Prospects for Using Digital Recording Systems for Evaluation

An Overview

Trip Stallings, The Friday Institute for Educational Innovation, College of Education, North Carolina State University

Kevin Bastian, The Carolina Institute for Public Policy, The University of North Carolina–Chapel Hill

Rodolfo Argueta, The Friday Institute for Educational Innovation, College of Education, North Carolina State University

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Summary

The Consortium for Educational Research and Evaluation–North Carolina *Race to the Top* Evaluation Team investigated the possibility of utilizing in-class panoramic cameras for repeated observation of multiple classrooms statewide over the course of the *Race to the Top* evaluation. The Team also considered several different classroom observation coding schemes for use across all *Race to the Top* evaluations.

The Team determined that, while there is much promise for using in-class cameras for observation purposes in the near future, the current state of the technology does not yet allow for extensive distribution and use of these tools for *Race to the Top* evaluation purposes. For the near future, the Team will use these cameras only as additional observation tools in schools in which an observer already will be present on-site in other classrooms.

The Team selected the Classroom Assessment Scoring System (CLASS) Framework for its evaluation-wide classroom observation rubric, in part because of its proven track-record as an observation protocol for use with remote panoramic camera technology, should the Evaluation Team extend its use of that technology in the future.

Objective & Procedure

Objective

The objective of this assessment was to evaluate and develop coding for digital recording systems designed to record teachers' practice, for use in discreetly assessing instructional practices.

Background

In Spring 2011, the Consortium for Educational Research and Evaluation–North Carolina (CERE-NC) investigated the possibility of using dedicated, in-school technology for repeated classroom observations of teachers for *Race to the Top* evaluation purposes. One potential feature of this technology is the possibility of generating classroom observations that are not altered by any changes in normal behavior as a result of the presence of external evaluators in the classroom. In addition, the use of technology could increase the number and length of observations and reduce costs.

The development of digital classroom observation technology is at an early stage, with only a handful of vendors currently offering products. A front-runner in the field has been Teachscape[1], whose *Reflect* system combines a dedicated camera with video storage services and customizable

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[1] http://teachscape.com

observation software. Teachscape has several hundred cameras in the field currently, and their most prominent usage has been for the Gates Foundation-funded *Measures of Effective Teaching* (MET) study, which placed Teachscape cameras in over 3,000 classrooms across the country.

Goals

To determine whether digital classroom observation technology could aid in CERE-NC's planned evaluations of North Carolina's *Race to the Top* initiatives, and, if so, to develop a coding scheme for reviewing the digital observations.

Procedure

CERE-NC purchased one 360° Camera from Teachscape. Three researchers and a technician received training on how to set up and use the camera, as did a volunteer mathematics teacher at a nearby middle school.

The mathematics teacher agreed to install the camera in his classroom and operate it daily during one class period. Daily operation included: positioning, starting up, and initializing the camera and sound equipment; recording a class; converting the recording to an uploadable format; and uploading the video to the Teachscape secure server.

The classroom teacher had access to onsite technology assistance via the Friday Institute for Educational Innovation at North Carolina State University, as well as onsite and remote assistance from Teachscape. CERE-NC researchers maintained a dialog with both the teacher and Teachscape representatives throughout the teacher's experience.

Simultaneously, CERE-NC researchers reviewed several classroom observation protocols for possible use during the *Race to the Top* evaluation.

Teachscape System Mechanics

The Teachscape Reflect system includes an independently-mounted 360° camera, a fixed-position web camera (for focusing continuously on one particular part of the classroom), a dedicated laptop, wireless microphones, specialized software, and storage space on the Teachscape server. The camera can be placed anywhere in a classroom with enough surface area to hold the base (about 1.5 square feet). The teacher wears one microphone, and others can be placed around the room.

The camera cannot be activated remotely or by a timer, so someone must be in the room to start the recording process; the recording software also must be stopped manually. For the CERE-NC trial, the volunteer classroom teacher was instructed on camera activation.

After a recording has been made, the file from the 360° camera must be processed (to convert the image captured by the 360° lens format into an interpretable, panoramic image). Then, all video and sound files must be uploaded to the Teachscape server via an Internet connection.

Once uploaded, videos and sound files are available immediately for review and annotation. One annotation feature is a multiple-user video-tagging system – similar to the Comments feature in Microsoft Word – that allows reviewers to post comments at specific points in the video. The panoramic-view video file and the fixed-view video file are linked, so that a reviewer can see both views at the same time.

Teachscape provides user training that includes use of the device as well as incorporation of user-created or -provided observation rubrics into the video review system.

Coding Schemes

CERE-NC researchers considered several different coding schemes for use not only during *Race to the Top* evaluation work in classrooms but also with teaching sessions captured using classroom cameras. Tool selection was conducted with an eye toward identifying a tool that was able to capture classroom characteristics relevant to the multiple and diverse evaluation projects being conducted as part of the overall *Race to the Top* evaluation. The coding schemes considered included:

- Charlotte Danielson Framework
- Classroom Assessment Scoring System (CLASS) Framework
- *Teach for America* Teaching as Leadership Rubric
- District of Columbia Effectiveness Assessment System for School Personnel (IMPACT)
- Interstate Teacher Assessment and Support Consortium (InTASC) Standards
- National Board of Professional Teaching Standards Framework
- Texas Beginning Educator Support System (TxBESS) Framework
- Research for Better Teaching Framework

An overview of each of these schemes is included in **Appendix A**.

Findings

Advantages and Benefits of the 360° Camera

The Teachscape software is somewhat customizable, allowing project-specific rubrics or other tools to be loaded in for analyzing video. As a tool for school-level teacher evaluation and reflection, these options – along with the ability to upload artifacts and store comments from multiple viewers (including a teacher's own reflective comments) – allow for a rich pre- and post-observation experience for a reviewer and the teacher.

Potentially the most important function of in-class camera systems for evaluation purposes is the opportunity they allow for determining inter-rater reliability among various reviewers – whether those reviewers are evaluation specialists or school administrators. With its ability to hold multiple observation comments from multiple users, it becomes possible to review and discuss

discrepancies in scoring alongside a video of the event or moment that led to the discrepant scoring.

To address the issue of inter-rater reliability, Teachscape provides scaffolded training that helps users make reliable observations. In the training, users go through various levels (general level of understanding, practice, testing) and have opportunities to practice scoring videos, compare their scoring with scores by experts, and receive feedback from the system.

Finally, multiple North Carolina LEAs – including Charlotte-Mecklenburg, Granville County, and Winston-Salem/Forsyth County – already use the cameras for LEA-level professional development, which would make their presence in classrooms in those LEAs less obtrusive or novel.

Coming Enhancements

As of August, 2011, Teachscape began offering a version of their *Reflect* software (*Reflect Live*) that allows users to record and upload to the Teachscape servers observation notes and short video clips recorded on iPads and other portable devices without requiring use of the 360° camera. Users now can combine video-capture evaluations and self-assessments with non-video evaluation data.

By January 2012, Teachscape plans to incorporate into the system a set of web-based learning materials that will give users more options for data analysis. Users will be able to:

- Incorporate artifacts (lesson plans, rubrics, common core standards, etc.), or other analytics tools that can be used to tag the video;

- Generate reports (e.g., at the domain level) and export them (as .pdf or Excel files); and

- Analyze and tag the video using multiple analytical tools (e.g., the system will allow users to attach multiple rubrics to a video).

Concerns

Initial and persistent technical difficulties with the camera (**Appendix B**) challenged the notion that the camera could be deployed in remote teacher classrooms without access to direct technical assistance. In particular, it may be more feasible to deploy the camera in urban schools such as Charlotte-Mecklenburg, where technical assistance is more readily available, but in rural schools – the target of many of the *Race to the Top* evaluations – remoteness presents a greater challenge to effective and continuous usage.

Furthermore, several reviewers noted that, even with the 360° panoramic perspective, it is not clear how well the videos allow reviewers to fully appreciate actual, live classroom dynamics.

Finally, video and audio captures are stored on the Teachscape server and therefore are not available locally. There are options for arranging to store videos locally, but the infrastructure requirements are heavy (**Appendix C**).

Recommendations and Next Steps

Cameras

The *RttT* Evaluation Team has determined that 360° classroom observation camera technology has not yet reached a developmental threshold that would allow it to be deployed on a regular basis in classrooms that do not have frequent and reliable access to Evaluation Team members.

One inevitable outcome of this decision is the necessity of scheduling a greater number of in-person observations to meet evaluation needs than was originally anticipated. However, while the concerns listed above argue against widespread use of the cameras statewide for researcher-independent observations, the *RttT* Evaluation Team will be able to employ the cameras in other ways. In particular, the cameras can serve the role of second observer on school site visits when only one human observer can be present at the school, without imposing any burden on the classroom teacher to operate and trouble-shoot the device. Observers can set up the camera in one classroom before observing in another, and then return afterwards to shut it down. Data conversion, file uploading, and, ultimately, observation coding for the second classroom can occur once the observer returns from the visit.

Despite the current set of drawbacks and limitations, the future for this technology remains bright. Other companies are beginning to offer similar software and hardware packages, and subsequent competition should lead to improvements in the technology in the near future, further suggesting the value of delaying early adoption of the current technology. Most notable among the newcomers is Kogeto[2], the company that originally designed and built the Teachscape panoramic cameras, which has now launched a new consumer-oriented panoramic camera ("Dot") and associated web services. The "Dot" camera is a special lens that snaps on the back of the iPhone 4 and allows the user to shoot panoramic movies. The *RttT* Evaluation Team will continue to monitor developments in this industry.

Coding

After careful consideration, the *RttT* Evaluation Team has selected the CLASS Observation tool for all *RttT*-related classroom observations. CLASS is applicable in a wide range of classroom situations. In addition, the tool's depth rivals or surpasses the depth of other tools, there are multiple grade-level versions, and the ratings scale (1 through 7, rather than the 1 through 4 or 1 through 5 scales used in most of the other tools) offers more rating flexibility and refinement than most of the other tools considered. The CLASS distributor also makes extensive training and reliability measures available. Finally, because CLASS is one of the observation tools employed in the ongoing MET study, its integration into digital observation protocols already has been tested, suggesting the possibility for its ongoing use by the *RttT* Evaluation Team in the event that the Team's reliance on that technology expands in the future.

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[2] http://kogeto.com

Appendix A. Classroom Observation Coding Schemes Considered by the Evaluation Team

1. Danielson Framework: Scored Unsatisfactory, Basic, Proficient, and Distinguished			
Domain 1: Planning & Preparation	**Domain 2: The Classroom Environment**	**Domain 3: Instruction**	**Domain 4: Professional Responsibilities**
1) Demonstrating Knowledge of content and pedagogy • Content and the structure of the discipline • Prerequisite relationships • Content-related pedagogy 2) Demonstrating knowledge of students • Child and adolescent development • Learning process • Students' skills, knowledge, and language proficiency • Students' interests and cultural heritage • Students' special needs 3) Setting Instructional Outcomes • Value, sequence, and alignment • Clarity • Balance • Suitability for diverse learners 4) Demonstrating knowledge of resources • Resources for classroom use • Resources to extend content knowledge and pedagogy • Resources for students 5) Designing coherent instruction • Learning activities • Instructional materials and resources • Instructional groups • Lesson and unit structure 6) Designing student assessments • Congruence with instructional outcomes • Criteria and standards • Design of formative assessments • Use for planning	1) Creating an environment of respect and rapport • Teacher interaction with students • Student interactions with other students 2) Establishing a culture of learning • Importance of the content • Expectations for learning and achievement • Student pride in work 3) Managing classroom procedures • Management of instructional groups • Management of transitions • Management of materials and supplies • Performance of non-instructional duties • Supervision of volunteers and paraprofessionals 4) Managing student behavior • Expectations • Monitoring of student behavior • Response to student misbehavior 5) Organizing physical space • Safety and accessibility • Arrangement of furniture and use of physical resources	1) Communicating with students • Expectations for learning • Directions and procedures • Explanations of content • Use of oral and written language 2) Using questioning and discussion techniques • Quality of questions • Discussion techniques • Student participation 3) Engaging students in learning • Activities and assignments • Grouping of students • Instructional materials and resources • Structure and pacing 4) Using assessments in instruction • Assessment criteria • Monitoring of student learning • Feedback to students • Student self-assessment and monitoring of progress 5) Demonstrating flexibility and responsiveness • Lesson adjustment • Response to students • Persistence	1) Reflecting on teaching • Accuracy • Use in future teaching 2) Maintaining accurate records • Student completion of assignments • Student progress in learning • Non-instructional records 3) Communicating with families • Information about the instructional program • Information about individual students • Engagement of families in the instructional program 4) Participating in a professional community • Relationships with colleagues • Involvement in a culture of professional inquiry • Service to the school • Participation in school and district projects 5) Growing and developing professionally • Enhancement of content knowledge and pedagogical skill • Receptivity to feedback from colleagues • Service to the profession 6) Showing professionalism • Integrity and ethical conduct • Service to students • Advocacy • Decision making • Compliance with school and district regulations

2. Preliminary Pilot of the CLASS Framework at the Secondary Level: Scored on a 1-7 scale (1-2 low) (3-5 mid) (6-7 high)			
Domain 1: Emotional Support	**Domain 2: Classroom Organization**	**Domain 3: Instructional Support**	**Domain 4: Student Engagement**

1) Positive climate
• Reflects the emotional connection and relationships among teachers and students, and the warmth, respect, and enjoyment communicated by verbal and non-verbal interactions
   o Relationships: physical proximity, peer interactions, shared positive affect, interest in each others' lives and social conversation
   o Positive affect: smiling, laughter, and enthusiasm
   o Positive communication: positive comments and expectations
   o Respect: respectful language, use of each others' names, warm and calm voice, listening, and cooperation
2) Negative Climate
• Reflects the overall negativity among teachers and students in the class; the frequency, quality, and intensity of teacher and student negativity are important to observe
   o Negative affect: irritability, anger, harsh voice, physical aggression, disconnected
   o Punitive control: yelling, threats, harsh punishment, physical control
   o Disrespect: teasing or bullying, humiliation or sarcasm, exclusionary behavior, inflammatory behavior
3) Teacher sensitivity
• Reflects the teacher's responsiveness to the academic and social/emotional and developmental levels of individual students and the entire class, and the way these factors impact students' classroom experiences (cont. next page)
	1) Behavior management
	• Encompasses the teacher's use of effective methods to encourage desirable behavior and prevent and redirect misbehavior
	   o Clear expectations: explicit, consistent, lack of constant reminders, absence of student confusion
	   o Proactive: monitoring, anticipation of problem behavior, proximity, attention to the positive
	   o Effective redirection of misbehavior: uses subtle cues to redirect, peer redirection and problem solving, problems resolved, little time lost
	   o Student behavior: meets expectations, absence of aggression and defiance, and absence of chaos
	2) Productivity
	• How well the teacher manages time and routines so that instructional time is maximized. This dimension captures the degree to which instructional time is effectively managed and down time is minimized for students; it is not a code about student engagement or about the quality of instructional activities
	   o Maximizing learning time: tasks provided, teacher preparation for lesson and tasks is apparent, disruptions minimized
	   o Routines: students know what to do
	   o Transitions: little wasted time, redirection to task when necessary, and time cues provided
		1) Content Understanding
		• Refers to both the depth of lesson content and the approaches used to help students comprehend the framework, key ideas, and procedures in an academic discipline. At a high level, this refers to interactions among the teacher and students that lead to an integrated understanding of facts, skills, concepts, and principles
		   o Depth of understanding: emphasis on meaningful relationships among facts, skills, and concepts; real world connections; multiple and varied perspectives; procedural practice
		   o Communication of concepts and procedures: essential characteristics identified, conditions for appropriate use, multiple and varied examples, contrasting non-examples
		   o Background knowledge and misconceptions: attention to prior knowledge, explicit integration of new information, attention to misconceptions, students share knowledge and make connections
		   o Transmission of content knowledge and procedures: clear and accurate definitions, effective clarifications, and effective rephrasing
			1) Student engagement
			• This scale is intended to capture the degree to which all students in the class are focused and participating in the learning activity presented or facilitated by the teacher. The difference between passive engagement and active engagement is of note in this rating
			   o Active engagement: responding, asking questions, volunteering, sharing ideas, manipulating materials, lack of off-task behavior
			   o Sustained engagement

2. Preliminary Pilot of the CLASS Framework at the Secondary Level: Scored on a 1-7 scale (1-2 low) (3-5 mid) (6-7 high)			
Domain 1: Emotional Support	**Domain 2: Classroom Organization**	**Domain 3: Instructional Support**	**Domain 4: Student Engagement**
- Awareness: checks in with students, anticipates problems, notices difficulties - Responsiveness to academic needs and cues: individualized support, reassurance and assistance, adjusts pacing and wait time, re-engagement, acknowledgement of emotions and out of class factors, and timely response - Effectiveness in addressing problems: student issues and questions resolved; follow-up - Student comfort: seeks support and guidance, take risks, participate freely 4) Regard for adolescent perspectives • Focuses on the extent to which the teacher is able to meet and capitalize on social and developmental needs and goals of adolescents by providing opportunities for student autonomy and leadership. Also considered are the extent to which student ideas and opinions are valued and content is made useful and relevant to adolescents - Support for student autonomy and leadership: choice, shared responsibilities, chances for leadership - Connections to current life: connects content to adolescent life and communicates usefulness - Student ideas and opinions: encourages sharing of ideas and opinions and follows and responds to student comments - Meaningful peer interactions: provides structures for peer sharing and promotes peer conversations - Flexibility: relaxed structure for movement	3) Instructional Learning Formats • Focuses on the ways in which the teacher maximizes student engagement in learning through clear presentation of material, active facilitation, and the provision of interesting and engaging lessons and materials - Learning targets/organization: clear learning targets, previews, reorientation/summary, and clear, well-organized presentation of information - Variety of modalities, strategies and materials - Active facilitation: promoting involvement, effective pacing, teacher interest - Effective engagement: focused attention and active participation	2) Analysis and Problem Solving • Assesses the degree to which the teacher facilitates students' use of higher level thinking skills, such as analysis, problem solving, reasoning, and creation through the application of knowledge and skills. Opportunities for demonstrating metacognition are also included - Opportunities for higher level thinking: analysis, creation/synthesis, evaluation - Problem solving: identification of problems, opportunities for new application, hypothesis generation and testing - Metacognition: modeling metacognition, promotes thinking about thinking, self-evaluation and reflection encouraged, planning encouraged 3) Quality of feedback • Assesses the degree to which feedback expands and extends learning and understanding and encourages student participation. In secondary classrooms, significant feedback may also be provided by peers. Regardless of the source, the focus here should be on the nature of the feedback provided and the extent to which it pushes learning - Feedback loops: back and forth exchanges, persistence, follow-up questions - Prompting thought processes: students asked to explain thinking and students asked to extend responses/actions - Scaffolding: Assistance, hints, prompting - Providing information: expansion, clarification, specific feedback - Encouragement and affirmation: recognition and affirmation of effort, encouragement of persistence	

3. Teach For America Teaching as Leadership Rubric: Scored Pre-novice, novice, beginning proficiency, advanced proficiency and exemplary					
Domain 1: Set Big Goals	**Domain 2: Invest Students and Others**	**Domain 3: Plan Purposefully**	**Domain 4: Execute Effectively**	**Domain 5: Continuously Increase Effectiveness**	**Domain 6: Work Relentlessly**
1) Develop standards aligned, measurable, ambitious, and feasible goals that will dramatically increase student's opportunities in life	1) Develop students' rational understanding that they can achieve by working hard through evidence of students' own progress, statistics, explicit discussions of malleable intelligence, creative marketing, leveraging the big goals, etc. 2) Develop students rational understanding that they will benefit from achievement through connections between class achievement and their lives and aspirations 3) Employ appropriate role models so that students identify with people who work hard toward achievement and value academic achievement 4) Consistently reinforce efforts toward the big goals even while increasing long-term investment in hard work and the big goals 5) Create a welcoming environment through rational persuasion, role models, and constant reinforcement and marketing to instill values so that students feel comfortable and supported enough to take the risks of striving for the big goals 6) Respectfully mobilize students' influencers using techniques such as direct explanation, role models, modeling, constant reinforcement, and marketing so that they actively invest students in working hard toward the big goals	1) Create or obtain standards aligned diagnostic, formative, and summative assessments (with tracking systems) to determine where students are against big goals 2) Backwards plan by breaking down longer-term goals into bundles of objectives and mapping them across the school year in long-term and unit plans 3) Create rigorous, objective-driven lesson plans so that students who complete class activities successfully will have mastered the objectives and made progress towards the big goals 4) Differentiate plans for individual students based on their unique learning profiles so that all students are engaged and challenged 5) Establish age-appropriate long and short-term behavioral management plans so that, if students comply, the amount of instructional time is maximized 6) Design classroom procedures that provide structure to students and maximize the amount and value of instructional time	1) Clearly present academic content so that students comprehend key information and ideas 2) Facilitate, manage, and coordinate student academic practice so that all students are participating and have the opportunity to gain mastery of the objectives 3) Check for academic understanding frequently by questioning, listening, and/or observing, and provide feedback in order to ensure student learning 4) Communicate high expectations for behavior by teaching, practicing, and reinforcing rules and consequences so that students are focused on working hard 5) Implement and practice time-saving procedures to maximize time spent on learning 6) Evaluate and keep track of students' performance on assessments so that the teacher and students are aware of students' progress on academic, behavioral, and investment goals	1) Gauge progress and notable gaps between student achievement and big goals by examining assessment data 2) Identify student habits or actions most influencing progress and gaps between student achievement and big goals 3) Isolate the teacher actions most contributing to key aspects of student performance by gathering data and reflecting on teacher performance 4) Identify the underlying factors causing teacher actions 5) Access meaningful learning experiences that direct and inform teacher improvement 6) After a cycle of data collection, reflection, and learning, adjust course as necessary to maximize effectiveness	1) Persist in the face of considerable challenges, focusing effort on the ultimate goal and targeting those challenges one can impact to increase student achievement 2) Pursue and secure additional instructional time and resources in order to increase opportunities for student learning 3) Sustain the intense energy necessary to reach the ambitious big goals through a variety of strategies

4. DCPS IMPACT Teacher Evaluation: Scored 1-4 with specific student and teacher behaviors		
Domain 1: Plan	**Domain 2: Teach**	**Domain 3: Increase Effectiveness**
Instruction 1) Develop annual student achievement goals 2) Create standards-based unit plans and assessments 3) Create objective-driven lesson plans Learning Environment 4) Adopt a classroom behavior management system 5) Develop classroom procedures and routines 6) Organize classroom space and materials	1) Lead well organized, objective driven lessons 2) Explain content clearly 3) Engage students at all learning levels in rigorous work 4) Provide students multiple ways to engage with content 5) Check for student understanding 6) Respond to student misunderstandings 7) Develop higher level understanding through effective questioning 8) Maximize instructional time 9) Build a supportive, learning-focused classroom community	1) Assess student progress 2) Track student progress data 3) Improve practice and re-teach in response to data

5. InTASC Standards: Appears to be in Piloting Stages without Any Evaluation/Measurement of Quality			
Domain 1: The Learner and Learning	**Domain 2: Content**	**Domain 3: Instructional Practice**	**Domain 4: Professional Responsibility**
1) Learner Development • The teacher understands how children learn and develop, recognizing that patterns of learning and development vary individually within and across cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences 2) Learning Differences • The teacher uses understanding of individual differences and diverse communities to ensure inclusive learning environments that allow each learner to reach his/her full potential 3) Learning Environments • The teacher works with learners to create environments that support individual and collaborative learning, encouraging positive social interaction, active engagement in learning, and self-motivation	1) Content knowledge • The teacher understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners 2) Innovative Applications of Content • The teacher understands how to connect concepts and use differing perspectives to engage learners in critical/creative thinking and collaborative problem solving related to authentic local and global issues	1) Assessment • The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to document learner progress, and to inform the teacher's ongoing planning and instruction 2) Planning for instruction • The teacher draws upon knowledge of content areas, cross-disciplinary skills, learners, the community, and pedagogy to plan instruction that supports every student in meeting rigorous learning goals 3) Instructional strategies • The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to access and appropriately apply information	1) Reflection and continuous growth • The teacher is a reflective practitioner who uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others and adapts practice to meet the needs of each learner 2) Collaboration • The teacher collaborates with students, families, colleagues, other professionals, and community members to share responsibility for student growth and development, learning, and well-being

6. National Board for Professional Teaching Standards				
Domain 1: Teachers are Committed to Students and their Learning	**Domain 2: Teachers Know the Subjects They Teach and How to Teach Those Subjects to Students**	**Domain 3: Teachers are Responsible for Managing and Monitoring Student Learning**	**Domain 4: Teachers Think Systematically About Their Practice and Learn from Experience**	**Domain 5: Teachers are Members of Learning Communities**
1) NBCTs are dedicated to making knowledge accessible to all students. They believe all students can learn. 2) NBCTs treat students equitably. They recognize the individual differences that distinguish their students from one another and they take account for these differences in their practice. 3) NBCTs understand how students develop and learn 4) NBCTs respect the cultural and family differences students bring to their classroom 5) NBCTs are concerned with their students' self-concept, their motivation and the effects of learning on peer relationships 6) NBCTs are also concerned with the development of character and civic responsibility	1) NBCTs have mastery over the subject(s) they teach. They have a deep understanding of the history, structure and real-world applications of the subject 2) NBCTs have skill and experience in teaching their subject(s), and they are very familiar with the skills gaps and preconceptions students may bring to the subject 3) NBCTs are able to use diverse instructional strategies to teach for understanding	1) NBCTs deliver effective instruction. They move fluently through a range of instructional techniques, keeping students motivated, engaged, and focused 2) NBCTs know how to engage students to ensure a disciplined learning environment, and how to organize instruction to meet instructional goals 3) NBCTs know how to assess the progress of individual students as well as the class as a whole 4) NBCTs use multiple methods for measuring student growth and understanding, and they can clearly explain student performance to parents	1) NBCTs model what it means to be an educated person—they read, they question, they create and they are willing to try new things 2) NBCTs are familiar with learning theories and instructional strategies and stay abreast of current issues in American education 3) NBCTs critically examine their practice on a regular basis to deepen knowledge, expand their repertoire of skills, and incorporate new findings into their practice	1) NBCTs collaborate with others to improve student learning 2) NBCTs are leaders and actively know how to seek and build partnerships with community groups and businesses 3) NBCTs work with other professionals on instructional policy, curriculum development and staff development 4) NBCTs can evaluate school progress and the allocation of resources in order to meet state and local education objectives 5) NBCTs know how to work collaboratively with parents to engage them productively in the work of the school

7. TxBess (TX Beginning Educator Support System) Framework: Scored Developing, Beginning Competent, Advanced Competent, Proficient			
Domain 1: Planning for Learner-Centered Instruction	**Domain 2: A Classroom Environment that Promotes Equity, Excellence, and Learning**	**Domain 3: Instruction and Communication**	**Domain 4: Professional development and communication**

1) Demonstrating knowledge of content and pedagogy
• Content knowledge
• Prerequisite relationships
• Content-specific pedagogy
2) Demonstrating knowledge of students
    • Characteristics of age group
    • Students' varied approaches to learning
    • Students' skills and knowledge
    • Students' interests and cultural heritage
3) Selecting Key Knowledge and Skills
    • Significance
    • Clarity
    • Suitability for diverse students
    • Balance
4) Demonstrating Knowledge of Materials, Resources, and Technology
    • Materials/resources
    • Technology
5) Designing activities that promote student learning
    • Learning activities
    • Learning groups
    • Learning structure
6) Planning to assess student learning
    • Assessment content and methods
    • Criteria
	1) Creating an environment of rapport and respect
	    • Teacher interaction with students
	    • Student interactions
	2) Establishing a culture for learning
	    • Importance of content
	    • Expectations for learning and achievement
	3) Managing classroom procedures
	    • Cognitive engagement
	    • Transitions
	    • Materials and supplies
	    • Non-instructional duties
	    • Volunteers and paraprofessionals
	4) Managing student behavior
	    • Expectations
	    • Monitoring of student behavior
	    • Response to student behavior
	5) Organizing physical space
	    • Safety and arrangement of furniture
	    • Accessibility to learning and use of physical space
		1) Communicating clearly and accurately
		    • Directions and procedures
		    • Oral and written language
		2) Using questioning and discussion techniques
		    • Quality of questions
		    • Discussion techniques
		    • Student participation
		3) Engaging students in learning
		    • Representation of content
		    • Activities and assignments
		    • Grouping of students
		    • Instructional materials, resources, and technology
		    • Structure, sequencing and pacing
		4) Assessing student learning
		    • Assessment design
		    • Use for planning
		    • Quality and timeliness of feedback
		5) Demonstrating flexibility and responsiveness
		    • Lesson adjustment
		    • Response to students
		    • Persistence
			1) Reflecting on teaching
			    • Accuracy
			    • Use in future teaching
			2) Maintaining accurate records
			    • Student progress in learning
			    • Non-instructional records
			3) Communicating with families/caregivers
			    • Information about the instructional program
			    • Information about individual students
			    • Engagement of families/caregivers in the instructional program
			4) Contributing to the school and district
			    • Relationships with colleagues
			    • Service to the school
			5) Growing and developing professionally
			    • Enhancement of content knowledge and pedagogical skill
			    • Participation in beginning teacher support
			6) Showing professionalism
			    • Decision-making
			    • Student advocacy

8. Research for Better Teaching: Skillful Teacher			
Domain 1: Curriculum Planning	**Domain 2: Motivation**	**Domain 3: Instructional Strategies**	**Domain 4: Management**
1) Over-arching objectives • Interactive teaching • Curricular choices and materials 2) Curriculum design (Assess the clarity and completeness of curriculum according to decisions made about…) • Topics to be taught; big ideas; units of study; learning expectations; uniform performance assessments; criteria for proficiency; end-of-course exemplars; pedagogical practices; pacing guides; lesson plans; time allocations; instructional strategies; activities, materials and exemplars; resources for teachers 3) Planning • Check curriculum and standards; article mastery objective; plan how to communicate the objective; decide on evidence of student mastery; plan making students' thinking visible; select strategies for summarizing; select activator; plan time and space; select effective effort strategies; specify important interactive moves; decide how to match and adjust to learning styles; plan student support; plan extensions and challenges; choose homework 4) Objectives • Dig deeply into the content to define a worthy student outcome; communicate a mastery objective in kid friendly language; ensure the learning experience is objective aligned; develop a product or performance that assesses mastery; communicate criteria for success	1) Personal relationship building • Acknowledging and communication value; respect; fairness; realness; humor and fun 2) Class climate • Community with mutual support; confidence and risk taking; influence and control 3) Expectations • Defining your expectations (quality of work, work habits, procedures, behaviors); Communicating your expectations (direct, specific, repeated, positive expectancy, modeling, personal contact, no excuses, recognizes strong performance, logical consequences, tenacity, feedback); attributions retraining (motivation, confidence, and effective effort)	1) Clarity • Framing the learning (the big picture and getting ready for instruction); presenting information (explanatory devices, speech); creating mental engagement (explicitness, making cognitive connections); getting inside the head of the student (checking for understanding, unscrambling confusion, making students' thinking visible); consolidating and anchoring the learning (summarizing) 2) Principles of learning • Active participation; application in setting; concrete-semiabstract-abstract progression; breaking complex tasks into simpler parts; close confusers; contiguity; cumulative review; degree of guidance; end without closure; feeling tone; goal setting; isolation of critical attributes; keep students open and thinking; knowledge of results; meaning; mnemonics; modeling; practice; reinforcement; say-do; sequence and backward chaining; similarity of environment; teach for transfer, vividness 3) Models of teaching • Concept attainment; inductive teaching; synectics teaching; inquiry training; group investigation; jurisprudential teaching	1) Space • Matching space to instruction; ownership and privacy 2) Time • Minimizing non-instructional time; pacing and rhythm; maximizing academic learning time; school-wide agreements that impact instructional time 3) Routines 4) Attention • Desisting; alerting; enlisting; acknowledging; winning 5) Momentum • Provisioning; overlapping; fillers; intrusions; lesson flexibility; giving notice before transitions; subdividing; anticipation 6) Discipline • Establishing foundations (management, relationships, instruction); eliminating disruptions (communicating expectations, setting, back-up consequences); building a climate of high achievement (community, risk-taking, influence and control); dealing with very resistant students (models of discipline)

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5) Assessment
   • Determine the assessment task; communicate standards of performance; assess prior knowledge; frequent data collection and record keeping; frequent high quality feedback; student self-assessment; student record keeping about progress; frequent error analysis by teacher; error analysis by students; planning and implementing reteaching; goal setting and action planning by students; reporting systems on student progress, including conferences
6) Learning Experiences
   • Sources of information; resources; personal relevance; type of interdependence; degree of supervision; self-expression; degree of abstraction; cognitive level; structuring; grouping and interpersonal complexity; information complexity; sensory channels; scale			

Appendix B. Issues that Arose during Regular Use of the Teachscape Reflect Camera

- Dedicated laptop "crashes" during video capture
- Lengthy upload times require high-quality, high-speed Internet connections
    - In one instance, the upload time was 16 hours for a 90-minute class video: "Recording an entire class/block . . . takes entirely too long to process and upload. I had the computer connected directly to my cable modem and it still took that long."
    - When the dedicated laptop was connected to the Internet via a higher-speed connection, the upload process, coupled with processing, still required several hours.

Appendix C. Technical Requirements for Local Storage and Sharing of Teachscape Videos

- Ftp server for video upload;
- Dedicated network for video streaming (minimum recommended bandwidth requirement to stream panoramic video is 2MB per second);
- Rtmp server for video streaming;
- Caching server;
- Established security protocols;
- Adequate storage capacity (each video is approximately 600MB);
- Adequate throughput for multiple users (1MB / sec is required for a each viewer); and
- Available technical assistance