Three different statistical and theoretical models of mathematics achievement are estimated.
- Results show that the best statistical fit to empirical data may not always yield the most useful information about the causal processes being examined.
- Moving from a lower track or ability group to a higher track or ability group, all else constant, leads to higher achievement.
- Moving from a higher to a lower track or ability group leads to lower achievement. Moving up two tracks or ability group levels has a greater positive effect on achievement than moving up only one track or group level, and moving down two tracks or group levels has a greater negative effect than moving down only one track or group.
- Researchers are cautioned not to rely on goodness of fit as the sole, or even the most important determinant of the choice of model to depict a social process.

Kaplan and Elliot (1997) NELS

- Results provide a didactic presentation and application of new developments in structural equation modeling (SEM) that allow for modeling of multi level data.
- Students within schools that exhibit higher levels of academic press have, on average, higher science achievement scores.
- This type of analysis is particularly useful for gauging the extent to which the properties of measurement instruments—construct validity show substantial between-group variation.
- A limitation of multi-level SEM involves the interpretation of cross-level effects, that is since the intercepts and not usual mean values are being analyzed, how the independent variables are centered has profound implications for the interpretation of the results.

Kaplan and George (1998) LSAY

- Using ex post (historical) simulation statistics, as a means of evaluating latent variable growth models, the authors examine science in science achievement.
- Parent push and teacher push are found to predict growth with respect to both the ex post simulations as well as using standard statistics.
- For forecasting future values, in this case science achievement, ex post simulations are shown to provide important information for the quality of the model.
- Simulation models are not intended to replace existing measures of model fit, but it is suggested that they be used in conjunction with other standard methods.

Kaplan and Elliot (1997) NELS

- Multi-level structural equation modeling was used with NELS science data to demonstrate the potential of this approach.
- Slightly higher levels of academic press are predicted for schools where ability grouping is used.
- If the teacher has a bachelor's degree in science, versus not having one, it does not change the predicted value of science achievement or the determinants within the model.
- When ability grouping, teacher degree, and time spent on science are all introduced into the model there are different effects. Science achievement seems to increase slightly when there is not ability grouping, teachers have bachelor's degrees in science, and there is an increase in the total time of two hours per week for science classes.

Wang (1997) Replication of Bryk and Raudenbush Rat Data

- Many of the most common types of HLM applications encountered in educational research fall under the general class of models referred to as random coefficient or empirical Bayes methods.
- The SAS PROC MIXED procedure is fully compatible with the modeling capabilities contained in other specialized applications such as HLM/2L and HLM/3L. Unlike the latter applications, SAS PROC MIXED may require users to specify a general covariance structure for some types of models (such as latent trajectory models).
- The test statistics included in SAS PROC MIXED may make it slightly more applicable for the analysis of large data sets, while other applications such as HLM/2L may be better for use with smaller data sets.

Wang (1999) NELS

- Educational analysts may assume that data with an inherent hierarchical structure need to be analysed with mixed effects models (such as HLM). In many instances regression with dummy variables provides simpler, more convenient, and more accurate ways of analysing hierarchical structure/effects in these data.
- In general, mixed effects models only need to be applied in situations where the data are subject to more than one random component, such as when sampling occurs at two levels of a study design. The use of mixed effects models in situations where only one random component exists may lead to model misspecification and the generation of statistical artifacts.

Wang (1998) LSAY

- Conventional statistical procedures relying on Least Squares (LS) methods can be extremely sensitive to data with larger numbers of outliers. In data sets of high dimensionality, cases may obscure one another, making the detection of outliers particularly difficult. Least Median Squares (LMS) methods which minimize the median of the squared residuals provide a simple and effective alternative to LS estimation that resist higher breakdown points (proportions of outlying cases), in some situations up to 50% of the sample in question.

- A comparison of LS and LMS estimates for simple linear models regressing school enrollment on the number of grade levels in schools for students in the Longitudinal Study of American Youth (LSAY) data set revealed that regression coefficients and coefficients of determination can vary substantially between methods, with the LMS method producing more robust parameter estimates and a much smaller average deviation from the observed data.
- Diagnostics for outliers developed to complement LS estimation, including Cook's D or Mahalanobis Distances may miss important outliers. This problem is minimized in the LMS framework, and LMS modeling provides a means of identifying outliers in multivariate modeling.

Morgan (2001) NELS

- Propensity matching models (PMMs) and the more general counterfactual framework provide an effective means of estimating causal effects from observational data while calling attention to conceptual and theoretical shortcomings in current sociological models of learning and school effects.
- Counterfactual analyses of (causal) school effects from observational data may be impossible to estimate effectively if it is assumed that students, parents, and schools make enrollment decisions based on the prospects of students' learning. Regardless, even advanced statistical methods cannot provide anything more than serviceable alternatives to actual experimental data.
- Provided that the assumptions underlying the PMMs used are acceptable, data from the National Longitudinal Study of 1988 (NELS:88) provide evidence suggesting that the Catholic school effects on math and reading achievement noted in prior research are genuine and that students who are least likely to attend Catholic schools (based on observed characteristics such as race and SES) are in fact most likely to benefit from attending such schools.
- While the evidence for Catholic schools effects is clear, the evidence also supports at least one of four different underlying narratives related to these effects: the common school narrative (where Catholic schools are viewed as distributing opportunities for learning more equitably than do public schools), the differential sacrifice narrative (where Catholic school students are hypothesized to work harder than their more advantaged peers in recognition of the sacrifice required on the part of their parents to send them to such schools), the better-alternatives narrative (where Catholic schools are posited to be particularly beneficial to students with poor public school alternatives), or the binding-constraint narrative (where Catholic school effects are argued to be the product of a differential responsiveness to selection based on an accurate perception of students' likely benefit from Catholic schooling).

Goldhaber, Brewer, Eide, and Rees (1999) Milwaukee Parental Choice

- Among Milwaukee students eligible to participate in the Milwaukee Parent Choice Program (MPCP), students from lower income families are more likely to apply to private schools than are students whose parents have more education (graduated from either high

- school or college), or students who are African American or Hispanic.
- Students living further away from a choice school, and students who are in higher grade levels are less likely to apply to the MPCP.
- Students who decide to participate in the MPCP differ markedly from those who do not decide to participate: Higher ability students and students whose parents went to college experienced greater gains in both math and reading achievement. Females experienced greater gains in achievement in reading only. Blacks and students at higher grade levels experienced lower gains in both math and reading, while Hispanics experienced lower gains in reading but not in math.
- Students with higher base year test scores who applied to the program fared better than those who did not apply to the program, while students from single parent households who applied to the program did better than those who did not.
- The data provide limited to no evidence of sample selection associated with the decision to participate in the Milwaukee school choice experiment, and the findings of earlier research on the achievement effects of enrollment in the MPCP cannot be explained by unobserved differences (selection effects) between MPCP applicants who attended private schools and non-applicants who chose to remain in public schools.

Roberts (2000) Science Education for Public Understanding (SEPUP) (NSF-Funded)

- Graphical IRT techniques provide a flexible and intuitive means for evaluating the implementation of teacher enhancement and curricular reform programs that are readily accessible to various stakeholders in the educational process. Using the partial credit model outlined by Masters (1988) and data from the Science Education for Public Understanding Program (SEPUP), it is possible to evaluate teachers in terms of their use of alternate learning techniques and their perceptions of the effectiveness of such practices.
- Dividing the SEPUP sample into treatment groups, it was found that teachers who were required to use the basic SEPUP curricular materials but not the SEPUP student assessment systems became more positive in their assessments of the usefulness of the program while using SEPUP assessment practices less frequently over time. Teachers who were not only required to use the SEPUP curricular materials but the accompanying assessment systems as well displayed a tendency to increase their use of SEPUP assessment practices over the course of the study while devaluing the perceived usefulness of the program slightly.
- The disjuncture between the rhetoric and reality of curricular reform suggests that teachers will not use embedded assessment and evaluation tasks, scoring guides, or ongoing curricular modification processes without appropriate preparation and support mechanisms, regardless of their enthusiasm for curricular reform objectives

Ma (1997) Dominican Republic Data Set

- Using data from a 1988-89 study of high school seniors in the Dominican Republic, it was found that student attitudes toward mathematics (self-reported perceptions of the importance of mathematics, the difficulty of learning math, and finding math enjoyable)

mediate between student background and student achievement. The effects of student attitudes are not only consistent across topical areas in math (algebra, geometry, trigonometry), but are influenced by reciprocal “loop enhancement” relationships between attitudes and achievement.

- Father’s education was found to have a significant positive effect on achievement in math, but not on student perceptions of the importance of math. This relationship mirrors that found in analyses of US data. In contrast, the Dominican Republic data suggest that mothers’ educational level is negatively correlated with their children's perceptions of the importance of math, a result the author attributes to the difference in women’s roles in the US and the Dominican Republic.
- The strongest direct determinant of student enjoyment of mathematics is student perceptions of how difficult math is. Student enjoyment of mathematics was found to be more important to achievement than student perceptions that math is difficult. Gender and parent education were not found to be significantly correlated with student reports of how much they enjoyed math, or how difficult they found math to be. Thus, in contrast to prior analyses of US data, females do not differ from males with respect to attitudes toward math (self-reported perceptions of the importance of mathematics, the difficulty of learning math, and finding math enjoyable), or math achievement.
- In general, the effects of student perceived importance of mathematics on achievement were weakened by the effect of achievement on perceived importance of math. The effects of student perceived difficulty of mathematics influenced achievement through student perceptions of how enjoyable math is (negative relationship), and was in turn modestly strengthened by the effect of achievement on this attitudinal measure. In spite of the strong relationship between enjoyment of mathematics and achievement, enjoyment was not influenced by mathematics achievement. The data therefore suggest that unidirectional specifications of the relationship between attitudes toward math and achievement overstate the relationship between perceptions of the importance of math and achievement.

Peng, So, Stage, St. John (2002) Review of articles using higher education datasets

- A review of three leading higher education journals from 1988 to 1999 revealed 52 articles that used logistic regression techniques.
- There continues to be confusion over terminology, reporting, and interpretation of results. Logistic regression results have been reported in various forms.
- Recommendations are made with regard to reporting logistic regression results, including overall model significance test, significance test of each regression coefficient, the goodness of fit statistic, evidence of the predictive power of the model, such as the percent of correct classifications, and the diagnostic analysis.

IV. ABSTRACTS

Baker, D. P., Riordan, C., and Schaub, M. (1995). The Effects of Sex-Grouped Schooling on Achievement: The Role of National Context. Comparative Education Review 34(4):468-482.

In this article, Baker et al. examine the role of national context on the effects of single- or mixed-sex schooling. To this end, they choose four countries (two of which, Belgium and New Zealand, have more even enrollments in single and mixed high schools and two of which, Thailand and Japan, have less than 20% enrollment in single-sex high schools) and study their national twelfth-grade mathematics achievement trends. Much previous research has assumed that male students often dominate social interactions and that this impedes female achievement in mixed-sex classrooms. The authors note, however, that while many studies find clear differences between sex groupings, a substantial number of them find only small and substantively insignificant influences and results often vary across countries. To address these issues, the authors present and test three cross-national hypotheses using data from the International Educational Assessment's Second Mathematics Study. Their findings suggest that although the interactions among the sexes in classrooms affect achievement, this effect may be mitigated or increased by the context of a country's usual system of schooling. In other words, specialized schools in any country may have increased achievement scores due to the fact that these schools, for the most part, have greater creative control over the makeup of the student body, the teachers, the curriculum, the school structure, etc. Therefore, it is difficult to make absolute statements as to the effects of single-sex schooling as they will most likely differ according to whether or not single-sex or mixed-sex schooling is the national norm.

Bellas, M. (2001). Investment in Higher Education: Do Labor-Market Opportunities Differ by Age of Recent College Graduates? Research in Higher Education 42(1): 1-25.

The relationship between age and the post-graduation experiences of college graduates has often been overlooked in research that examines labor market opportunities for recent graduates. However, given the aging of the U.S. student population and the growing awareness of age discrimination, it is becoming an increasingly important topic. This paper uses data from the Baccalaureate and Beyond Longitudinal Study to generate descriptive statistics comparing the characteristics, job search strategies, and experiences of older (40+ years old) and younger (<40 years old) college graduates. Multiple regression techniques are then used to examine the potential effects of age on number of job interviews and number of job offers, controlling for the potential effects of sex, race, marital status, dependent children, various education-related variables, and whether respondents had any work experience related to their degree. Regression analyses were also used to predict annual salary one year after graduation. Results indicate that one year after graduation, graduates more than forty years old were less likely to be employed full-time and slightly more likely to be employed part-time, to be unemployed, and to be out of the labor force. Among those employed, the largest percentage were in the professional sector and this was much more likely to be the case for older graduates. Older graduates had fewer job offers than younger graduates, but they were employed in better jobs one year after graduation

and their higher salaries are not explained by sociodemographic, educational, or employment-related barriers. In general, the results suggest that older graduates for the most part fare better in the labor market than previously thought.

Betts, J. (1998). The Impact of Educational Standards on the Level and Distribution of Earnings. The American Economic Review 88(1): 266-275.

Economists have become increasingly interested in the role of standards in improving the quality of public education. One implication of the existing theoretical models of educational standards is that increases in standards will exacerbate inequality. This paper uses simulated models and presents an alternative finding that an egalitarian policy maker might actually prefer higher standards than would a policy maker whose goal was to maximize the sum of earnings. The models show that higher education standards increase the earnings of both the most-able and the least-able workers. The only workers whose earnings fall are those who fail to meet the standard. That is, while higher educational standards will not increase the earnings of all workers since the lowest-ability students are likely to reduce both their effort and their earnings, the majority of students who are above and below the average ability level will see increases in their earnings. These considerations suggest that in the case of educational standards, the trade-off between equity and efficiency may not be as severe as commonly thought.

Betts, J. R. and Shkolnik, J. L. (In press). The Effect of Ability Grouping on Student Achievement and Resource Allocation in Secondary Schools. Economics of Education Review 19(1).

Does the policy of ability grouping have any effect on student achievement and/or the allocation of resources in high schools? Researchers have generally found that ability grouping in secondary schools has a positive effect on the students in the higher ability groups and a negative effect on students in the lower ability groups. The size of these effects being about equal, the overall effect of ability grouping is thus near zero. Using data from the Longitudinal Study of American Youth (LSAY), this study examines both the overall and the differential effects resulting from a formal policy of ability grouping. Students of similar levels at both ability-grouped and non-ability-grouped schools are compared. The authors expand upon the typical research on this topic by controlling for class ability at each type of school in order to estimate math achievement growth for each [ability] group. Another improvement upon earlier research is the question of whether ability grouping affects inputs such as class size, teacher education, and teacher experience. One of the main claims as to the benefits of grouping is that it helps tailor the inputs needed by different groupings of students. Resource allocation within schools is studied to see whether resources allocated to different ability groups further exacerbate inequalities.

Betts, J. and Shkolnik, J. (In press). Key Difficulties in Identifying the Effects of Ability Grouping on Student Achievement. Economics of Education Review 19(1).

In this paper, Betts and Shkolnik provide empirical evidence that undermines the claims of earlier research that tracking greatly impacts inequality in student achievement. First they present their findings from the LSAY (see abstract above). The authors had compared students

in ability-grouped schools with students of similar ability level in non-ability grouped schools and found that there is little effect of formal ability grouping when comparing these groups. They then address criticisms that question these findings. The authors counter that they do not believe that mislabeling grouped schools as ungrouped explains away their initial findings that there is little effect of ability grouping on student achievement. The authors then go on to enumerate six major problems present in this field of study. Definition problems, they state, are compounded by a series of measurement issues. The authors describe an ideal data set as one that would include data on every student at a particular school, on how teachers group students within a classroom, and on curriculum differences between and within classrooms. They conclude that based upon the current research, it is not possible to make an easy decision as to whether de-tracking students will have a positive, negative or any effect on achievement for most American students.

Bielinski, J. and Davison, M. L. (2001) A Sex Difference by Item Difficulty Interaction in Multiple-Choice Mathematics Items Administered to National Probability Samples. Journal of Educational Measurement 38: 51-77.

A notable gender gap in mathematics achievement has been found in a multitude of data sets. The evidence points to females being more successful at mathematics in grade school; males, on the other hand, are favored by the gender gap in high school. During middle school, both sexes exhibit similar accomplishment. Why does the gap exist? Explanations for this depend upon whether one feels the gap is a characteristic of the examinees or the material being studied. Many argue that basic differences in the male and female thought processes account for the gap: females are better at understanding abstract terms and males do better on applied items. The assumption here is that the mathematics learned at earlier stages of life is more abstract and high school math is more concrete and applicable. The authors of this paper take a slightly different stance on the issue. They argue that there is a sex difference by item difficulty interaction present in standardized, multiple choice mathematics tests. Using data from three national studies of student achievement (the 1992 NAEP, TIMSS and NELS:88), the authors tested their hypothesis. They found that although the association varied across populations, it was statistically significant in all samples. Specifically, results show that easy math questions are easier for females than for their male counterparts. Hard math questions, on the other hand, favor males over females. Females will thus outperform males on easier tests. On more difficult material, for example college entrance exams, males will do better than females.

Blau, J., Lamb, V., Stearns, E., and Pellerin, L. (2001). Cosmopolitan Environments and Adolescents Gains in Social Studies. Sociology of Education 74: 121-38.

The authors theorize that high school students' achievement in social studies will be facilitated by residence in a cosmopolitan neighborhood environment. A cosmopolitan environment is one where residents come from diverse racial and ethnic groups, but racial inequality in resources is not high. Cosmopolitan settings are beneficial because they are high in social complexity; students are challenged to negotiate a wide variety of interactions and roles in their daily lives. To test their theory, the authors use data from the 1990 and 1992 High School Effectiveness Survey administered to students and school administrators as part of the follow-up to NELS:88.

They also use data from the 1990 Census. ANOVA estimates show that neighborhood context makes a bigger difference in students' achievement in social studies than in reading, science, or mathematics. A hierarchical linear model of social studies achievement demonstrates that the source of this neighborhood effect is the presence or absence of racially based economic inequality; mere diversity has no effect. In addition to its overall negative effect on social studies learning, racial inequality increases the natural disadvantage boys have in this subject, and (paradoxically) decreases the advantage enjoyed by students of high socioeconomic status. In addition, the HLM model shows that low achievers in tenth grade make greater gains in social studies than others. OLS regression estimates show that this is also true for reading and mathematics (but not science). The reasons seem to be that low achievers who remain in school work hard during their last two years, and that their teachers provide them with encouragement and learning resources.

Borman, G. D. and Rachuba, L. T. (1999). Qualifications and Professional Growth Opportunities of Teachers in High- and Low-Poverty Elementary Schools. Journal of Negro Education 68: 366-381.

Previous research has concluded that students who attend schools with relatively high levels of poverty are more likely to be taught by teachers who are not well prepared, experienced, or qualified. In addition, these teachers appear to have fewer professional growth opportunities than those teachers in schools with low poverty levels. The authors examine two key sets of indicators of teachers' professional status: the qualifications and credentials a teacher brings to the classroom, and the opportunities teachers are given to continue to grow professionally. The authors also look to see whether teachers who have greater qualifications and opportunities to grow are more efficacious and make greater use of reformed instructional practices than those not so qualified and/or lacking such opportunities. The authors set up a new model of teacher capacity building which maps the school, teacher, and student effects resulting from, among other things, high levels of poverty, teacher qualifications, and professional development opportunities. They find that indeed, high-poverty schools do offer less institutional and professional growth support than is offered to teachers in low-poverty schools. They also find that this can lead to lower efficacy levels and implementation of reforms. They conclude that there is much to support the most recent wave of educational reforms, which supplements the older method of top down reform with teacher and school agency and autonomy.

Coker, J. K. and Borders, L. D. (2001). An Analysis of Environmental and Social Factors Affecting Adolescent Problem Drinking. Journal of Counseling and Development 79: 200-208.

Prevention of youth substance abuse has become a priority in recent decades. With data indicating that 70% of adolescents report drinking alcohol before the age of 12, researchers have been preoccupied with the life factors that seem to promote or prevent destructive behavior. Historically, theory has focused upon a variety of issues: peer associations, parental relationships, and environmental factors. Recently, the school climate or environment has become a focus of research interest. The authors hypothesize that parental support, parental control, community involvement, and positive school climates of 8th grade students affect the formation of peer relationships and positive value structures in 10th grade which, in turn, will

decrease the incidence of substance abuse. Data from the 1996 NCES longitudinal study of over 17 thousand adolescents were analyzed. Approximately 21% of those surveyed admitted to having engaged in binge drinking behavior within the previous two weeks. Other research has yielded a slightly higher percentage, about one-third of 10th grade youth. Results indicated that parental support and school climate affected peer formation. This then influenced later drinking habits. Parental support seems to have more effect than school climate. Parental control and community involvement, on the other hand, showed little influence in the previously stated pathway. Knowing how important a role school climate has, it is clear that school counselors have the power to help students guard against binge drinking.

Cooley, V. and Shen, J. (1997) Are Schools and Families Ready for School Learning: Reflections from a National Longitudinal Study. Educational Horizons 76(2):81-86.

This study focuses on the readiness of schools and families to meet complex needs of first grade students and factors that affect a school's ability to meet student needs. The investigation also explores the impact of geographic location and race on the first-graders' environment. Utilizing data from the Schools and Staffing Survey (1987-88, 1990-91, and 1993-94), this study shows that the severity of problems - including student absenteeism and tardiness, physical conflict among students, vandalism of school property, verbal abuse of teachers, robbery or theft, and possession of weapons - increased from 1987-88 to 1993-94. Although urban schools experienced a wider range of problems than suburban and rural schools, the severity of problems increased more in rural and suburban schools than in their urban counterparts. For minority students, with the exception of drug and alcohol abuse, the severity of problems intensified as the percentage of first-grade minority students enrolled in particular schools increased. Regarding the home environment, the severity of problems - including lack of parental involvement, parental alcoholism, drug abuse, and poverty - increased from 1990-91 to 1993-94. The results of the study suggest that children may be victims of an environment that perpetuates behavior and habits that diminish the effectiveness of the learning environment, with the consequence that these students are not ready for school. One solution to these problems of environment may be the creation of an educative community - a concept that calls for the coming together of family, school, and social agencies to maximize positive impact on students. Finally, educational equity must be achieved for students in urban areas and in schools where minority students comprise more than 50 percent of the student population.

Eide, E. Brewer, D. J., and Ehrenberg, R. G. (1998). Does It Pay to Attend an Elite Private College? Evidence on the Effects of Undergraduate College Quality on Graduate School Attendance. Economics of Education Review 17: 371-376.

Although recent research has shown increasing economic benefits for those who attend elite private colleges, the authors believe scholars may still understate the advantage because survey data is usually collected when many respondents are still in graduate school (or have just graduated). They argue that access to top graduate schools is in fact a large part of the mechanism whereby elite college diplomas translate into economic rewards. Using probit regression, the authors estimate the effect of elite college attendance on graduate school admission for three cohorts of students drawn from NLS:72 and High School and Beyond. They

find a consistent positive effect across cohorts, although the effect has become weaker over time. The authors attribute this weakening in part to increasing opportunities for elite college graduates to achieve high income without attending graduate school. Using multinomial logit regression, they also estimate the effect of elite college attendance on admission to graduate study at a major research institution (as opposed to a less prestigious school). They find a significant effect for cohorts who graduated from high school in 1972 and 1980, but not for the most recent (1982) cohort.

Eide, E. and Showalter, M. H. (1998a). The Effect of School Quality on Student Performance: A Quantile Regression Approach. Economics Letters 58: 345-350.

Noting that past research often finds no effects of school resources on student test scores, the authors suggest the problem may be that the most common statistical approaches focus on the average student. In other words, the standard methodology may miss what is crucial for policy purposes, namely, how school resources affect achievement differently at different points of the conditional test score distribution. Employing a technique known as quantile regression, the authors look at the effects of several measures of school quality on mathematics test score gain at five different points in the test score distribution. Data from the 10th grade sample of High School and Beyond are used. The authors find several effects that would not be apparent from simple regression. The school year's length has an effect at the top of the test score distribution, meaning that brighter students tend to benefit from a longer year. By contrast, per pupil expenditures are significant at the bottom of the distribution, meaning that increasing school spending mainly benefits low-achieving students. Finally, higher enrollment has a positive effect everywhere but at the very top (5%) of the distribution.

Eide, E. and Showalter, M. (1999). Factors Affecting the Transmission of Earnings Across Generations: A Quantile Regression Approach. Journal of Human Resources 34(2): 253-267.

Eide, E. and Showalter, M. (2000). A Note on the Rate of Intergenerational Convergence of Earnings. Journal of Population Economics 13: 159-162

How much mobility is there in the earnings distribution across generations? In other words, do the rich stay rich and the poor stay poor? These two closely related articles address these questions by examining correlations in earnings across generations, that is between fathers and sons. The first article estimates intergenerational earnings mobility models using quantile regressions and explores the role of education as an intergenerational transmission mechanism for earnings. Based on analyses of PSID and HS&B data, results indicate that fathers' income and education are important in explaining intergenerational linkages in earnings, but there still remains an unexplained family effect, particularly for those sons highest in the income distribution. Education seems to be relatively more valuable at the bottom of the conditional earnings distribution suggesting that increasing educational attainment for sons at the bottom of the earnings distribution would help to lessen earnings inequalities. The second article shows that when inferring how many generations it takes for a given family's earnings to revert to the population mean, it is important to take into account not only single-generation correlations in earnings but also the distribution of stochastic shocks across generations.

Elliott, M. (1998). School Finance and Opportunities to Learn: Does Money Well Spent Enhance Students Achievement? Sociology of Education 71(3): 223-245.

With widespread inequalities in schools' access to scarce financial resources, it has become important to understand the relationship between school finance and student achievement. Parents and educators often assume that more money translates into better schools and higher achievement, but there is considerable controversy among scholars over the size of the effects and the specific pathways by which financial resources translate into more effective schools. This study examines three related questions: Do educational expenditures affect students' achievement? How does access to learning opportunities affect math and science achievement? If funds are allocated to provide critical opportunities to learn, do students learn more? Using hierarchical linear modeling, this study specifically examined the direct effects of school expenditures on math and science achievement and the indirect effects of expenditures on achievement through schools' provision of learning opportunities. Results show that more money is spent in schools where teachers tend to be more educated and more experienced, classes tend to be smaller, and teachers put greater emphasis on higher order thinking in math rather than memorization of facts. In schools where less money is spent, however, classes tend to be larger and teachers are more likely to emphasize the relevance of math and science and to make greater use of calculators. These findings suggest that resources are most effective in promoting student achievement when they are used not only to hire greater numbers of more educated teachers but also to encourage teachers to use effective teaching strategies which emphasize higher order thinking and inquiry skills.

Fan, X. (2001). "Parental Involvement and Students' Academic Achievement: A Growth Modeling Analysis." The Journal of Experimental Education 70(1): 27-61.

The author looks at the relationship between parental involvement and children's academic success in high school. Data for his analyses come from the National Education Longitudinal Study of 1988 (NELS:88). These data were selected on the basis of its external validity, the multiple components within the data related to parental involvement, the large sample size which includes people of various ethnicities, and because NELS:88 includes both parent and student data. The author used exploratory analysis to identify the dimensions of parental involvement. A multivariate analysis of covariance (MANCOVA) was then used to detect any differences in parental involvement among the major ethnic groups. To assess the correlation between parent involvement and student academic growth, latent growth modeling analysis was used. Based on the analyses of these data, the author concludes that parental involvement has several relatively independent components. After being adjusted for socio-economic status, the reported degrees of parental involvement of the four major ethnic groups were comparable. Parents' educational aspirations for their children had the most significant effect on student growth. Finally, the effects, or lack thereof, of parental involvement on students' academic growth were consistent across groups.

Fan, X. and Chen, M. (2001). "Parental Involvement and Students' Academic Achievement: A Meta-Analysis." Educational Psychology Review 13(1): 1-22.

The authors conducted a meta-analysis to provide insights into issues related to parental involvement research. They felt that too many inconsistencies existed regarding the measurable positive effect of parental involvement on students' academic achievement or a lack thereof. The strength of the general relationship between measured parental involvement and students' academic achievement is examined. Study features that have a potentially moderating effect on the relationship between parental involvement and students' academic achievement are also examined.

Both ERIC and PSYCHLIT databases were searched using the following key words: achievement, academic achievement, parents, parental involvement. Only those articles relevant to the authors' topic and those which reported their own empirical findings were kept as being potentially usable for this meta-analysis. Twenty-five studies were found to be adequate for this analysis, and virtually all of these had a different definition for "parental involvement. Each effect size measure (i.e., the correlation coefficient between parental involvement and students' academic achievement) was coded according to seven study features: the study ID; sample size; the subjects' approximate average age; ethnicity of the subjects; type of measure for academic achievement; area of academic achievement; and parental involvement dimension.

Two types of meta-analysis were used in this study. The first was based on study features and included all correlation coefficients between parent involvement and students' achievement. The second was a study effects meta-analysis; in studies with multiple effect sizes, the numbers are averaged resulting in one measure, which is then used for analysis. General linear model (GLM) analysis was also used to assess the effect of each study feature on the correlation coefficients between parental involvement and students' academic achievement. The authors found that parental aspiration/expectation for children's education achievement has the strongest relationship with students' academic achievement. Parental home supervision was discovered to have the weakest correlation to students' academic success.

Figlio, D., and Stone, J. (In press). Are Private Schools Really Better? Research in Labor Economics.

The authors question whether private school attendance improves student outcomes. Earlier studies, most of which compared public and Catholic schools, found a strong, beneficial effect resulting from Catholic school attendance. However, this effect might result from selection bias; in other words, there may be unobserved differences between students who attend Catholic school and those who attend public school. This problem is typically addressed (if it is addressed at all) by using the student's religion as a proxy for the likelihood of choosing private school. Unfortunately, religion is a poor proxy because it is endogenous to the process that explains student achievement.

The authors propose an improved model where the likelihood of attending private school is proxied by a set of factors that discriminate between private and public school attendees but do not affect student achievement. Their model also extends past research by including non-religious private schools, as well as religious and public ones. The model is tested using data from NELS:88.

The results show that neither religious nor non-religious private schools have a significantly positive effect on either test scores or high school completion. However, African-

Americans who live in large cities fare better in private than in public schools in terms of test score improvements. Private schools, and particularly non-religious ones, also increase the probability of attending a selective college and the probability of staying in college.

Finn, J. and Gerber, S. (1998) Learning Document Skills at School and at Work. Journal of Adolescent and Adult Literacy 42(1): 2-15.

According to the U.S. Department of Education, in 1993 there were over 90 million functionally illiterate Americans. With advances in technology, the literacy demands of the workplace are rising. Assuming the trend continues, millions of Americans will not be able to find work, no matter what the occupation, because of their limited literacy skills. The authors of this paper ask two questions: whether the skills needed for work are actually taught in school and whether the workplace has become a primary teacher of necessary job skills. They theorize that, in fact, employers already play a major role in teaching necessary skill sets and thus in literacy training. The authors describe two different types of reading strategies: reading-to-do and reading-to-learn. The former describes reading as a means to accomplish a single, defined task. The latter, on the other hand, uses strategies to remember information read. Reading done within the school environment is typically reading-to-learn. The literacy required at the workplace is reading-to-do. Because the work environment requires understanding of a wide variety of print media and document types, far more than one has access to in school, one does not learn how to create or understand those types of documents until they are exposed to them. Using data from the Department of Education's National Adult Literacy Survey (NALS), the authors find that most adults learn particular literacy skills in the workplace. At the same time, though, they find that more schooling is, in fact, related to better performance on document-related tasks. Quite simply, the workplace is a provider of skills as much as it is a receiver of them. But, school does provide a significant amount of literacy required in the workplace.

Friedkin, N. and S. Thomas. (1997). Social Positions in Schooling. Sociology of Education 70(4):239-255.

This article develops the idea that a track is a type of social position in students' relations with particular teachers and course work over the course of their schooling careers. Based on analysis of students' profiles of course work obtained from High School and Beyond, the authors define eight curricular positions that involve distinctive combinations of high school course work. Using Hierarchical Linear Modeling, they report the effects of curricular positions on senior-year academic achievement. Results indicate that these curricular positions are associated with students' background characteristics (SES, gender, race) and attitudes (college plans and locus of control) and affect students' academic achievements during their senior year when controlling for the effects of background characteristics, tenth-grade achievement, and public or private school attendance. Results are consistent with reform efforts that seek to diminish the negative effects of status characteristics such as race and gender on academic achievement by changing the profile of students' course work. Efforts that encourage female, minority, and low-SES students to enter more academically rigorous programs, for example, lessen the negative effects of status characteristics on their achievement. Private school education offers no distinctive advantages over public school education for students who are in similar high-quality programs. Moreover,

students at public school who take the same science classes as those who attend private school show higher mean gains in performance. This research suggests that curricular positions as defined by distinctive combinations of coursework provide a better understanding of the effects of school organization on student performance than conventional measures of tracking.

Fuller, B., Eggers-Pierola, C., Holloway, S. D., Liang, X. and Rambaud, M. F. (1996). Rich Culture, Poor Markets: Why Do Latino Parents Forgo Preschooling? Teachers College Record 97(3): 400-418.

The authors examine data from the 1991 National Household Education Survey conducted by the National Center for Education Statistics to determine why Latino parents are less likely than parents from other ethnic groups to send their children to formal preschools. Among ethnic groups in the U.S., Latino parents disproportionately choose not to send their children to formal preschools. Comparative economic and demographic variables are considered, including family economy, social structure, and parental educational practices. The authors conclude that the inability of Latino families to purchase formal preschooling, the availability of a larger and more cohesive family structure, educational backgrounds, and Latino parenting practices help explain the disparity among Latino and other ethnic groups in preschool enrollment. These factors do not completely account for the aversion, however, as even when income, education, family structure, and parenting practices are accounted for, Latinos still select preschool at a lower rate than other groups. The authors study four Latina mothers for insight into the perspectives Latina mothers have on formal preschool programs. They find that the development of Spanish language skills and the ability to effectively communicate, a sense of personal connection with the child-care provider, and the social development of their children according to established norms of independence figure importantly into Latinas' assessment of their children's education. These features are seen to be lacking in American pre-schools. The authors conclude that Latina mothers are not particularly averse to formal preschool education, but rather are dissatisfied with the character of the pre-school options available to them.

Fuller, B. and Liang, X. (1996). Market Failure: Estimating Inequality in Preschool Availability. Educational Evaluation and Policy Analysis 18(1): 31-49.

Although it is often assumed that the supply of preschool and child-care organizations is insufficient to meet growing demand for preschool and child-care services, recent empirical findings suggest that preschool supply may be sufficient overall, given current family preferences and demand patterns. Using multivariate models to analyse U.S. Census data, the authors examine differences in per-child availability and identify economic and demographic factors that help account for these differences. Results of the analyses show that there are clear inequalities in availability associated with county wealth and demographic features. Counties with higher median income and greater concentrations of well-educated, professionally employed parents display more robust preschool markets. However, working-class and rural counties dominated by larger families display lower levels in the availability of preschools. The supply of preschools is shown to be consistently higher in communities with higher income supplements

from welfare, suggesting that gains in supply and subsidy of preschooling allow greater expression of demand by low-income families.

Georges, A. (2001). "The GED Certificate and the Poverty Status of Adult Women." Journal of Children and Poverty 7(1): 49-61.

The author asks whether having a General Educational Development (GED) certificate reduces the probability that a woman will ever be in poverty. The study also examines the probability of entering poverty for women with differing levels of education, as well as the probability of a poor woman exiting poverty. The analysis differentiates between high school dropouts, GED certificate holders, and high school graduates. Data for this study come from the National Longitudinal Study of Youth (NLSY). A discrete-time event history model is used to examine entry into poverty, and a similar model is used to examine poor women's exit out of poverty. A person-year data file is used to estimate the discrete-time model. Each participant has an individual record for each year until the event occurs or until the last year of the panel. The analysis of these data includes variables to account for changes in education, employment, decision to have an early birth, number of children born to the woman, marital status, local area unemployment rate, geographical region of residence, and the woman's age. These women are separated into categories based on their education level.

The findings from NLSY indicate that passing the GED test alone may not be an effective labor market intervention for high school dropouts. These women have a higher probability of entering into poverty than those individuals who graduated from high school. High school dropouts without a GED are even more likely to enter poverty than GED certificate holders and/or high school graduates. The study also reveals that women who enter poverty have a marginally better chance of exiting poverty if they have a GED. Likewise, a high school graduate has a significantly better chance of exiting poverty than a GED certificate holder or a high school dropout.

Goldhaber, D., Eide, E., Brewer, D. and Rees, D. (1999). Testing for Sample Selection in the Milwaukee School Choice Experiment. Economics of Education 18: 259-267.

A major question in school policy debates concerns the effect of school voucher programs on public and private school enrollments and their subsequent impact on student academic performance. Analyses of the Milwaukee Parent Choice Program (MPCP) data (sometimes referred to as the Milwaukee school choice experiment) have yielded inconsistent results. A number of researchers have attempted to address this problem by employing econometric methods to account for differences between students who have or have not chosen to participate in the MPCP. Despite the improvements over conventional ANOVA regressions afforded by invoking multigroup or selection equation techniques, few analyses have taken advantage of the experimental structure of the Milwaukee data. In the current study, the authors use selection equation techniques to compare public high school students who did or did not apply to the MPCP. The analysis demonstrates that in spite of salient differences between these two groups of students, students who applied to the program but enrolled in public schools because their private schools of choice were oversubscribed did not differ with respect to unobserved characteristics on tests of reading or math achievement. As a result, the findings of earlier

research on the effects of enrollment in the MPCP cannot be explained by unobserved differences between MPCP applicants who attended private schools and non-applicants who chose to remain in public schools.

Grogger, J. (1996). School Expenditures and Post-Schooling Earnings: Evidence from High School and Beyond. Review of Economics and Statistics 78(4): 628-37.

How the resources available to a school affect the post-schooling wages of its students is a key issue for education research on school finance. However, research conducted over the past two decades, while showing that there is an effect, has produced mixed conclusions regarding the magnitude of this effect. Studies based on state-level data generally report large effects of school quality on subsequent wages; studies based on less aggregated measures tend to report small effects. Using wage data from High School and Beyond and NCES per-pupil expenditure data, this paper analyzes the extent to which measurement errors are the source of this discrepancy and estimates the effect of school expenditures on the entry-level post-schooling earnings of workers who attended public schools. Results of regression analyses show that the discrepancies reported in the literature are largely due to failure to fully account for differences in family background, state effects, and measurement errors. When these factors are considered, the analyses reveal that school spending does affect post-schooling earnings but not by much.

Grogger, J. (1996). Does School Quality Explain the Recent Black/White Wage Trend? Journal of Labor Economics 14(2): 231-253.

Historically there have been large differences in the wages earned by whites and blacks in comparable jobs. However, between 1940 and 1980, the black/white wage differential narrowed considerably. The author tried to determine whether the marked slowdown in the wage convergence since around 1980 has anything to do with educational quality. He is motivated by what he sees as a major contradiction in the literature on this topic. Juhn, Murphy, and Pierce (1991) report that differences in the quality of schools could explain about half of the recent slowdown (the other half being seen by them as a result of lower educational attainment by blacks along with the 1980 s trend of returning to school), while Boozer, Krueger, and Wolkon (1992) conclude that school quality is unlikely to explain the recent break in the black/white wage convergence trend. Both of these claims are based on indirect evidence, a gap which this research attempts to fill. Data from NLS:72 and HSB provide earnings information for two separate groups of recent high school graduates the Class of 1972 the Class of 1982 . These data sets also provide information about school quality (e.g., pupil/teacher ratio, length of the school year, teacher education, school size, and racial segregation) and students background characteristics. The author finds that by the early 1970 s, there was no longer any significant difference in the average quality of education being received by blacks and whites, and concludes that the recent black/white wage trend cannot be adequately explained by differences in school quality.

Grogger, J. (1997). Local Violence and Educational Attainment. Journal of Human Resources 32: 659-82.

The author addresses the question of whether a violent school climate affects the educational outcomes of all students, and not just those who actually commit violence. Using data from *High School and Beyond*, he constructs a school violence index reflecting principals' assessments of how severe three problems—student fighting, student-teacher conflict, and weapons possession—are in their schools. Defined in this way, violence is more prevalent in public than private schools, and the impact of violence falls disproportionately on Hispanic and African-American students.

Using probit regression, Grogger explores the effect of violence on several educational outcomes while controlling for confounding factors such as the student's violence-proneness, race, and family background, as well as a variety of school characteristics. Even with these controls, school violence has an effect on educational attainment. Compared to the least violent schools, moderate levels of violence reduce the likelihood of graduation by 5.1 percent on average, and lower the likelihood of college attendance by 6.9 percent. If school violence were cut in half, college attendance rates would rise by 5 percent.

Grogger, J. and Eide, E. (1995). Changes in College Skills and the Rise in the College Wage Premium. Journal of Human Resources 30(2): 280-310.

Between 1979 and the late 1980s, the difference in mean wages between male college graduates and male high school graduates increased dramatically. This study examines how much of this change was due to changes in the skill level of the typical college graduate. Focusing on the skills that students obtain while attending college, the study specifically analyzes the importance of changes in the distribution of college majors, and changes in major-specific wage premiums, in determining changes in the aggregate college wage premium among entry-level workers. Data from NLS-72 and HS&B, with comparison samples drawn from CPS, are used to estimate major-specific wage premiums earned in the late 1970s and changes in major-specific wage premiums during the early 1980s. These price data are then combined with data on the distribution of college majors to calculate the effect of changes in the major distribution on changes in the aggregate wage premium and in the male-female wage gap among college-educated workers. Results indicate that changes in skills acquired during precollegiate education had nothing to do with changes in the college wage premium for men, but for women the returns to mathematics ability increased by so much during the early 1980s that estimates of the rise in the college wage premium that fail to account for math ability may overstate the increase in the value of a college education by a factor of two. Changes in the skills acquired during college played an important role in rising college wage premiums for men. Changes in major distribution during the 1980s when students switched from low-skill to high-skill fields of study account for almost 25 percent of the change in the aggregate wage premium for men. A substantial portion of the change in the college wage premium reflects, therefore, not only that college degrees have become more valuable, but that students are obtaining more valuable degrees.

Hallinan, M. T. (1996). Track Mobility in Secondary School. Social Forces 74(3): 983-1002. Tracking is a commonly used practice in American secondary schools but is often criticized.

because it is seen as pigeonholing students into set levels of ability without ever providing them with the opportunity to move up (down is less of an issue here). In the current study, the author uses data from a longitudinal survey of tracking in middle schools, begun in 1986, to test this commonly held belief. Questions addressed by the study include: (1) When do track changes take place, if they do at all? (2) Who changes tracks, and in what direction? And (3) does tracking lead to track homogeneity, as one would assume it is intended to do? In answering these questions, the author also attempts to describe a general conceptual model for tracking as it exists in American secondary schools. She concludes that a fitting model would be a combination of the contest mobility model and the optimization process i.e., students move both up and down, although mostly up. This process occurs with the participation of the students, and as their preferences in course selection are taken into account, there are compromises made by both students and school officials. The author finds that there is a great deal more track mobility than is commonly believed, that these changes take place in every year of high school, and that background characteristics (gender, race, income) can have a large influence on the direction of change.

Hallinan, M. T. and Kubitschek, W. N. (1999). Curriculum Differentiation and High School Achievement Social Psychology of Education 3: 41-62.

The authors of this study examined the relationship between curriculum differentiation and growth in student achievement in high school using two data sets with two different measures of curricular differentiation tracks and ability groups. Tracks are distinct instructional programs for students; a typical structure includes Academic, General, and Vocational tracks. Students may also be broken down into units based on their academic ability, called ability groups. A common structure of these groups may include Advanced, Honors, Regular, and Basic groups.

Data from the National Education Longitudinal Study (NELS) were used to analyze the effects of track location on growth in achievement. The effects of ability group level on growth in achievement were also studied employing longitudinal data from the Ability Grouping Project. The authors estimated statistical models that provided a conservative test of the effects of curriculum differentiation on achievement; after eliminating all effects that could be attributed to confounds, they were left with residual effects that could be attributed solely to track or ability group assignment.

The authors found that students in the higher tracks or groups benefitted from a differentiated curriculum, while those in the lower tracks or groups did not. They suggest that closer attention be paid to how instructional, interpersonal, and institutional influences operate across track and ability groups in order to determine how to reduce the negative effects of grouping.

Hamilton, L. S. (1998). Gender Differences on High School Science Achievement Tests: Do Format and Content Matter? Educational Evaluation and Policy Analysis 20: 179-195.

In this article, the author explores gender differences in high school science achievement test scores and asks if they might result less from differences in ability or teaching methods than from the format and content of the exams themselves. Data for her analyses come from multiple

choice tests administered to 12th graders as part of the High School Effectiveness Study. The questions that make up the exams are broken down into type and studied in relation to students characteristics and experiences. Student characteristics include socioeconomic background as well as gender and ethnicity. Students experiences include exposure to various teaching practices, hours of television watched, and course-taking patterns, among other things. For questions that deal with items learned explicitly within the classroom, there were few gender differences. The author finds that the major factor in the size and source of the gender differences lies in the test construction, in the content and format, along with the type of reasoning and sources of knowledge involved in student responses. The author concludes that future test construction would benefit from the exclusion of questions that rely heavily on knowledge gained outside of the classroom and that show large-group differences. Test developers and users need to engage in careful validity investigations so they understand what tests actually measure, and specific item types that make up a test.

Hamilton, L. S. (1999). Detecting Gender-based Differential Item Functioning on a Constructed-response Science Test. Applied Measurement in Education 12: 211-235.

Using data from a science test administered to 12th graders as part of the High School Effectiveness Study, the author finds that one item in particular displayed a large male advantage and contributed to the gender differences on the total scores. The author also examined differential item functioning for the constructed-response items, finding that male and female students who were matched on several multiple choice items displayed unequal probabilities of success on a constructed-response item. Efforts to explain differences in differential item functioning were obtained using cumulative logit analysis and analyses of categorical subscores, suggesting that efforts to explain differential item functioning should not be determined solely on inspection of item content.

Results from constructed-response items were similar to those obtained from multiple-choice tests. However, gender differences were largest on items that involved visualization and knowledge obtained outside of the classroom. Combining interview and test results, it appears that male and female differences in item scores are directly attributable to knowledge learned outside of school by males rather than gender differences in visual or spatial reasoning. Constructed-response items do not necessarily reduce the male advantage in science and may in fact increase it. The magnitude of gender difference is also affected by the content and reasoning requirement of the test items and is subject to change depending on the items in the test. Conclusions concerning gender differences on tests need to be informed by careful study of the achievement measure and the items it comprises.

Huang, G. G. and Weng, S. S. (1998). Minority Post-secondary Education Attendance, High School Desegregation, and Student Characteristics. Race, Ethnicity, and Education 1(2): 241-265.

Previous research on racial educational inequality has focused on the question of whether school desegregation benefits minority students without considering students particular backgrounds. In this study the authors investigate the combined effects of particular student characteristics and school integration on postsecondary outcomes. The authors hypothesize that

the effects of desegregated schooling on postsecondary educational attainment (vocational training, community college, and 4-year college) will not be uniform but will vary on the individual level depending on racial or ethnic identities, socioeconomic status, or placement in particular curriculum programs. The authors further hypothesize that postsecondary educational attainment will vary on the school level with the average socioeconomic background, racial composition of the school, and academic program provision. Employing data from *High School and Beyond*, the authors found that, contrary to expectation, high school desegregation does not significantly affect postsecondary attendance rates. Further, racial desegregation in high school did not raise a student's chance of attending postsecondary school, and in fact, mildly lowered postsecondary minority attendance. On an individual level, however, sustained enrollment in desegregated schools prior to high school did raise a minority student's chances of attending postsecondary school. In addition, minority students placed in inferior curricular programs in desegregated schools were less likely to attend postsecondary school than minority students placed in similar programs in segregated minority schools.

Huang, G. G., Weng, S. and Cohen, M. P. (1997). Outmigration Among Rural High School Graduates: The Effect of Academic and Vocational Programs. Education Evaluation and Policy Analysis 19(4): 360-72.

The problems of rural communities in America have often been blamed on the out-migration of its youth, and thus on the type of schooling these children are given. Emphasis on either vocational/technical or liberal/academic programs has been vilified as leading rural high school students to urban centers and away from their towns. Many have claimed that emphasis on vocational programs in rural public schools gives high school students the labor skills necessary for successful migration to large cities. They claim that liberal arts/academic programs teach students the importance of contributing to the community, thus encouraging them to remain committed to the locales in which they were raised. Both of these types of school programs have also, in turn, been held up as the solution to the rural brain drain, through teaching skills necessary to aid in the betterment of the community. In this study, Huang et al. move beyond previous research on this topic by differentiating between the effects of overall school programs and the coursework completed by individual students. Using data from *High School and Beyond*, they look at the ways in which the types of programs rural high school students participate in predict post-high school mobility patterns, controlling for student background (parents' education, ethnic background, etc.) as well as community context.

Hurtado, S., Inkelas, K. K., Briggs, C., and Rhee, B. S. (1997). Differences in College Access and Choice Among Racial/Ethnic Groups: Identifying Continuing Barriers. Research in Higher Education 38(1): 43-75.

Employing a theoretical model articulated by Hossler and Gallagher (1987), the authors draw on data from NELS and the Beginning Postsecondary Student Longitudinal Study (1990/92) to evaluate college application behaviors across racial and ethnic groups as indicators of students' access, choice of college, and educational opportunity. They found significant differences among racial groups in preparation for college, college application behavior, and the chances of attending a first choice school. Numerous analyses are presented on the varied effects racial and

ethnic group and background characteristics (income, parental income education, and academic ability) have on the number of applications submitted and attendance at a first choice school. The authors conclude that it is necessary to develop more precise models of the early phases of the college application process in order to understand the vast differences in student preparation for college among racial groups.

Ingersoll, R. M. (1996). Teachers Decision-Making Power and School Conflict. Sociology of Education 69: 159-176.

A primary focus of education research has been the distribution and effects of the power structure in school systems. Of increasing interest is the question of who should have the power to control school decisions. The basic argument is over the benefits and drawbacks to centralization and decentralization of power. The author poses a slight variation upon this question: Does the amount of decision-making power that a teacher wields determine how well a school functions? In other words, within a given school environment, does the amount or type of power that teachers have over core educational activities at their school, affect the overall well being of that school? The analysis focuses upon one aspect of school performance, in particular the degree of conflict among teachers, students, and administrators. Using data from the Schools and Staffing Survey (SASS), conducted by the National Center for Educational Statistics (NCES), Ingersoll demonstrates that the amount of power held by teachers does, in fact, contribute to how well a school functions, depending upon the areas over which teacher have influence or autonomy. Specifically, the findings suggests that increased teacher autonomy and influence over areas related to sorting and socializing students have positive effects on school functioning.

Kaplan, D. and Elliott, P. R. (1997). A Didactic Example of Multilevel Structural Equation Modeling Applicable to the Study of Organizations. Structural Equation Modeling: A Multidisciplinary Journal 4: 1-24.

Results provide a didactic presentation and application of new developments in structural equation modeling (SEM) that allow for modeling of multilevel data. The method described here is a multilevel path analysis model wherein within-group level parameters are modeled as a function of between-group variables following their own path model. Students within schools that exhibit higher levels of academic press have, on average, higher science achievement scores. This type of analysis is particularly useful for gauging the extent to which the properties of measurement instruments/construct validity show substantial between-group variation. A limitation of multilevel SEM involves the interpretation of cross-level effects. That is, since the intercepts and not usual mean values are being analyzed, how the independent variables are centered has profound implications for the interpretation of the results.

Kaplan, D. and Elliott, P. (In press). Multilevel Structural Equation Modeling for Organizational Studies: The Case of Education. Advances in Research Methods and Analysis for Organizational Studies.

Multilevel structural equation modeling was used with NELS science data to demonstrate the potential of this approach. Slightly higher levels of academic press are predicted for schools where ability grouping is used. Whether the teacher has a bachelor s degree in science, versus

not having one, does not change the predicted value of science achievement or the determinants within the model. However, when grouping, teacher degree, and time on science are all introduced into the model there are different effects. Science achievement seems to increase slightly when there is not ability grouping, teachers have bachelor s degrees in science, and there is an increase in the total time spent on science.

Kaplan, D. and George, R. (1998). Evaluating Latent Variable Growth Models Through Ex post Stimulation. Journal of Educational and Behavioral Statistics 23(3): 216-235.

Using ex post (historical) simulation statistics as a means of evaluating latent variable growth models, the authors examine growth in science achievement. Such methods of evaluating temporal models were developed in applied economic forecasting and have been used for some time. In this paper, inequality coefficient, bias proportion, variance proportion, and covariance proportion are used to assess the simulation adequacy of growth models. Parent push and teacher push are found to predict growth using both ex post simulations and standard statistics. For forecasting future values, in this case science achievement, ex post simulations are shown to provide important information that improves the quality of the model. Simulation models are not intended to replace existing measures of model fit, but it is suggested that they be used in conjunction with other standard methods.

Kifer, E. (1997). Why I Like Test Scores and What They Tell Me About Curriculum. Journal of Curriculum Studies 29(6): 627-635.

This is an Op-Ed piece that suggests that test scores can be used to make inferences about the efficacy of the curriculum. In the past, testing emphasized coherence among goals, curricular experiences, and testing outcomes. A premium was placed on testing what was taught. Using SIMS and NAEP data, this article presents exploratory data analysis and visual displays that provide some evidence regarding the content of the elementary school curriculum and how it has changed over a ten year period. Results suggest that what is learned by students in international studies is more likely to be newly introduced content (algebra and geometry) where a solution requires little more than rote calculation. When comparing scores across countries it appears that the scores are more a curriculum coverage comparison than a knowledge one. And finally, changes in NAEP scores over time seem to be related to changes in the curriculum, with 8th grade mathematics scores being more closely related to each other across states than with 4th grade scores within states.

Kubitschek, W. N. and Hallinan, M. T. (1998). Tracking and Students Friendships. Social Psychology Quarterly 61(1):1-15.

It would seem that aside from academic achievement, there are other effects that school administrators might take into account when considering the widespread policy of tracking. Using data from High School and Beyond, the authors find that tracking has an independent effect on friendship choices. When previous association, similarities, and relationships are controlled for, tracking still has the effect of encouraging friendships among like-tracked students. Propinquity, similarity, and status, which are associated with tracking placement, contribute to the creation of friendships. The authors note that these results are not unique to

tracking it would seem that similar consequences would result from other student groupings. For example, students on the same varsity sports team or in the same debate club are just as likely to form friendships as those who spend the year in the same honors calculus class. This finding may prove to be useful to educational policymakers and school administrators by providing further insight into the effects of student grouping.

Lee, J. (1998). State Policy Correlates of the Achievement Gap Among Racial and Social Groups. Studies in Educational Evaluation 24(2): 137-152.

The author of this article examines the learning gap, as it exists between racial and social groups, and the effects of policies aimed at reducing it. Using data from the 1992 NAEP Trial State Assessment, the author conducts state-level analyses. Specifically, four dimensions of the learning gap are referenced: the within-school racial gap, the within-school social gap, the between-school racial gap, and the between-school social gap. The first two focus upon differences in mathematics achievement between white and minority students and students of different socioeconomic background in the same school. The later two dimensions concentrate upon the same topics, but the comparison is made between schools. Results of the analysis indicate that states have difficulty both improving student achievement and narrowing the racial gap when students are in higher grade levels. At the same time, there is little difference between high and low performing states with regard to the social achievement gap, indicating that it is difficult for all states to maintain a high level of achievement across social groups. In fact, even states that were active in raising standards for students and teachers in the 1980s have difficulty narrowing the differences as students age.

Lee, V. E. and Loeb, S. (1995). Where Do Head Start Attendees End Up? One Reason Why Preschool Effects Fade Out. Educational Evaluation and Policy Analysis 17:62-82.

Researchers have found that while Head Start has positive short-term effects on children's achievement, the long-term benefit is minimal. Why is this the case? The authors believe an important part of the answer is the quality of the schools Head Start graduates subsequently attend. Taking data from eighth graders who were part of NELS:88, the authors use analysis of covariance (ANCOVA) to compare the quality of the middle-grade schools 8th graders who attended Head Start as preschoolers and others experience. After taking into account the background characteristics that would have qualified students for Head Start, they find that the graduates of Head Start are significantly more likely than statistically equivalent graduates of other preschool programs and non-pre-school attendees to attend middle-grade schools that rank poorly along three out of five dimensions of school quality (school average SES, school average achievement, and school safety). In terms of academic climate, Head Start attendees' middle schools are worse than those of the other pre-school group, while in terms of student-teacher relations, their schools are worse than those of the no pre-school group. The authors conclude that the lack of compensatory education beyond preschool is too much for Head Start alone to overcome, and that the program should not be held accountable for long-term effects for that reason.

Lee, V. E. and Smith, J. B. (1997). High School Size: Which Works Best and for Whom? Educational Evaluation and Policy Analysis 19:205-227.

Past research on school size has shown that students learn more in smaller high schools and that learning is also more equitable in smaller school settings. Suggesting that there are diminishing returns to smallness, the authors attempt to determine optimal high school size. They use data from the first three waves of NELS:88, which allows them to follow eighth grade students through to twelfth grade. Utilizing hierarchical linear modeling, they test for the effects of differing school sizes on gains in test scores in two subjects: reading and math. Overall, the authors find that the best high school size is 600-900 students. Schools of this size produce the highest overall achievement gains. The effects of optimal size are especially dramatic for schools in which the student body has a low average SES, and in schools whose students are predominantly minorities. On the other hand, equity (defined as the relationship between learning and student socioeconomic status) has an inverse relationship to school size; the most equitable schools are the smallest. In closing, the authors caution that size probably does not have a direct effect on student outcomes. It is more likely that size influences achievement through its effects on the curriculum, school social relations, and extracurricular participation.

Lindauer, I. E. and Queitzsch, M. L. (1996). A Profile of Public School Biology Teachers in the USA. The American Biology Teacher 58(1): 20-33.

This article provides a descriptive profile of biology teachers in grades 7-12. A primary goal of the study is to assess how well-prepared these teachers are in the physical and life sciences. The primary source of data for the study is the U.S. Department of Education's Schools and Staffing Survey. The authors provide descriptive statistics on age, race, and gender, percentage of those holding bachelor's and master's degrees, and number of undergraduate and graduate courses taken in biology and other science-related fields. Among the study's findings: 63% of high school biology teachers are 41 years of age or older; a high percentage of teachers of physics and chemistry are also 41 years of age or older, suggesting that there is an aging population of science teachers in the U.S. Over 90% of biology teachers in the U.S. are white. The proportion of male and female teachers of biology is approximately equal in 7th and 8th grades, but in 9th through 12th grades more than 60% of biology teachers are male. A high proportion of junior high and high school biology teachers have obtained bachelor's degrees in biology or other science-related fields. Over 50 percent of junior high and high school biology teachers also hold master's degrees, but the fields in which they completed their degrees vary widely.

Ma, X. (1997). Reciprocal Relationships between Attitude toward Mathematics and Achievement in Mathematics. Journal of Educational Research 90(4).

The relationship between attitudes toward mathematics (ATM) and achievement in mathematics (AIM) has long been assumed, but infrequently addressed empirically by taking into account reciprocal causal relationships between attitudes and outcomes. Using structural equation methods and data from a 1988-89 study of 1,200 high school seniors in the Dominican Republic, the relationships between ATM and AIM are examined to determine the salience of loop enhancement effects between student attitudes and performance. The results suggest that

modeling approaches which fail to take into account the reciprocal relationship between attitudes and achievement overstate the correlation between student-perceived importance of mathematics and student enjoyment of mathematics and math achievement. They also point to important differences between students' social background and attitudinal and achievement effects. Both the aforementioned reciprocal and social background effects were found to be consistent across topical areas in mathematics (algebra, geometry, and trigonometry). Relevant comparisons with prior findings from U.S. data are noted as well.

Ma, X. and Kishor, N. (1997). Assessing the Relationship between Attitude toward Mathematics and Achievement in Mathematics: A Meta-analysis. Journal for Research in Mathematics Education 28: 26-47.

Noting that there has been very little quantitative integration of research on the relationship between attitudes toward mathematics (ATM) and achievement in the mathematics (AIM), and that research results have been far from uniform, the authors undertake a meta-analysis of studies that have examined this relationship at the elementary and secondary school levels. In addition to considering factors (such as gender and ethnicity) that might influence the ATM-AIM relationship, the authors assess the effects of sample selection (random or not) and sample size on this relationship. They also investigate the historical change or distribution of the ATM-AIM relationship that may reflect the influence of major events in mathematics education on the academic and attitudinal outcomes of students. Specific questions addressed by the study are: (1) What is the magnitude of the general relationship between ATM and AIM?; (2) Is this relationship consistent across gender, grade, ethnicity, sample selection, sample size, and the time period covered by the review?; (3) How is this relationship affected by the interaction effects among gender, race, and ethnicity?; and (4) What is the magnitude of the causal relationship between ATM and AIM?

In all, 113 studies were selected for analysis. A study was considered appropriate for inclusion if it met the following criteria: (1) It had a definition of ATM similar to the one used by the authors (who extend Neale's [1969] definition to include students' affective responses to mathematics as being easy/difficult as well as important/unimportant); (2) it investigated the relationship between ATM-AIM; (3) it measured ATM and AIM using psychometrically-developed instruments; (4) it did not include any experimental interventions on either attitude or achievement; (5) it contained students at the elementary and/or secondary school level; and (6) it reported quantitative data in sufficient detail for calculation of an effect size. The dependent variable for this meta-analysis was effect size, estimated with Pearson product-moment r ; independent variables included sample size; sample selection; causal direction (specified or not); gender; grade; and ethnicity.

Findings include the following: The relationship between ATM and AIM is similar for males and females; the ATM-AIM relationship declines through the grades; there appeared to be no relationship between ATM and AIM for white students, but the relationship was positive for both Asians and blacks; research designs using random samples were more powerful in detecting the relationship between ATM and AIM; there was no reliable evidence that interactions among gender, grade, and ethnicity affected the magnitude of the relationship between ATM and AIM. The study's overall finding was that the relationship between attitudes

toward mathematics and achievement in mathematics was slightly significant but not strong. On the basis their review of the literature, the authors identify several areas for future research, including: the need to take into account the ability levels of students (the majority of studies did not perform separate analyses of students of different mathematical abilities); the need for analyses by grade level and ethnic group in order to detect grade trends and cultural influences; and the need for multi-level analyses of the ATM-AIM relationship, using methods such as HLM.

Marsh, H. (In press). Evaluation of Self-rating Scales in Specific School Subjects from the National Educational Longitudinal Study of 1988: An Application of Confirmatory Factor Analysis. American Educational Research Journal.

Confirmatory factor analysis models of intrinsic motivation, extrinsic motivation, and anxiety in mathematics, science, social studies, and English show that the affect scores for each school subject on the NELS survey were contaminated so that simple scale scores are not appropriate. Employing multitrait-multimethod models, the authors found that students were able to differentiate their attitudes in relation to different school subjects. Attitudes toward mathematics, science, English, and social studies were validated in relation to standardized test scores and school grades for each of these subjects. The recommendation is made that more comprehensive, state-of-the-art designs be used for constructing survey items for large-scale studies.

Marsh, H. (1996). Positive and Negative Global Self-esteem: A Substantively Meaningful Distinction or Artifacts? Journal of Personality and Social Psychology 70(4): 810-19.

Results of confirmatory factor analysis on the seven item global measure of self esteem from the base year and first follow-up of NELS show the existence of a single latent construct instead of two separate items. Negatively worded items are problematic especially for students with reading difficulties. If surveys use negatively worded items, it is suggested that investigators employ confirmatory factor analysis to evaluate the psychometric properties of responses to the rating scales. Findings indicate that the positively worded items should be given more weight in the computation of a global self-esteem score. Using positive and negative items in follow-up administrations can inflate the correlations between measures of the same construct over time.

Marsh, H. W., and Yeung, A. S. (1996). The Distinctiveness of Affect in Specific School Subjects: An Application of Confirmatory Factor Analysis with the National Educational Longitudinal Study of 1988. American Educational Research Journal 33(3): 665-689.

The authors ask whether three dimensions of academic affect (anxiety, looking forward to the class, and future relevance) are subject-specific or similar for all subjects. (Subject-specific means that the level of affect varies between math and English, for example.) To investigate this question, they utilize data from the NELS:88 eighth grade sample. They employ sophisticated methods, namely confirmatory factor analysis (CFA) models of multitrait-multimethod (MTMM) data. The findings suggest that affect is strongly subject-specific. Indeed, affect varies across subjects quite a bit more than different dimensions of affect vary from one another. There is a matching pattern for academic achievement; test scores in a given subject are more highly

correlated with affect in that subject than with affect in other subjects. However, students test scores in different subject areas are more consistent from one subject to another than affect is.

Morgan, R. P., Kruytbosch, C., and Kannankutty, N. (2001). "Patenting and Invention Activity of U.S. Scientists and Engineers in the Academic Sector: Comparisons with Industry." Journal of Technology Transfer 26: 173-183.

The authors of this article look at data from workforce surveys distributed by the National Science Foundation to chart the patenting and licensing tendencies of scientists and engineers in academic institution versus industry. The dataset includes demographic information as well as employment and education history. Of 204,700 scientists and engineers who filled out the survey, 8.0% listed themselves as inventors holding at least one patent within the previous five years. The patent activity rates for the Education Sector and Industry Sector were 4.6% and 10.0%, respectively. Of those with patent activity in the Education Sector, 69.2% have doctorate degrees. In the Industry Sector, on the other hand, 26.2% were working with only a master s degree; another 44.6% reported having only earned a bachelor s degree. Other interesting findings: though females account for 25% of the doctorates in education, they only comprised about 11% of the patent activity share; the rate of patent activity for United States citizens was slightly lower than for non-citizens; and although patent activity normally decreases with age, in the education sector there is no such decline.

Morgan, S. L. and Sørensen, A. B. (1999). Parental Networks, Social Closure, and Mathematics Learning: A Test of Coleman s Social Capital Explanation of School Effects. American Sociological Review 64:661-681.

James Coleman and his colleagues first reported that Catholic school students learn more than similar public high school students despite Catholic schools low spending per pupil. They believed the reason was an abundance of social capital in Catholic school communities in the form of church norms, intergenerational social closure, or both. Since social closure can exist in public school communities as well, the authors test its effect on learning in both sectors. They utilize data from the base year and first two follow-ups of NELS in order to estimate random-effects of covariance models with both student-level and school-level characteristics and disturbance terms. Their models attempt to explain variance in math achievement test gains between the tenth and twelfth grades.

The authors find that when relevant individual and school-level variables are controlled, a composite measure of social closure among students and their parents does not explain variation in mathematics learning. Nor does social closure explain the positive effect that Catholic school attendance exerts upon learning.

Next, the authors break down social closure into its two components: students friendships with other students, and parents relationships with their children s friends parents. These two variables turn out to work in opposite directions. When students friends attend the same school as they do, math learning is increased; when parents know their children s friends parents, learning is reduced. However, social closure among parents only reduces learning in public schools; the evidence suggests it may promote math achievement in Catholic schools.

Based on these results, the authors conclude that horizon-expanding public schools, where student and parent networks include access to people outside the community, promote more learning than norm-enforcing schools, where student and parent contacts are mainly centered around the school. It is also suggested that the source of the Catholic school effect may lie in differences in course taking, combined with the norms of the church.

Morgan, S. L. (2001). Counterfactuals, Causal Effect Heterogeneity, and the Catholic School Effect on Learning. Sociology of Education 74: 341-374.

Coleman and his colleagues first discovered that Catholic school students seem to learn more than their public school counterparts. In this article, the author discusses difficulties with using standard regression techniques to estimate the size of the Catholic school effect. Propensity-score matching is offered as a complementary estimation strategy. Using data from NELS:88, he employs propensity-score matching to estimate the Catholic school effect on students who typically choose to attend Catholic schools. The basic idea is to match Catholic school students with public school students with a similar propensity to attend Catholic school, and then compare their test scores. His lower bound estimates of the Catholic school effect are as large as the regression estimates, and the upper bound estimates are considerably larger. An important finding is that the students who realize the largest benefit are those least likely to be attending a Catholic school. These students are disproportionately minorities from low-SES families. The author warns against drawing too many policy implications from existing work on the Catholic school effect. Even using propensity-score matching, it is not possible to accurately estimate the benefit to public school students of attending Catholic schools. Nor can we tell how Catholic school students' learning would be affected by a massive influx of public school students.

Morgan, S. (2001). Counterfactuals, Causal Effect Heterogeneity, and the Catholic School Effect on Learning. Sociology of Education 74: 341-374.

Attempts to infer causal effects from conventional surveys are inherently limited by the observational nature of their data. Propensity matching methods offer a means of approximating the causal ideal implicit in most social science writing and modeling. Using these methods and data from the National Longitudinal Study of 1988 (NELS:88), the author reexamines the Catholic school effect noted by Coleman and Hoffer (1982), Chubb and Moe (1990), Bryk et. al. (1993), and others by estimating the Catholic school differential for high school math and reading achievement. The results suggest that students who are least likely to be enrolled in Catholic schools are actually the most likely to benefit from attending these schools, although the author does not provide a statistical means of selecting from several underlying interpretations of such effects. The limitations of propensity matching models and the underlying counterfactual framework are also addressed, particularly with respect to sociological research and more general paradigms on learning and education.

Muller, C., and Ellison, C. G. (2001) Religious Involvement, Social Capital, and Adolescents Academic Progress: Evidence from the National Education Longitudinal Study of 1988." Sociological Focus 34(2): 155-183.

This study examines three questions concerning the links between religious involvement, social capital, and academic achievement of public school students using data from the second and third waves of NELS: (1) What are the relationships between adolescents' religious involvement and their access to social capital within families (parental expectations and parent-child interaction) and communities (intergenerational closure and peers' academic values)? (2) Is adolescent religious involvement associated with academic progress, including self-concept, attitudes (educational expectations), effort (time spent on homework and truancy), opportunities and demands (advanced mathematics course work), and rewards (high school graduation)? And (3) to what extent are the positive relationships between religious involvement and academic progress due to enhanced access to social capital? The study finds that adolescents' religious involvement at grade 10 is consistently and positively associated with various forms of social capital, including parental expectations and parent-child interaction, intergenerational closure, and relations with academically oriented peers. Religious involvement during grade 10 may play a role in the current and future availability of twelfth-graders' community social capital; it has a moderate and positive association with locus of control; it is associated with teens' higher educational expectations, more time spent on homework, and lower levels of truancy. Those estimated effects of religious involvement on academic progress are explained largely by family and community social capital. However, religious involvement remains modestly but significantly linked with desirable outcomes even controlling on the effects of social capital.

Muller, P., Kinzie, J., and Stage, F. K. (In press). Science Achievement Growth Trajectories: Understanding Factors Related to Gender and Racial-Ethnic Differences in Precollege Science Achievement. American Educational Research Journal.

Using a sample drawn from the first three waves of the National Education Longitudinal Study of 1988 and hierarchical linear modeling, the authors of this paper study racial-ethnic and gender differences in precollege student growth trajectories for science achievement. The available multi-wave data makes the examination of educational growth predictors possible. Precollege education provides a onetime exposure to the variety of sciences. The precollege learning experience thus determines, to a greater or lesser degree, who will in time choose science as a career. Faced with an obvious under-representation of females, minorities, and people of low socioeconomic status (SES), the authors of this paper hoped to comprehend what happens in precollege education that results in later attrition of non-white or Asian American males. The results point to their often poor academic preparation prior to college. The quality of science courses correlates positively with science achievement. Gender differences in science achievement grow as students advance through high school. In fact, by age 17, the difference is at its largest. Asian American and white male students show higher science achievement scores and disproportionately greater overall gains of knowledge in the field. Racial/ethnic differences with regard to science achievement are evident much earlier than gender differences. The differences also tend to be much greater. SES and achievement are linked; they vary directly with each other. People with higher SES generally gain more growth in science achievement. In fact, lower SES students show smaller and smaller growth over time, resulting in a widening of

the gap. Finally, the authors focused upon the concept of locus of control. Though mostly influential before high school matriculation, locus of control was strongly and positively related to achievement status. Students with higher internal locus-of-control achieved more than those with a lower internal or a high external locus-of-control.

Niemi, R. G., Hepburn, M. and Chapman, C. (2001). Community Service for High School Students: A Cure for Civic Ills? Political Behavior 22(1):45-69.

Some critics argue that America has entered a crisis period with respect to civic participation. According to several researchers, young adults are especially indifferent, distrustful, and politically disengaged, suggesting that there may be even greater attrition in civic involvement in the future. Involving high school students and young adults in public service has been high on the list of recommendations for responding to this situation. Until recently, however, there have been few reports about the extent of community service, and even fewer appraisals of what students learn from such service. Using data from the National Household Education Survey (1996), the authors examine the extent and effects of community participation by American high school students. They look first at overall levels of participation and, using logistic regression analysis, examine the ways in which participation rates relate to the characteristics of the students themselves, their families, and their schools. Using multivariate regression techniques, they then consider whether participation is linked to greater political knowledge, attention to news, participation skills, and efficacy. Results of the study indicate that half to two-thirds of high school students participate in community service in any given year. However, the amount of participation is minimal; the overwhelming majority of students participate once or twice or a few hours total. Students who were less active in community service received lower grades, and their parents were less likely to be involved in community service. When community service was regular and sustained, students more often absorbed the lessons related to community service such as greater political knowledge, more attention to politics, enhanced participation skills, and higher political efficacy. The authors conclude that while it has considerable potential, community service as practiced among today's high school students is not a civic education cure-all.

Peng, So, Stage, and St. John (In press). The Use and Interpretation of Logistic Regression in Higher Education Journals: 1988-1999.

The authors reviewed three leading education journals from 1988 to 1999 and found 52 articles that used logistic regression techniques. Despite the popularity of logistic regression in recent years, confusion continues to exist over terms, concepts, practices, and interpretations. Logistic regression results have been reported in various forms. Recommendations are made for researchers to formulate consistent policies and practices for applying versatile logistic regression techniques and communicating their results.

Perna, L. W. (2001). The Contribution of Historically Black Colleges and Universities to the Preparation of African Americans for Faculty Careers. Research in Higher Education 42(3): 267-294.

It has long been accepted that Historically Black Colleges and Universities (hereafter referred to

as HBCUs) are vital in the education of black students, and that they have continued to be successful in this area despite the lower levels of funding, academic preparation, and family income levels of their incoming students. Nevertheless, the future of HBCUs has been challenged as of late in the courts and state legislatures as they can be viewed as a remnant of segregation. Using data from the 1992 National Study of Postsecondary Faculty, the author seeks to inspect one area in which it may be said that HBCUs contribute: the preparation of African Americans for faculty careers. The author uses two measures of preparation: (1) research productivity, and (2) satisfaction in the work setting. She also breaks down the effects between the receipt of a bachelor's degree from an HBCU and the receipt of a doctoral degree from an HBCU. The research is limited, among other things, to African Americans, and by the variables and available data of the database (e.g., close to 13% of the African American full-time faculty in the database are missing educational background data). The author concludes that getting a degree from an HBCU at any point in one's educational career appears to have no effect upon the preparation of African Americans for their academic careers. In other words, the findings show that African-American full-time faculty who attended HBCUs for either their bachelor's or their doctoral degree are not at a disadvantage when compared with those African-American full-time faculty who have no degrees from an HBCU. The results of descriptive analyses suggest that HBCUs may be especially important producers of African American faculty in the fields of education and science, mathematics, and engineering. A large proportion of African Americans who were educated at HBCUs also return to such institutions to teach. The findings suggest, however, that they (African American full-time faculty at predominantly black colleges and universities) are less likely to have a refereed publication in a 2-year period and are less satisfied with their work setting than their counterparts who work in research institutions. HBCUs appear to be producing a smaller share of the nation's full-time faculty than they once did. Nonetheless, the author concludes that HBCUs continue to play an important role in preparing African-American faculty and that the results of this study should be used to guide future research on ways to further increase the flow of African-Americans along the educational pipeline.

Pong, S. (1997). Family Structure, School Context, and Eighth-grade Math and Reading Achievement. Journal of Marriage and the Family 59: 734-746.

Pong, S. (1998). The School Compositional Effect of Single-parenthood on Tenth-grade Achievement. Sociology of Education 71: 24-43.

Whereas past research into the effects of family structure on student achievement has restricted itself to the level of the individual family, the author asks whether there is a compositional effect of attending a school with a high concentration of children who do not live with two biological parents. Employing data from the NELS:88 eighth grade sample, Pong categorizes schools based on the concentration of students who live in single parent families and stepfamilies. She then constructs regression models to look at the effects of concentration on school-wide student achievement, controlling for other characteristics of the student body.

Pong discovers that math and reading achievement scores tend to be lower in schools with a high concentration of children who do not live with two biological parents. Parents average socioeconomic status and level of social capital largely, but not entirely, explain this

effect. (Pong defines social capital in Coleman's sense of parents' involvement with the school and parents' social networks. Accordingly, her measures of social capital are parental participation in school and parental acquaintance with other parents.) While students in schools with a high concentration of single parent and stepfamilies are disadvantaged on average, the disadvantage is offset for students whose parents maintain strong social ties to other parents.

Pong, S, and Ju, D. (2000). The Effects of Change in Family Structure and Income on Dropping Out of Middle and High School. Journal of Family Issues 21: 147-169.

Studies have repeatedly linked family disruption with a greater risk of children dropping out of school. One popular explanation, the economic deprivation argument made by McLanahan, holds that family disruption means fewer economic resources for children, which increases the risk of dropping out. An alternative thesis, the persistent poverty argument, suggests that pre-existing economic deprivation tends to lead to both family breakup *and* a greater risk of dropping out. To untangle this chicken or egg problem, the authors employ a sub-sample of students from the NELS:88 dataset who lived with both parents while attending eighth grade. Logistic regression models are used to test whether students' initial family income, or the loss of income associated with family disruption, explains more of the risk of dropping out.

The results suggest that both explanations of the link between family disruption and dropping out are partially correct. Consistent with the economic deprivation argument, family disruption is associated with a loss of income, on average, and loss of family income between eighth and twelfth grade increases children's chances of dropping out. Consistent with the persistent poverty thesis, families that experienced disruption started out with lower incomes on average, and lower family income in eighth grade is also associated with a higher risk of dropping out.

Pong, S. and Pallas, A. (In press). Class Size and Eighth-grade Math Achievement in the U.S. and Abroad. Educational Evaluation and Policy Analysis.

In the United States, evidence from Project STAR and other studies consistently shows that small classes promote academic achievement in the early grades. In this article, the authors investigate the effect of class size on math achievement in the later grades. A question of particular interest is the process by which small class size is translated into higher achievement. Two mechanisms are proposed: fuller coverage of the material, and the use of small groups as compared to whole-class instruction.

The authors analyze data from nine countries that participated in the TIMSS study: three English-speaking nations, three European nations, and three East Asian nations. When individual-level background variables are controlled, class size has a significant effect on math achievement in four of these nine nations. Surprisingly, *larger* class sizes are always associated with *higher* average math test scores in these four nations. (In the United States, the relationship between class size and achievement is negative but nonsignificant.) The effect of class size is not mediated by either curricular coverage or instructional technique.

When class-level background variables are also controlled, class size no longer explains math achievement in any of the nine nations studied. In particular, class size seems to be serving

as a proxy for a class's average socioeconomic status and average achievement level. However, the smallest 20 percent of all math classes have relatively high achievement in the U.S., and relatively low achievement in Hong Kong and Singapore. The reason why small classes have low achievement in the East Asian nations is that small classes are nearly always remedial classes.

Post, D. and Pong, S. (2000a). International Policies on Early Adolescent Employment: An Evaluation from the United States and TIMSS Participant Nations. International Journal of Educational Policy, Research and Practice 1: 153-170.

Post, D. and Pong, S. (2000b). Employment During Middle School: The Effects on Academic Achievement in the U.S. and Abroad. Educational Evaluation and Policy Analysis 22: 273-298.

The authors use data from NELS:88 and TIMSS to look at the cross-national relationship of employment during eighth grade (or the corresponding age internationally) to math and science achievement scores. They employ regression models that control for the effects of background factors and past grades. The authors find that internationally, for boys, and to a lesser extent for girls, there are negative effects on math and science achievement that are associated with adolescent employment, even after controlling for family background and, in the NELS, after controlling for prior achievement. Using the longitudinal component of NELS, the authors also report that, at least in the U.S., eighth grade work has lasting negative effects on high school achievement. High school employment results in similar negative effects only if pursued for long hours.

Breaking down the international data by country, the authors find a negative relationship between eighth grade employment and contemporaneous math achievement in 14 of 23 nations, including the United States. There is a positive interaction between employment and being female, indicating that girls are less harmed than boys by employment. The evidence suggests that this is because girls are far less likely than boys to be steadily employed for long hours.

Although U.S. eighth graders performed more poorly on the TIMSS tests than their counterparts in many other nations, the authors discover that employed U.S. students did nearly as well as employed students in the highest achieving countries. They conclude that the U.S.'s poor overall performance is partially due to the high rate of youth employment.

Riehl, C. and Sipple, J. W. (1996). Making the Most of Time and Talent: Secondary School Organizational Climates, Teaching Task Environments, and Teacher Commitment. American Educational Research Journal 33(4): 873-901.

Across the country teachers are in short supply. Given this fact, research into the sources of teacher satisfaction and the incentives that keep them in the teaching profession is vital. The authors address this issue by identifying factors that contribute to teacher commitment. Specifically, they hypothesize that teacher commitment, defined as a personal and professional dedication, is influenced by the work environment. If teacher commitment is indeed related to school environment, teacher satisfaction could be improved and a greater retention of teachers might be possible. The authors of this paper look at the daily teaching schedule, an indicator of the teacher task environment, in order to determine its effects on teacher commitment. Data for

their analyses come from the National Center for Education Statistics 1987-1988 Schools and Staffing Survey. The results of their study suggest that there is in fact no association between the characteristics of the task environment and a commitment to teaching. School climate variables were more strongly linked to professional commitment. The authors also found that: female and minority teachers reported more commitment to school goals; both professional commitment and commitment to school goals seem unrelated to teacher work effort; and teachers chose to spend more time on school work when they reported being helped by fellow teachers.

Riordan, C. (1994). The Value of Attending a Women's College: Education, Occupation, and Income Benefits. The Journal of Higher Education 65: 486-510.

It is folk wisdom as well as proven fact that single-sex schooling is less distracting for students, especially female students. Single-sex schooling is often touted as a more nurturing and less competitive atmosphere in which to educate women. Co-educational schools are said to foster the same male domination that exists in society as a whole. Critics of mixed-sex schools argue that women are held back, demeaned, and are not taken as seriously as their male counterparts in co-educational atmospheres. In this article, the author reconsiders these long-held beliefs by examining the academic and financial achievements of women with 1 to 6 years of single-sex higher education. Using data from the Longitudinal Study of American Youth (LSAY), he assigns an effect to each year of single-sex schooling and applies it to the achievements of the women in his sample. Riordan acknowledges that a factor which might skew his results is the selectivity of single-sex schools, but he assures us that the colleges which the women in his study attended span a wide range of academic selectivity. He concludes that women who attend a single-sex college for even one year are more likely to attain greater amounts of education than those women who never attend a single-sex college. In addition, he finds a considerable increase in occupational prestige and personal income for each year of attendance at a women's college.

Roberts, L. (2000). Using Criterion-Referenced Maps To Produce Meaningful Evaluation Measures: Evaluating Changes in Middle School Science Teacher's Assessment Perceptions and Practices. Pp. 41-63 in M. Wilson and J. Ingelhard, Jr. (eds.) Objective Measurement: Theory into Practice. Stamford, CT: Ablex.

Two problems facing educational professionals are the evaluation and dissemination of curricular reform programs and efforts. Partial credit model item maps derived from Rasch IRT techniques provide a convenient and accessible means of not only monitoring program effectiveness but also communicating the results of student and teacher evaluations to various stakeholders in the educational system. Basic IRT techniques are illustrated using an extended example based on data from an assessment development program conducted as part of the Science Education for Public Understanding Program (SEPUP). Particular attention is paid to scale construction, statistical reliability, reading and interpreting item maps, and evaluating cross-group differences in important policy parameters. Empirical findings suggest that teachers are not likely to use embedded assessment tasks, scoring guides, and other program features without some form of preparation and ongoing support structure. Since evaluation is only likely to be useful if it can

be meaningfully and readily communicated to others, it is recommended that attention be paid to integrating IRT graphical methods into teacher, student, and public policy assessments.

Roscigno, V. J. (1998). Race and Reproduction of Educational Disadvantage. Social Forces 76(3): 1033-60.

Extensive previous research has identified particular mechanisms and processes which contribute to and perpetuate racial inequality in education. The author focuses on the multi-tiered and interconnected institutional character of these processes, linking both family/peer processes and educational institutional processes to the racial achievement gap in education as measured by standardized scores in reading and math. Drawing on data from the National Educational Longitudinal Study and the Common Core of Data and employing a modeling strategy which allows for a more integrated examination of the patterns of inequality, the author considers factors bearing on racial educational inequality which focus on family background. These include household socioeconomic status (SES), familial structure, and the consequent availability of resources, parental involvement, child socialization, and peer group influence. He includes in his model factors pertaining to educational institutions explicitly, including race and class segregation, material resource differences among schools, the consequences of ability grouping, and diminished teacher expectations. The author sets up a model which draws out the linkages between family background and structure and educational institutional processes, revealing that family and peer attributes factor into the patterning of educational achievement. The institution of education shapes achievement through the stratification and segregation of students, through the formation of expectations, and through resource allocation. The institution of education at least partially reproduces the inequalities with which children walk into school, thus replicating the initial conditions of inequality. The author concludes that educational institutional processes are vulnerable to patterns of family stratification and thus there is a significant interconnection between both family and peer group influence and educational influences in reproducing racial educational disadvantages.

Roscigno, V. J. (1995). The Social Embeddedness of Racial Educational Inequality: The Black-White Gap and the Impact of Racial and Local Political-Economic Contexts. Research in Social Stratification and Mobility 14:135-165.

The literature on racial educational inequality details a wide range of mechanisms and processes which exacerbate educational inequality among different racial groups. The author finds, however, that existing research fails to offer a broad theoretical framework through which regional variations in inequality can be understood. The author proposes an alternative to what he sees as the limiting nature of both the *individualistic* and *classroom/school structured* approaches to understanding inequality. He presents an integrated theoretical framework in which individual or immediate sources of educational racial inequality are conceptualized as occurring within racial and local-political economic contexts. This allows for a more inclusive and thorough theoretical account of what is actually occurring.

Individualistic approaches to understanding racial educational inequality focus on the background characteristics of black students. They argue that culture, peer group pressure,

family structure, and socioeconomic status (SES) foster attitudinal and learning differences, and lowered aspirations and motivations among black students relative to whites. This approach, the author argues, is limited by its failure to account for geographical variation in levels of inequality and the structured processes which reproduce them. *Classroom/school structured* approaches acknowledge forms of inequality that remain neglected in individualistic approaches. Teacher expectations, resource allocation, and ability grouping, for example, suggest structural disadvantages within the current system. However, the author finds that such approaches ignore the fact that whatever goes on within a classroom or school is embedded within a local social context. This context may vary with regard to racial antagonism or the political-economic opportunities available to the whites and blacks within it.

The author concludes that the racial and political/economic context is the overarching determinate which unifies the literature on the educational consequences of racial inequality, as it shapes both student background and institutional features and processes. He argues that studies of racial inequality processes must take into consideration political-economic situations and histories. Racial ideologies and material distribution constitute the political-economic factors. These are local, and shape the processes through which the racial context emerges and reproduces itself. Thus, analyses of educational outcomes in studies of racial inequality must take into consideration the different processes which produce them.

Rumberger, R. W. (1995). Dropping Out of Middle School: A Multilevel Analysis of Students and Schools. American Educational Research Journal 32: 583-625.

Pointing out that most studies of the determinants of dropping out of school focus on either individual-level or school-level predictors, but not both, the author uses data from the NELS 1988 base year and 1990 follow-up to construct and test a comprehensive model of dropping out that includes factors at both levels. Also, where most dropout research focuses on the high school, he predicts dropping out of middle school.

At the individual level, the factor with the largest substantive effect on the odds of dropping out is having been held back a year, which quadruples the odds of dropping out. Some of the other important factors that increase the odds of dropping out include high absenteeism; low family socioeconomic status; being female; low parental academic support, supervision, and educational expectations; changing schools; student misbehavior at school; and poor grades and test scores. In general, the individual-level factors that predict dropping out vary from one racial or ethnic group to another. This suggests that a one size fits all approach to the problem will not work, particularly at the national level.

At the school level, the background characteristics of students explain one-third of the variability in school dropout rates. Beyond the individual effects of student background characteristics, schools with lower mean socioeconomic status and high minority concentrations have students who are more likely to drop out. Student perceptions that the discipline policy is fair lower the dropout rate, as does attending a non-Catholic religious school. Among schools with a low average socioeconomic status, important factors that increase the odds of dropping out include a high concentration of minorities, larger school size, *lower* student-teacher ratio, lower average amount of homework, and lower perceptions of a fair discipline policy.

Schneider, B., Swanson, C. B., and Riegle-Crumb, C. (1998). Opportunities for Learning: Course Sequences and Positional Advantages. Social Psychology of Education 2: 25-53.

Do the course sequences taken by high school students have consequences for students' personal lives and academic careers in secondary school and beyond? Using data from NELS:88-94, Schneider et al. examine the relationship between the math and science sequences taken by 10th, 11th, and 12th graders and academic achievement and college attendance rates. They take into account how any change, routine or non-routine (i.e., the movement of a student from a middle school into a corresponding high school upon graduation from middle school as opposed to a transfer from one high school to another), may affect or alter the educational path of the student. They find that not only is the level of course sequence in 10th grade associated with the level of course sequence in 12th grade, and with the relative academic success or failure of the student, but that transitions into and out of these sequences due to a non-routine change of school can disrupt whatever positional advantage (or disadvantage) the student might have acquired in his previous schooling.

Shen, J. (1997). How to Reduce Teacher Attrition in Public Schools: Policy Implications from a National Study. Educational Horizons 76(1): 33-39.

Shen, J. (1997). Teacher Retention and Attrition in Public Schools: Evidence from SASS91. Journal of Educational Research 91(2): 81-88.

The author reviews the literature on teacher attrition to develop an analytical framework which assumes that teacher attrition is a function of individual and school-level factors as well as the interaction between these factors and teacher perceptions. Using nationally representative data from the Schools and Staffing Survey 1990-91 and the Teacher Follow-up Survey 1991-92, the author examines the different factors among teachers who either continue teaching in the same school, voluntarily move to another school, or voluntarily leave the teaching profession altogether. The author finds that with the exception of number of years in teaching and salary, personal factors were not predictive of teacher attrition. Most school factors were also not predictive of attrition or retention. A positive perception of the teaching profession and the ability to contribute to school policy were positively associated with teacher retention, whereas teaching in a socially disadvantaged school, teaching in a school without a differential salary structure, and teaching in a school with fewer experienced teachers were negatively associated with retention. The author argues that teacher retention will be improved by implementing policies which provide incentives to teach in socially disadvantaged schools, create a career ladder for the teaching profession, and empower teachers in school and classroom policy decisions.

Shen, J. (1997). Has the Alternative Certification Policy Materialized Its Promise? A Comparison Between Traditionally and Alternatively Certified Teachers in Public Schools. Educational Evaluation and Policy Analysis 19(3): 276-283.

Proponents of alternative certification policies contend that such policies will alleviate teacher shortages in urban schools and in the fields of mathematics and science, provide opportunities to particularly knowledgeable and competent individuals who would otherwise not be able to teach, diversify the racial, gender, and age composition of the teaching force, and introduce an element

of competition into the preparation of teachers. Using cross-sectional data from the Schools and Staffing Survey 1993-94, the author compares characteristics of alternative certification (AC) teachers with traditionally certified (TC) teachers and asks whether AC policies are meeting their goals. The author found little difference in gender composition or age distribution between AC and TC teachers, though AC teachers were more likely to be minorities. Also, while AC policy did attract some experienced individuals to teaching, it also allowed for some recent college graduates to enter teaching without traditional certification procedures. AC teachers were less likely to hold advanced degrees, though they were more likely to hold degrees in science or mathematics. AC teachers were more likely to teach in secondary schools, predominantly minority schools, and more likely to teach mathematics or science than their TC counterparts. However, AC teachers were less likely to consider teaching a life-long career. The author's findings support the claims of AC proponents regarding mathematics and science instruction, racial diversity, and the alleviation of short-term teacher shortages in urban schools. However, findings on AC teacher educational backgrounds, the recruitment of experienced individuals, and AC teacher attitudes towards teaching contradict the claims of AC proponents. The author argues that further research into the qualifications of AC teachers is required before the success of AC policies can be fully assessed.

Shen, J. (1997). The Evolution of Violence in Schools Educational Leadership 55(2): 18-20.

The author identifies the nature and severity of the violence in schools by examining trends over the past few years for both elementary and secondary schools, and for schools in rural, suburban, and urban communities. The National Center for Education Statistics has been conducting a study of school problems since 1987. Every three years, approximately 50,000 public school teachers have been asked to rate the following problems as serious, moderate, minor, or nonexistent based on the degree to which they occur in their schools: physical conflicts among students; robbery or theft; vandalism of school property; student abuse of alcohol; student drug abuse; student possession of weapons; and verbal abuse of teachers.

The author found that the general trend among both elementary and secondary school students was an increase in violence. Secondary school teachers generally tended to rate these problems as being more severe than those teachers in elementary schools. He also found that the severity of nearly every type of problem decreased steadily from urban to suburban and from suburban to rural schools. Teachers from all communities rated drug and alcohol problems as equally serious. These results indicate that public schools have been becoming less safe over the last decade. To promote school safety, the author suggests that programs should focus on different issues for elementary and secondary schools, and for schools in different communities.

Shen, J. (1998). Do Teachers Feel Empowered? Educational Leadership 55(7): 35-36.

The National Center for Education Statistics has conducted surveys on leadership in the public school system since 1987. Teachers and principals have been asked to rate their influence on selected schoolwide and classroom issues on a scale ranging from no influence at all to a great deal of influence. An analysis of these data revealed several trends in the perceptions of teachers and principals. Principals were found to perceive their own influence on schoolwide issues to have increased slightly over the past few years; principals' perceptions of their

leadership in establishing curriculum remained unchanged for the most part. Teachers did not perceive their influence to have changed at all during the course of the past few years; the number of teachers who felt they had a great deal of influence on various classroom issues also remained unchanged. There were large discrepancies between the way principals viewed teachers influence and the way that teachers perceived their own influence; principals repeatedly rated the amount of influence that teachers had higher than the teachers themselves. This trend was also evident with regard to the school budget, inservice programs, and teacher evaluation. The author concludes that one goal that needs to be accomplished over the course of the next few years is to make teachers and principals perceptions congruent.

Shen, J. (1998). Alternative Certification, Minority Teachers, and Urban Education. Education and Urban Society 31(1): 30-41.

Alternative teacher certification programs have greatly expanded in recent years, and proponents contend that these programs and policies facilitate diversity in the teaching profession and combat teacher shortages in urban schools. Using data from the Schools and Staffing Survey 1993-94, the author explores the link between alternative certification (AC) programs, minority teachers, and urban education and compares the characteristics of AC minority teachers with those of both traditionally certified and AC white teachers. The findings show that AC policies are successful in recruiting more minority teachers and that AC impacted urban schools more than suburban or rural schools. However, the results with regard to teacher diversity and expanding the teaching pool are mixed. Though AC policies recruit increased numbers of older minorities with higher educational qualifications, the policies failed to attract more minority men. Further, AC minority teachers were more likely to teach at the elementary school level and less likely to have a background in math or science or consider teaching to be a life-long career. AC thus achieves some goals insofar as it positively impacts racial diversity and expands the teacher pool, but it fails in attaining diversity among genders or on the school level, or in its aims at attracting qualified, long-term minority teachers.

Singh, K. and Billingsley, B. (1998). Professional Support and Its Effects on Teachers Commitment. The Journal of Educational Research 91(4): 229-239.

Using data from the U.S. Department of Education's Schools and Staffing Survey (1987-88), this paper examines the effects of professional support (both principal and peer support) on public school teachers' commitment to the teaching profession. A 25% random sample of respondents to the public school teachers' survey was selected for analysis; the sample was further reduced by selecting only full-time employees. Latent variable structural equation modeling was used to estimate cause-effect relationships among variables. The authors found that peer support (measured by items assessing shared beliefs and rules among teachers, cooperative effort, and help with instruction) exerted the largest direct effect on professional commitment. Principal support/leadership (measured by items assessing clarity of expectations, communication, and goals, teacher evaluation, staff recognition, principal support and encouragement, and principal help with teaching and instruction) influenced professional commitment not only directly but also indirectly through peer support. Background variables—gender, education, and experience—showed small but significant effects on teacher

commitment. Among the background variables, gender had the strongest effect, indicating that female teachers feel more committed than male teachers. The study's findings indicate the importance of principals' leadership in enhancing teachers' commitment to the teaching profession and the effect principals can have on teachers' collegial relations. The results suggest the importance of clear expectations on the part of the principal and the communication of a vision and goals for the school. The influence of principal support/leadership on peer support in turn suggests that when principals foster shared goals, values, and professional support, teacher cooperation and a supportive learning environment are likely to result.

Stage, F. (In press). Symbolic Discourse and Understanding in a College Mathematics Classroom. Journal of General Education.

Stage uses qualitative techniques to investigate students' understanding of the symbolic discourse taking place in a college mathematics classroom. If mathematics is a formalized language, as many have described it, then perhaps misinterpretation of that language by students leads to poor performance. This hypothesis has been supported in research at the elementary and secondary levels. Whether it applies at the college level needs to be understood because of students' high failure rates in college math courses.

The author conducted observations and made videotapes during a four-week segment of a course in finite mathematics aimed at freshman business and social science majors. She then interviewed selected students and the teacher. Her surprising finding is that some students can explain the basic concepts but do not score well on tests covering the material. The reverse is also true; some students get good grades but cannot explain the basic concepts being taught. The reason, she suggests, is that students in this class and in many college level mathematics classes are only asked to calculate. Course evaluations are based solely on manipulation of numbers. No value is placed on a student's ability to understand the material on a theoretical level. The author questions a calculation-only basis for grading in low-level mathematics courses.

Swanson, C. B. and Schneider, B. (1999). Students on the Move: Residential and Educational Mobility in America's Schools. Sociology of Education 72: 54-67.

The authors draw a conceptual distinction between two types of mobility experienced by adolescents: residential mobility and educational mobility (meaning a non-routine move from one school to another). They then conduct analyses examining the effects of these types of mobility on academic achievement. They construct regression models utilizing data from NELS:88-94. The finding is that residential and educational mobility often have different effects on achievement. In addition, the timing of a change matters. The worst kind of mobility, from the point of view of student outcomes, is educational mobility that occurs after tenth grade. Students who experience this type of mobility are disadvantaged in terms of math achievement, and have a higher risk of behavioral problems and dropping out. On the other hand, educational mobility that takes place between the eighth and tenth grades is beneficial in terms of math achievement and the long-term risk of dropping out. (However, such students are at a higher short-term risk of dropping out.)

Valadez, J. R. and Anthony, J. S. (2001). "Job Satisfaction and Commitment of Two-year College Part-time Faculty." Community College Journal of Research and Practice 25(2): 97-108.

The authors sought to examine the accuracy of the perception that part-time college professors are frustrated academics; they also examined these individuals' satisfaction and commitment to their professional roles, responsibilities, and rewards. Exploratory factor analysis was used to create a multidimensional description of job satisfaction. Data were taken from the National Study of Postsecondary Faculty (NSOPF). To assess job satisfaction, 15 items were taken from the NSOPF questionnaire that dealt with how satisfied individuals were with various aspects of their job. An exploratory principle-components factor analysis showed that 14 of these items could be grouped into one of three dimensions of satisfaction: satisfaction with autonomy, satisfaction with students, and satisfaction with demands and rewards. Overall satisfaction was the remaining item, and was left as a stand-alone variable representing a global measure of satisfaction.

To measure the commitment level of these individuals the authors selected the statement, "If I had to do it all over again, I would still choose an academic career." This is representative of an individual's dedication to teaching; despite hardships associated with part-time work, he or she would again choose an academic career if given the opportunity. Commitment was also assessed by looking at an individual's response to items from the NSOPF questionnaire that asked faculty members to identify reasons that would be important if they were to leave their current position for another. The authors found that part-time faculty members are satisfied with their roles, but are concerned with issues regarding salary, benefits, and long-term job security. The findings also showed a consistency regarding part-time faculty members' commitment to their career choice.

Wang, J. (1996). Reassessing a Learning Gap: A Comparative Study of Student Science Achievement in the U.S. and China. Phi Delta Kappan 78: 234-239.

Wang, J. (1998). International Achievement Comparison: Interesting Debates on Inconclusive Findings. School Science and Mathematics 98: 376-382.

The author reviews arguments about a science learning gap between the United States and other nations. He also discusses the ways the TIMSS dataset can contribute to the learning gap debate. According to Wang, previous international comparisons of science learning have been challenged on several grounds: methodological problems that leave the data open to competing interpretations, a lack of sensitivity to cultural differences between nations, and an emphasis on summary statistics that turn international educational comparisons into a horse race.

TIMSS improves on past data in several ways. Some questions were free-response rather than multiple choice. The same students were tested in both math and science, allowing for comparisons between subjects. Further, to better understand cultural and contextual differences, the main study was accompanied by two other efforts in Germany, Japan, and the U.S.: Math and science classrooms were (a) videotaped and (b) studied ethnographically. On the other hand, the TIMSS data set is not without its problems, which Wang enumerates at length. For example, the free-response items were hard to code accurately. Also, when teachers participated in the

videotape project, only one lesson per classroom was videotaped. No assessment can be made on variability of these results.

Wang, J. (1998). A Content Examination of the TIMSS Items. Phi Delta Kappan 80 (1): 36-38.

The Third International Mathematics and Science Study (TIMSS) is a collaborative research project sponsored by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS is the largest and most ambitious study of comparative educational achievement ever undertaken; it includes students from 5 grade levels, assessed in math and science, from more than 40 nations around the world. Wang uses the items released to the public to look at the academic content of the TIMSS instrument.

The author discovered four potential problems when analyzing two-thirds of the TIMSS items released to the public. One third of this test was devoted to free-response questions; Wang found that not all of the free-response scores reflected student science achievement. The coding system used for these responses left little room for interpretation, and thus many answers earned zero credit when in fact they were partially correct or better answers. It was also found that there were multiple correct answers for some of the science questions. To receive credit for these questions, however, students had to choose the correct response according to TIMSS grading system. The TIMSS grading system also failed to take into account cognitive development. Students in the third and fourth grade tend to use words such as higher and farther interchangeably; however such concrete operations were not taken into consideration, and thus students received a score of zero when in fact they knew the correct answer.

The final problem which Wang encountered was that not all TIMSS items reflected collaboration between mathematics and science educators. The way in which many of the questions were worded left considerable room for misconceptions. Mathematics and science educators were involved in TIMSS, and these misconceptions could have been easily avoided. After identifying these four problems, Wang questioned whether all TIMSS items were in fact true reflections of student achievement in science and mathematics.

Wang, J. (1997). Using SAS PROC MIXED to Demystify the Hierarchical Linear Model. Journal of Experimental Education 66(1): 84-93.

Many educational experts appear unaware of the range of modeling opportunities and software tools available to individuals working within the hierarchical linear modeling (HLM) framework. In recognizing the origins of hierarchical linear models (HLMs) and mixed models, researchers are better able to keep abreast of developments in statistics and other social science areas. A review of selected literature in statistics and agronomy is used to demonstrate the logic of fixed, random, and mixed effect conceptions of data structures. A side-by-side analysis of data using two popular software tools, HLM/2L and SAS PROC MIXED, is used to demonstrate the particular features of both applications as well as the similarities underlying two seemingly different approaches to the analysis of hierarchical data.

Wang, J. (1999). Reasons for Hierarchical Linear Models (HLM): A Reminder. Journal of Experimental Education 68(1): 89-93.

The success of the hierarchical linear model (HLM) framework and the proliferation of software products for these types of analyses may lead educational analysts to apply statistical methods that are inappropriate for their particular research questions or sample designs. Reviewing the core structure and assumptions of HLMs and fixed effects models, it can be seen that mixed effects models are only appropriate in applications where the data of interest are subject to more than one random component. Indeed, invoking HLM-related methods for analyses that do not fit the assumptions of the model may contribute to model misspecification and the misinterpretation of results. Conventional ordinary least squares (OLS) techniques are still appropriate for the analysis of many datasets with hierarchical designs.

Wang, J. (1998). An Illustration of the Least Median Squares (LMS) Regression Using PROGRESS. Education 118(4): 515-520.

Statisticians have long known about the sensitivity of Least Squares (LS) estimators to outliers for high dimensional ($p > 2$) data sets. Prior research also suggests that common methods for analyzing residuals based on LS estimation can fail to identify important outliers and thus contribute to biased parameter estimates. It is argued that Least Median Squares (LMS) regression provides a convenient and robust alternative to LS methods, particularly given the increasing power of desktop computers and the availability of sophisticated software applications. A brief empirical example drawn from the Longitudinal Study of American Youth (LSAY) data suggests that LMS methods can produce parameter estimates that yield smaller average deviations from observed data as well as more sensitive regression diagnostics.

Wang, J. and Staver, J. R. (1996). An Empirical Approach Toward the Prediction of Students Science Achievement in the United States and Hubei, China. Journal of Research in Science Teaching 33: 283-301.

Noting the lack of a generally accepted, theoretically supported model to predict students science achievement, the authors conduct an exploratory exercise in model fitting. They use SISS (Second IEA Science Study) data from the U.S. and Hubei province, China. The authors findings seem to accord with clearly observable cultural and structural differences between the two nations. For example, the best fitting model of science achievement in the U.S. is much more complex than the analogous model for Hubei province. The authors attribute this to the diversity of students and curricula in the U.S., relative to China. Also, demonstrations and experiments are a larger part of the classroom experience, and testing a much smaller part, in the U.S. than in China. The reason is the existence of high stakes testing in China, and the lack of lab equipment in many schools there.

Weinberger, C. J. (1998). Race and Gender Wage Gaps in the Market for Recent College Graduates. Industrial Relations 37(January): 67-84.

Previous studies have shown that women and black men have lower average earnings than white men with the same number of years of education. One explanation for the race wage differential is that African Americans, while they may have completed the same amount of schooling, are believed to receive a lower quality of education. The gender wage differential is often explained

by the fact that women are less likely to major in mathematical/technical fields fields that have consistently proved to be the most lucrative. Another explanation often put forth is that women choose degree programs that will fit in with their plans to have a family. With all three of these examples, one would expect that controlling for the type and quality of education would reduce or erase any wage differentials. The authors tested this hypothesis using data from the 1985 Survey of Recent College Graduates. The hypothesis was not supported. The major finding of the study is that, among recent college graduates, white women, black men, black women, Asian men, and Asian women all face the same 10 to 15 percent wage disadvantage relative to white men with the same type and quality of college education. This finding provides strong support for the existence of discrimination in the market for recent college graduates.

Weiss, E. M. (1999). Perceived Workplace Conditions and First-year Teachers' Morale, Career Choice Commitment, and Planned Retention: A Secondary Analysis. Teaching and Teacher Education 15: 861-879.

This study examines the relationships between perceived workplace conditions and morale, career choice commitment, and plans to remain in the profession for first-year teachers in the U.S. Using data from the Schools and Staffing Surveys (1987-88 and 1993-94), the author extracted a nationally representative sample of first-year K-12 public and private full-time teachers. Ordinal logistic regression, multiple regression, and hierarchical regression techniques were used to examine the effect of workplace conditions (school leadership, student behavior, autonomy and discretion, class size, and SES of students) on first-year teachers' morale and commitment. Overall, the study found that new teachers' views of their workplace conditions are related to their morale, career choice commitment, and plans to remain in the profession. Specifically, the study found that how new teachers perceive workplace conditions is often as important as the conditions themselves. For example, dissatisfaction with class size, rather than actual class size, was associated with low morale among new teachers. Supportive school leadership and culture, together with teacher autonomy and discretion, were strongly associated with high morale, commitment to a career path, and intention to stay in the profession, among first-year teachers. The perception that student behavior interferes with teaching was associated with lower morale among new teachers. Salary and perceptions of salary did not appear to affect first-year teachers' morale. New middle-school teachers had lower morale than elementary or secondary teachers. Neither gender nor race had significant effects on teacher morale, career choice commitment, or intention to stay in the profession. The need for better working environments that provide mentoring and support for new teachers is emphasized.

Weinberger, C. J. (1999). Mathematical College Majors and the Gender Gap in Wages. Industrial Relations 38(July): 407-413.

There is a gender gap in wages among college graduates. Some researchers have said that this gap can be accounted for by the fact that college graduates who received degrees in mathematics earn more money than those who received non-mathematical degrees. Since women are less likely than men to pursue math degrees, it follows that there will be a gender wage differential.

There is a problem with this explanation though, which is made clear in a study of recent graduates (Weinberger, 1998a), recently completed by the author, in which women with mathematical majors were found to make 9 percent less than their male counterparts. Using data from the 1985 Survey of Recent College Graduates, the author seeks to resolve this contradiction by studying the mathematical content of graduates majors in a representative sample of college graduates. She found that regardless of mathematical content, female graduates with mathematical majors experience the same 9 percent gender wage gap. Although female graduates with technical degrees earn less than men with comparable degrees, they do make more money on average than do other female graduates, suggesting that policies aimed at increasing the participation of women in technical college majors are likely to be quite effective at increasing the relative wages of female college graduates, labor market discrimination notwithstanding.

Wiley, S. D. (2001). Contextual Effects on Student Achievement: School Leadership and Professional Community. Journal of Educational Change 2: 1-33.

The author reviews two elements of school context that have been identified with effective teaching. One is transformational leadership, or leadership by means of promoting a shared vision that drives belief and actions ; the other is professional community among teachers. Noting that no national-level statistical study has investigated the interdependence of these two contextual processes or the independent effects of each on student achievement, Wiley proposes to do so.

The author analyzes data from the High School Effectiveness Study (HSES), a longitudinal study conducted in 1990 and 1992 within NELS:88-92. She uses data from high school mathematics teachers to measure effects on student achievement in mathematics. HLM is employed to analyze the effects of school-level variables, professional community, and transformational leadership on 12th grade math achievement.

The author finds that the effects of transformational leadership and professional community on student achievement are interdependent. However, professional community only has a noteworthy positive effect when an above average level of transformational leadership is also present. A related finding is that the effects on student achievement are found to be strongest in schools with a lower average socioeconomic status (SES). Also, neither teacher participation in decision-making nor administrator management skills are found to be related to student achievement.

Yan, W. (1999). "Successful African American Students: The Role of Parental Involvement. Journal of Negro Education 68(1): 5-22.

This study examines the characteristics of social capital held by successful black students as compared to successful white and unsuccessful black students. Social capital refers to the social networks and social institutions that facilitate educational attainment (Coleman, 1988). This includes three types and levels of capital which a family may provide or possess: financial (income or wealth), human (parental education), and social (relationships between parents and children).

The data used in this study come from the National Educational Longitudinal Study of 1988 (NELS:88). Bonferoni's multiple comparison tests were used to examine the differences

between black and white families with respect to social capital. The author also used correlational analyses to investigate the extent to which measures of parental involvement correlated with family background variables.

The author found that the families of successful black students demonstrate equal or higher levels of parental involvement than families of successful white students. Successful black students came from families with high levels of home discussion, which provided them with an emotionally supportive environment that encouraged academic success. These parents also tended to contact their children's schools to discuss their teen's experiences and their future plans more frequently than white parents did. However, parent-school interactions do not play as significant a role as home discussion in the success of black teens.

Zvoch, K. (1999). "Family Type and Investment in Education: A Comparison of Genetic and Stepparent Families." Evolution and Human Behavior 20: 453-464.

The inclusive fitness theory (Hamilton 1964) provides a theoretical basis for understanding the augmented conflict and instability observed in stepfamilies by acknowledging the direct and indirect manner in which individuals contribute genetically to future generations. This theory predicts that due to the potential for genetic proliferation through close relatives, individuals will preferentially value and assist those with whom they share a common descent. In accordance with this theory, Zvoch hypothesizes that children with two genetic parents will receive more parental support for pursuit of higher education compared to children residing in stepparent households.

The author analyzed data from the National Education Longitudinal Study of 1988 (NELS: 88) to investigate postsecondary educational investment in two-parent families. A two-stage stratified clustered probability sample design was used to randomly sample 1,000 of the 40,000 schools in the U.S. that provided instruction to eighth graders in 1988. Approximately 25 students from each school were randomly chosen to participate in the study; they completed a contextual survey, took a standardized achievement test, and their parents were mailed questionnaires to assess parental support for postsecondary education. Eventually students were removed from the study if any of the following pertained to them: relevant data were not available; parent data were not available; the student resided in a single-parent or alternative household; a parent indicated their child was not planning on continuing his or her education after the completion of secondary schooling; there were any missing data on the variables being analyzed. After these exclusions, 7,161 students remained in the study, 6,389 of whom resided in a two genetic parent family, and 772 of whom lived in a stepparent family.

A one-way multivariate analysis of variance (MANOVA) was performed on the three investment-related dependent variables. Measures of child achievement, familial SES, and the number of financial dependents in each family were used as a set of covariates. It was found that family type was significantly related to the weighted multivariate combination of educational investment measures. Univariate ANOVAs revealed a statistically significant difference in the mean investment decisions between family types. A second multivariate analysis was conducted to ensure resources and/or child related factors did not account for these differences. The findings of all these tests supported the author's hypothesis that stepchildren were likely to receive less parental support for pursuit of postsecondary education, relative to children with two genetic

parents. These findings raise concerns that children raised by two genetic parents are at a potential advantage in gaining access to higher levels of education than stepchildren, thus restricting the latter's educational success.

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