

## LPO 3910

### Modeling the Context of Educational Organizations

Fall 2004

Mondays, 4:00-7:00 in Payne 006 (4-5pm) and Hobbs 107 (5:15-7pm)

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#### Course Description

This graduate seminar will examine school systems as complex organizations, emphasizing their hierarchical and stratified nature, including the “nested layers” of classrooms, schools, and districts, and the stratified divisions within school systems such as selective schools, tracks, and ability groups. In the course, students will explore the methodological challenges and substantive implications of organizational context for understanding the effects of schools and schooling on student outcomes. Substantively, we will begin with the literature on school effects, moving from early input-output studies to current research that examines the organizational context of schools. We will also examine the impact of stratification within and between schools, focusing on selection processes as well as outcomes. Next, we will consider stratification and hierarchy in light of current policy issues such as standards and accountability; gender, race, and SES differences in achievement growth; decentralization and teacher empowerment; dropping out of school; and class size. Methodologically, we will explore statistical packages designed to address the hierarchical organization of school systems through *multilevel models* (e.g., HLM). Substantive and methodological issues will be integrated through seminar discussions, hands on work in the computer lab, student presentations, and seminar papers.

Students are advised that LPO 3460 (Regression Analysis), Sociology 311 (Multivariate Analysis II), or an equivalent course (statistics through at least ordinary least squares regression) is necessary for adequate preparation for this course.

#### Introduction to HLM

HLM stands for *hierarchical linear modeling*, which is a type of model used for analyzing data in a clustered or nested structure. An example of such data is students who are nested within classrooms, which are nested within schools. In this situation, we would expect that students within a cluster, such as a classroom or school, would share some similarities due to their common environment. This commonality leads to a violation of the “independence” assumption of the error structure when applying Ordinary Least Squares (OLS) regression models. Hierarchical linear modeling is also known as *multilevel models*, *random coefficient models*, or *random effects models* and is a means to deal with, and take advantage of, clustered data. HLM can be used to analyze a variety of questions with either categorical or continuous dependent variables, with single or multiple observations.

### **Course Requirements**

Students will be expected to read assigned material, take part in in-class discussions on substantive topics, lead discussion on assigned papers, complete computer exercises, present work in progress to the class, and write a seminar paper. The course grade will be based on an evaluation of the seminar paper, and satisfactory performance on the other requirements.

### Seminar Leader

The quality and effectiveness of the seminar portion of this course will depend much on your input as a careful reader of assigned materials, participant and leader of discussions, and, ultimately, contributor of original research through your seminar paper. Fifteen percent of your grade will be based on your performance as a discussion leader, plus your contributions to discussions and to questions for discussions. Students will be asked to take substantial responsibility for class sessions. As we progress through the term, each of you will be asked to serve in the role of discussion leader for the week. This will involve a short summary of the main research questions addressed in the readings, as well as the methodology that the authors used to answer these questions. Then the discussion leader will organize the discussion. As we only have an hour for the substantive part of the course each week, the discussion leader's responsibility is to maximize the effective use of this time. We will set a schedule for discussion leading in the first class. Each of you will be asked to submit questions to me and to the discussion leader, via email, no later than noon on Sunday before each class session. The discussion leader will refine and organize questions and provide seminar participants with an outline of the main research questions, variables used and created in the analysis, a description of the sample, and a summary of the methods used and conclusions drawn. More detail on this will be provided in class

### Homework Assignments

There will be 8 homework assignments, comprising 20 percent of your grade. Each assignment provides an opportunity for you to practice the techniques that we discuss in class using the HLM software. I believe that it is important to put what you learn into immediate practice, well in advance of completing the unguided analyses that will comprise your seminar paper. The datasets that you will be analyzing for these assignments either come with the Student Version of the HLM software or will be posted on Prometheus. You should be able to complete the assignments using the Student Version of HLM (i.e., on your own computer). The assignments will be due at 9am, the Monday following their assignment so that I can review them and return them in class that day. As a rule, I will not accept or review late assignments, but if you have extenuating circumstance I will consider them.

### Seminar Paper and End of Term Presentation

Students will be expected to write and present a seminar paper in which they:

1. identify a research problem that can be studied through hierarchical analysis,
2. review the relevant literature and discuss what is known and not known about the problem,
3. select an existing hierarchical dataset that can be used to study the problem,
4. appropriately describe variables that will be constructed for use in the analysis,
5. develop appropriate HLM models to test hypotheses generated from the literature review,
6. test the models using the HLM program, and
7. describe and interpret the results.

The seminar paper should be of a quality that would warrant presentation and distribution at a professional conference (AERA, ASHE, ASA, AEFA, etc.). You are encouraged to explore more deeply one of the substantive topics that we address in class, although alternate topics will be allowed if approved in advance. In addition to the seminar paper, students will make a 15 minute conference-quality presentation of their project at the end of the semester. An overhead projector and/or PowerPoint projector will be available for this purpose.

Before undertaking data analysis for this project, students shall complete a literature review and write up and turn in for approval a project proposal that addresses the first five questions above. I would be happy to meet with you to discuss your paper. I also have a number of large datasets available for you to use (National Educational Longitudinal Study of 1988; Third International Mathematics and Science Study, Schools and Staffing Survey, Early Childhood Longitudinal Study, as well as others). This “project proposal” will be due **October 8** and will be worth 25 percent of your grade. It should be 8-10 pages double spaced and should describe in detail the data you will plan to use, as well as some of the hypotheses you plan to test (as well as the equations that you plan to model using HLM). The final project paper is due Thursday, December 13. If you are not knee deep in your analyses by Thanksgiving, you will probably run out of time, do a “rush job”, and accept a lower grade in the course. This paper should be 15-20 double-spaced pages, *plus* tables, figures, and references.

### Software

We will use the computer program, HLM, for this course. Additional information about the software and HLM in general can be found at the website for Scientific Software International (<http://www.ssicentral.com/hlm/hlm.htm>). The company provides a free student-version of the software (<http://www.ssicentral.com/other/hlmstu.htm>). The student version of the software contains most of the datasets we will use as examples in class and the on-line help function contains most of the information available in the HLM5 Manual referenced in the Course Readings (so you don't need to buy it).

## Course Readings

The Coleman and Barr and Dreeben readings for week 2 will be posted on Prometheus. The remaining articles are available through e-reserves at the Peabody Library (see link below). In addition, the following books (except Millman) have been ordered at the University Bookstore and a copy of each will be on reserve at the Peabody Library (The materials are available on the shelf in the AV room).

Rebecca Barr and Robert Dreeben, *How Schools Work* (Chicago: University of Chicago, 1983). [3 copies on reserve at the Peabody Library]

Stephen W. Raudenbush and Anthony S. Bryk and, *Hierarchical Linear Models*, second edition, (Sage, 2002).

\*\*Millman, Jason (ed.). 1997. *Grading teachers, Grading Schools: Is Student Achievement a valid evaluation measure?* Thousand Oaks CA: Corwin. pp. 3-8, 73-181 [2 copies on reserve at the Peabody Library]

\*\*Stephen W. Raudenbush, Anthony S. Bryk, and Richard Congdon, *HLM6: Hierarchical Linear and Nonlinear Modeling* (Chicago: Scientific Software International, 2004). Has been ordered by the bookstore, but may not be published until September 2004.

\*\*Tom Snijders and Roel Bosker, *Multilevel Analysis* (London: Sage 1999).

The articles listed in the outline are available on ereserve

[http://eres.library.vanderbilt.edu/cgi-bin/viewcourse.pl?LPO3910\\_SMITH](http://eres.library.vanderbilt.edu/cgi-bin/viewcourse.pl?LPO3910_SMITH)

The password is smit3910

\* \*indicates supplemental book, not required.

**LPO 3910—Fall 2004**  
Schedule of topics and reading List

Notes: Substantive readings must be completed in advance of the class session date listed. It is recommended that you skim the methodological reading in advance of class and return to them in greater detail after they are introduced in class.

Supplemental readings indicated by \*\*.

**Week 1 (August 30)**

Introduction

Methodological problems addressed by HLM  
What do you want to get out of this course?

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, Chapter 1

**Week 2 (September 6)**

*Substantive topic: School effects*

Coleman, J. S. *Equality and Achievement in Education*, chapter 2, skim chapters 6-11.  
[\[ON Prometheus\]](#)

Barr and Dreeben, *How Schools Work*, chapters 1-2, 6. [\[ON Prometheus\]](#)

Gamoran, A, Secada, W. G. & Marrett, Cora B. (2000). "The Organizational Context of Teaching and Learning: Changing Theoretical Perspectives" in Hallinan, M. T. (ed.) *Handbook of the Sociology of Education*. New York: Kluwer Academic/Plenum Publishers.

\*\* Bidwell, C. E. & Kasarda, J. D. (1980). "Conceptualizing and Measuring the Effects of School and Schooling." *American Journal of Education*, 88, 401-430.

\*\*Dreeben, R. (2000). "Structural Effects in Education: History of an Idea," in Hallinan, M. T. (ed.) *Handbook of the Sociology of Education*. New York: Kluwer Academic/Plenum Publishers.

\*\*Greenwald, R., Hedges, L. & Laine, R. D. (1996) The Effects of School Resources on Student Achievement. *Review of Educational Research* 66: 361-396.

\*\*Sorensen, A, B. & Morgan, S. L. (2000). "School Effects: Theoretical and Methodological Issues" in Hallinan, M. T. (ed.) *Handbook of the Sociology of Education*. New York: Kluwer Academic/Plenum Publishers.

\*\* Heyns, B. *Summer Learning and the Effects of Schooling* (New York: Academic

Press, 1978).

\*\* Entwisle, D. Alexander, K. L. & Olson, L. S. *Children, Schools, and Inequality*

\*\*Bryk, A. S. & Raudenbush, S. W. (1988). "Toward a More Appropriate Conceptualization of Research on School Effects: A Three-Level Linear Model." *American Journal of Education*, 97, 65-108 (1988).

*Methodological topic: The logic of hierarchical linear models*

Oneway ANOVA with random effects

Group means as outcomes

The contextual effects model

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, chapters 2, 4.

Bryk, Raudenbush, and Congdon, *HLM5*, chapters 1-2 (pp. 1-40).

### **Week 3 (September 13)**

#### **Exercise 1 (Minority Gap in Achievement) Distributed, due by 9am September 20**

*Substantive topic: Organizational Effects*

Rowan, B. (1990). "Commitment and Control: Alternative Strategies for the Organizational Design of Schools." In C. Cazden (Ed.), *Review of Research in Education*, vol 16 (Washington, DC: AERA 1990).

Bryk, A. S., and M. E. Driscoll. (1988). "The High School as Community: Contextual Influences and Consequences for Students and Teachers." Madison, Wisconsin: National Center on Effective Secondary Schools, University of Wisconsin, 1988. ED 302 539.

Rowan, B., Raudenbush, S. W. & Kang, S. J. (1991) "Organizational Design in High Schools: A Multilevel Analysis." *American Journal of Education*, 99, 238-266.

\*\* Meyer, J. & Rowan, B. (1978). "The Structure of Educational Organizations." In M. Meyer and Associates, *Environments and Organizations* (San Francisco: Jossey-Bass).

\*\* Barr and Dreeben, *How Schools Work*, chapters 3-5.

\*\*Weick, K. (1976). "Educational Organizations as Loosely Coupled Systems." *Administrative Science Quarterly*, 21, 541-552.

*Methodological topic: Applications of hierarchical linear models in organizational research*

Unconditional model or the random coefficient model

Multilevel interactions or Slopes as outcomes models

Formulating models

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 5 (pp. 99-117).

#### **Week 4 (September 20)**

##### **Exercise 2 (Impact of content coverage on achievement) Distributed, due by 9am September 27**

*Substantive topic: Stratification between schools*

Lee, V., & Bryk, A. (1989). A multilevel model of the social distribution of educational achievement. *Sociology of Education*, 62, 172-192.

Gamoran, A. (1996). "Student Achievement in Public Magnet, Public Comprehensive, and Private City High Schools." *Educational Evaluation and Policy Analysis*, 18, 1-18.

\*\*Bryk, A., Lee, V. E., & Holland, P. B. (1993). *Catholic Schools and the Common Good* Cambridge, MA: Harvard.

\*\*Buchmann, C., & Hannum, E. (2001). "Education and Stratification in Developing Countries: A Review of Theories and Research." *Annual Review of Sociology*, 27, 77-102 (2001).

\*\*Rohlen, T. P. (1983). *Japan's High Schools*. Berkeley, CA: University of California Press.

\*\*Chubb, J. & Moe, T. M. (1990). *Politics, Markets, and America's Schools* (Washington, DC: Brookings Institution).

*Methodological topic: Applications of hierarchical linear models in organizational research (continued)*

Centering measures in multilevel models  
 Within, between and contextual effects  
 Multiparameter tests  
 Multivariate hypothesis testing

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 5 (pp. 117-159).

#### **Week 5 (September 27)**

##### **Exercise 3 (College quality and future earnings) Distributed, due by 9am October 4**

*Substantive topic: Organizational effects in higher education*

Ethington, C. A. (1997). A Hierarchical Linear Modeling Approach to Studying College Effects in Smart, J. C. (ed.) *Higher Education: Handbook of Theory and Research Volume XII*. New York: Agathon Press, pg. 165-194.

Anderson, M. S., Louis, K. S., & Earle, J. (1994). Disciplinary and Departmental Effects on Observations of Faculty and Graduate Student Misconduct. *The Journal of Higher Education* Vol. 65 Iss. 3; pg. 331-350.

Keith, B. (1999). The institutional context of departmental prestige in American higher education. *American Educational Research Journal*, Vol. 36., No. 3, pp. 409-445.

\*\*Rumberger, R.W. and S.L. Thomas (1993), The Economic Returns to College Major, Quality and Performance : a Multilevel Analysis of Recent Graduates, *Economics of Education Review* 12, 1-19.

\*\*Marsh, H. W. & Hattie, J. (2002). The relation between research productivity and teaching effectiveness: Complementary, antagonistic, or independent constructs? *The Journal of Higher Education* Vol. 73, Iss. 5; pg. 603-641.

*Methodological topic: Applications of hierarchical linear models in organizational research (continued)*

Model building strategies in HLMs

Exploratory analysis of potential level 2 predictors (approximate “t” to enter)

Testing homogeneity of level-1 variances

Modeling heterogeneity of level-1 variances

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 5 (pp. 117-159).

#### **Week 6 (October 4)**

No exercise distributed. Proposal for term project due October 8 by 5pm.

*Substantive topic: Curricular differentiation and tracking*

Gamoran, A. (1992). The Variable Effects of High School Tracking *American Sociological Review*, 57(6), (Dec.), pp. 812-828.

Pallas, A. M., Entwisle, D. R., Alexander, K. L., & Stluka, M. F. (1994). Ability-Group Effects: Instructional, Social, or Institutional? *Sociology of Education*, 67(1), (Jan.), pp. 27-46.

Lee, V. E, Croninger, R. G., Smith, J. B. (1997). Course-taking, equity, and mathematics learning: testing the constrained curriculum hypothesis in U.S. secondary schools. *Educational Evaluation and Policy Analysis*, 19, Summer pp 99-121.

*Methodological topic: Modeling individual change over time*

Modeling change over time for one individual: The Level 1 model

Modeling change over time for J individuals: The Level 2 model

Readings: Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 5 (pp. 161-185).

**Week 7 (October 11)**

**Exercise 4 (Growth in attitudes favoring deviant behavior) Distributed, due by 9am October 25**

*Substantive topic: Factors underlying variation in achievement growth*

Gamoran, A., Porter, A. C., Smithson, J., & White, P. A. (1997). Upgrading high school mathematics instruction: Improving learning opportunities for low-achieving, low-income youth. *Educational Evaluation and Policy Analysis*, 19(4) Winter. p. 325-38.

Alexander, K. L., Entwisle, D. R., & Olson, L. (2001). Schools, achievement, and inequality: a seasonal perspective. *Educational Evaluation and Policy Analysis*, 23(2) Summer. p. 171-91.

\*\*Muller, P. A; Stage, F. K.; Kinzie, J. (2001). Science achievement growth trajectories: understanding factors related to gender and racial-ethnic differences in precollege science achievement. *American Educational Research Journal*, 38(4), Winter 2001. pp 981-1012.

\*\*D'Agostino, J. V., Borman, G. D., Hedges, L. V., Wong, K. K. (1998). "Longitudinal Achievement and Chapter I Coordination in High-Poverty Schools: A Multilevel Analysis of the Prospects Data." *Journal of Education for Students Placed at-Risk*, 3(4), pp 401-420.

*Methodological Topic: Multi-level applications to repeated measures*

Possible bias in studying time-varying covariates

Piecewise linear growth models

**Week 8 (October Break—No Class October 18)**

**Week 9 (October 25)**

**Exercise 5 (Math Achievement Growth Among High and Low Poverty Kids) Distributed, due by 9am October 25**

*Substantive Readings: Growth modeling grab bag*

Murnane, R. J., Willett, J. B., & Boudet, K.P. (1999). Do male dropouts benefit from obtaining a GED, postsecondary education, and training? *Evaluation Review*, Vol. 23 No. 5, October, pp. 475-502.

Osgood, D.W., & Smith, G.L. (1995). Applying hierarchical linear modeling to extended longitudinal evaluations: The Boys Town Follow-up Study. *Evaluation Review*, 19, pp 3-38.

*Methodological Topic: Multi-level applications to repeated measures*

- Modeling alternative covariance structures

### **Week 10 (November 1)**

**Exercise 6 (Retention and math achievement growth) Distributed, due by 9am November 8**

*Substantive topic: School-level accountability* (Guest speaker: Prof. Dale Ballou)

Sanders, W. et al. (1999). The Tennessee Value-Added Assessment System: A Quantitative, Outcomes-Based Approach to Educational Assessment in Millman, J. (ed.). *Grading teachers, Grading Schools: Is Student Achievement a valid evaluation measure?* Thousand Oaks CA: Corwin. pp. pp 137-162.

Raudenbush and Willms. 1995. The estimation of school effects. *Journal of Educational and Behavioral Statistics*, 20(4), 307-335. (Lots of equations – skim)

*Methodological Topic: Assessing the Adequacy of Hierarchical Models*

Assessing distributional assumptions via residual analysis  
Model building

Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 9  
Bryk, Raudenbush, and Congdon, *HLM5*, pp. 41-45, 100-103.

### **Week 11 (November 8)**

**Exercise 7 (Organizational factors predicting teacher turnover) Distributed, due by 9am November 15**

*Substantive topic: Teacher empowerment /Decentralization*

Rowan, B., Raudenbush, S., & Cheong, Y.F. (1993). Teaching as a nonroutine task: Implications for the management of schools. *Educational Administration Quarterly*, 29(4), 479-500.

Marks, Helen M; Louis, Karen Seashore. (1997). Does teacher empowerment affect the classroom? The implications of teacher empowerment for instructional practice and student academic performance. *Educational Evaluation and Policy Analysis*, 19, Fall.. pp 245-275.

Ingersoll, Richard. (2001). “Teacher Turnover and Teacher Shortages: an Organizational Analysis” *American Educational Research Journal*, 38(3), pp 499-534.

\*\*Lee, Valerie E; Loeb, Susanna; Marks, Helen M. (1995). Gender differences in secondary school teachers' control over classroom and school policy. *American Journal*

of *Education*, 103, May. pp 259-301.

*Methodological topic: Hierarchical Generalized Linear Models*

Two-level HLM as a special case of HGLM (sampling model, link function, structural model)

Binary outcomes

Population average and unit specific models

Modeling count data

Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 10 (pp. 291-317)

Bryk, Raudenbush, and Congdon, *HLM5*, pp. Chapters 5 & 6 (pp. 111-118; 128-131; 133-148)

**Week 12 (November 15)**

**Exercise 8 (Individual and organizational predictors of college attendance) Distributed, due by 9am November 29**

*Substantive topic: School organization and “dropping out”*

Bryk, A. S. & Thum, Y. M. (1989). The Effects of High School Organization on Dropping Out: An Exploratory Investigation. *American Educational Research Journal*, 26, pp 353-384.

Rumberger, R. W. (1995). Dropping out of middle school: a multilevel analysis of students and schools. *American Educational Research Journal* , 32, pp. 583-625.

\*\*Riehl, C. (1999). “Labeling and letting go: An organizational analysis of how high school students are discharged as dropouts.” In Pallas A.M. (ed) *Research in Sociology of Education and Socialization*, vol 12. Stamford, CN: JAI Press: pp 231-268.

*Methodological topic: Hierarchical Generalized Linear Models (Continued)*

Ordinal and Multinomial data

Raudenbush and Bryk, *Hierarchical Linear Models*, chapter 10 (pp. 317-333)

Bryk, Raudenbush, and Congdon, *HLM5*, pp. Chapters 5 & 6 (pp. 150-163)

**Week 13 Thanksgiving Break (No class November 22)**

**Week 14 (November 29)**

*Substantive topic: Class size*

Ehrenberg, R., Brewer, D., Gamoran, A. & Willms, J. D. (2001). Class Size and Student Achievement. *Psychological Science in the Public Interest*, 2.

Nye, B., Hedges, L. V., & Konstantopoulos, S. (1999). The Long-Term Effects of Small Classes: A Five-Year Follow-Up of the Tennessee Class Size Experiment. *Educational Evaluation and Policy Analysis*, 21(2) pp 127-142.

Gerber, Finn, Achilles, and Boyd-Zahariaa. (2001). Teacher Aides and Students' Academic Achievement. *Educational Evaluation and Policy Analysis*, 21(2), pp 123-143.

\*\**Educational Evaluation and Policy Analysis*, Special Issue on "Class Size: Issues and New Findings," 21 (summer 1999). Abstracts available on-line at:

<http://aera.net/pubs/eepa/abs/eepa21.htm>

*Methodological topic: TBA*

**Week 15 (December 6 and December 9, the second day takes place of final exam)**

Student presentations

**Term projects due December 13 at 9am (by email to [tom.smith@vanderbilt.edu](mailto:tom.smith@vanderbilt.edu))**