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ORIGINAL ARTICLE

# The effect of working condition on math teacher effectiveness: value-added scores and student satisfaction in teaching

**Yincheng Ye**[1] · **Kusum Singh**[2]

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**Abstract** The purpose of this study is to better understand how math teachers' effectiveness as measured by value-added scores and student satisfaction with teaching is influenced by school's working conditions. The data for the study were derived from 2009 to 2010 Teacher Working Condition Survey and Student Perception Survey in Measures of Effective Teaching Project. Using the structural equation modeling and other related methods, several models of teacher effectiveness were estimated. The findings indicate that among the examined working condition factors, support for instruction and for student conduct management have significant effects on teachers' value-added scores in mathematics. Moreover, the student satisfaction with teaching seems to have a mediating effect on value-added scores. The findings of the study significantly contribute to a better understanding of the effects of working environment on math teachers' effectiveness and how improvement in working conditions can enhance math teachers' performance.

**Keywords** School working conditions · Math teacher value-added score · Effective teaching

## 1 Introduction

Having effective teachers is the key school factor for improving student learning (Aaronson et al. 2007; Lockwood and McCaffrey 2009; Rivkin et al. 2005; Rockoff 2004). The role of teacher involves more than simply standing in front of a classroom and lecturing; it aims to assist students with making conceptual connections and therefore better learning through an

✉ Yincheng Ye
yeyinche@msu.edu

Kusum Singh
ksingh@vt.edu

1 Counseling, Educational Psychology and Special Education, Michigan State University, Room 240D Erickson Hall, 620 Farm Lane, East Lansing, MI 48824, USA

2 Educational Research and Evaluation, Virginia Tech, 2104 VT CRC (0302), 1750 Kraft Dr., Blacksburg, VA 24060, USA

educational process in an integrated teaching and learning environment. In other words, an effective teacher understands that teaching involves multiple tasks to ensure that all students receive quality education (Markley 2006).

Recent math reform efforts have two main goals: closing student achievement gaps and ensuring high-quality math education for all students. For both of these goals, effective teachers are the most critical link. Thus, policy makers and practitioners are interested in exploring ways to improve teacher effectiveness. While in recent years, researchers have consistently shown that effective teachers are distributed very unevenly among schools, especially to the clear disadvantage of high-need schools (Clotfelter et al. 2011; Lankford et al. 2002; Sass et al. 2012). These high-need schools that serve more low-income or minority students face particular difficulty attracting qualified teachers to teach math classes (Ingersoll and Perda 2009; Ingersoll and May 2012). As spurred by the Race To The Top (RTTT), policy makers have undertaken a wide range of reforms and developments to improve the performance of teachers, particularly the math teachers (Race to the Top Progress 2013).

While recruiting knowledgeable and skilled teachers is important, it is insufficient for schools to ensure effective teaching performance (Berry et al. 2009, 2010). Good teachers need a workplace that promotes their efforts in a variety of ways to retain them as well as improve their teaching (Jackson and Bruegmann 2009). Teacher effectiveness is not just about teachers' experience, knowledge, skills, etc., but also about the conditions under which they work. Jackson (2014) concluded that "Teachers may be more or less effective as a contextual function of schools' working conditions that transpose human capital into productivity and effective instructional practice of teachers" (p. 8). Teachers' working conditions play an important role in a school's ability to deliver high-quality education. Schools that are able to offer their teachers a safe, pleasant, and supportive working environment that can better attract and retain good teachers and motivate them to do their best.

The purpose of this study is to develop and estimate a model of math teacher effectiveness as measured by student satisfaction and value-added scores, using multiple working conditions and teacher background qualities. Plenty of recent studies have found that teachers' working conditions are directly correlated with teacher effectiveness (e.g. Hanushek and Rivkin 2007; Jackson 2014; Johnson 2006; Johnson et al. 2012). Research indicates that working conditions are malleable and dynamic within a rich, professional context that encourages teachers' learning and growth. To better understand how math teachers' effectiveness is influenced by working conditions, this study aims to assess two broad conceptions of teacher effectiveness: student satisfaction with teaching and teacher value-added score. Student satisfaction and value-added score are two reliable measures that characterize the teacher effectiveness in student perceived teaching in classrooms and student achievement outcome (Aaronson et al. 2007; Bill & Melinda Gates Foundation 2010; Kyriakides 2005). Specifically, this study addresses the following research questions:

1. What is the effect of working conditions (i.e. instructional related support, resources and facilities, community support, student conduct management) on teachers' value-added scores in math?
2. What is the effect of working conditions on students' satisfaction with teaching?
3. Does student satisfaction with teaching mediate the impact of working condition factors on teacher value-added scores?

## 2 Theoretical framework

The theoretical framework of this research is based on previous studies on working conditions and how they affect the teacher effectiveness. Teacher effectiveness is conceptualized as the joint function of what it contributes to student achievement outcome and what the teachers do in classrooms (Goe et al. 2008). The research work of Sanders and Wenglinsky demonstrated that teacher effectiveness can be measured based on student test scores and are critical to student success (Sanders et al. 1997; Wenglinsky 2000). Teacher value-added model is one of the prominent methods to measure teachers' impact on their student achievement, which captures the pure student achievement gains by controlling for other factors that affect achievement, such as individual ability, family environment, past schooling, etc. (Aaronson et al. 2007; Glazerman et al. 2010; Hanushek 1971; Kane and Staiger 2008; Nye et al. 2004; Rivkin et al. 2005; Rockoff 2004). In addition, previous studies also demonstrated that student satisfaction of teaching can be used as a complement to measures of teacher effectiveness in student learning (Kyriakides 2005; Oesterle 2008), which provides more information and a more robust definition of teacher effectiveness. Research has found strong link between these two measures, showing that teachers with more satisfied students had higher value-added scores (Bill & Melinda Gates Foundation 2012; Hanover Research 2013; Raudenbush 2013).

Literature on multiple working conditions has indicated that school working conditions directly affect teachers' effectiveness and student achievement in various ways (Berry et al. 2009; Johnson 2006). Researchers have examined the impact of concrete working conditions, such as material resources and facilities, community relations, managing student conduct (Johnson et al. 2012; Ladd 2011; Loeb et al. 2005); as well as instruction-related working conditions, such as the amount of professional development offered and time allotted for instruction planning and collaboration (Johnson et al. 2012; Ladd 2011).

Consistent with these research findings, working conditions such as resources and facilities, community support, student conduct management, and instructional related support are expected to predict teacher value-added score. The conceptual model hypothesizes that teachers with more satisfied students will have better value-added scores. The model also allows for the possibility that these working conditions will affect students' satisfaction with teaching. Moreover, teachers' background qualities such as teaching experience and advanced education degree are expected to affect the estimates of teacher value-added scores as well as students' satisfaction about teaching (see Fig. 1).

## 3 Method

### 3.1 Data sources and sample

All data in this study are derived from the Teacher Working Condition Survey and Student Perception Survey in the Measures of Effective Teaching (MET) Project. Researchers from the University of Michigan helped in collecting a variety of indicators of teaching quality focused on fourth to ninth grade over a 2-year period, from the year 2009–2010 to the year 2010–2011. All teachers were located in six large urban school districts in the USA. For the present study, a total of 941 teachers in 317 schools teaching math from fourth to eighth grade in the year 2009–2010 were selected. Value-added scores of teachers are estimated by using student learning measured by the state assessments in mathematics in the year 2009–2010 and baseline year 2008–2009. After the teachers who did not have complete data on variables of interest were eliminated, the data file contained 622 cases.

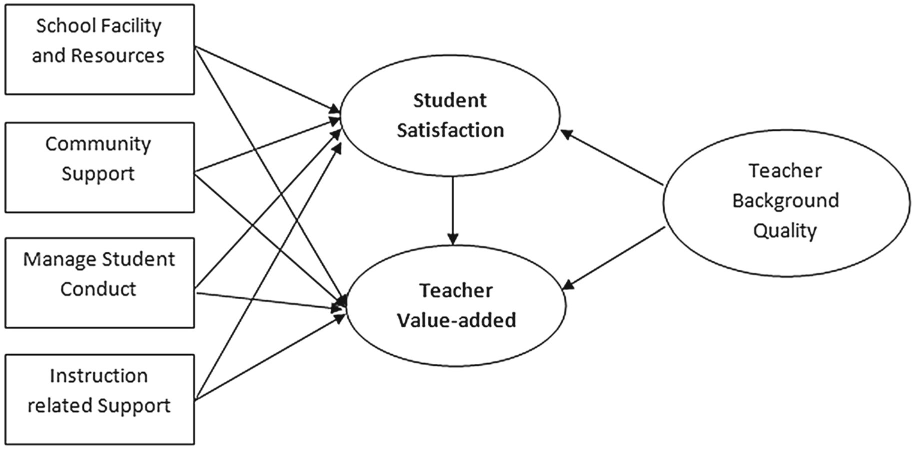


**Fig. 1** Hypothesized model

### 3.2 Items and constructs

The questionnaire data on facility and resources, community support, student conduct management and instructional related support were reported by math teachers on a 4-point Likert scale (1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree); and the MET student perception survey was used to collect data from students on a 5-point Likert scale (1 = Totally untrue; 2 = Mostly untrue; 3 = Sometimes; 4 = Mostly true, 5 = Totally true). The student satisfaction items were aggregated to the teacher level by averaging them for each teacher's class. In the present study, we created five composites: student satisfaction (7 items), facility and resources (9 items), community support (8 items), manage student conduct (7 items), and instruction-related support (14 items). The measurement models were evaluated using confirmatory factor analysis. The results are showed in Table 1.

For the teacher value-added score in math, MET researchers used student test scores to construct the value-added measures of teaching effectiveness for individual teachers (White and Rowan 2014). A context adjusted 2-level hierarchical model was used to estimate teacher value-added scores (Raudenbush and Bryk 2002). The value-added model accounted for prior achievement in the subject area, student background (e.g. gender, age, ethnicity, free-reduced lunch status, special education, gifted status, etc.), and class-level average prior achievement scores, class-level aggregated student background proportion. The teacher-level residuals were used as estimates of the value-added score for a specific teacher. For teacher background quality (TBQ), Teachers' education level [whether teachers have a master degree (MD)] and teaching experience in year (TE) were used to create a composite measure of teacher background quality. The teacher background quality measure was created by linearly adding these two variables: TBQ = MD*3 + TE. Table 1 presents the descriptive statistics of all items.

### 3.3 Data analysis

This research used a structural equation modeling (SEM) approach to achieve the research goals. SEM is a statistical method that takes a confirmatory approach to data analysis and is used to test a structural theory about the relationships of some variables of interest (Byrne 1998). The LISEREL 8.80 software was used for the analysis of hypothesized

**Table 1** Descriptive statistics for all items

| Items | | Mean | SD |
|---|---|---|---|
| *Student satisfactions* | | | |
| SP1 | My teacher in this class makes me feel that he/she really cares about me | 3.99 | 0.59 |
| | My teacher knows if something is bothering me | 3.42 | 0.59 |
| SP2 | My teacher has several good ways to explain each topic that we cover in this class | 4.08 | 0.42 |
| | My teacher explains difficult things clearly | 4.09 | 0.46 |
| | My teacher asks questions to be sure we are following along when s/he is teaching | 4.42 | 0.30 |
| SP3 | My teacher wants me to explain my answers | 4.16 | 0.34 |
| | My teacher gives us time to explain our ideas | 3.94 | 0.48 |
| *Facility and resources* | | | |
| FR1 | Teachers have sufficient access to appropriate instructional materials | 3.02 | 0.78 |
| | Teachers have sufficient access to instructional technology, including computers, printers, software and internet access | 2.92 | 0.88 |
| | Teachers have access to reliable communication technology, including phones, faxes and email | 3.04 | 0.79 |
| FR2 | Teachers have sufficient access to a broad range of professional support personnel | 2.89 | 0.77 |
| | Teachers have sufficient access to office equipment and supplies such as copy machines, paper, pens, etc. | 2.69 | 0.91 |
| FR3 | The reliability and speed of Internet connections in this school are sufficient to support instructional practices | 2.90 | 0.85 |
| FR4 | The school environment is clean and well maintained | 3.13 | 0.77 |
| | Teachers have adequate space to work productively | 3.14 | 0.70 |
| | The physical environment of classrooms in this school supports teaching and learning | 3.15 | 0.69 |
| *Community support* | | | |
| CS1 | Parents/guardians are influential decision makers in this school | 2.62 | 0.84 |
| CS2 | Parents/guardians know what is going on in this school | 3.01 | 0.76 |
| | Teachers provide parents/guardians with useful information about student learning | 3.29 | 0.58 |
| CS3 | This school does a good job of encouraging parent/guardian involvement | 3.11 | 0.74 |
| | This school maintains clear, two-way communication with the community | 3.00 | 0.71 |
| CS4 | Parents/guardians support teachers, contributing to their success with students | 2.64 | 0.82 |
| | Community members support teachers, contributing to their success with students | 2.79 | 0.75 |
| | The community we serve is supportive of this school | 2.90 | 0.74 |
| *Manage student conduct* | | | |
| MC1 | Students at this school understand expectations for their conduct | 3.04 | 0.81 |
| | Students at this school follow rules of conduct | 2.55 | 0.83 |
| MC2 | School administrators support teachers' efforts to maintain discipline in the classroom | 2.55 | 0.94 |
| | School administrators consistently enforce rules for student conduct | 2.79 | 0.87 |

**Table 1** continued

| Items | | Mean | SD |
|---|---|---|---|
| MC3 | Policies and procedures about student conduct are clearly understood by the faculty | 3.05 | 0.77 |
| MC4 | Teachers consistently enforce rules for student conduct | 3.08 | 0.72 |
| MC5 | The faculties work in a school environment that is safe | 3.19 | 0.70 |
| *Instruction-related support* | | | |
| IS1 | State assessment data are available in time to impact instructional practices. | 2.71 | 0.92 |
| | Local assessment data are available in time to impact instructional practices | 3.11 | 0.62 |
| | Teachers use assessment data to inform their instruction | 3.29 | 0.59 |
| IS2 | Teachers work in professional learning communities to develop and align instructional practices | 3.10 | 0.72 |
| | Provided supports (i.e. instructional coaching, professional learning communities, etc.) translate to improvements in instructional practices by teachers | 3.00 | 0.68 |
| | Teachers are encouraged to try new things to improve instruction | 3.15 | 0.68 |
| | Professional development provides ongoing opportunities for teaches to work with colleagues to refine teaching practices | 2.88 | 0.74 |
| IS3 | Teachers are assigned classes that maximize their likelihood of success with students | 2.55 | 0.86 |
| | Teachers have autonomy to make decisions about instructional delivery (i.e. pacing, materials and pedagogy) | 2.73 | 0.89 |
| IS4 | Class sizes are reasonable such that teachers have the time available to meet the needs of all students | 2.68 | 0.87 |
| | Teachers have sufficient instructional time to meet the needs of all students | 2.93 | 0.79 |
| | Teachers are allowed to focus on educating students with minimal interruptions | 2.52 | 0.78 |
| | Efforts are made to minimize the amount of routine paperwork teachers are required to do | 2.60 | 0.82 |
| | Teachers are protected from duties that interfere with their essential role of educating students | 2.30 | 0.85 |
| TQ | *Teacher background quality* | 5.12 | 2.25 |
| | Teacher has master or higher degree | 0.39 | 0.49 |
| | Teaching experience in year | 3.85 | 1.36 |
| TVA | *Teacher value-added score* | .004 | 0.24 |

models (Jöreskog and Sörbom 2006). First, the measurement properties of the instrument were examined. Then, the effects of working condition factors on student satisfaction and teacher value-added scores were examined. The fit indices and parameter estimates were used to judge the model fit, with acceptable fit statistics supporting the overall latent factor model, significant factor loadings upholding the measurement models, and significant causal parameters supporting the structural model (Schumacker and Lomax 2010).

## 4 Results

The correlation coefficients in Table 2 showed that the indicators within the latent constructs were related to each other. As expected, the items of all predictors had small to moderate correlation with math teachers' value-added scores and the student satisfaction with teaching. Besides, the multicollinearity among the predictors were also examined and the results indicates that there is no significant multicollinearity among all predictors.

### 4.1 Measurement model

The first step of the analysis involved testing the measurement model of the scales and the correlations among all the variables in the model. Results showed high fit indices for the measurement model and indicated an overall well-fitting to the hypothesized model ($\chi^2 = 611.78$, $df = 160$, $N = 622$, $p < .01$). Specifically, the goodness-of-fit index (GFI) was .91; the comparative fit index (CFI) was .97; the root-mean-square error of approximation (RMSEA) was .067, and the standardized root-mean square error of approximation (SRMR) was .050. A large modification indices suggested that one pair of items was highly correlated. To obtain a better fitting model, the model was modified by releasing the first pair of covariance of items. As a result, the fit was improved: $\chi^2(df = 159, N = 622) = 564.24$, $p < .01$, GFI = .92, CFI = .97, RMSEA = .064, and SRMR = .050.

As shown in Table 3, every item and their respective factors resulted in moderate or high pattern coefficients and statistical significance at 95% level. They also demonstrated considerable variability (range of loadings = .39–.92), The Cronbach's alpha coefficients for those latent variables were .91, .79, .83, .84 and .77, respectively. The Cronbach's alphas of all constructs were above .70, indicating the model contains considerable reliability (Henson 2001; Lance et al. 2006).

### 4.2 Testing the direct paths between working condition factors and teacher value-added scores

In this step, the model included paths to teacher value-added score in math through working condition factors, and through teacher background quality. The fit indices suggested the model fit the data well, $\chi^2(df = 142, N = 622) = 485.45$, $p < .01$, GFI = .92, CFI = .97, RMSEA = .065, and SRMR = .048. In this model, a small proportion of variance ($R^2 = .07$) of teacher value-added scores in math was explained by working conditions and teacher background quality. Figure 2 showed the direct paths of the structural model, in which the solid lines represent significant paths and the dash lines indicate insignificant effects at 95% level. Controlling for teacher background qualities in the model, we found the only significant path to teacher value-added score that was through the instruction-related supports ($\beta = .22$). In addition, the path from teacher background quality to their value-added score in math was found positive ($\beta = .08$) yet nonsignificant.

### 4.3 Testing the mediation effects of student satisfaction with teaching

In this step, student satisfaction with teaching was entered as a mediator between the working condition factors and teacher value-added scores in the model. This model had a good fit, $\chi^2(df = 193, N = 622) = 617.07$, $p < .01$, GFI = .92, CFI = .97, RMSEA = .059, and SRMR = .048. It explained 9% of the variance in teacher value-added score.

Figure 3 illustrated the full structural model of math teachers. Similar to the prior results, the paths from these four working condition factors to teacher value-added did not change after the mediating variables were added in the model. The only significant path to teacher value-added score was through instruction-related supports ($\beta = .21$). In additions, across all working conditions, managing student conduct ($\beta = .28$) showed significant effects on stu-

**Table 2** Correlations among items

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP1 | – | | | | | | | | | | | | | | | | | | | | | |
| SP2 | .830 | – | | | | | | | | | | | | | | | | | | | | |
| SP3 | .813 | .793 | – | | | | | | | | | | | | | | | | | | | |
| FR1 | .005 | −.014 | −.024 | – | | | | | | | | | | | | | | | | | | |
| FR2 | −.032 | −.063 | −.054 | .621 | – | | | | | | | | | | | | | | | | | |
| FR3 | −.031 | −.057 | −.089 | .488 | .426 | – | | | | | | | | | | | | | | | | |
| FR4 | −.017 | −.023 | .001 | .547 | .520 | .446 | – | | | | | | | | | | | | | | | |
| CS1 | .006 | −.031 | −.090 | .145 | .234 | .084 | .190 | – | | | | | | | | | | | | | | |
| CS2 | .138 | .098 | .007 | .249 | .302 | .145 | .347 | .425 | – | | | | | | | | | | | | | |
| CS3 | .024 | −.024 | −.009 | .269 | .377 | .216 | .408 | .501 | .694 | – | | | | | | | | | | | | |
| CS4 | .095 | .053 | .040 | .329 | .362 | .222 | .377 | .544 | .502 | .578 | – | | | | | | | | | | | |
| MC1 | .126 | .069 | .097 | .273 | .333 | .214 | .419 | .339 | .409 | .460 | .540 | – | | | | | | | | | | |
| MC2 | .095 | .053 | .089 | .323 | .423 | .225 | .438 | .261 | .419 | .499 | .476 | .664 | – | | | | | | | | | |
| MC3 | .116 | .091 | .112 | .218 | .314 | .128 | .336 | .187 | .421 | .415 | .307 | .509 | .586 | – | | | | | | | | |
| MC4 | .220 | .172 | .172 | .187 | .255 | .086 | .242 | .187 | .397 | .305 | .308 | .396 | .421 | .474 | – | | | | | | | |
| MC5 | .056 | .015 | .015 | .345 | .350 | .293 | .474 | .288 | .434 | .484 | .486 | .594 | .596 | .452 | .386 | – | | | | | | |
| IS1 | −.048 | −.040 | −.040 | .287 | .228 | .165 | .258 | .021 | .176 | .130 | .147 | .157 | .152 | .167 | .134 | .175 | – | | | | | |
| IS2 | .062 | .069 | .069 | .351 | .370 | .283 | .395 | .190 | .388 | .392 | .296 | .355 | .433 | .380 | .289 | .344 | .349 | – | | | | |
| IS3 | .074 | .045 | .045 | .354 | .373 | .282 | .345 | .187 | .249 | .327 | .350 | .337 | .384 | .272 | .243 | .345 | .244 | .530 | – | | | |
| IS4 | −.015 | .005 | .005 | .426 | .470 | .349 | .415 | .170 | .195 | .327 | .375 | .375 | .435 | .254 | .176 | .340 | .228 | .449 | .534 | – | | |
| TQ | .095 | .071 | .071 | .015 | −.039 | −.103 | −.044 | .004 | .091 | .026 | .052 | −.015 | −.009 | .063 | .036 | −.011 | .039 | −.019 | .024 | −.036 | – | |
| TVA | .118 | .119 | .119 | .095 | .097 | .098 | .154 | .074 | .094 | .055 | .140 | .115 | .130 | .061 | .054 | .133 | .094 | .118 | .119 | .123 | .056 | – |

**Table 3** Item loadings of composite variables

| | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | α |
|---|---|---|---|---|---|---|
| Student satisfaction | .92 | .90 | .88 | | | .91 |
| Facility and resources | .77 | .77 | .59 | .73 | | .79 |
| Community support | .63 | .67 | .77 | .79 | | .83 |
| Manage student conduct | .79 | .84 | .67 | .54 | .73 | .84 |
| Instruction-related support | .39 | .71 | .72 | .71 | | .78 |

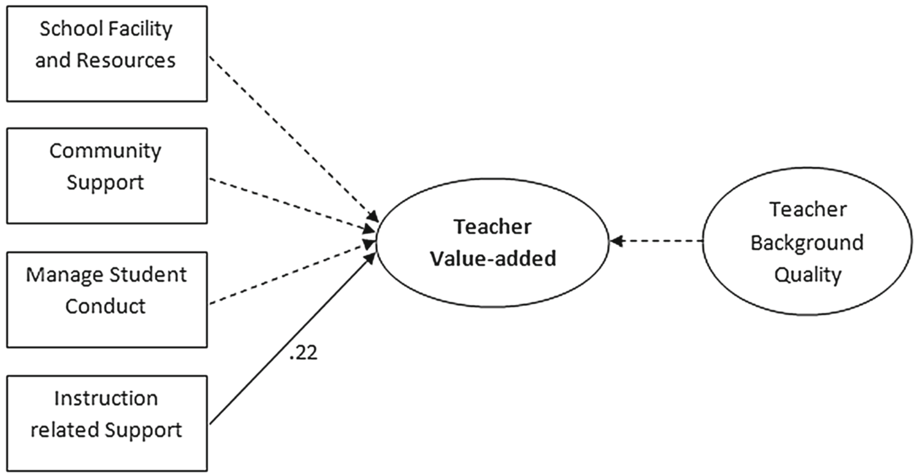


**Fig. 2** Paths between working condition factors and teacher value-added scores. All coefficients shown are completely standardized and significant at $p < .05$. *Solid lines* represent significant paths, and *dashed lines* represent non-significant paths

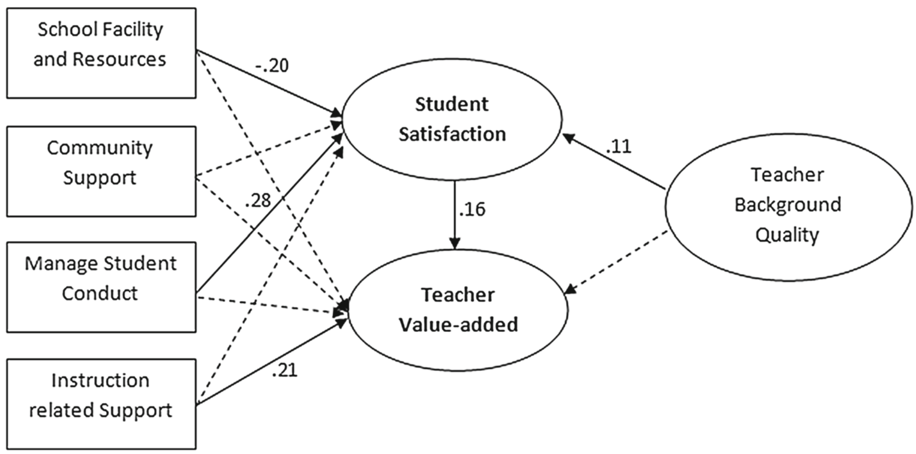


**Fig. 3** Mediation effects of student satisfaction. All coefficients shown are completely standardized and significant at $p < .05$. *Solid lines* represent significant paths, and *dashed lines* represent non-significant paths

**Table 4** Standardized direct, indirect, and total effects for the final model

| | Student satisfaction | Teacher value-added score |
|---|---|---|
| Teacher background quality | | |
| Direct | .11* | .05 |
| Indirect | | .02 |
| Total | .11* | .07 |
| Facility and resources | | |
| Direct | −.20* | .04 |
| Indirect | | −.03 |
| Total | −.20* | .01 |
| Community support | | |
| Direct | −.10 | .03 |
| Indirect | | −.02 |
| Total | −.10 | .01 |
| Manage student conduct | | |
| Direct | .28* | −.03 |
| Indirect | | .05* |
| Total | .28* | .02 |
| Instruction-related support | | |
| Direct | .06 | .21* |
| Indirect | | .01 |
| Total | .06 | .22* |
| Student satisfaction | | |
| Direct | | .16* |
| Indirect | | |
| Total | | .16* |

* $p < .05$

dent satisfaction. The path to student satisfaction was significant and negative through school facilities and resources ($\beta = -.20$). As hypothesized, the path from student satisfaction to teacher value-added scores was positive and significant ($\beta = .16$).

Table 4 showed the indirect and total effects in the model. The effects of teacher background quality were significantly and positively correlated with student satisfaction ($\beta = .11$) while they were weakly correlated with teacher value-added scores ($\beta = .07$). Student satisfaction had a significant effect on teacher value-added scores ($\beta = .16$). Facility and resources had a negative effect on student satisfaction ($\beta = -.20$) and weak effects on teacher value-added ($\beta = .04$). Community support had weak effects on student satisfaction ($\beta = -.10$) and teacher value-added scores ($\beta = .03$). Management of student conduct had a very weak effect on teacher value-added scores ($\beta = -.03$), but it had an influential effect on student satisfaction ($\beta = .28$). Moreover, managing student conduct had a significantly indirect-effect on teacher value-added scores ($\beta = .05$) which was mediated by student satisfaction. Instruction-related supports had a very weak effect on student satisfaction ($\beta = .06$), but it had significant effects on teacher value-added scores ($\beta = .21$).

In summary, among these four types of working conditions, instruction-related supports directly affected teacher value-added; and managing student conduct indirectly affected teacher value-added score. Student satisfaction and teacher background quality were significant predictors for the teacher value-added score. In addition, managing student conduct affected student satisfaction and indirectly affected teacher value-added score through student satisfaction. The results suggest that student satisfaction mediates the link between managing student conduct and teacher value-added score.

## 5 Discussion and implications

This study makes a significant contribution to the literature on teacher working conditions and math teacher effectiveness in public elementary and middle schools in the USA. It confirms some of the previous findings with more rigorous methods. More specifically, the study incorporates multiple aspects of working conditions in the model and highlights the importance of instruction-related support in teacher value-added scores, comparing it with other working conditions. This finding is consistent with the results of some earlier studies that instruction supports for the teachers are the most direct condition that allows teachers to deliver knowledge and skills through the instruction in classrooms successfully (Allen 2011; Cosner 2011). When teachers have access to assessment data, are provided opportunities for professional development and are supported in their efforts to provide better instruction, and have more appropriate instruction workload, they are likely to be more effective in the classroom. Such pedagogical coaching and instructional support will lead to better student learning and higher student achievement gains in mathematics. Furthermore, it also suggests that support for managing student conduct is another influential working condition in teacher effectiveness, which has an indirect effect on teacher value-added score through the mediating effect on student satisfaction with teaching. In schools where rules and procedures about student conduct are implemented fairly and consistently, the policies regarding student conduct are clearly communicated, teachers can better maintain discipline and create a safer and respectful environment in the classroom. The teachers in such schools are able to effectively interact with students and maintain consistent standards of behavior, which in turn creates a positive learning environment and enhances learning outcomes. Better support in schools for student conduct management encourages more effective teaching, and in turn, is likely to increase the students' achievement gains in mathematics.

In addition, the study provides empirical evidence for the importance of student satisfaction ratings as a measure of teacher effectiveness. Students' satisfaction with teaching can predict their learning outcome, as can be seen by the significant effect of student satisfaction with teaching on teachers' value-added scores in mathematics. This study confirms that student rating of teaching can be used as a complement to other tools, such as classroom observations or measures of student achievement gains in the evaluation of effective teachers, particularly for math teachers. Data from student survey captured the impressions of many students who have spent many hours with the teachers; it provides many details similar to classroom observations.

This study has both theoretical and practical significance. This research provides critical evidence that can be used by policymakers or researchers to promote math teachers' performance. Many states and districts have implemented policies to improve physical working conditions, professional development opportunities, and instructional practices and programs in schools for improving teacher effectiveness. In developing such programs, the findings of this study may benefit policy makers by focusing on the specific working conditions such as instruction-related supports and support with managing student conduct. The support for classroom management and instructional practice are salient as more attention needs to be paid to the classroom activities, interaction with students, in order to achieve high-quality and effective teaching for all students' learning. However, the results showed that the teacher working conditions only explained a small proportion of the variance in teacher value-added scores and student satisfaction. In addition to working conditions, policymakers may have to pay attention to other factors that influence teacher effectiveness.

Since this study is a cross-sectional exploration of data, causality may be inferred only tentatively. Reverse causality may also explain some of the relationships observed here. For example, it is not clear whether instructional practice support makes teachers more effective, or whether more effective teachers are more able to garner support. Given that these findings are based on non-experimental data, further research would be required to confirm whether policies that promote classroom management or instruction support to improve teacher practice can enhance teacher effectiveness. Moreover, future researchers could reexamine the results of this study by using alternative statistical methods. Other statistical models, such as hieratical linear modeling (HLM) technique, could be used to examine the working conditions' effects for testing the replicability and explain the schools' and teachers' variability, using the nested data. The study points to the need for more research using other methods and deeper conceptualization of the study's constructs.

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