Demographic Opportunities and School Achievement

Jesse L. M. Wilkins
Virginia Polytechnic Institute and State University

The Virginia Department of Education recently administered the first round of its Standards of Learning (SOL) exams. These exams are meant to assess students' achievement in the four core academic areas: mathematics, science, English, and social studies, and ultimately serve as the primary means for determining school accreditation. Using school-level passing rates based on the Virginia Standards of Learning exams, this study examined the relationship between characteristics of a demographic opportunity structure such as financial, human, cultural, and geographic capital, and the success of schools within these structures. Results suggest that school-level scores on the SOL tests can largely be predicted by the demographic opportunity structure of the surrounding community. On average schools with higher capital tend to be significantly more successful than lower capital schools on all of the exams. Recommendations for re-evaluation of school accreditation policies are offered.

Introduction

The Virginia Department of Education recently administered the first round of its Standards of Learning (SOL) exams. These exams are based on Virginia's Standards of Learning (Board of Education, 1995) and beginning in the Spring of 1998 are given annually to all students in grades 3, 5, 8, and high school in the state of Virginia. These exams are meant to assess students' achievement in the four core academic areas: mathematics, science, English, and social studies, and ultimately serve as the primary means for determining school accreditation. This study investigates the relationship between school success on these exams and the demographic opportunity structure of the community associated with the schools. Evaluation of this type of assessment of school success and recommendations for school accreditation policies are offered.

History of the Standards of Learning Exams in Virginia

Like other states in the US, Virginia has reacted to the call for educational reform (e.g., *A Nation at Risk*, [National Commission on Excellence in Education 1983]) by implementing state-wide curriculum standards with accompanying assessments in an attempt to increase levels of achievement. Similar to those in other states, these standards and exams were developed to monitor progress of students, teachers, and schools, with the hope that such monitoring would promote increased achievement. However, Virginia has increased the stakes of these exams for schools by making them the primary means for deciding school accreditation (Virginia Department of Education, [VDOE], 1997). Schools will be required to attain a 70% passing rate in all four core academic areas to maintain accreditation.[1] At present, schools who did not meet this requirement based on the 1998 test administration are "provisionally accredited" until the year 2003. At that time, schools who have neither met the 70% cut-off rate nor improved will be "accredited with warning." If these schools have not met the cut-off by the 2006-07 school year, accreditation can be denied (VDOE, 1998; 1997). The atmosphere surrounding the adoption of the Standards of Learning has been characterized as bitter and fierce (Fore, 1998) and the validity of the cut-off scores continues to be in debate (Cross, 1999).

After the first round of testing, results released by the Virginia Department of Education show that only 2.2% or 39 of the more than 1,800 Virginia public schools met the 70% cut-off rate in all four core academic areas (VDOE, 1999a). Concerns about test bias related to demographic factors have been the focus of several discussions around the state (e.g., Crooke, 1999; Turner, 1999). Interestingly, of the 39 schools that met the criterion passing rates, 37 were in the Northern or Central parts of Virginia. Of these 37, 24 were in either Fairfax County or Henrico County, both prosperous suburban areas near Washington, D. C. and Richmond, respectively (VDOE, 1999b). While these findings are not at all surprising, they lead to questions about the fairness of the accreditation policies recommended by the Virginia Board of Education.

Educational and Demographic Opportunity Structures

Performance standards coupled with performance assessments are thought by some to be the primary means for creating systemic reform in the United States (e.g., Resnick, 1992). In this way students, teachers, and schools are held

accountable for their respective roles in the education of the nation. However, as pointed out by Guiton and Oakes (1995), the use of such performance outcomes as a basis for comparison presumes that schools, teachers, and students are given equal opportunities and resources. Before students and schools can be held accountable for their achievement levels and be compared to a standard they must be given comparable starting points in terms of educational and demographic opportunities.

Opportunities for schools, and thus students, can be categorized into at least two types of structures, educational and demographic. An educational opportunity structure (EOS) relates directly to the schooling process, for example, quality of instruction, amount of instruction, curriculum materials, courses available, and qualifications of teachers. A school or classroom, would represent models of educational opportunity structures. Differing levels of opportunity supplied by these structures have been found to be strongly related to student achievement (e.g., Barr & Dreeben, 1983; Gamoran, 1987, 1994; Wilkins, 1997). Demographic opportunity structures (DOS) might best be characterized by the community and the people that make up the community in which a school resides. People with similar backgrounds tend to live in the same neighborhoods or geographic location (urban or rural) which are served by a local school. Resources for and background characteristics of students in these local schools are therefore very similar to those of the residents in the surrounding community. Although schools and their surrounding communities are obviously intertwined in their allocations of opportunities, it is possible to differentiate between them based on the level at which different opportunities are allocated. Thus, by considering resources associated with a DOS one can understand how these resources affect an EOS and thus student learning.

The major focus of this study is on the opportunities that are associated with demographic opportunity structures. This structure is investigated at the community level and opportunities are characterized by level of financial and human capital (Coleman, 1988), cultural capital (Bourdieu, 1986), and an additional form of capital related to geographic location (Ghelfi & Parker, 1997). What follows is a brief description of each form of capital.

Financial capital (Coleman, 1988) refers to fiscal resources that enable parents to provide food, clothes, and other resources necessary for children to be ready for learning. Beyond these basic necessities, greater financial capital allows families to provide more educational resources such as a place in the home to study, books, and computers. Human capital (Coleman, 1988) is often characterized by the level of parents' education. Parents with greater levels of education may be better able to provide cognitively stimulating environments for children, or simply may be better able to offer help with homework. In addition, a college education has become almost necessary to achieve financial stability for a family and thus may be related to the types of stressors students may experience at home.

Cultural capital (Bourdieu, 1986) refers to an embodiment of status and expectancy that is related to being a member of a dominant group or class. In the case of the United States, it might refer to the privileges afforded those that find themselves in the norm of "white" mainstream. Although opportunities for minorities, including jobs and education, have increased since the civil rights movement of the 60's, forces of racial stratification continue to deny minorities equal access to these opportunities and further to deny equal reward for their work and educational accomplishments (Ogbu, 1994). As a result, minority communities with similar educational and occupational characteristics as those of predominantly white communities, are not always able to attain the same heights of educational and occupational success. This definition of cultural capital is not a comparison of different cultures in terms of value, as if one is better or worse than another, but a recognition that those who belong to the dominant group possess many privileges, and have access to opportunities, that are not readily available to other groups. Those groups marginalized from this norm (e.g., non-whites or minority communities) lack equal access to opportunities that allow them to progress upward irrespective of qualifications that might make them deserving (West, 1990).

Rural communities have often been characterized as having fewer educational opportunities than urban areas. In fact, several researchers have suggested that location can directly affect the level of economic resources that are available to a community (Ghelfi & Parker, 1997; Logan & Molotch, 1987). Further, rural communities may not have access to resources that would be readily available in a more urbanized area, such as museums and libraries, resources that could be expected to enrich educational outcomes. These perceived differences in opportunities associated with geographic location might be referred to as geographic capital. However, when considering geographic capital as part of a DOS it is important to characterize it by more than just population density, but instead to encompass a sense of proximity to urbanized areas (Ghelfi & Parker, 1997).

By studying the relationship between different components of a DOS one can create a deeper understanding of its effects on achievement in schools. Using school-level passing rates based on the Virginia Standards of Learning exams, this study examines the relationship between characteristics of a demographic opportunity structure such as financial, human, cultural, and geographic capital, and the success of schools within these structures.

Methods

Data

The data used in this study come from the Virginia Department of Education (1999a) and the 1990 U. S. Census (Bureau of the Census, 1992). There are over 1,800 public schools in the Commonwealth of Virginia. Due to sampling procedures carried out by the U.S. Census not all

communities in Virginia have demographic data available. Schools without corresponding community demographic data were deleted from the sample. In addition, because alternative and special education schools may attract children from outside a community in which a school is located, and thus distort the demographic make-up of the school, these schools were also deleted from the sample. Therefore the working sample consists of 1,560 public schools, of which 1,016 are elementary schools, 247 middle schools, 251 high schools, and 46 combined schools (i.e., some other combination of grade levels such as K-12, 6-12, K-6).

Measures

School Success

Twenty-seven SOL exams are administered as part of the Virginia Standards of Learning (SOL) assessment process.[2] Twenty-five of these exams are used in determining passing rates for accreditation purposes. Passing rates for each Virginia school are calculated for math, science, history, and English for grades three, five, eight, and high school. Passing rates for a school are determined using all exams for a particular level. For example, passing rates for mathematics for a 9-12 high school would be based on all students in algebra I, algebra II, and geometry. School success for the present study was measured using a composite score of school-level passing rates created by standardizing each of the separate content scores ($M = 50$, $SD = 10$) and then averaging the four scores by grade level. This composite score reflects the Virginia policy of considering all four content areas in order to determine accreditation.

Demographic Opportunity Structure

Using zip codes for each school obtained from the Virginia Department of Education, schools were linked to community-level data (based on a weighted sample) from the 1990 U. S. Census (Bureau of the Census, 1992). These data were used to create community level indicators of opportunity associated with financial capital, human capital, and cultural capital. Urban influence codes (Ghelfi & Parker, 1997) were used as indicators of opportunity associated with a communities' geographic capital.

Financial capital of a community. An indicator of the opportunities associated with financial capital was created using the median-household income of a community, measured in thousands of dollars.[3]

Human capital of a community. An indicator of the opportunities associated with human capital was created using educational attainment of the members of a community. This was accomplished by calculating the percentage of people in a community 25 years of age and older who had attained a four-year college degree or higher.

Cultural capital of the community. An indicator of the opportunities associated with cultural capital was created by calculating the percentage of people in the community that indicated that they were white (non-Hispanic).

Geographic capital of the community. An indicator of opportunities associated with geographic capital was created based on a classification scheme of level of urban influence on a community (Ghelfi & Parker, 1997). This scheme divides counties and independent cities in the U. S. into nine groups based on the size of metro areas, the adjacency of nonmetro counties to different sized metro areas, and the size of the largest urban area within each nonmetro county. Using this scheme each of the counties and independent cities in Virginia were classified into five groups 1) a large metro area, 2) a small metro area, 3) adjacent to a large metro area, 4) adjacent to a small metro, or 5) not adjacent to a metro area (i.e., rural).

Results

Descriptive statistics for variables used in the study are presented in Table 1.

The relationship between the demographic opportunity structure associated with a school and the passing rates of the school for the SOL tests was analyzed using multiple regression techniques. Each of the four composite scores (i.e., grade 3, grade 5, grade 8, and high school) were regressed on the opportunity indicators. In the case of geographic capital, the categorization of 'not adjacent to a metro area' (i.e., rural) was left out of the regression model to maintain non-collinearity among the independent variables. Therefore, the magnitude of the coefficients associated with the other four categories is in comparison to rural communities. In addition to unstandardized regression coefficients, standardized regression coefficients were calculated in order to compare the relative effect of the independent measures of opportunity. Results of these analyses are presented in Table 2.

Based on the R^2 values, the characteristics of the demographic opportunity structure predicted 47%, 47%, 54%, and 47% of the variance in school-level passing rates in grade 3, 5, 8 and high school, respectively (see Table 2). For all grade levels, opportunities associated with financial, human, and cultural capital were consistently found to significantly predict school success. Although not as strong, opportunities associated with geographic capital were also found to significantly predict school success. The most consistent differences due to geographic capital were found between rural communities and those communities bordering a small metro area. Interestingly, the two extremes of geographic capital (rural, large metro) did not differ in predicting SOL performance.

Possible bias of the 25 individual SOL tests with respect to DOS was also analyzed. Here bias would be represented by interactions between level of capital and schools' success on the tests. For financial, human, and cultural capital, communities, and thus schools, were classified into high or low groups based on Virginia state-level measures (Bureau of the Census, 1992). The median-household income for Virginia is $33,328, thus, schools in communities with

Table 1
Descriptive Statistics for Variables

	N^a	*M*	*SD*
Measures of School Success			
Mean Composite SOL Score for Grade 3	956	50.00	9.47
Mean Composite SOL Score for Grade 5	937	50.00	9.29
Mean Composite SOL Score for Grade 8	325	50.03	9.33
Mean Composite SOL Score for High School	263	49.91	8.63
	N^b	*M*	*SD*
Measures of Capital			
Financial Capital			
(Median household income)	1560	32.49	13.20
Human Capital			
(Percent four-year degree or higher)	1560	0.21	0.15
Cultural Capital			
(Percent white {non-Hispanic})	1560	0.77	0.20
Geographic Capital	N^c	%	
(Geographic influence classification)			
Large Metro	618	39.6	
Small Metro	449	28.8	
Border Large Metro	77	4.9	
Border Small Metro	219	14.0	
Not Adjacent to Metro Area	197	12.6	

Note: [a]Represents the number of schools administering the specified exams. [b]Represents the total number of schools in the working sample. [c]Represents the number of schools in each classification.

median-household income greater than $33,328 were classified high financial capital, otherwise low financial capital. Similarly, schools were classified using state-level measures of human capital (P =.2448) and cultural capital (P =.7600). For geographic capital, schools in communities containing or adjacent to a metro area (classifications 1-4) were classified high on geographic capital and schools that were not adjacent to a metro area (i.e., rural or classification 5) were classified low on geographic capital. Average school passing rates for the 25 SOL tests[2] were calculated by level of capital (high, low) and for each of the four types of capital. These averages were then used to create a scatterplot in which each of the points in the plot represents one of the 25 SOL tests (Angoff, 1972; Angoff & Ford, 1973). The coordinates of each point represents the average passing rate for schools with high capital plotted against the average passing rate for schools with low capital for each test. A scatterplot for each of the four forms of capital is presented in Figure 1.

The shape of the scatterplot represents the level to which the two groups (schools with high or low capital) perform similarly on the tests. More specifically, if schools overall do not perform differently with respect to demographic opportunity variables the points in the plots would tend to cluster on or around the 45° line of the graph. However, if some of the tests function differently for the groups, that is, the tests tend to favor one group over another, there may be several points that stray significantly from the 45° line in favor of one group or another. Considering Figure 1, notice that *all* of the points in (a) and (b) are on the side of the 45° line favoring the group with higher capital, suggesting that schools with higher financial and human capital did significantly better on all the SOL tests. For cultural capital (Figure 1c) all of the points are on the side of the line favoring the high capital group. Notice, however, that four of the points (indicated by, Algebra II, Geometry, Writing, and World History to 1000), do not show significant mean differences across groups. Similar patterns are found for geographic capital (Figure 1d), with *all* the points on the side of the line favoring high capital schools and 21 out

Table 2
Regression of Mean Composite Score of School-Level Passing Rates for SOL Tests for Grades 3, 5, 8, and High School on Financial, Human, Cultural, and Geographic Capital

	Grade 3		Grade 5		Grade 8		High School	
	b	*B*	*b*	*B*	*b*	*B*	*b*	*B*
Financial	0.22	0.32***	0.20	0.30***	0.33	0.43***	0.16	0.23*
Human	14.18	0.23***	18.12	0.30***	16.51	0.24***	21.42	0.35***
Cultural	16.69	0.35***	14.06	0.30***	12.56	0.27***	15.54	0.34***
Geographic[a]								
Large Metro	.99	0.05	0.62	0.03	2.27	0.12	1.78	0.10
Small Metro	1.61	0.08	2.33	0.11**	2.67	0.13*	2.02	0.10
Border Large	3.24	0.07*	2.13	0.05	4.67	0.12**	4.12	0.12*
Border Small	2.60	0.09**	3.89	0.14***	4.07	0.15**	1.59	0.07
	F(7,948)=118.06*** R-Squared = .47		F(7,929)=116.85*** R-Squared = .47		F(7,317)=53.23*** R-Squared = .54		F(7,255)=31.77*** R-Squared = .47	

Note. *$p<.05$; **$p<.01$; ***$p<.001$; [a]These coefficients are compared to the group "not adjacent to a metro area" (i.e. rural).

of 25 tests possessing significant mean differences favoring schools with high capital (Earth Science, Biology, Chemistry, and World History to 1000 did not have significant differences). Overwhelming evidence suggests that on average, irrespective of grade level or content area, the SOL tests tend to be significantly harder for schools having lower levels of capital.

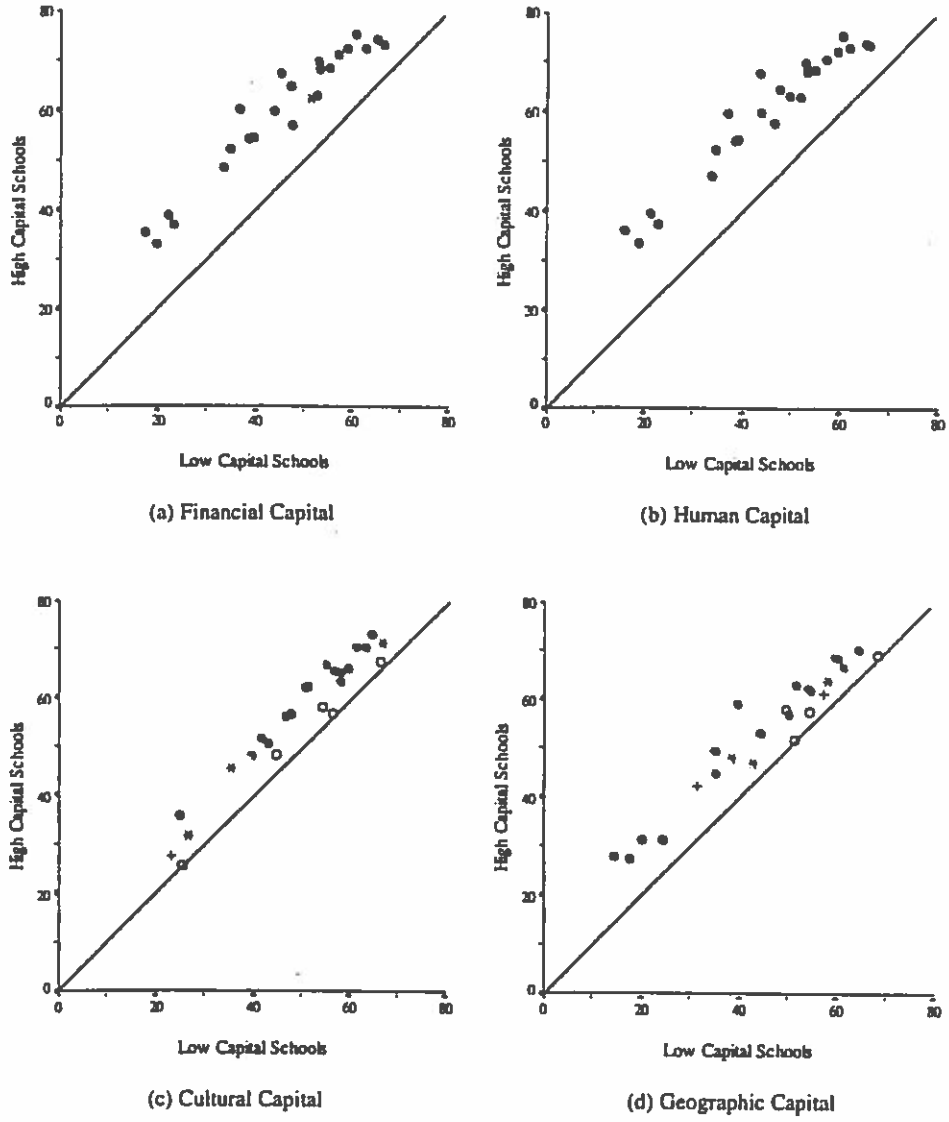
Discussion and Recommendations

Based on the results of this study, school-level success on the SOL tests can largely be predicted by the demographic opportunity structure of the surrounding community. Approximately half of the variance in school success on SOL tests was predicted by demographic opportunity structre alone and all of the tests were found to be significantly harder for schools in low capital communities. In essence, if a community is predominantly white, educated, financially secure, and close to an urbanized area, their schools have a greater likelihood of being successful on the SOL tests and will more than likely have little trouble attaining and maintaining accreditation. On the other hand, if a community is predominantly minority, less educated, and poor its schools have a greater likelihood of not being successful on the SOL tests and will more than likely have difficulty attaining and maintaining accreditation. These results suggest that school accreditation can be predicted without any knowledge of the educational opportunity structure within the schools.

Finding that community demographics strongly predicts school success on the SOL tests leads us to question the policy of accrediting schools based solely on the SOL tests results. In order to hold schools accountable for accreditation, it must be the case that they have control over the variables used to evaluate them for accreditation. Schools and teachers cannot control the background of the students that attend their schools because they cannot control demographic variables. Therefore, for the state department to hold schools accountable for scores that can be largely predicted by opportunities associated with demographics seems unfair.

This leads us to consider what would be fair standards on which to base school accreditation. As has been shown in analyses of U.S. data (e.g., Schmidt, et al., 1999; Schmidt, Wolfe, & Kifer, 1992), between-school differences account for much less than half of the variance in achievement. This suggests that much of the variance in achievement occurs within schools either between classrooms or students. Given that the present study was able to show that approximately 50% of the between-school variance can be attributed to the demographic opportunity structure of the surrounding community it seems that the focus of reform should be on within-school differences in opportunities for students. Sub-

Figure 1. Demographic Opportunity Structure



Average passing rates for schools with high versus low (a) Financial Capital (b) Human Capital (c) Cultural Capital, and (d) Geographic Capital. Each point in the scatterplot represents a single SOL test. Level of significance for mean differences between groups indicated by marker: • $p < .001$, *$p < .01$, + $p < .05$, O $p > .05$.

sequently, accreditation policy should be based on within-school measures of success.

School-level success on the SOL tests should only be a small part (if any) of the accreditation process and more emphasis should be placed on the opportunities that are available for students within schools. Although schools have little control over the demographic opportunity structure of the communities in which they reside, they do have control over maintaining the educational opportunity structures within the school. Instruction in the classroom, content taught in the classroom, as well as the expectations of teachers should have little to do with the demographic make up of the school, but instead should be developed and carried out based on sound pedagogical practices that give all students the necessary opportunities to learn. Every school should be held accountable for the level of instruction and curricula that is available within the school.

In conclusion, accreditation of schools should include standards that monitor the educational opportunities allocated within the school (Kreft, 1987; Madaus, et al., 1979; Wilkins, 1997). Such standards should encourage schools to continually strive for improvement of the educational opportunity structure, making sure that every student is given the opportunity to do the best that they can. With the inequities that have been shown in this study to exist across demographic opportunity structures it is unreasonable to accredit schools based solely on their success on the SOL tests.

References

Angoff, *W. H. (1972). A technique for the investigation of cultural differences*. A paper presented at the American Psychological Association Meeting, Honolulu, HA.

Angoff, W. H. & Ford, S. F. (1973). *Item-Race Interaction on a Test of Scholastic Aptitude. Journal of Educational Measurement*, 10, 95-106.

Barr, R. & Dreeben, R. (1983). *How schools work*. Chicago: University of Chicago Press.

Board of Education (1995). *Standards of learning for Virginia's public schools*. Richmond, VA: State Board of Education.

Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.) *Handbook of Theory and Research for the Sociology of Education*. New York: Greenwood Press.

Bureau of the Census (1992). *Census of Population and Housing, 1990*. Summary Tape File 3 [STF3B and STF3C]. Available Internet: http://www.census.gov/.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94 (Supplement), 94* S95-S120.

Crooke, J. (1999, January 23). Schools that passed SOL's have common characteristics. *Blacksburg Sentinel*, p. A1.

Cross, L. H. (1999). Are Virginiais Public Schools Failing? Assessing the Assessments. *Virginia Issues and Answers*, 6(1), 2-6.

Entwisle, D. R. & Astone, N. M. (1994). Some practical guidelines for measuring youth's race/ethnicity and socioeconomic status, *Child Development*, 65, 1541-1545.

Fore, L. C. (1998). Curriculum control: Using discourse and structure to manage educational reform. *Journal of Curriculum Studies*, 30 (5), 559-576.

Gamoran, A. (1987). The stratification of high school learning opportunities. *Sociology of Education*, 60, 135-155.

Gamoran, A. (1994). Schooling and achievement: Additive versus interactive models. In I. Westbury, C. A. Ethington, L. A. Sosniak, & D. P. Baker (Eds.), *In Search of a more effective mathematics education* (pp. 273-292). Norwood, New Jersey: Ablex Publishing Corporation.

Ghelfi, L. M. & Parker, T. S. (1997). *A county-level measure of urban influence* (Staff Paper No. 9702). Washington, DC: U.S. Department of Agriculture.

Guiton, G. & Oakes, J. (1995). Opportunity to learn and conceptions of educational equality. *Educational Evaluation and Policy Analysis*, 17(3), 323-336.

Hauser, R. M. (1994). Measuring socioeconomic status in studies of child development. *Child Development*, 65, 1521-1540.

Kreft, G. G. (1987). *Models and methods for the measurement of school effects*. Amsterdam: University of Amsterdam.

Logan, J. R. & Molotch, H. L. (1987). *Urban fortunes: The political economy of place*. Berkeley, CA : University of California Press.

Maduas, G. F., Kellaghan, T., Rakow, E. A., & King, D. J. (1979). The sensitivity of measures of school effectiveness. *Harvard Educational Review, 49*(2), 207-230.

National Commission on Excellence in Education (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: U. S. Government Printing Office.

Ogbu, J. U. (1994). Racial stratification and education in the United States: Why inequality persists. *Teachers College Record, 96*, 264-298.

Resnick, L. B. (1992). Standards, assessment, and educational quality. *Stanford Law and Policy Review, Winter 1992-1993*, 53-59.

Schmidt, W., McKnight, C. C., Cogan, L. S., Jakwerth, P. M., Houang, R. T. (1999). *Facing the consequences: Using TIMSS for a closer look at U. S. mathematics and science education*. Boston: Kluwer Academic Publishers.

Schmidt, W., Wolfe, R. G., & Kifer, E. (1992). The identification and description of student growth in mathematics achievement. In L. Burstein (Ed.), *The IEA Study of Mathematics III: Student Growth and Classroom Processes*. New York: Pergamon Press.

Turner, J. (1999, January 31) Success of SOLs correlates with family income in Roanoke. *The Roanoke Times*, p. B1.

Virginia Department of Education (January, 1999a). *Virginia department releases results from first SOL test administration* [On-line]. Available Internet: http://www.pen.k12.va.us/ VDOE/NewHome/pressreleases/

jan899.html.

Virginia Department of Education (January, 1999b). *Schools already meeting the criteria for full accreditation based on spring 1998 scores* [On-line]. Available Internet: http://www.pen.k12.va.us/VDOE/NewHome/pressreleases/jan899sch.html.

Virginia Department of Education (October, 1998). *Virginia board of education sets passing scores* [On-line]. Available Internet: http://www.pen.k12.va.us/VDOE/NewHome/ pressreleases/oct3098.html.

Virginia Department of Education (September, 1997). *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (8 VAC 20-131-10 et. seq.) [On-line]. Available Internet: http://www.pen.k12.va.us/VDOE/VA_Board/Standards/SOA/clensoa.html.

West, C. (1990). The new cultural politics of difference. In R. Ferguson, M. Gever, T. T. Minh-ha, & C. West (Eds.), *Out there: Marginalization and contemporary cultures*. Cambridge, MA: The MIT Press.

Wilkins, J. L. M. (1997). Modeling correlates of problem-solving skills: Effects of opportunity-to-learn on the attainment of higher-order-thinking skill in mathematics. (Doctoral Dissertation, University of Illinois at Urbana-Champaign, 1997) *Dissertation Abstracts International*, 58-06A, 2124.

Footnotes

[1] For Grade 3 the passing rates are as follows: 70% for English; 70% for mathematics; 50% for science; and 50% for history (VDOE, 1997).

[2] There are 14 SOL grade-level content tests: three grade levels (Grade 3, Grade 5, and Grade 8) x four content areas (math, science, English, history) plus writing tests in grades 5 and 8. In addition there are 11 end-of-course tests: Algebra I, Algebra II, Geometry, Earth Science, Biology, Chemistry, U.S. History, World History to 1000, World History from 1000, Writing, and English. There are also two Technology SOL tests in grades 5 and 8, however, they do not count for school accreditation.

[3] Median-household income was chosen instead of the often used percentage of students in a school that qualify for federally subsidized lunches because this later measure has been criticized for being unreliable and should only be used if other measures are unavailable (Hauser, 1994; Entwisle & Astone, 1994). This measure may underestimate the number of students who actually qualify, as many students who are eligible do not apply.

Author Note

The author would like to thank Michelle Wilkins for the many discussions that helped formulate the ideas in this paper and for reading and making suggestions for improvement on previous drafts. The author would also like to thank George Glasson, John Burton, Josiah Tlou, and Lawrence Cross for reading previous drafts of the paper and making suggestions for improvement.

Jesse L. M. Wilkins (Jay) is Assistant Professor of mathematics education in the Department of Teaching and Learning at Virginia Polytechnic Institute and State University, Blacksburg, VA.