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AUTHOR Lehnen, Robert G.; Lutz, Sabrina W. M.
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ABSTRACT

This paper examines the development of international education-policy indicators and some conceptual and methodological issues that shape how cross-national comparisons may be made. During the late 1980s representatives of education ministries and departments of the Organisation for Economic Cooperation and Development (OECD) member states initiated the Indicators of Education Systems Project (INES), the first system of comparative education policy indicators on education. The INES Project represents the single best source of international policy indicators today. The paper identifies issues in comparing states and nations, which include different locuses of policy decision making, variation among the study populations, and different contexts of educational environments. Factor analysis was used to examine the social context of American states and European nation-states with more centralized education policies. The data found a common social context characterized by violent death among youth, youth poverty, and teenage births. The American states were found to be more different than alike on the social context of education, and some eastern states appeared to be more like European countries than other states. The paper recommends that member OECD countries commit to complete reporting of at least the core education indicators. One figure and two tables are included. (Contains 27 references.) (LMI)

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Using International Education Policy Indicators to Inform State Education Policy

Robert G. Lehnken, Ph.D.

Director, SPEA Education Policy Office
School of Public and Environmental Affairs
Indiana University (IUPUI)

Sabrina W. M. Lutz

Principal Investigator, SPEA Education Policy Office
School of Education
Indiana University

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Using International Education Policy Indicators to Inform State Education Policy

The concept behind the use of indicators in international comparative research is the belief that policy makers can learn from the experience of other countries. Policy indicators and report cards are a widely used tools to shape or otherwise influence the public policy debate(Lehnen & McGregor, 1994). While critics argue that borrowing educational approaches around the world simply reinforces various kinds of cultural and economic dependencies (Arnone, 1982), there are a number of issues in education which would benefit from comparative inquiry. International comparisons of education do not provide recipes for immediate success, but they can illuminate problems with current educational practice and guide policymakers toward more viable options.

Questions of finance, teacher autonomy, decentralization versus centralization, lifelong education, opportunities for minority populations, and school choice options are present in one form or another in most organized systems of education around the world. More recently, arguments for collecting cross-national data have also been based on an internationally shared belief in the relationship between a nation's knowledge and skills and its economic competitiveness. In this context, a study by the Industrial Research and Development Advisory Committee of the Commission of the European Communities concluded that "the output of education and training systems... in terms of both quantity and quality of skills at all levels is the prime determinant of a country's level of productivity and hence competitiveness" (OECD, 1995, p. 45). As a result, there is growing pressure

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on national governments to monitor the level of skills produced by the educational system in comparison with those produced by other countries. Throughout the world, governments are looking for "measures" of the health of their systems (Westbury & Travers, 1990; Oakes, 1986) and education policy indicators have evolved out of this need.

International comparisons of education have traditionally focussed on national representativeness; however, educational policy in many countries is made and implemented at the state, provincial, or local level. The results of cross-national comparisons, therefore, often have little relevance to policy makers at those levels where policies must be designed and implemented. In this paper we will examine the development of international education policy indicators and some conceptual and methodological issues that shape how cross-national comparisons may be done.

What Are Education Policy Indicators?

Education policy indicators provide information on the performance or behavior of an education system. Their intent is to inform policy in the same way that economic and health policy indicators have done. Duncan MacRae, Jr. distinguishes a policy indicator from a broader class of social indicators as one that is "relevant to public policy choices made in view of ethical values" (1985, p. 35). He distinguishes policy indicators in the following ways:

- 1) they are designed to affect policy;

- 2) they are rooted in "intrinsic values" of the society;
- 3) they may be used to set national, state, or other public priorities;
- 4) they are used to evaluate system performance.

Education policy indicators in education thus provide an 'at a glance' profile of current conditions and are designed to give information to policy makers about the state of the education system, either to demonstrate its accountability or, more commonly, to help in analysis, evaluation and formulation of policy (Riley & Nuttal, 1994, p. 19). The important distinction then between policy and social indicators is that the former are rooted in values expressed through a political process and are focussed on valued outcomes. Innes (1990) argues that social indicators ultimately have their most important role to play in framing the terms of the policy discourse. Examples of intrinsic values in education held by many nation-states are equity in educational opportunity and the economic relevance of learning (economic competitiveness). In summary, education policy indicators are imbedded in the political processes of the nation-state, not set apart from them, and are used to: 1) identify the "policy problem" or question; 2) shape policy choices; 3) evaluate or monitor valued outcomes of policy; and 4) reformulate and redirect the policy discussion.

The Emergence of International Education Policy Indicators

The mid-1980s in the United States saw a change in the policy debate on education and the emergence of new policy indicators. The nation's governors working primarily through the National Governors Association (NGA) initiated a major change in the use of

education policy indicators to inform the policy debate on education. Prior to the 1980s many state governors opposed the use of state comparisons of education inputs, processes, and outputs because of the potentially unfavorable comparisons that such report cards might bring. By the 1980s however, many governors began to believe that state report cards comparing education were an effective tool to promote debates about education policies and ultimately education improvements. The first example of the use of education policy indicators reflecting this changed view of how report cards might promote education reform was the "wall charts" produced by the U.S. Department of Education from 1984 to 1989. (Ginsburg, Noell, & Plisko, 1988).

Though the wall charts were flawed in their execution, they were replaced by improved data systems, such as the state comparisons found in the National Assessment of Educational Progress (NAEP) and improvements in the Common Core of Data pertaining to school finance and enrollment statistics, produced by the National Center of Education Statistics (NCES). At present, however, the United States has no national system of state education policy indicators to replace or improve upon the wall charts concept, although it maintains data systems that report at the state level.

In the area of international education comparisons, the principle source of data since the 1960s have been the IEA studies. The International Assessment for the Evaluation of Educational Achievement (IEA) established in 1958 under the auspices of the UNESCO Institute of Education, serves as the coordinating body for the collection of international data on education. The focus of IEA research traditionally was the use of

cross-national comparisons to portray similarities and differences in education among nation-states, not the development of indicators relevant to policy. More recently, cross-national comparisons are being developed to portray similarities and differences in national education policy as well as its relative effectiveness (Schmidt & McKnight, 1995). Substantial improvements have been made in developing education indicators for policy purposes as opposed to research, but IEA studies still face limitations of timeliness and relevance to policy making.

The notion that policy is driven by questions coming from policy makers was, until recently, of little relevance for comparative educators. Future frameworks for the development of education policy indicators will very likely emerge increasingly from a policymaker's agenda as opposed to that of a research institution like IEA. As Carley observes, "There is a danger in developing indicators that are highly accurate but lose their relevance for policy questions because they ignored issues of relevance, timeliness, and comprehensibility" (1981, p. 166).

During the late 1980s representatives of education ministries and departments of the Organization for Economic Cooperation and Development (OECD) member states met in Lugano, Switzerland, to initiate the Indicators of Education Systems Project (INES). The INES Project has produced three reports entitled *Education at a Glance* (EAG) that report on the state of education in member countries. The INES Project represents a significant departure from other attempts at international comparisons because it creates the first system of comparative education policy indicators on education. These policy indicators

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represent a different approach because of the process used to define them as well as the methodology used to measure them.

The INES Project is organized around a system of networks lead by representatives of a member country. Network A, headed by the United States, is responsible for outcome measures. Network B addresses measures of the workforce and the economy and is lead by Sweden. Network C, directed by the Netherlands, develops measures of teachers and the school environment. Networks are the research and development side of the INES Project. They undertake the task of developing consensus among the member countries regarding the content and methodologies associated with new indicators.

INES has established a set of core indicators and continues to develop experimental ones. A quick review of the contents of the three *Education at a Glance* reports reveals the evolution of thinking in the construction of education policy indicators. The OECD/INES Project is credited (Riley & Nuttal, 1994) with raising the bar in developing high quality measures of education systems. It set three general benchmarks for adopting indicators: 1) indicators should measure common features of schooling; 2) indicators should measure enduring features of the school system so trends can be analyzed over time; 3) indicators should be readily understood by broad audiences (Riley & Nuttal, 1994, p. 11). The end result of the INES process is a set of education indicators that member states find informative to their policy concerns.

One of the original goals of the OECD's INES Project was to shorten the amount of time between publications and the reference year in measuring the indicators (OECD,

1993). One of the weaknesses of the IEA as a source of policy indicators has been its failure to produce timely information (see Table 1). The average lag time of 6 IEA studies conducted between 1964 and 1985 was 3.4 years, the Second International Science study taking the longest.

[INSERT TABLE I HERE]

INES-developed indicators also share a common methodology. A methodological group based at the OECD headquarters in Paris, in cooperation with the respective networks, establishes consistent operational definitions and provides quality control.

The INES Project indicators are not without significant problems. For example, the measurement of expenditures has proved to be an on-going issue, since the definition of total spending on education in member countries posed a number of definitional and methodological issues. Member countries finance their schools in many varied ways, and distinctions between public and private sources and public and private schools vary among countries. Establishing a consistent set of operational definitions has significantly improved the comparability of the expenditure data reported in EAG3 over those reported in EAG1.

To summarize, the INES Project represents the single best source of international education policy indicators today. These indicators measure what MacRae calls "intrinsic education values" defined by the policy process and are based on a common

methodology. They are produced in a timely fashion, and have evolved to meet the changing world of education policy.

Issues in Comparing States and Nations

The international education indicators included in *Education at a Glance* are compiled and reported at the nation-state level. Though such reporting is functional when comparing national economies, the traditional strength of OECD reports, such a policy often makes little sense where education is concerned. The reason is that the formation and execution of education policy in member states have, in the words of EAG, different "locuses of decision-making". Education policymakers in Indiana, for example, would very likely learn much more from a comparison of educational processes and outcomes with France, where education is organized under a central Ministry of Education, than with Germany, where education is primarily the responsibility of the individual laender (states).

Similarly, Belgium became a federal state in the 1970s, and the responsibility for making education policy was delegated among the language communities in 1988. Australia, another federally organized system of government, developed into a commonwealth when formerly independent penal colonies became states retaining the responsibility for providing education. Switzerland, a highly multicultural and multilingual society, is organized into 26 cantons, each with its own school law. As Switzerland has no federal ministry of education, there is also no direction from or education planning at the national level. Canada's system of education has the double responsibility of local

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control of education at the provincial level as well as a separate status, administratively and linguistically, for Quebec.

All of these countries, including the U.S., are analyzed by their expenditure on education, human resources, and student outcomes on the basis of national averages in international comparisons of education. While the results of comparisons of education at the nation-state level are interesting from a purely descriptive vantage point, they can not inform the education decision making processes in Swiss cantons, Australian states, Canadian provinces, or German laender. As a result, comparing data from a unitary state such as Sweden with a federal system, such as the United States, makes little conceptual sense from a policy evaluation perspective.

NCES, in the U.S. Department of Education, has recognized the need to produce disaggregated comparative policy data on U.S. education, and has reported education policy indicators at the level of the American states as well as the nation-state in its *Education in States and Nations* reports, (SN1, 1993; SN2, 1996). The SN1 and SN2 reports permit international comparisons of American states on a variety of measures for the first time (NCES, 1996, p.4). While SN1 and SN2 created a framework based on existing data sets for comparing states within an international context, little attention has been given to the appropriateness of those comparisons and the issues involved in making state-to-country comparisons. Because the focus of this paper is comparing American states to comparable countries using data from SN2, the federal states of Europe and Asia are excluded from the analysis. The excluded federal nation-states are Australia,

Canada, Germany, and Switzerland. Additionally, Belgium is excluded because it maintains separate systems of education based on language.¹

A second issue in comparing states and nations is the comparability of the study populations. Variation in study population definitions creates a lack of comparability among education systems. The SN2 data also includes achievement and other data from other international studies, particularly the International Assessment for Educational Progress (IAEP). The IAEP math achievement data includes widely different study populations. For example, the Swiss population of 13-year olds was restricted to 15 of 26 cantons, the former Soviet population was restricted to Russian speaking schools in 14 of the 15 republics, and the Israel sample population was restricted to Hebrew-speaking schools (Linn & Baker, 1995). For this analysis, national data that is not representative of the country as a whole are excluded from the analysis.

A third conceptual issue that shapes how international comparisons are made is that of adjusting for the educational environment or context in which education services are delivered. Discussion surrounding what or who to compare usually involves a debate about the appropriate focus for education indicators: outcome or performance indicators versus context indicators. For example, Richard Murnane (1987) argues against moving beyond outcome indicators as context data can be easily misinterpreted, and changes frequently over time due to new emphases in school activities and shifts in education reform. In contrast, Jeannie Oakes makes a strong case for including context indicators in comparative data if policy makers want monitoring and accountability systems that mirror

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the condition of education accurately, or data that is useful for making improvements (1987, p.182). Douglas Willms and Alan Kerckhoff (1995) argue "that the indicators we have usually used are too narrowly concerned with bottom-line variables and not sufficiently concerned with either the processes involved in generating the bottom-line or the subjective aspects of social life" (p. 116). To learn anything from international comparisons of education, context data becomes extremely important to help policy makers understand why states and countries get certain outcomes. In the analysis that follows, we will examine the social context of education for the American states and nation-states with more centralized education policy.

Methodology

The policy indicators in the SN2 report are grouped onto six categories: background, participation, processes and institutions, achievement and attainment, labor market outcomes, and finance. The background indicators are measures of the context of education, and include population and area, youth and population, gross domestic product per capita, youth poverty, teenage births, and youth violent deaths (NCES, 1996). The initial exploratory analysis to find a common social context dimension for education used six background indicators:

<i>Density:</i>	Persons per square mile, 1991
<i>Wealth:</i>	Gross domestic product or gross state product per capita, 1991
<i>Youth Poverty:</i>	Percentage of population age 17 years and younger in

	poverty, various years
<i>Teenage Births:</i>	Births to teenagers aged 15 to 19 years as a percentage of all births, 1990
<i>Youth Violent Deaths:</i>	Violent deaths per 1,000,000 youths ages 5 to 24, various years
<i>Youth Population:</i>	Percentage of population aged 5 to 29, 1991

A principle components factor analysis was used to determine whether a common dimension characterizing education context existed for the American states and nations.² The initial factor solution revealed two dimensions, one that may be characterized as a "social context" dimension comprising of the youth poverty, teenage births, and youth violent deaths variables, and the other as an "economic context" dimension comprising of the wealth and density variables. The youth population variable had no associations with either dimension. The initial solution contained seven nation-states and 51 American states including the District of Columbia. After excluding the youth population variable, we produced a second factor solution with 58 observations containing the social context and economic dimensions resulted. The results of this analysis are presented in Figure 1.

[INSERT FIGURE 1 HERE]

The issue of judging the comparability of nation-states and the American states on education context is clearly illustrated in Figure 1 of the factor scores plot. Most of the observations fall along a single social context dimension, but the District of Columbia and,

to a lesser extent, Alaska are different from the other states and nations on the economic dimension. Figure 1 suggests that the context of education in the District of Columbia is substantially different and should thus be excluded from further analysis.

The factor analysis was resubmitted with 57 observations (excluding the District of Columbia) producing a single social context dimension based on five variables. The data and factor scores are reported in Table 2. The factor loadings were youth violent deaths (0.84), youth poverty (0.80), teenage births (0.79), wealth (0.05), and density (-0.61). The squared multiple correlation of the five variables with the factor was 0.87.

[INSERT TABLE 2 HERE]

Analysis

The SN2 data show that although considerable variation exists in the variables comprising the background data, they share a common dimension labeled the Social Context of Education. This common dimension is most heavily defined by three characteristics, youth violent deaths, youth poverty, and teenage births. Density is inversely related to this dimension, meaning that countries with higher densities have better social context. Wealth (GDP/GSP per capita) does not correlate strongly with the Social Context dimension.

The ordering of states and countries on the Social Context dimension ranges from the Netherlands, which has the most favorable Social Context (score = -266) to the state

of New Mexico, which has the least favorable context (score = 193). In general, the seven European nations included in the analyses, the Netherlands, Denmark, Italy, France, Luxembourg, Ireland, and the United Kingdom, are at the positive end of the social context dimension, and American states in the southwest and south have the least favorable education context. New Jersey, Rhode Island, and several states in New England appear to be more like the seven European countries than like southern and southwestern American states. These states have factor scores equal to or less than -95.

Indiana is about average among the states and nations (score = 14).³ It appears with other Great Lakes, plains, and western states in the middle of the Social Context continuum. At the other end, Mississippi (score = 151) and Louisiana (score = 152) along with New Mexico have the least favorable social context for education.

The implications of the findings reported in Table 2 are significant for suggesting how comparative education policy analysis should be done. The variation in the social context of the Netherlands versus New Mexico raises questions about their comparability. If both are included in an analysis, the social context dimension should be included, since these conditions are highly correlated with other education policy indicators, such as outcomes and achievement, finance, and labor market outcomes.

Discussion and Conclusion

This analysis has demonstrated that comparisons of states and nations is not only feasible but also informative. Issues such as the legal-administrative context, or locus of

decision-making, must be considered in order to establish valid comparisons. Furthermore, the composition of study populations must be addressed to insure comparability. The value of the INES data is that they are based on common study populations. Finally, analyses of process and outcomes must also allow for the context of education because of the substantial variation among political entities responsible for education policy. As this analysis demonstrates, the American states are more different than alike on the social context of education, and some eastern states appear to be more like European countries than other states. In sum, the generalizability of outcome measures resulting from cross-national comparisons is highly dependent on the extent to which similarities between countries exist in the legal/organizational, economic, social and curricular contexts of education.

The analysis also reveals some important lessons on the politics of creating international education indicators. Because the OECD does not report state/provincial data for its member countries, the task falls to nation-states such as Australia, Belgium, Canada, Germany, and Switzerland to release their "states and nations" reports comparable to those produced by NCES. Otherwise, these nation-states will have questionable analyses made of their respective "national" systems that do not inform policymakers at the state, provincial, laender, or canton level. Only a continuing dialogue among OECD members can produce a better system of indicators that reflect the legal-administrative context of education.

The analysis was substantially affected by the unavailability of the most basic data

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supplied by the OECD countries. Data for a number of indicators was not collected from some countries as education ministries had not previously compiled all the information requested by the OECD. A review of the OECD countries with missing data on one or more of three variables used in this analysis showed that nine countries - Austria, Finland, Greece, Israel, New Zealand, Norway, Portugal, Spain, and Sweden - were excluded because of lack of information on one or more indicators of youth poverty, teenage births, or youth violent deaths. Six of the nine countries failed to report teenage births, four countries did not report youth poverty, and one, youth violent deaths. Had these nine countries reported fully, the richness of the state-nation analysis would be enhanced.

The value of the INES Project has been its development of a limited number of core indicators. Given the complexity of making meaningful international comparisons, not reporting even one core indicator has significant implications for the entire system of comparisons. We recommend that member countries commit to complete reporting of at least the core education indicators. Although national departments and ministries of education do not always have the capability of tracking individuals once they leave the education system, and thus frequently have to access statistics from departments of labor and employment, the ongoing development of national assessment infrastructures is an integral part of the process of creating meaningful education policy indicators.

In conclusion, the potential for using cross-national studies of education to inform education policy and influence education reform is improving. The breadth and depth of comparative data has evolved considerably. However, in order to prevent outcomes-

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based interpretations of international education indicators, and to improve their usefulness for policymaking, researchers conducting cross-national comparisons of education need to continue to improve the relevance and consistency of the data. The challenge for creators of new education policy indicators as well as policymakers using the data is to ensure that cross-national studies continue to draw on a plurality of methods and traditions while discovering new ways to quantify those kinds of learning for which good measures have not yet been found (NRC, 1993).

Reference List

- Arnone, R. (1982). *Comparative education*. New York: Macmillan.
- Blank, R. (1993). Developing a system of education indicators: Selecting, implementing, and reporting indicators. *Educational Evaluation and Policy Analysis*, 15,(1), 65-80.
- Bottani, N. (1990). The background of the CERI/OECD Project on international educational indicators. *International Journal of Educational Research*, 14 (4), 335-342.
- Carley, M. (1981). *Social measurement and social indicators: Issues of policy and theory*. London: George Allen and Unwin.
- Ginsburg, A., Noell, J. & Plisko, V. (1988). Lessons from the wall chart. *Educational Evaluation and Policy Analysis*, 10(1), 1-12.
- Innes, J. (1990). Disappointments and legacies of social indicators. *Journal of Public Policy*, 9 (4).
- Lehnen, R. & McGregor, E. (1994). Human capital report cards for American states. *Policy Sciences*, 27, 19-35.
- Mislevy, R. (1995). "What can we learn from international assessments?" *Educational Evaluation and Policy Studies*, 17 (4).
- MacRae, D. (1985). *Policy indicators: Links between social sciences and public debate*. Chapel Hill, NC: The University of North Carolina Press.
- Murnane, R. (1987). Improving education indicators and economic indicators: The same problems?. *Educational Evaluation and Policy Analysis*, 9 (2), 101-116.
- National Center for Education Statistics. (1993). *Education in states and nations: indicators comparing U.S. states with the OECD countries in 1988*. Washington, DC: OERI.
- National Center for Education Statistics. (forthcoming). *Education in states and nations: Indicators comparing U.S. states with the OECD countries in 1991*. Washington, DC: OERI.
- National Research Council and Board on International Comparative Studies in Education. (1993). *A collaborative agenda for improving international comparative studies in education*. Washington, D.C.: National Academy Press.

- Nuttall, D. (1990). "The functions and limitations of international education indicators," *International Journal of Educational Research.*, 14 (4).
- Oakes, J. (1989). What educational indicators? The case for assessing the school context. *Educational Evaluation and Policy Analysis*, 11 (2), 181-199.
- Oakes, J. (1986). *Educational indicators: A guide for policymakers*. Santa Monica: Center for Policy Research in Education.
- Organization for Economic Cooperation and Development, (1995). *Measuring what students learn*. Paris: OECD Publications.
- Organization for Economic Cooperation and Development, (1993a). *Education at a glance*. Paris: OECD Publications.
- Organization for Economic Cooperation and Development, (1993b). *Curriculum reform: Policies, practices and plans for the future*. Paris: CERI, (Governing Board Draft).
- Organization for Economic Cooperation and Development, (1992). *OECD Definitions for education indicators*. Paris: (Working Paper).
- Organization for Economic Cooperation and Development. (1991). *Handbook on international education indicators*. Paris: OECD Publications
- Riley, K. & Nuttal, D. (1994). *Measuring quality*. London: Falmer Press.
- Rotberg, I. (1990). I never promised you first place. *Phi Delta Kappan*, December, 296-303.
- Schmidt, W. & McKnight, C. (1995). Surveying educational opportunity in mathematics and science: An international perspective. *Educational Evaluation and Policy Analysis*, 17 (3), 337-353.
- United States Department of Education (U.S. DOE) (1984-89). State education indicators (wall chart). Washington, DC: United States Department of Education.
- Westbury, I. & Travers, K. (1990). *Second international mathematics study*. Urbana: Illinois University, College of Education.
- Willms, J. D., & Kerckhoff, A. (1995). The challenge of developing new educational indicators. *Educational Evaluation and Policy Analysis*, 17 (1), 113-131.

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Table 1. An overview of IEA Studies

Name of Study	Study Date	Publication Date	Lag time/ yrs.
Math I	1964	1967	3
Science I	1970	1973	3
Math II	1982-1983	1985	2
Science II	1983-1984	1992	6
Composition I	1984-1985	1988	3
Math/Science III	1993-1995/1997-2000	-	-
		Average lag time -	3.4 yrs

Table 2: The Social Context of Education in 50 American States and 7 Nation-states: Based on Population Density, Wealth, Youth Poverty, Teenage Birth Rate, and Youth Violent Deaths

Nation or state	Population Density	Wealth	Youth Poverty	Teenage Births	Youth Violent Deaths	Social Context Factor 1
Netherlands	1,146	16,524	6.2	1.6	171	-266
Denmark	314	17,142	3.3	2.6	284	-178
Italy	509	16,543	9.6	3.7	232	-163
France	269	17,763	6.5	2.5	342	-141
New Jersey	890	26,963	13.4	4.1	352	-118
Luxembourg	389	21,075	4.1	3.0	436	-116
Rhode Island	650	20,915	14.0	4.5	304	-112
Ireland	131	16,918	12.0	5.0	246	-107
United Kingdom	617	15,845	9.9	7.9	235	-100
New Hampshire	118	21,537	8.7	3.4	375	-99
Connecticut	594	28,570	10.2	3.9	420	-95
Massachusetts	568	25,586	15.9	3.6	360	-95
Utah	21	17,761	12.1	4.3	345	-67
Vermont	59	19,943	13.2	3.5	398	-65
Iowa	50	20,201	12.3	4.1	416	-52
Nebraska	21	21,150	14.4	4.2	408	-43
Wisconsin	76	20,568	12.7	4.3	438	-40
Pennsylvania	260	20,589	16.2	4.5	423	-36
Minnesota	51	22,858	18.5	3.6	413	-35
North Dakota	9	18,915	15.5	3.6	441	-33
Ohio	244	20,478	17.3	5.8	367	-32
Hawaii	104	25,856	17.4	6.1	347	-31

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State	Population	Density	Wealth	Youth Poverty	Teenage Births	Youth Violent Deaths	Social Context (Factor 1)
Delaware	273	29,471	11.7	5.5	472	-28	
Virginia	147	22,896	14.4	5.3	425	-27	
Washington	70	22,470	12.5	5.3	445	-24	
New York	331	25,949	22.5	4.4	439	-10	
Maryland	392	22,709	14.5	5.4	503	-7	
Kansas	30	20,626	13.9	5.6	461	-3	
Maine	35	18,947	18.7	4.3	456	-3	
Colorado	32	21,697	17.1	5.5	448	4	
Indiana	154	20,175	18.9	5.9	451	14	
South Dakota	9	18,790	17.1	4.7	512	19	
Oregon	30	19,502	14.3	5.5	525	22	
Illinois	199	23,812	20.9	6.3	460	28	
Wyoming	5	27,740	12.6	5.6	569	30	
Montana	5	16,685	20.7	4.8	500	33	
Michigan	87	20,230	20.5	6.0	484	38	
Missouri	74	20,261	18.4	6.3	498	40	
North Carolina	125	21,293	18.9	6.8	488	43	
Oklahoma	45	17,806	21.7	6.7	457	48	
Idaho	12	18,426	17.0	5.0	584	51	
California	186	25,024	21.7	7.1	495	58	
Nevada	12	25,581	14.2	7.3	577	67	
Kentucky	92	18,315	23.2	6.8	493	68	
West Virginia	74	15,790	26.4	5.8	507	74	
Texas	65	21,898	24.1	7.6	525	96	
Florida	202	18,907	22.9	6.9	610	107	
Alabama	78	17,408	24.6	7.2	560	107	
Alaska	1	47,764	13.9	6.5	750	108	
Georgia	111	21,129	24.3	7.6	577	115	
Arizona	33	18,353	22.1	7.6	589	115	
Tennessee	118	19,571	25.8	7.3	571	115	
South Carolina	111	18,284	23.9	7.2	595	115	
Arkansas	45	16,477	24.9	8.0	548	119	
Mississippi	54	15,476	33.9	8.2	519	151	
Louisiana	82	21,536	32.8	7.5	574	152	
New Mexico	13	17,615	28.7	7.8	701	193	

Density: Persons per square mile, 1991

Wealth: Gross Domestic Product/Gross State Product per capita (in US \$), 1991

Youth Poverty: Percentage of population age 17 years or younger in poverty, various years

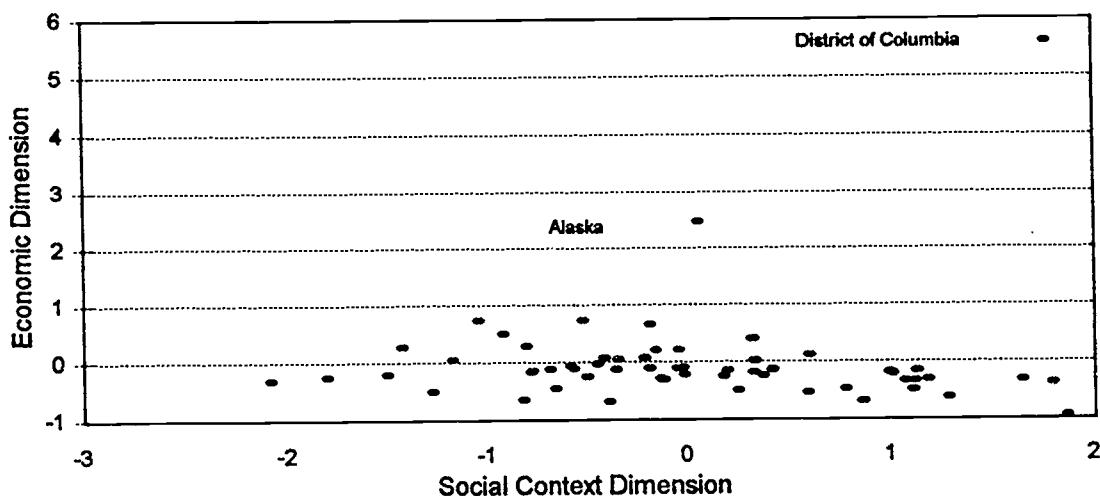
Teenage Births: Births to teenagers aged 15 to 19 years as percentage of all births, 1990

Youth Violent Deaths: Violent deaths per 1,000,000 youths ages 5 to 24, various years

Social Context: Factor score (x 100) based on 5 variables

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Figure 1: Two Dimensions
of the Educational Environment



Endnotes

1. *Education at a Glance* recognizes the language differences of Belgium education and reports some indicators separately for French- and Flemish-speaking areas, but the SN2 report does not disaggregate the Belgium data.
2. The factor analysis procedure in the computer software SAS was used to analyze these data. A minimum Eigenvalue ≥ 1 was the criterion for determining the number of dimensions in the factor space. Orthogonal rotation was used to finalize the solution.
3. A factor score equal to 0 is average.