Technical Report, September 2022:
2022 Teaching and Learning Conditions in Colorado (TLCC) Survey
and
General validity of the TLCC Survey instrument

Overview

In spring 2018, an independent analysis of the reliability and validity of the new *Teaching and Learning Conditions in Colorado* ("TLCC") survey presented herein was conducted by Dr. Kent Seidel, via a data sharing research agreement with the Colorado Department of Education. Dr. Seidel is associate professor of research and evaluation methods in the School of Education & Human Development, University of Colorado Denver. He is also the founding director of the Center for Practice Engaged Education Research (C-PEER) at CU Denver.

The TLCC survey was developed through a process involving numerous educational leaders, practitioners, researchers, and representatives of education-related organizations in Colorado. Details on the development of the TLCC can be found in the technical memo provided by Augenblick, Palaich and Associates (APA), the consulting firm that led the survey development prior to the state contracting with Cambridge to administer the survey in January and February of 2018.

For this technical analysis, an overall valid number (n) of 33,879 respondents in the "teachers" dataset was comprised of 30,958 teachers with 2,921 "Education Professional or Service Provider" respondents. The "leaders" dataset was comprised of 1,568 respondents identifying as "School Leader (e.g., principal, assistant principal, dean) and 32 identifying as "Combined District and School Leader Role." Data about school characteristics were added to the dataset, pulling from publicly available data sources available on the Colorado Department of Education website. Additional analysis of this first administration of the TLCC will be completed during spring 2018, to provide insights on the relationship of TLCC data with other aspects of school characteristics and performance improvement.

All three foci are always important to schools and districts, of course, but challenges with each have been exacerbated in the extreme due to the pandemic, including massive shifts from in-person to online educational delivery and political divides in most districts' communities. These pandemic influences have increased staff turnover: past trends have been 20% on average across Colorado, but current indicators are now as bad as 50% in some districts, even resulting in school closures due to lack of staffing (internal CDE correspondence). Student behavior issue trends have been collected by CDE annually from well before the TELL 2009 survey, and the 2022 TLCC survey included a new block of items gathering staff views of concerns for student wellbeing, school/district supports for student wellbeing, and staff personal wellbeing. The wellbeing block provided insights on the current post-pandemic challenges facing schools, which are of concern (Cambridge Education, 2022). Student behavior challenges have also increased dramatically upon return to somewhat "normal" in-person school settings. Finally, student achievement growth has always been a key concern—indeed, the primary goal of schools—and in addition has been impacted for most students emerging from the pandemic.

The TLCC and TELL surveys have provided CDE and schools/districts throughout Colorado with annual reports on aspects of their school climate and teaching/learning conditions. Now that there exists a multi-

year administration and the PI's validity analyses have confirmed the TLCC items and constructs as stable over multiple years (a trend established) and a variety of respondent groups (school types/settings across Colorado), the PI and partner CDE are interested in what insights these regular surveys of school personnel can provide with regard to 1) staff turnover/retention; 2) student behaviors and wellbeing; and 3) students' achievement growth.

This technical report is focused on providing basic information regarding the appropriate use of TLCC data for research and other secondary analysis purposes. A more comprehensive publication regarding the development, validity, and use of the TLCC Survey instrument is in process for peer-reviewed publication, so this report is necessarily brief. Researchers using TLCC can cite this technical information, and a reference for the future comprehensive publication will be made available at a later date.

CITATION:

Questions about this report should be directed to Dr. Seidel at Kent.Seidel@UCDenver.edu.

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Constructs and Scales

A factor analysis was conducted to test whether the planned constructs, consisting of questions grouped into categories reflected these categories in the responses of the teachers taking the TLCC 2018 survey. These eight categories were tested:

- School Leadership

- Teacher Leadership

- Managing Student Conduct

- Instructional Practices & Support

- Professional Development

- Time

- Facilities & Resources

- Community Support & Involvement

The group of questions categorized as "New Teacher Supports" and "District Supports" were not included in the factor analysis or missing data diagnosis, since these questions were only administered to a subset of teachers and to the leaders, respectively. A deeper analysis of these areas of questions with other data from the TLCC survey and school level characteristics is planned for summer 2018.

The factor analysis (Principal Components Analysis, varimax rotation) showed that TLCC 2018 is, empirically, a very good match for the constructs as designed. Six of the eight constructs (Teacher Leadership, Managing Student Conduct, Professional Development, Time, Facilities & Resources, and Community Support & Involvement) matched directly, demonstrating the planned constructs did indeed reflect the ways that educators throughout Colorado think about these important topics. Two of the eight constructs matched well, but also offered two sub-constructs which may be of interest:

- School Leadership broke into two sub-constructs, one of which is labeled, "Team Climate" and one of which is labeled, "Evaluation."

- Instructional Practices & Supports broke into two sub-constructs, one of which is labeled, "Responsibility for Instruction" and one of which is labeled, "Differentiating & Adjusting Instruction."

These sub-constructs are of interest because they associate with different aspects of other TLCC items, such as "intent to stay" and the overall ratings of the school, so while the full-group constructs of School Leadership and Instructional Practices & Supports are appropriate to report, in some cases the sub-constructs offer even more insights into the TLCC data. See Appendix A for an output of the full set of TLCC items from the Principal Components Analysis.

A check on the internal consistency (Cronbach's alpha, with statistics run for "scale if item deleted" on each) were also conducted. These values are shown below for both the main constructs and for the sub-constructs identified through the factor analysis.

Internal Consistency (Cronbach's alpha) of Constructs and Sub-constructs

Construct / Sub-construct	N of items	Cronbach's Alpha
School Leadership	8	0.904
Sub-construct (from factor analysis): "Team Climate"	5	0.876
Items (in order of factor loadings): • 2-1e. I feel comfortable raising important issues with school leadership. • 2-1a. This school is led by an effective team. • 2-1b. Our work together is guided by a shared vision that is student focused. • 2-1d. School staff show respect for each other. • 2-1c. School staff participate in the improvement planning process (e.g., UIP) in a meaningful way.		
Sub-construct (from factor analysis): "Evaluation"	3	0.864
Items (in order of factor loadings): • 2-1h. The teacher evaluation process provides me with actionable feedback for improvement. • 2-1g. My effectiveness is accurately assessed through the school's teacher evaluation process. • 2-1f. I receive informal feedback that helps me to improve my instruction.2-1e. I feel comfortable raising important issues with school leadership.		
Teacher Leadership	4	0.858
Managing Student Conduct	4	0.840
Instructional Practices & Support	13	0.883
Sub-construct (from factor analysis): "Responsibility for Instruction"	4	0.766
Items (in order of factor loadings): • 5-1b. Staff in this school hold themselves accountable for the academic growth of every child. • 5-1a. Staff in this school consistently seek new and improved ways of providing instruction. • 5-1d. Students understand how class activities relate to learning objectives. • 5-1e. Instruction in this school encourages different cultural viewpoints.		
Sub-construct (from factor analysis): "Differentiating/Adjusting Instruction"	8	0.828
Items (in order of factor loadings): • 5-1h. Students with disabilities are adequately supported in this school. • 5-1k. I have the autonomy to make important decisions for my classroom. • 5-1g. English Learners are adequately supported in this school. • 5-1l. I feel supported in trying new instructional strategies. • 5-1m. I use formative assessment data to improve my students' learning. • 5-1i. Gifted students are adequately supported in this school. • 5-1j. Students' social and emotional learning is adequately supported in this school. • 5-1f. The diverse academic needs of our students are met by this school's current curriculum.		
Professional Development	7	0.906
Time	6	0.882
Facilities & Resources	4	0.688
Community support & Involvement	4	0.801

A usual rule of thumb is to expect a Cronbach's alpha score of 0.7 or higher. Most of these are quite strong on internal consistency; only Facilities and Resources is a bit on the low end.

Comparing TLCC Constructs to TELL Survey Constructs

While the TELL and TLCC constructs have similar names, the new TLCC constructs are comprised of fewer items, and 2018 technical analysis indicates that these new constructs are more stable than the TELL constructs. Because of this, it is recommended that a general comparison of similarly-named constructs is acceptable, but readers should use some caution and not consider the new constructs to be a longitudinal extension of the TELL data. Moving forward, the TLCC constructs will likely be more reliable for year-to-year comparisons.

"Overall" School Rating Items

The TELL question, "Overall, my school is a good place to work and learn" was represented in the TLCC 2018 survey as two questions:

- 10-1a. I would recommend this school as a good place to work.
- 10-1b. I would recommend this school as a good place for students to learn.

The two TLCC questions do indeed load with different sets of other construct questions (for example, "place to work" is more highly correlated with time, teacher leadership, and school leadership, while "place to learn" is generally more highly correlated with instruction and safety questions). Because of this, we conclude that it was good to split the TELL item into two related but substantively different questions on TLCC. Averaged together, these give the same good indicator of the school "overall," but considered separately, they can also offer additional insights into how the "teaching" and "learning" aspects contribute to the overall view of the school.

Analysis of correlation of the two TLCC 2018 items with the "Overall" question on TELL 2015 and 2013 indicates that

1) It is best to average the "percentage agree" (the values provided to schools and districts by the state report) for the two TLCC items, and to compare the average to the TELL *Overall* item.

There is reason to believe that the new TLCC items, averaged together, are comparable to the TELL *Overall* question. Some actual school change is likely to have occurred in the three years since TELL was last administered, so it is impossible to know exactly how close TLCC items are to extending TELL longitudinally, but correlations are in the moderate-to-high range (average of about 60% overlap).

Constructs and Key Questions of Interest: Early Analysis

Planning to stay in current school position:

A logistic linear regression of all constructs (using percent agree, averaged for items in each scale) as predictors of whether teachers report an expectation of staying in their school or not, found the regression model explained 20% of variance ($r=.451$, $p<.001$), and of the constructs:

- All constructs EXCEPT the "Time" were statistically significant, with

   o "School Leadership: Team & Climate" sub-construct contributing the most ($\beta = .172$, $p<.001$),

   o "Instructional Practices: Differentiation" sub-construct contributing next ($\beta = .101$, $p<.001$).

We intend to further explore interactions among TLCC responses and a comprehensive set of school and district characteristics in summer 2018.

Overall rating of the school:

A linear regression of all constructs (using percent agree, averaged for items in each scale) as predictors of the Overall view of the school as a good place to work and learn (two items, percent agree, averaged), found the regression model explained 46.7% of variance (r=.683, p<.001) and of the constructs:

- All constructs were statistically significant, with

  - "School Leadership: Team & Climate" sub-construct contributing the most (β = .326, p<.001),

  - "Instructional Practices: Differentiation" sub-construct contributing next (β = .133, p<.001), and

  - "Community Support" construct (β = .111, p<.001).

Missing Data Diagnoses

To confirm that the TLCC administration did not have relevant missing data bias, an extensive missing data diagnosis was conducted to look at the possible correlations of missing individual responses to all TLCC construct questions (except for the new teacher supports section) with background identifier questions (role in school, years in position, etc.). Then, school-level characteristics were connected to the TLCC dataset, and aggregate responses for each school were tested for missing response sets, to see if any particular school types (e.g., size, setting, level, SPF performance rating, charter status; see full list below) were missing in large numbers or non-random patterns. For all construct questions, response option 5, "I don't know," was treated as user-missing (intentionally missing) data, and absent responses were identified as system-missing data. In addition, less than 1 percent of surveys were removed in advance of any analysis, as being designated too incomplete to be considered a finished survey.

The conclusion of the missing data analysis is that missing data are *Missing At Random* for purposes of further analysis, and that the dataset in general is representative of the state-level population at the respondent and school levels.

Missing Data Diagnosis, Leaders' Individual Response Set

The variables listed below were identified as some that, if correlating highly with other TLCC responses, could indicate data Missing Not At Random:

- I would recommend this school as a good place for students to learn.

- How many years have you worked at your present school?

- I would recommend this school as a good place to work.

- How many years have you worked in this position?

- Are you hoping to continue your position in the same school next school year?

For example, Leaders who don't think their school is a good place to work might decline to answer some questions that are related to why they don't think the school is a good place to work. Because of the size of the dataset, there were a number of statistically significant but trivial correlations found (max $r^2 = .029$, p<.05). Nothing found raises concerns that Leaders' responses are other than Missing At Random.

Missing Data Diagnosis, Teachers' Individual Response Set

The variables listed below were identified as some that, if correlating highly with other TLCC responses, could indicate data Missing Not At Random:

- How many years have you worked in this position?
- Novice teacher indicator
- Have you received any new teacher supports at this school?
- Have you been assigned a mentor teacher this school year?
- How many years have you worked at your present school?
- I would recommend this school as a good place to work.
- I would recommend this school as a good place for students to learn.
- Are you hoping to continue your position, same school next school year?

Because of the size of the dataset, there were a number of statistically significant but trivial correlations found (max $r^2 = .025$, $p<.05$). Nothing found raises concerns that Teachers' responses are other than Missing At Random.

For "Education Professional or Service Provider" respondents, the following variables were examined for missing data correlations:

- How many years have you worked in this position?
- Novice educator
- Have you received any new teacher supports at this school?
- Have you been assigned a mentor teacher this school year?
- How many years have you worked at your present school?
- I would recommend this school as a good place to work.
- I would recommend this school as a good place for students to learn.
- Are you hoping to continue your position, same school next school year?

Because of the size of the dataset, there were a number of statistically significant but trivial correlations found (max $r^2 = .017$, $p<.05$). Nothing found raises concerns that Education Professionals/Service Providers' responses are other than Missing At Random.

Missing Data Diagnosis, Educator Responses Aggregated by School

TLCC construct response items (70 in total) were analyzed for whether missing school responses correlated with items below. Analysis indicates that items are *Missing At Random*, and that the dataset in general is representative of the state-level population.

Items for which TLCC responses had no significant interaction with missing responses:
- K12 percent IEP
- SPF points earned (weighted)
- Pupil-teacher ratio
- NCES local (rural, town, suburban, city)

Items for which most TLCC responses had a significant but trivial (largest r^2 = .0377) interaction with missing responses:

- Size classification (larger schools had significant but trivially greater tendency to respond)
- K12 percent F/RL, ELL, minority students
- Attendance and truancy rates
- Principal and teacher turnover rate (district)
- Average salary (district)
- AEC designation
- EMH designation
- Online designation

Items for which some types of schools had significant and trivial-to-low (largest r^2 = .146) interaction with missing responses:

- Charter designation: *r^2 average of .142*

  On average charter schools are underrepresented in the TLCC dataset, explaining about 14% of missing response variance.

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Appendix A. Factor Loadings, Factor Analysis of Teacher Responses, TLCC 2018

TLCC Construct	TLCC Item	Rotated Component Matrix[a]	Loading
School Leadership: *"Team Climate"* sub-construct	2-1e	I feel comfortable raising important issues with school leadership.	0.719
	2-1a	This school is led by an effective team.	0.699
	2-1b	Our work together is guided by a shared vision that is student focused.	0.646
	2-1d	School staff show respect for each other.	0.547
	2-1c	School staff participate in the improvement planning process (e.g., Unified I	0.530
School Leadership: *"Evaluation"* sub-construct	2-1h	The teacher evaluation process provides me with actionable feedback for i	0.797
	2-1g	My effectiveness is accurately assessed through the school's teacher evalua	0.778
	2-1f	I receive informal feedback that helps me to improve my instruction.	0.506
Teacher Leadership	3-1a	Teachers' professional expertise is valued.	0.681
	3-1d	Teachers have an adequate level of influence on important school decision	0.626
	3-1b	There is a process in place for collaborative problem solving in this school.	0.621
	3-1c	I have had leadership opportunities in this school.	0.472
Professional Development	6-1c	The effectiveness of professional development is assessed regularly.	0.652
	6-1f	I receive adequate professional development to effectively use student dat	0.644
	6-1b	Professional learning opportunities are personalized and aligned to teacher	0.611
	6-1d	Professional learning (e.g., instructional coaching, PLCs, training) has a posit	0.595
	6-1g	I receive adequate professional development to support my students' socia	0.557
	6-1e	I receive ongoing support and coaching to improve my practice.	0.532
	6-1a	The school improvement plan (e.g., Unified Improvement Plan) influences t	0.503
	7-1f	New initiatives (e.g., curriculum, assessments, instructional approach) are g	0.416
	5-1c	The school provides opportunities for me to learn from other teachers.	0.371
Student Conduct	4-1a	Students know how they are expected to act in the school.	0.709
	4-1d	This school is a safe place for students to learn.	0.696
	4-1b	Students have the knowledge, skills and supports needed to focus on learni	0.626
	4-1c	Rules for student behavior are enforced in a consistent manner.	0.608
	8-1d	Our school is a safe place to work.	0.516
Time	7-1a	I have adequate time to prepare for instruction.	0.789
	7-1c	I have adequate time to analyze and respond to student assessment data.	0.757
	7-1e	I have adequate time to communicate with my students' families.	0.726
	7-1d	I have adequate time to support my students' social and emotional learnin	0.660
	7-1b	My time is protected from duties that take time away from teaching.	0.654

TLCC Construct	TLCC Item	Rotated Component Matrix[a]	Loading
Instructional Practices: *"Responsibility for Instruction"* sub-construct	5-1b	Staff in this school hold themselves accountable for the academic growth o	0.702
	5-1a	Staff in this school consistently seek new and improved ways of providing i	0.672
	5-1d	Students understand how class activities relate to learning objectives.	0.566
	5-1e	Instruction in this school encourages different cultural viewpoints.	0.492
Instructional Practices: *"Differentiating/ Adjusting Instruction"* sub-construct	5-1h	Students with disabilities are adequately supported in this school.	0.708
	5-1k	I have the autonomy to make important decisions for my classroom.	0.673
	5-1g	English Learners are adequately supported in this school.	0.663
	5-1l	I feel supported in trying new instructional strategies.	0.659
	5-1m	I use formative assessment data to improve my students' learning.	0.634
	5-1i	Gifted students are adequately supported in this school.	0.568
	5-1j	Students' social and emotional learning is adequately supported in this sch	0.500
	5-1f	The diverse academic needs of our students are met by this school's curren	0.439
Community support & involvement	**9-1b**	The school's efforts to engage families are effective.	0.706
	9-1c	The school provides strategies that families can use at home to support the	0.632
	9-1a	The community is supportive of the school.	0.602
	9-1d	All families have access to information about what is happening in the scho	0.583
Facilities & resources:	8-1a	My class size(s) is reasonable.	0.753
	8-1c	I have adequate physical space to work productively.	0.736
	8-1b	Instructional resources are adequate to support student learning.	0.586
		Extraction Method: Principal Component Analysis. *Rotation Method: Varimax with Kaiser Normalization.* *a. Rotation converged in 8 iterations.*	