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# Teaching Quality and Student Outcomes: Academic Achievement and Educational Engagement in Rural Northwest China

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## **Abstract**

A central task of educational researchers has been to uncover factors that improve student academic achievement. Research in both developed and developing nations during the past few decades has analysed the links between educational outcomes and school physical resources, teacher quality and children's demographic and family background. Importantly, research on teacher and school effects in developing countries has focused on factors such as human capital, economic resources and physical infrastructure, the so-called input factors in the "black box" production function model of school outcomes. Fewer studies have focused on the "softer" classroom process factors that might be seen as important mechanisms of the production function, such as teaching style, the quality of teacher-student interactions and student academic engagement.

## **Disciplines**

International and Comparative Education

## **Comments**

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## COMMENTS AND NOTES

# Teaching Quality and Student Outcomes: Academic Achievement and Educational Engagement in Rural Northwest China

Xuehui AN, Emily HANNUM and Tanja SARGENT

A central task of educational researchers has been to uncover factors that improve student academic achievement. Research in both developed and developing nations during the past few decades has analysed the links between educational outcomes and school physical resources, teacher quality and children's demographic and family background.<sup>1</sup> Importantly, research on teacher and school effects in developing countries has focused on factors such as human capital, economic resources and physical infrastructure,

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the so-called input factors in the “black box” production function model of school outcomes. Fewer studies have focused on the “softer” classroom process factors that might be seen as important mechanisms of the production function, such as teaching style, the quality of teacher-student interactions and student academic engagement.

This study investigates the sensitivity of academic achievement and educational engagement to student experiences in the classroom: teaching style, teacher-student interactions and classroom environment. This study is first placed in the theoretical context of comparative educational research, then in the context of recent education reform initiatives in China. Next follows a description of the data which came from a survey of primary school students, teachers and principals in rural Northwest China that was carried out in the summer of 2000. Multivariate analyses of achievement and engagement are presented and the paper closes with a discussion of the implications of the findings.

## Framework and Hypotheses

### *Research on Teacher Quality*

Disparate lines of research in the fields of sociology, demography and economics have considered community, school, classroom and family characteristics that predict children’s educational outcomes.<sup>2</sup> Across these disciplines, an important goal has been to produce policy-relevant insights on measurable aspects of school quality, including teacher quality, that significantly affect outcomes such as achievement. Much of this research stemmed from Stephen Heyneman’s “Coleman Report for a Developing Country”, and his subsequent research suggesting that the portion of the variance in achievement attributable to school quality, as opposed to family background, was generally much larger

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<sup>1</sup> For a review, see Claudia Buchmann and Emily Hannum, “Education and Stratification in Developing Countries: A Review of Theories and Research”, *Annual Review of Sociology*, no. 27 (2001): 77–102.

<sup>2</sup> For reviews, see Buchmann and Hannum, “Education and Stratification in Developing Countries”; Bruce Fuller, “What School Factors Raise Achievement in the Third World?”, *Review of Educational Research* 57, no. 3 (1987): 255–92; and Bruce Fuller and Prema Clarke, “Raising School Effects While Ignoring Culture? Local Conditions and the Influence of Classroom Tools, Rules, and Pedagogy”, *Review of Educational Research* 64, no. 1 (1994): 119–57.

in developing versus industrialised countries.<sup>3</sup> Following Heyneman's lead, studies of school effects have been conducted in a wide range of developing countries, and many have found significant effects of school factors, net of family background, on achievement.<sup>4</sup>

However, recent work by David Baker and his colleagues has suggested that the Coleman effect — large family effects and small school effects — has spread throughout the world.<sup>5</sup> Moreover, studies that have sought to identify effects of specific dimensions of teacher quality and other school inputs on academic achievement have produced decidedly mixed results for both developed and developing countries.<sup>6</sup> For example, Hanushek has argued that US-based research yields no systematic evidence that teacher education, experience or salaries affect student performance.<sup>7</sup>

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<sup>3</sup> Stephen P. Heyneman, "Influence on Academic Achievement: A Comparison of Results from Uganda and More Industrialized Societies", *Sociology of Education* 46 (1976); and later Stephen P. Heyneman and William A. Loxley, "The Effect of Primary School Quality on Academic Achievement across Twenty-Nine High- and Low-Income Countries", *American Journal of Sociology* 88 (1983).

<sup>4</sup> Fuller, "What School Factors Raise Achievement in the Third World?"; and Fuller and Clarke, "Raising School Effects While Ignoring Culture?".

<sup>5</sup> D.P. Baker, B. Goesling and G.K. LeTendre, "Socioeconomic Status, School Quality and National Economic Development: A Cross-National Analysis of the 'Heyneman-Loxley Effect' on Mathematics and Science Achievement", *Comparative Education Review* 46, no. 3, (2002): 291–312; and D.P. Baker and G.K. LeTendre, *National Differences, Global Similarities: World Culture and the Future of Schooling* (Palo Alto: Stanford University Press, 2005).

<sup>6</sup> Gary Burtless, "Introduction and Summary", in *Does Money Matter?: The Effect of School Resources on Student Achievement and Adult Success*, ed. Gary Burtless (Washington, DC: Brookings Institution Press, 1996), pp. 1–42; Eric Hanushek, "Interpreting Recent Research on Schooling in Developing Countries", *World Bank Research Observer* 10 (1995): 247–54; and Michael Kremer, "Research on Schooling: What We Know and What We Don't (a comment on Hanushek)", *World Bank Research Observer* 10 (1995): 247–54.

<sup>7</sup> Eric Hanushek, "The Economics of Schooling: Production and Efficiency in Public Schools", *Journal of Economic Literature* 24 (1986): 1141–77; Eric Hanushek, "The Impact of Differential Expenditures on School Performance", *Educational Researcher* 1 (1989): 45–51; and Eric Hanushek, "School Resources and Student Performance", in *Does Money Matter?: The Effect of School Resources on Student Achievement and Adult Success*, ed. Gary Burtless (Washington, DC: Brookings Institution Press, 1996), pp. 43–73.

Other studies have found stronger evidence of positive school and teacher effects on learning and labour market outcomes.<sup>8</sup> In developing countries, a number of studies have found that teacher education and experience, as well as basic material resources do affect achievement, but other work has presented a mixed verdict on teacher and school effects.<sup>9</sup>

### *Limited Definition of Quality*

One problem with these studies has been the narrow conceptualisation of teacher quality. Too often, teacher quality has been conceptualised simplistically, as easy-to-measure background factors thought to be linked to productivity such as teacher education or training, teacher salary or teacher experience. While identifying a mix of easy-to-measure and easy-to-manipulate inputs has a great deal of theoretical and policy appeal, the lack of consistent findings suggests the value of exploring alternative approaches.

One potentially fruitful approach is to look for quality not in the background attributes of teachers, but rather in classroom (or school) environments that they have a hand in creating. For example, one interesting development in sociology of education has focused on understanding social and cultural environments within schools and classrooms, and particularly the role of hospitable and inhospitable environments for learning.<sup>10</sup>

Educational research on effective teaching styles also carries interesting potential directions for conceptualising teacher quality. For example, one

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<sup>8</sup> Eric Hanushek, John F. Kain and Steven G. Rivkin, "Teachers, Schools and Academic Achievement", National Bureau of Economic Research Working Paper, no. 6691, 1998; and David Card and Alan Krueger, "Labor Market Effects of School Quality: Theory and Evidence", in *Does Money Matter?: The Effect of School Resources on Student Achievement and Adult Success*, ed. Gary Burtless (Washington, DC: Brookings Institution Press, 1996).

<sup>9</sup> Heyneman and Loxley, "The Effect of Primary School Quality on Academic Achievement across Twenty-Nine High- and Low-Income Countries"; Fuller and Clarke, "Raising School Effects While Ignoring Culture?"; Hanushek, "Interpreting Recent Research on Schooling in Developing Countries"; and Kremer, "Research on Schooling: What We Know and What We Don't".

<sup>10</sup> Jean Anyon, "Social Class and School Knowledge", *Curriculum Inquiry* 11, no. 1 (1981); Annette Lareau, "Social Class Differences in Family-School Relationships", *Sociology of Education* 60 (1987); Kimberly Goyette and Gilberto Q. Conchas, "Family and Non-Family Roots of Social Capital Among Vietnamese and Mexican American Children", in *Research in Sociology of Education 13: Schooling and Social Capital in Diverse Cultures*, ed. Bruce Fuller and Emily Hannum (Oxford: Elsevier Science, 2002), pp. 41-72;

important dimension of teaching style is the extent to which students are given the opportunity to participate actively in the classroom, as opposed to listening passively to lectures. According to Jere Brophy, classrooms of successful teachers “feature more time spent in interactive discourse and less time spent in solitary seatwork ... [or] extended lecture presentations”.<sup>11</sup> Brophy also suggests that discourse is important for fostering higher order thinking skills, and that discourse should not be limited to rapidly-paced recitation that elicits short answers to miscellaneous questions.

Other aspects of teaching style that may matter for student outcomes are teacher characteristics such as enthusiasm and the extent to which teachers embody an “ethic of caring”, such as friendliness and affection for students.<sup>12</sup> Such behaviour on the part of the teacher provides an exemplary model that can exert a socialising influence on the students’ behaviour. It also establishes a safe environment in which students collaborate with each other and mistakes are accepted as a part of the natural learning process.

Fuller and Clarke assert that there is a lack of studies of teacher effects in developing countries investigating the teaching behaviours or classroom environmental factors that promote favourable student outcomes.<sup>13</sup> The few studies that do exist have found significant effects on achievement or attainment of classroom management, hours of instruction and classroom dynamics.<sup>14</sup>

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Toby L. Parcel and Mikaela J. Dufur, “Capital at Home and at School: Effects on Student Achievement”, *Social Forces* 79, no. 3 (2001): 881–912; and An, Xuehui, “Shisheng ketang hudong guocheng yu xuexiao xiaolu guanli (Teacher-student Interactions and School Effectiveness)”, *Journal of Northwest Normal University* 2 (2006).

<sup>11</sup> See the 12 principles of effective teaching that Jere Brophy presents in his monograph on teaching. Jere Brophy, *Teaching* (Brussels/Geneva: International Academy of Education/International Bureau of Education, 1999).

<sup>12</sup> Brophy, “Teaching”; Yi Chen and Wei Li, “Xiaoxue jiaoshi renge tezheng he xuesheng xueye chengji xiangguan yanjiu (Study on the Relationship between the Personality Characteristics of Primary School Teachers and Student Academic Achievement)”, *Nanjing shida xuebao (shehui kexue ban) Journal of Nanjing Normal University (Social Science)*, no. 4 (2000); and Nel Noddings, *The Challenge to Care in Schools* (New York: Teachers College Press, 1992).

<sup>13</sup> Fuller and Clarke, “Raising School Effects While Ignoring Culture?”.

<sup>14</sup> See for example, *ibid.*, and L.J. Saha, “Social Structure and Teacher Effects on Academic Achievement: A Comparative Analysis”, *Comparative Education Review* 27 (1983): 69–88; and Cynthia Lloyd, Barbara Mensch and W.H. Clark, “The Effects of Primary School Quality on School Dropout among Kenyan Girls and Boys”, *Comparative Education Review* 44 (2000): 113–47.



### *Limited Definitions of Student Outcomes*

Just as teacher quality has been narrowly defined, so have student outcomes, primarily as academic achievement or attainment. It is likely that teaching styles and the classroom environment may be linked directly to another concept that has received little attention in research on teacher quality: students' academic engagement. In US-based sociology of education research, engagement is coming to be recognised as an important research topic. For example, Johnson, Crosnoe and Elder characterise the educational experience of American middle school and high school students as "a multifaceted phenomenon that encompasses far more than academic achievement and degree attainment, which have been the primary foci of sociological research".<sup>15</sup> Other important aspects of the educational experience include daily participation in school and students' feelings about school. Johnson *et al.* argue that these latter, and much less understood, aspects of the educational experience also have important consequences in children's lives.

A child's degree of educational engagement provides obvious benefits for his or her school performance, as measured by other educational outcomes. For example, US-based research indicates that academically engaged students are less likely to drop out of high school or to engage in other problematic behaviours.<sup>16</sup> However, engagement may also be a fundamental component of what Johnson *et al.* refer to as the "good student" role: a role that may set the stage for successful functioning in non-school settings later in life. In other words, engagement may engender or reflect traits such as ambition and

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<sup>15</sup> Monica Kirkpatrick Johnson, Robert Crosnoe and Glen H. Elder, Jr., "Students' Attachment and Academic Engagement: The Role of Race and Ethnicity", *Sociology of Education* 74, no. 4 (2001): 318.

<sup>16</sup> For example, Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organisation on Dropping Out: An Exploratory Investigation", *American Educational Research Journal* 26 (1989): 353–83; George Farkas, Robert P. Grobe, Daniel Sheehan and Yuan Shuan, "Cultural Resources and School Success: Gender, Ethnicity and Poverty Groups within an Urban School District", *American Sociological Review* 55 (1990): 127–42; Patricia Jenkins, "School Delinquency and School Commitment", *Sociology of Education* 68 (1995): 221–39; Johnson, Crosnoe and Elder, Jr., "Students' Attachment and Academic Engagement"; and Fred Newmann, Gary Wehlage and Susie Lamborn, "The Significance and Sources of Student Engagement", in *Student Engagement and Achievement in American Secondary Schools*, ed. Fred Newmann (New York: Teachers College Press, 1992), pp. 11–39.

confidence that determine future life outcomes independently of academic success.<sup>17</sup>

Thus, engagement is potentially important as an influence on future socio-economic status, either instrumentally through its effect on academic achievement and persistence, or directly by fostering character traits that predict success in the labour market. In either case, the importance of such effects suggests that educational engagement itself is an outcome worthy of study. This paper argues that engagement with schooling may be particularly important to understand in settings such as rural Gansu, where education beyond the primary level has placed a serious economic burden on families and children's attitudes toward schooling may play a role in household decisions about how long to support children in school.

### *China Context*

Student participation in interactive classroom discourse, a caring relationship between teachers and students, and students' engagement with schooling have been the focus of recent attention among policy makers in China. The "New Curriculum" reforms, which began initial implementation in 2001, seek to reduce the traditional emphasis on rote memorisation, drill, monotonous classroom environments and a heavy burden of homework assignments.<sup>18</sup>

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<sup>17</sup> Johnson, Crosnoe and Elder, Jr., "Students' Attachment and Academic Engagement".

<sup>18</sup> PRC Ministry of Education, "Jichu jiaoyu kecheng gaige gangyao (Shixing)" [Framework for the Curriculum Reform of Basic Education (Trial Version)] (Beijing: Ministry of Education, 2001); Ministry of Education, "Mianshang ershiyi shiji jiaoyu zhenxing xingdong jihua" (Action Plan Towards the Revitalisation of Education for the 21st Century) (PRC Ministry of Education, 1998); Ministry of Education, *Suzhi jiaoyu guannian: xuexi tiyao (The Concept of Quality Education: Key Points for Study)* (Beijing, 2002); Tanja Sargent, "Ideologies of Educational Purpose for the 21st Century: Curriculum Policy and the Transformation of Teaching Practices in China" (Unpublished dissertation, University of Pennsylvania, PA, 2006); Tanja Sargent, "Ideologies of Educational Purpose for the 21st Century: The 'New Curriculum' Reform Policy in China" (Paper presented at the American Educational Research Association Annual Meeting, San Francisco, CA, Apr. 2006); Tanja Sargent, "Revolutionizing Ritual Interaction in the Classroom: Constructing the Chinese Renaissance of the 21st Century" (Paper presented at the Eastern Sociological Society Annual Meeting, Boston, MA, Mar. 2006); and Ou Shi and Liqun Liu, *Kecheng gaige zhong de ruogan wenti (Problems in Curriculum Reform)* (Guangzhou: Guangdong Educational Press, 2004).

These reforms emphasise instead the importance of a more student-centred teaching style that stimulates students to become active subjects of their own learning, engaged in inquiry and discussion, and imbued with a love of learning, self-confidence, self-discipline and cooperativeness.<sup>19</sup> The new reforms place great emphasis on the creation of a relaxed and encouraging classroom environment that meets the needs of children of all abilities and backgrounds.

Complicating implementation of these changes is the continuing reality of competitive examinations as the primary basis for advancement in the system. Whether progressive teaching styles will be as effective as traditional styles in preparing students for high-stakes tests remains an open question. Further, especially in China's poorer regions where school fees place a real burden on families, exams are not the only determining factor in children's school progress. Whether or not students and their parents see schooling as being worth the hardship it places on the family probably depends on students' engagement with schooling — their aspirations, academic confidence, their industriousness and their alienation. For this reason, and because engagement is thought to predict achievement, it is also important to understand the relationship between teaching quality and engagement measures.

The analysis focuses on data that were collected the year prior to the initial implementation of China's curricular reforms, thus cannot investigate questions about the reforms, per se. The analysis can, however, address a significant, related question: how children's perceptions of the behaviours encouraged by the reforms relate to their performance and to their engagement with the schooling process.

### *Hypotheses and Analytic Approach*

To address the theoretical and policy issues outlined in the preceding section, the paper presents models of achievement and engagement that, first, assess the effects of teacher background characteristics, including those commonly

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<sup>19</sup> Wang Xia and W. Liu, "Xin kecheng linian xia ketang jiaoxue zhong de shisheng hudong (Teacher-Student Interactions in New Curriculum Classroom Teaching)", *Jichu jiaoyu cankao (Basic Education Reference)*, no. 2 (2005); Wensen Yu, "Shisheng hudong, gongtong fazhan: Xin kecheng suo changdao de jiaoxueguan" (Teachers and Student Interacting and Developing Together: The Teaching Philosophy of the New Curriculum), *Shifan jiaoyu (Teacher Education)*, no. 9 (2002).

considered as dimensions of teacher quality and additional demographic variables, then assess the effects of variables linked to teaching quality and classroom environment. The hypotheses presented in this paper are as follows:

- (a) Achievement and engagement are higher in classrooms where students experience a safe and stable environment, where they perceive that learning is more interactive and homework is not excessive, where they experience closer relationships to teachers, and where they perceive teachers to be fair.
- (b) Engagement has a direct positive relationship with student academic achievement.

The analysis is composed of two sets of models: a set of regressions of student academic achievement and a set of regressions of educational engagement. Standard teacher “input” measures are considered. In addition, new measures of teaching style, classroom environment and teacher-student interactions are developed. The models also incorporate extensive controls for student family background and fixed effects for unmeasured differences across schools.

## **Data and Measures**

### *Data*

The study employs data from the first wave of the Gansu Survey of Children and Families (GSCF-1), a longitudinal, multi-level study of rural children’s welfare outcomes, including education, health and psycho-social development carried out in the summer of 2000. The data is composed of a primary sample of 2000 rural children in 20 counties. The sampling strategy involved a multi-stage, cluster design with random selection procedures employed at each stage. The children were sampled from the list of all 9–12 year old children in selected villages. This paper analyses the 1926 primary school children, excluding 50 children in junior high school and 24 children not in school in the year 2000.

The GSCF-1 used seven separate linked questionnaires for children, mothers, household heads, teachers, homeroom teachers, school principals and village leaders. This paper makes use of questionnaire items from the child, general teacher, homeroom teacher and principal questionnaires to investigate the relationship between an expanded conceptualisation of

teaching quality and the academic achievement and educational engagement of children at school. A detailed discussion of the variables used follows.

## *Indicators and Measurement*

### *Student Outcome Measures*

*Academic Achievement.* The first student outcome variable is student achievement, measured by scores on tests administered during data collection in the summer of 2000. There were two tests, mathematics and Chinese language, both of which were designed by the Gansu Institute for Educational Research and based on the standard curriculum. Half of the children took the Chinese language test and half took the mathematics test. The measure used represents the combined math and language scores for all the children in the sample. For multivariate analyses, test scores were standardised by grade, and then combined.

*Educational Engagement.* Educational engagement is measured along four dimensions: educational aspirations, academic confidence, industriousness and alienation from school. For each of the four dimensions, student reports are used. Educational aspirations are measured using student reports of the highest level of education they wish to complete, converted to a number of years measure. The three measures of academic confidence, industriousness and alienation are scales that are generated by standardising the component variables shown in Table 1, summing them and dividing by the number of components. See Table 1 for a list of the component variables that make up the measures of educational engagement.

### *Teacher and Teaching Quality Measures*

*Teacher Background.* Teacher background measures that are often considered part of teacher quality in sociological and economic models of school achievement are used, namely teaching experience and teaching experience squared, educational level and logged monthly income. Demographic factors such as teacher gender and birthplace (whether or not the teacher comes from the same village) are also included. Teacher gender is a common background characteristic that, while not a proxy for quality, is sometimes included in teacher effects research due to perceptions that female and male teachers may teach or interact with students in different ways. Birthplace is not usually included in teacher effects research, but it

**Table 1.** Description of Indicators Used in the Analysis

Variable Name	Mean or proportion	SD	N
<b>Student Current Academic Achievement</b>			
Math (exam score)	31.779	21.462	1,022
Language (exam score)	39.128	24.737	919
Combined Score	35.259	23.355	1,941
<b>Student Previous Academic Achievement</b>			
Language: (Last semester's exam score)	72.591	13.064	1,941
Math (Last semester's exam score)	73.934	14.550	1,941
Total Score (Last semester's exam score)	146.525	26.291	1,941
<b>Student Background</b>			
Student Gender (1=female)	0.451	0.498	1,916
Age (years)	11.065	1.386	1,916
Father's Education (years)	6.697	4.227	1,915
Mother's Education (years)	3.672	4.024	1,916
Number of Siblings	1.300	0.710	1,916
Family Wealth (ln [rmb])	9.909	0.727	1,916
<b>Educational Engagement</b>			
Educational Aspirations (years):	13.718	2.881	1,912
Academic Confidence (scale): 1. "In your opinion, are you a good student?" no=1, so-so=2, yes=3; 2. Rate your math ability compared to other students in your class: very poor=1, below average=2, average=3, above average=4, excellent=5 3. Rate your language ability compared to other students in your class: very poor=1, below average=2, average=3, above average=4, excellent=5	0.011	0.739	1,914
Industriousness (scale): 1. Do you study hard for math?: Do you not study hard=1; occasionally study hard=2; generally study hard=3 2. Do you study hard for language?: Do you not study hard=1; occasionally study hard=2; generally study hard=3	0.023	0.858	1,913
Alienation (scale): 1. I do not want attend school most of time: Strongly disagree=1, somewhat disagree=2, somewhat agree=3, strongly agree=4. 2. I often feel bored at school? Strongly disagree=1, somewhat disagree=2, somewhat agree=3, strongly agree=4. 3. I often feel lonely at school? Strongly disagree=1, agree=4, somewhat disagree=2, somewhat agree=3, strongly agree=4.	0.000	0.745	1,902

**Table 1.** (continued)

Variable Name	Mean or proportion	SD	N
<b>Teacher Background</b>			
Teacher Gender (proportion female)	0.353	0.478	1,916
Teaching Experience (years)	14.849	9.994	1,916
Teacher Educational Attainment			1,916
– Middle school and below	0.233	–	446
– High school	0.547	–	1,048
– College	0.220	–	422
Teacher from Same Village (proportion yes)	0.384	0.487	1,916
Teacher Monthly Income (ln [rmb])	6.019	0.763	1,903
<b>Teaching Quality</b>			
<b>1) School and Classroom Environment</b>			
Instability (scale): 1. <i>Teacher is absent from class: Never=1, sometimes=2, often=3</i> 2. <i>School closed: Never=1, sometimes=2, often=3</i>	–0.021	0.775	1,908
Discipline (scale): 1. <i>Do any of your classmates skip school? Never=1, sometimes=2, often=3</i> 2. <i>Have you or your classmates ever had anything stolen? Never=1, sometimes=2, often=3</i> 3. <i>Have you ever been beaten in school? Never=1, sometimes=2, often=3</i> 4. <i>Have your peers ever been beaten in school? Never=1, sometimes=2, often=3</i> 5. <i>Students violate school rules? Never=1, sometimes=2, often=3</i> 6. <i>Students cheat on tests? Never=1, sometimes=2, often=3</i> 7. <i>Students copy other's homework? Never=1, sometimes=2, often=3</i> 8. <i>Students disrupt in class? Never=1, sometimes=2, often=3</i> 9. <i>There are fights between students? Never=1, sometimes=2, often=3</i> 10. <i>Students bully others? Never=1, sometimes=2, often=3</i>	–0.004	0.547	1,908
<b>2) Teacher-Student Interaction</b>			
Teacher pays attention to me in class <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	2.806	0.939	1,916
Teacher listens to me <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	2.748	0.925	1,916

**Table 1.** (continued)

<b>Variable Name</b>	<b>Mean or proportion</b>	<b>SD</b>	<b>N</b>
Teacher cares for students <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	3.454	0.687	1,916
Teacher treats students fairly <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	3.232	0.744	1,916
<b>3) Teaching Style</b>			
The teacher assigns a lot of homework <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	2.802	0.962	1,916
We discuss questions animatedly in class <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	2.956	0.880	1,916
The teacher always lectures and students listen <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	3.161	0.854	1,916
The teacher encourages questions in class <i>Completely disagree=1, somewhat disagree=2, somewhat agree=3, completely agree=4</i>	3.315	0.732	1,916

could be important, if local teachers serve as role models for children, communicate better with children or have closer and more positive relationships with children.

*Teaching Style.* There are four measures of teaching style. Students are asked the extent to which they agree with the following statements about their teacher: (1) the teacher often encourages students to ask questions in class; (2) in class the teacher always lectures and students listen; (3) we often discuss questions animatedly in class; and (4) the teacher assigns a great deal of homework.

*Teacher-student Interactions.* Four measures are also used to measure the concept of teacher-student interactions, all consisting of student reports of the kinds of interactions they have with teachers in class. These measures are based on the extent to which students agree with the following statements: (1) the teacher pays attention to me in class; (2) the teacher listens to me in class; (3) the teacher cares for students at school; and (4) the teacher treats students fairly.



*Classroom Environment.* Research suggests that the classroom environment plays an important role in student academic achievement.<sup>20</sup> Two indicators of school and classroom environment are included. The first is composed of the frequency with which the school is closed or their teacher is absent from class. The second is a standardised scale of discipline problems reported by the student. See Table 1 for a detailed list of the components that make up the discipline scale variable.

### *Controls for Student Background*

*Socio-economic Status.* Measures of parental educational attainment and logged family wealth are used as indicators of socio-economic status.

*Demographic Characteristics.* The models control for student gender and age, as well as for the number of siblings.

*Prior Achievement.* It is likely that there is a strong relationship between children who are already high achievers and educational engagement. While the problem cannot be fully addressed, the prior semester's total test scores reported by the student's homeroom teacher are incorporated as a measure of past academic achievement.

## **Results**

### *Academic Achievement Results*

The analysis begins with a model of educational achievement that includes only child and teacher background characteristics. Teacher background characteristics are measured using conventional variables for teacher effects, as well as an additional variable measuring whether or not the teacher is local (see Table 2, Model 1). Model 1, like all regression models presented here, also includes fixed effects for schools.

Model 1 in Table 2 shows, perhaps unsurprisingly, that none of the conventional teacher characteristics — education, experience, salary or gender — show significant effects for achievement. The only teacher background variable that does significantly matter for achievement in this specification is teacher birthplace: students with homeroom teachers from the local villages tend to have higher scores. In fact, teacher birthplace matters after

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<sup>20</sup> Ann Locke Davidson, *Making and Molding Identity in Schools: Student Narratives on Race, Gender and Academic Achievement* (Albany: SUNY Press, 1996); and Goyette and Conchas, "Family and Non-family Roots of Social Capital".

controlling for the significant effect of students' prior achievement (Model 2) as well as in all other specifications in Table 2. Perhaps more surprisingly, family background characteristics do not show significant effects across these specifications, though family background effects may be partially washed out by school fixed effects.

Model 3 tests the environment and teaching quality indicators. The results suggest that perceptions that teachers treat students fairly are significantly related to current achievement, net of prior achievement and other factors. In addition, two items tapping perceptions of classroom teaching style — lecturing and encouraging questions — are marginally significantly related to achievement, with students who report less lecturing and more questioning showing higher scores.

Model 4 includes teacher and student background characteristics, prior achievement and engagement measures, in order to begin to investigate the relationship between engagement and achievement. Results show that two dimensions of engagement, namely academic confidence and alienation, are significantly associated with current achievement, net of prior achievement and other measured factors. Children who report more confidence and less alienation are children who score better.

Finally, Model 5 consists of a full model incorporating all factors discussed in earlier specifications. A comparison of Model 5, with teaching quality measures and engagement measures included, with Model 3, which includes teaching quality but not engagement measures, reveals that the fair treatment variable is little reduced, but that the marginal lecturing and questioning effects are gone in the fuller specification.<sup>21</sup>

### *Engagement Results*

The analysis of the engagement measures — aspirations, confidence, industriousness and alienation — are presented in Tables 3 to 6. Much more than for the achievement results, many factors are found to be significant predictors

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<sup>21</sup> These findings suggest the possibility that engagement measures may mediate the effects of these particular teaching quality measures. Sobel Test statistics were computed to test the mediating effects of these variables. See M.E. Sobel, "Asymptotic Intervals for Indirect Effects in Structural Equation Models", in *Sociological Methodology 1982*, ed. S. Leinhardt (San Francisco: Jossey-Bass, 1982), pp. 290–312. Further explanation of the Sobel Test and the results of this analysis are shown in the Appendix.

Table 2. Student Achievement Regression Models

Dependent Variable: Parameter	(1) Combined Score		(2) Combined Score		(3) Combined Score		(4) Combined Score		(5) Combined Score	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Child Background</b>										
Student gender (ref=male)	0.067	0.042	0.036	0.041	0.044	0.041	0.035	0.041	0.043	0.041
Age	-0.018	0.019	-0.006	0.018	-0.013	0.019	-0.007	0.018	-0.011	0.019
Father's education	0.006	0.006	0.003	0.005	0.003	0.005	0.001	0.005	0.001	0.005
Mother's education	-0.001	0.006	-0.004	0.006	-0.006	0.006	-0.004	0.006	-0.006	0.006
Siblings	-0.003	0.032	-0.005	0.031	-0.004	0.031	-0.013	0.031	-0.013	0.031
Family wealth (ln [rmb])	0.040	0.037	0.023	0.036	0.026	0.036	0.008	0.036	0.013	0.036
<b>Teacher Background</b>										
Teacher gender (ref=male)	-0.028	0.060	-0.055	0.058	-0.055	0.058	-0.080	0.058	-0.080	0.058
Experience (years)	-0.008	0.009	-0.005	0.009	-0.005	0.009	-0.004	0.009	-0.004	0.009
Experience squared (years <sup>2</sup> )	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
Teacher education (ref=middle school or less)										
-High school	-0.070	0.063	-0.070	0.061	-0.071	0.061	-0.089	0.061	-0.091	0.061
-College	-0.063	0.077	-0.084	0.075	-0.095	0.075	-0.084	0.075	-0.092	0.075
Birthplace (ref=outside the village)	<b>0.166**</b>	<b>0.056</b>	<b>0.138**</b>	<b>0.054</b>	<b>0.141**</b>	<b>0.055</b>	<b>0.128**</b>	<b>0.054</b>	<b>0.132**</b>	<b>0.055</b>
Monthly income (ln [rmb])	0.007	0.045	0.003	0.043	0.008	0.044	-0.014	0.043	-0.008	0.044
<b>Past Academic Achievement</b>										
Last semester score			<b>0.009**</b>	<b>0.001</b>	<b>0.009**</b>	<b>0.001</b>	<b>0.008**</b>	<b>0.001</b>	<b>0.008**</b>	<b>0.001</b>
Educational Engagement										
Educational aspirations							0.001	0.008	-0.003	0.008
Academic confidence							<b>0.106**</b>	<b>0.031</b>	<b>0.104**</b>	<b>0.032</b>
Industriousness							-0.006	0.026	-0.010	0.026
Alienation							<b>-0.083**</b>	<b>0.029</b>	<b>-0.074**</b>	<b>0.030</b>

Table 2. (continued)

Dependent Variable: Parameter	(1) Combined Score		(2) Combined Score		(3) Combined Score		(4) Combined Score		(5) Combined Score	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Teaching Quality</b>										
Instability					0.010	0.029			0.016	0.030
Discipline					0.010	0.043			0.029	0.044
Teacher pays attention to me					-0.014	0.022			-0.013	0.022
Teacher listens to me					-0.008	0.023			-0.009	0.023
Teacher cares for students					0.010	0.032			-0.003	0.033
Teacher treats students fairly					<b>0.091</b>	<b>0.030**</b>			<b>0.084**</b>	<b>0.030</b>
Teacher assigns a lot of homework					-0.003	0.024			0.006	0.024
We discuss questions animatedly in class					-0.020	0.024			-0.021	0.024
Teacher always lectures and students listen					<b>-0.047</b>	<b>0.026+</b>			-0.039	0.026
Teacher encourages questions					<b>0.057</b>	<b>0.030+</b>			0.045	0.030
N	1,901		1,901		1,893		1,880		1,873	
F	1.41		10.02		6.59		9.28		4.42	
Adj Rsq	0.323		0.314		0.315		0.324		0.322	

Notes: \*\*significant at .01 level; \* significant at .05 level; + significant at .10 level. All models contain fixed effects for schools.

**Table 3.** *Educational Aspirations Regression Models*

Dependent Variable:	(1) Aspirations		(2) Aspirations		(3) Aspirations	
Parameter	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Child Background</b>						
Student gender (ref=male)	<b>-0.396**</b>	<b>0.132</b>	<b>-0.458**</b>	<b>0.130</b>	<b>-0.416**</b>	<b>0.129</b>
Age	-0.005	0.059	0.018	0.058	-0.014	0.058
Father's education	<b>0.062**</b>	<b>0.017</b>	<b>0.055**</b>	<b>0.017</b>	<b>0.056**</b>	<b>0.017</b>
Mother's education	0.004	0.019	-0.002	0.019	-0.005	0.019
Siblings	<b>-0.163+</b>	<b>0.099</b>	<b>-0.168*</b>	<b>0.098</b>	<b>-0.151+</b>	<b>0.096</b>
Family wealth (ln [rmb])	<b>0.265**</b>	<b>0.116</b>	<b>0.231*</b>	<b>0.114</b>	<b>0.213*</b>	<b>0.113</b>
<b>Teacher Background</b>						
Teacher gender (ref=male)	0.268	0.186	0.207	0.184	0.238	0.182
Experience (years)	0.022	0.028	0.028	0.027	0.025	0.027
Experience squared (years <sup>2</sup> )	-0.001	0.001	<b>-0.001+</b>	<b>0.001</b>	<b>-0.001+</b>	<b>0.001</b>
Teacher education (Ref=middle school or less)						
- High school	-0.169	0.196	-0.158	0.193	-0.212	0.191
- College	0.177	0.241	0.139	0.238	0.037	0.236
Birthplace (ref=outside the village)	<b>0.326+</b>	<b>0.175</b>	<b>0.268+</b>	<b>0.173</b>	<b>0.272+</b>	<b>0.171</b>
Monthly income (ln [rmb])	0.132	0.140	0.126	0.138	0.134	0.136
<b>Past Academic Achievement</b>						
Last semester score			<b>0.019**</b>	<b>0.003</b>	<b>0.017**</b>	<b>0.003</b>
<b>Teaching Quality</b>						
Instability					-0.130	0.092
Discipline					-0.006	0.136
Teacher pays attention to me					0.001	0.070
Teacher listens to me					0.089	0.072
Teacher cares for students					<b>0.257**</b>	<b>0.102</b>
Teacher treats students fairly					<b>0.319**</b>	<b>0.093</b>
Teacher assigns a lot of homework					<b>-0.170*</b>	<b>0.074</b>
We discuss questions animatedly in class					0.076	0.075
Teacher always lectures and students listen					<b>-0.164*</b>	<b>0.082</b>
Teacher encourages questions					<b>0.265**</b>	<b>0.094</b>
N	1,897		1,897		1,890	
F	3.84		7.32		6.77	
Adj Rsq	0.150		0.174		0.195	

Notes: \*\*significant at .01 level; \* significant at .05 level; + significant at .10 level. All models contain fixed effects for schools.

ACADEMIC ACHIEVEMENT AND EDUCATIONAL ENGAGEMENT

**Table 4.** *Academic Confidence Regression Models*

Dependent variable	(1) Academic Confidence		(2) Academic Confidence		(3) Academic Confidence	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Child Background</b>						
Student gender (ref=male)	<b>0.060+</b>	<b>0.035</b>	0.028	0.034	0.024	0.033
Age	<b>-0.034*</b>	<b>0.016</b>	-0.021	0.015	-0.020	0.015
Father's education	<b>0.012**</b>	<b>0.005</b>	<b>0.009*</b>	<b>0.004</b>	<b>0.010*</b>	<b>0.004</b>
Mother's education	0.001	0.005	-0.002	0.005	-0.002	0.005
Siblings	<b>0.054*</b>	<b>0.027</b>	<b>0.051*</b>	<b>0.025</b>	<b>0.052*</b>	<b>0.025</b>
Family wealth (ln [rmb])	-0.019	0.031	-0.036	0.030	<b>-0.052+</b>	<b>0.029</b>
<b>Teacher Background</b>						
Teacher gender (ref=male)	<b>0.160**</b>	<b>0.050</b>	<b>0.131**</b>	<b>0.048</b>	<b>0.134**</b>	<b>0.047</b>
Experience (years)	0.000	0.007	0.002	0.007	0.001	0.007
Experience squared (years <sup>2</sup> )	0.000	0.000	0.000	0.000	0.000	0.000
Teacher education (Ref=middle school or less)						
- High school	-0.010	0.053	-0.011	0.050	-0.026	0.049
- College	0.081	0.065	0.058	0.062	0.030	0.061
Birthplace (ref=outside the village)	0.063	0.047	0.036	0.045	0.026	0.044
Monthly income (ln [rmb])	<b>0.065+</b>	<b>0.038</b>	<b>0.061*</b>	<b>0.036</b>	<b>0.063+</b>	<b>0.035</b>
<b>Past Academic Achievement</b>						
Last semester score			<b>0.010**</b>	<b>0.001</b>	<b>0.009**</b>	<b>0.001</b>
<b>Teaching Quality</b>						
Instability					0.026	0.024
Discipline					<b>-0.178**</b>	<b>0.035</b>
Teacher pays attention to me					-0.001	0.018
Teacher listens to me					<b>0.045**</b>	<b>0.019</b>
Teacher cares for students					<b>0.077**</b>	<b>0.026</b>
Teacher treats students fairly					<b>0.066**</b>	<b>0.024</b>
Teacher assigns a lot of homework					-0.001	0.019
We discuss questions animatedly in class					0.022	0.019
Teacher always lectures and students listen					-0.013	0.021
Teacher encourages questions					-0.001	0.024
N	1,899		1,899		1,891	
F	2.90		16.58		12.65	
Adj Rsq	0.067		0.158		0.185	

Notes: \*\*significant at .01 level; \* significant at .05 level; + significant at .10 level. All models contain fixed effects for schools.

**Table 5.** *Industriousness Regression Models*

Dependent Variable	(1) Industriousness		(2) Industriousness		(3) Industriousness	
Parameter	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Child Background</b>						
Student gender (ref=male)	<b>0.137**</b>	<b>0.041</b>	<b>0.122**</b>	<b>0.040</b>	<b>0.126**</b>	<b>0.039</b>
Age	<b>0.062**</b>	<b>0.018</b>	<b>0.067**</b>	<b>0.018</b>	<b>0.062**</b>	<b>0.018</b>
Father's education	<b>0.011**</b>	<b>0.005</b>	<b>0.009+</b>	<b>0.005</b>	<b>0.012**</b>	<b>0.005</b>
Mother's education	<b>-0.013**</b>	<b>0.006</b>	<b>-0.015**</b>	<b>0.006</b>	<b>-0.013**</b>	<b>0.006</b>
Siblings	0.044	0.030	0.043	0.030	0.045	0.029
Family wealth (ln [rmb])	-0.004	0.036	-0.011	0.035	-0.026	0.035
<b>Teacher Background</b>						
Teacher gender (ref=male)	0.044	0.057	0.029	0.057	0.025	0.055
Experience (years)	0.006	0.009	0.007	0.008	0.003	0.008
Experience squared (years <sup>2</sup> )	0.000	0.000	0.000	0.000	0.000	0.000
Teacher education (Ref=middle school or less)						
- High school	0.077	0.060	0.079	0.060	0.054	0.058
- College	0.035	0.074	0.026	0.074	-0.010	0.072
Birthplace (ref=outside the village)	-0.019	0.054	-0.032	0.054	-0.052	0.052
Monthly income (ln [rmb])	0.005	0.043	0.004	0.043	0.008	0.042
<b>Past Academic Achievement</b>						
Last semester score			<b>0.004**</b>	<b>0.001</b>	<b>0.004**</b>	<b>0.001</b>
<b>Teaching Quality</b>						
Instability					<b>-0.076**</b>	<b>0.028</b>
Discipline					<b>-0.189**</b>	<b>0.042</b>
Teacher pays attention to me					0.014	0.021
Teacher listens to me					<b>0.094**</b>	<b>0.022</b>
Teacher cares for students					<b>0.065**</b>	<b>0.031</b>
Teacher treats students fairly					<b>0.083**</b>	<b>0.029</b>
Teacher assigns a lot of homework					<b>0.037+</b>	<b>0.022</b>
We discuss questions animatedly in class					0.024	0.023
Teacher always lectures and students listen					-0.011	0.025
Teacher encourages questions					<b>0.062**</b>	<b>0.029</b>
N	1,898		1,898		1,891	
F	3.18		5.02		8.23	
Adj Rsq	0.086		0.100		0.154	

Notes: \*\*significant at .01 level; \* significant at .05 level; + significant at .10 level. All models contain fixed effects for schools.

**Table 6.** *Alienation Regression Models*

Dependent Variable	(1) Alienation		(2) Alienation		(3) Alienation	
Parameter	Coefficient	SE	Coefficient	SE	Coefficient	SE
<b>Child Background</b>						
Student gender (ref=male)	<b>-0.056+</b>	<b>0.034</b>	-0.043	0.034	-0.044	0.033
Age	<b>-0.054**</b>	<b>0.015</b>	-0.059**	0.015	<b>-0.040**</b>	<b>0.015</b>
Father's education	-0.008+	0.005	-0.007	0.004	-0.006	0.004
Mother's education	-0.002	0.005	0.000	0.005	0.001	0.005
Siblings	0.028	0.026	0.030	0.026	0.023	0.025
Family wealth (ln [rmb])	<b>-0.075**</b>	<b>0.030</b>	-0.067*	0.030	<b>-0.072**</b>	<b>0.029</b>
<b>Teacher Background</b>						
Teacher gender (ref=male)	0.024	0.048	0.035	0.048	0.014	0.047
Experience (years)	<b>0.011+</b>	<b>0.007</b>	0.010	0.007	<b>0.011+</b>	<b>0.007</b>
Experience squared (years <sup>2</sup> )	0.000	0.000	0.000	0.000	0.000	0.000
Teacher education (Ref=middle school or less)						
- High school	<b>-0.121**</b>	<b>0.051</b>	<b>-0.120**</b>	<b>0.051</b>	<b>-0.119**</b>	<b>0.049</b>
- College	-0.097	0.063	-0.087	0.063	-0.087	0.061
Birthplace (ref=outside the village)	0.008	0.046	0.021	0.045	0.015	0.044
Monthly income (ln [rmb])	<b>-0.067*</b>	<b>0.037</b>	<b>-0.065+</b>	<b>0.036</b>	<b>-0.062+</b>	<b>0.035</b>
<b>Past Academic Achievement</b>						
Last semester score			<b>-0.004**</b>	<b>0.001</b>	<b>-0.003**</b>	<b>0.001</b>
<b>Teaching Quality</b>						
Instability					<b>0.114**</b>	<b>0.024</b>
Discipline					0.016	0.035
Teacher pays attention to me					<b>0.039**</b>	<b>0.018</b>
Teacher listens to me					0.025	0.019
Teacher cares for students					<b>-0.108**</b>	<b>0.026</b>
Teacher treats students fairly					-0.030	0.024
Teacher assigns a lot of homework					<b>0.100**</b>	<b>0.019</b>
We discuss questions animatedly in class					<b>0.038*</b>	<b>0.019</b>
Teacher always lectures and students listen					<b>0.051**</b>	<b>0.021</b>
Teacher encourages questions					<b>-0.114**</b>	<b>0.024</b>
N	1,887		1,887		1,879	
F	3.26		5.61		9.34	
Adj Rsq	0.144		0.160		0.220	

Notes: \*\*significant at .01 level; \* significant at .05 level; + significant at .10 level. All models contain fixed effects for schools.



of engagement. In the following sections, the main results are summarised across the models, by predictor variable groupings.

### *Student Background Effects*

In all of the models, it is clear that student demographic factors and family background factors have highly significant relationships with educational engagement. Female students have significantly lower educational aspirations, but report higher levels of industriousness. There are significant positive relationships between father's level of education and educational aspirations, academic confidence and industriousness. One anomalous finding is that mother's level of education, net of father's education and wealth, is significantly negatively related to industriousness.

Interestingly, having more siblings appears related to greater academic confidence, although there are negative effects, sometimes marginal, of sibship size on educational aspirations. Family wealth is positively significantly related to educational aspirations and negatively associated with alienation. Unsurprisingly, students' prior semester academic achievement is positively related to educational engagement.

### *Teacher Background and Teaching Quality Effects*

Teacher background effects on engagement are somewhat more striking than those in the achievement models. Regarding the effects of conventional teacher background characteristics, female teachers are significantly more likely to instil a sense of academic confidence in students, while students taught by teachers from the same village are marginally significantly more likely to have higher educational aspirations. Teachers who are paid more are more likely to instil confidence and to inspire less alienation, though these results are only marginally significant in some specifications.

Teaching quality, as perceived by the student, is quite closely linked to student engagement measures, and the relationships work mainly in expected directions. For educational aspirations, significant positive effects are seen for students who report that teachers care for students, treat students fairly and encourage questions. Significant negative effects are seen among students who report that teachers assign lots of homework and always lecture in class.

Students who report that their teachers listen to them, care for them and treat them fairly report higher levels of academic confidence. Confidence is lower among students reporting more disciplinary problems in the classroom.

Industriousness is significantly greater among students who perceive that their teachers listen to them, care for them, treat them fairly and encourage questions. Experiences of instability and disciplinary problems are associated with less industriousness.<sup>22</sup>

Finally, students who report instability, lots of homework being assigned and lots of lecturing in the classroom are more alienated, while students who perceive that their teachers care for students and encourage questions are less alienated. Two possibly anomalous findings emerge, however: students who report animated discussions in the classroom are more alienated, and students who report that their teacher pays attention to them are more alienated. The first of these results suggests that the meaning of “animated” deserves further scrutiny. The second of these results could emerge if teachers are paying close attention to students who are visibly disaffected from the schooling process.

## Discussion and Conclusions

This paper has yielded several findings of interest to the teacher quality debates and literature. First, for achievement, a standard outcome in teacher effects research, the findings suggest that a few new concepts may be worthy of further consideration. Having local teachers matters for achievement in rural Gansu. It seems likely that this finding is, at least in part, attributable to local teachers being better able to understand local children, communicate with them or serve as role models for them. In addition, there is evidence that student perceptions of fair treatment, and suggestive evidence that an interactive pedagogical style in the classroom may help student achievement. The results also suggest that certain dimensions of engagement — specifically, confidence and alienation — predict achievement. Engagement measures vary significantly with student socio-economic background but are also substantially linked to many dimensions of teaching quality. While specific results varied across the engagement measures, there is evidence that students who perceived that their classrooms were more interactive, that their teachers treated students fairly and cared for them, and who reported less homework and fewer disciplinary problems showed higher levels of engagement.

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<sup>22</sup> A marginally significant result suggests also that students who report that their teachers assign lots of homework also report working harder.

In rural Gansu, like in many other rural, developing country settings, economic deprivation is generally (and reasonably) viewed as the most substantial barrier to educational opportunity. However, in recent years, the Chinese Government has made a commitment to eliminate cost barriers to compulsory education in rural areas,<sup>23</sup> and engagement has become increasingly recognised as an important goal of education policy. Dropout rates during nine-year compulsory schooling continue to be high, especially in the rural areas.<sup>24</sup> Zhu Muju, Deputy Director of the Basic Education Department of the Ministry of Education, cites a study carried out in Ningxia Hui Autonomous Region on the causes of dropping out.<sup>25</sup> The study found that, contrary to popular perception, economic reasons are not the leading cause of dropping out. The leading cause is rather a strong dislike of school among the dropouts. Zhu Muju goes on to voice her opinion that “Actually, in most cases a student’s dislike of school is ... a result of issues related to the curriculum and the teaching methods.”

It is possible that China’s New Curriculum reform policies may ease some of these problems. The New Curriculum reforms call for a reduction in the homework burden, relaxed classroom environments with greater use of praise and encouragement and more varied forms of teacher-student interaction.<sup>26</sup> New Curriculum classrooms are intended to be environments where students can feel that learning is pleasant and enjoyable. The results here suggest that if

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<sup>23</sup> The most recent statement on tuition is the revised Compulsory Education Law, which came into effect 1 September 2006. This law gives children in both cities and the countryside nine years of free compulsory education, but tuition charges will not be completely waived immediately. See “China Adopts Amendment to Compulsory Education Law”, *People’s Daily Online*, 10 July 2006. China plans to offer nine-year education free to children in rural areas by 2010 and nationwide by 2015. See “Rich-poor Education Gap to be Addressed”, *China Education and Research Network* (CERNET), 30 Nov. 2005 at <<http://www.edu.cn/20051130/3163495.shtml>> [Apr. 2007].

<sup>24</sup> See, for example, a discussion in Jiayi Guo, “Nongcun xuesheng de chuxuelu weihe jubaobuxia? (Why is the Rate of School Dropout So High among Rural Students?)” *People’s Daily Online*, 20 July 2006.

<sup>25</sup> “Zhu Muju tan shiyanqu kecheng gaige redian wenti (Zhu Muju Talks about Important Issues Facing the Curriculum Reforms in Experimental Districts)”, *CERNET*, 20 July 2006 <[http://www.edu.cn/20020110/3017011\\_1.shtml](http://www.edu.cn/20020110/3017011_1.shtml)> [Apr. 2007].

<sup>26</sup> PRC Ministry of Education, *Suzhi jiaoyu guannian: xuexi tiyao* (*The Concept of Quality Education: Key Points for Study*).

New Curriculum classrooms enable teachers to create classroom environments where students feel that they are treated fairly, cared for and able to engage in a rich variety of interactions with their teachers and classmates, students may indeed exhibit higher levels of engagement.

The findings in this paper may be susceptible to concerns about using student-reported teacher behaviours to predict student-reported engagement. While it would be preferable to collect objective observations of teaching quality, this strategy would be cost-prohibitive and difficult to implement. Further, there is some validity to the perspective that the experience of teaching quality or classroom environment is not the same across individuals in a given classroom, depending, for example, on teacher treatment of different individuals in the class or the social groupings of individuals in the class. What can be stated strongly is that children's engagement is importantly linked to *their own experiences* of teaching quality and the classroom environment. This insight suggests that developing better strategies for understanding the quality of teaching and learning in the classroom may yield more informative results than simply measuring teacher background factors as "inputs" in a school production function.

## Appendix

In order to measure the significance of mediating effects, Sobel (see footnote 21) developed a combined significance test for mediation using the z-value as a test statistic according to the following formula:

$$z = a*b/\sqrt{(b^2*s_a^2 + a^2*s_b^2)},$$

where  $a$  is the raw (unstandardised) regression coefficient for the association between the independent variable and the mediator;  $S_a$  is the standard error of  $a$ ;  $b$  is the raw coefficient for the association between the mediator and the dependent variable; and  $S_b$  is the standard error of  $b$ . Significance of the mediating effect is then determined according to conventional standards of significance for a two tailed z-test.

Results shown in Appendix Table 1 indicate significant mediating effects of alienation on achievement for lecturing and encouraging questions. However, because the results for lecturing and encouraging questions were marginal in the original achievement models, we are hesitant to over-interpret this finding.

**Appendix Table 1.** *Sobel Test for the Mediating Effect of Educational Engagement on Academic Achievement*

Mediating Variable	(1) Aspirations		(2) Confidence		(3) Industriousness		(4) Alienation	
	Z-value	P-value	Z-value	P-value	Z-value	P-value	Z-value	P-value
<b>Child Background</b>								
Student gender (ref=male)	0.372	0.710	0.710	0.478	-0.381	0.703	1.173	0.241
Age	0.202	0.839	-1.234	0.217	-0.382	0.702	<b>1.811</b>	<b>0.070</b>
Father's education	-0.373	0.710	<b>1.981</b>	<b>0.048</b>	-0.380	0.704	1.282	0.199
Mother's education	0.215	0.830	-0.397	0.691	0.379	0.705	-0.199	0.841
Siblings	0.365	0.715	1.752	<b>0.079</b>	-0.373	0.709	-0.862	0.389
Family wealth (ln [rmb])	-0.370	0.713	-1.570	0.116	0.342	0.733	<b>1.750</b>	<b>0.080</b>
<b>Teacher Background</b>								
Teacher gender (ref=male)	-0.361	0.719	<b>2.143</b>	<b>0.032</b>	-0.294	0.769	-0.296	0.767
Experience (years)	-0.348	0.728	0.142	0.887	-0.269	0.788	-1.325	0.185
Experience squared (years <sup>2</sup> )	0.351	0.726	0.956	0.339	-0.359	0.720	-0.927	0.354
Teacher education (Ref=middle school or less)								
– High school	0.355	0.722	-0.524	0.601	-0.356	0.722	<b>1.731</b>	<b>0.084</b>
– College	-0.145	0.885	0.486	0.627	0.131	0.896	1.235	0.217
Birthplace (ref=outside the village)	-0.365	0.715	0.581	0.561	0.359	0.720	-0.338	0.736
Monthly income (ln [rmb])	-0.351	0.726	1.575	0.115	-0.171	0.865	1.439	0.150
<b>Past Academic Achievement</b>								
Last semester score	-0.374	0.708	<b>3.057</b>	<b>0.002</b>	-0.382	0.702	<b>1.905</b>	<b>0.057</b>
<b>Teaching Quality</b>								
Instability	0.363	0.717	1.028	0.304	0.381	0.703	<b>-2.189</b>	<b>0.029</b>
Discipline	0.044	0.965	<b>-2.739</b>	<b>0.006</b>	0.383	0.702	-0.500	0.653
Teacher pays attention to me	-0.014	0.989	-0.056	0.956	-0.333	0.740	<b>-1.627</b>	<b>0.103</b>
Teacher listens to me	-0.359	0.720	<b>1.914</b>	<b>0.056</b>	-0.383	0.702	-1.161	0.246
Teacher cares for students	-0.371	0.711	<b>2.189</b>	<b>0.029</b>	-0.378	0.705	<b>2.121</b>	<b>0.034</b>
Teacher treats students fairly	-0.372	0.709	<b>2.099</b>	<b>0.036</b>	-0.381	0.703	1.115	0.265
Teacher assigns a lot of homework	0.370	0.711	-0.053	0.958	-0.373	0.708	<b>-2.234</b>	<b>0.026</b>
We discuss questions animatedly in class	-0.352	0.725	1.091	0.275	-0.361	0.718	-1.554	0.120
Teacher always lectures and students listen	0.369	0.712	0.608	0.543	0.290	0.772	<b>-1.731</b>	<b>0.084</b>
Teacher encourages questions	-0.371	0.710	0.417	0.997	-0.379	0.705	<b>2.189</b>	<b>0.029</b>