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Inquiry-based Instruction – Cultivating Analytical Habits of Mind with 21st Century Skills: A Qualitative Study

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Inquiry-based Instruction – Cultivating Analytical Habits of Mind with 21st Century Skills: A Qualitative Study[1]

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ABSTRACT

Significant challenges face the United States regarding global competition as 21st century workforce skills lag behind corporate demands in STEM-based careers (Bucher, 2011; Campbell & Pedersen, 2007; Kramer, 2010; Savitz & Elias, 2011; Scott, 2007). Strategic interventions for inquiry-based, 21st century skills development are of grave necessity for K-12 education to encourage post-secondary STEM opportunities (Abaidoo, 2012; Mouhammed, 2009; Porter & Rivkin, 2012; Rombel, 2012).

This study investigated inquiry techniques in K-12 urban classrooms where greatest equity gaps reside and explored teacher self-efficacy with respect to promoting 21st century skills. Changes needed to promote sustainable, inquiry-based, analytic habits of mind for success in STEM disciplines with respect to student populations of greatest need is a priority. Comprehensive study details and findings are available in the unpublished dissertation, *Inquiry-based Instruction: Cultivating Analytical Habits of Mind with 21st Century* Skills (Laliberte, 2014). Research questions guiding the qualitative portion of this study included:

1. How do teachers describe their use of inquiry in the classroom?

2. How did teachers learn to implement inquiry practice in the classroom?

This paper focuses on the qualitative components of a mixed methods, sequential explanatory, study that employed a sample of certified public teachers from urban classrooms in a Northeastern state where educational achievement gaps are greatest. Qualitative data collection was comprised of sequential focus groups that explored teacher perceptions of self-efficacy regarding inquiry (Krueger & Casey, 2009) following quantitative assessments of frequency and inquiry levels related to *Webb's Depth of Knowledge* (Webb, 1997; Webb, 2009) and teacher self-efficacy based on Bandura's research (2006, 2013).

Qualitative findings revealed six emergent themes including: *Student Skills and Extended Thinking, Qualities and Characteristics of Teachers, What Does this Vision Look Like?, Boundaries and Challenges of Change, Elementary Versus Secondary Preparation, Myth or Reality?,* and *Benefits of Collaboration in Real Time*. Participating educators described accountability to promote 21st century inquiry skills in their classrooms, recognized shortcomings related to teacher preparation programs, indicated needs for strategic professional development to remain proficient with evolving skills required in the competitive workplace, and noted stressors of new educator evaluation systems that prohibit expansion of classroom practices. Findings may assist varied audiences focused on 21st century global readiness. Those tasked with professional development and teacher preparation initiatives must meet teachers' needs to support inquiry practices in K-12 classrooms.

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I. INTRODUCTION

Many Americans remain inadequately educated to enter competitive economic sectors of science, technology, engineering, and mathematics (STEM) (Abaidoo, 2012; Lamos, Simon, Waits, Fulton, & Bird, 2010; Mouhammed, 2009; Porter & Rivkin, 2012; Rombel, 2012). Political, philanthropic, and corporate influences on educational reforms have been heavily focused on market driven approaches through standardized testing, limiting curriculum opportunities (Bartholomew, 2010; Dodge, 2012; Haimson & Ravitch, 2013; Hunsecker & Borman, 2010; Maranto, 2010; Merrifield, 2010; Mitchem, 2011; Ravitch, 2010; Ravitch, 2011a; Ravitch, 2011b; Ravitch, 2013; Umphrey, 2012). Despite such restructurings, inequities continue to widen for those of greatest needs (Haimson & Ravitch, 2013; Mitchem, 2011). It is well documented that family income is a predictor of U.S. test scores; indicating student achievement gaps are in place before students enter school (Dodge, 2012). Failing to address such achievement gaps will have major impacts on higher education and the economy (Bremer, Albus, & Thurlow, 2011; Darling-Hammond, 2010; Darling-Hammond, 2010a; Darling-Hammond, 2010b; Darling-Hammond, 2011; Frerer, Sosenko, & Henke (Eds.), 2013; Jensen, 2009; Ravitch, 2013; Sullivan, A'Vant, Baker, Chandler, Graves, McKinney, & Sayles, 2009; Thurlow, Bremer, & Albus, 2011; Umphrey, 2013).

Only one in 10 low-income kindergarten students attain college graduation (Darling-Hammond, 2010). National graduation data revealed markedly reduced rates for Black (50.2%), American Indian (51.1%) and Hispanic (53.2%) students in comparison to White (74.9%) or Asian/Pacific Islander (76.8%) students (Lee, 2007).

Projections for 2035 note students of color will comprise a majority of the U.S. student population with English language learners increasing to approximately 3.2 million, indicating intensifying equity gap challenges (Darling-Hammond & Bransford (Eds.), 2005; Hodgkinson, 2001; U.S. Bureau of the Census, 2000; Villegas & Lucas, 2002). Teachers must prepare for this cultural diversity and the equity gaps that characterize it in order to transform the U.S. workforce with a focus on skills development rather than discipline-specific content and facts (Ancess, 2003; King, Hollins, & Hayman), 1997; Zirkel, 2008).

Systemic change is reliant on strong instructional leadership with high teacher quality and redefined professionalism (Darling-Hammond, Hightower, Husbands, Lafors, Young, & Christopher, 2005). Studies have indicated direct correlations of low student achievement to low teacher qualifications especially in regards to students of low socio-economic and minority status (Darling-Hammond, 2006; Shields et al., 2001; Skinner, Garreton, & Schultz, 2011). Access and opportunity is increasingly reliant on challenging 21st century curricula with skills in critical thinking, language, collaboration, communication, and technology facilitated by highly effective educators in STEM fields (Bellanca & Brandt, 2010; Boyles, 2012; Darling-Hammond, 1984; Darling-Hammond, 2010b; Darling-Hammond, 2011; Darling-Hammond, Barron, Pearson, Schoenfeld, Stage, Zimmerman, Cervetti, & Tilson, 2008; Ferguson, 1991; Figlio, 2002; Figlio & Rueben, 2001; Gallagher & Bailey, 2000; Greenstein, 2012; Griffin, McGaw, & Care, 2012; Hilton, 2008; Loeb & Page, 2000; Ondrich, Pas, & Yinger, 2008; Presseisen, 2008; Prensky, 2013; Rosefsky Saavedra & Opfer, 2012; Walker, 2007). Connections of such skills across core

disciplines are imperative for economic success (Munson, 2011; Roberts, Shedd, & Norman, 2012; Suarez-Orozco & Sattin, 2007).

II. PROBLEM STATEMENT

Effective teachers have the greatest impact on improving student outcomes, while the pool of educators with expertise in STEM areas remains limited (Boone, Abell, Volkman, Arbaugh, & Lannin, 2011; Dawson, 2007; Hobbs, 2012; Karelitz, Fields, Levy, Martinez-Gudapakkam, & Jablonski, 2011; Scott, Milam, Stuessy, Blount, Kit, & Bentz, 2006; Tapping America's potential, 2008; Fulton & Britton, 2011; Xuejin, Jianping, & Poppink, 2007). Improvement of 21st century skills at K-12 levels is needed especially in schools serving high numbers of students characterized by low socioeconomic status (SES), or students in Hispanic or Black subgroups, to fuel the U.S. workforce for economic success (Nordgren, 2011).

Frequency and level of inquiry of student practice of 21st century skills across contents in elementary and secondary urban classrooms where greatest equity gaps reside was measured and related to teachers' self-efficacy to promote these skills.

III. RESEARCH QUESTIONS

The research questions addressed were: 1) How do teachers describe their use of inquiry in the classroom? 2) How did teachers learn to implement inquiry practice in the classroom?

IV. BACKGROUND OF STUDY

Clear goals contextualized through inquiry, characterize analytical practices that drive student outcomes (Pella, 2012; Tosa, 2011). The level of educator self-efficacy exhibited in imparting inquiry-based skills to students is paramount. Bandura's social cognitive theory

emphasizes a person's self-efficacy has a direct relationship with personal achievements (Craig & Dunn, 2010; Bandura (1977a, 1977b, 1982a, 1982b, 1986, 1989a, 1989b, 1993, 1997, 2001, 2006, 2013); Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Bandura, Adams, Hardy, & Howells, 1980; Bandura & Locke, 2003). Teacher preparation programs need strategic redesign to foster a 21st century education through student outcomes and instructional methodologies (Messer, 2010). STEM integration in curriculum and instruction is vital to develop critically thinking problem solvers (Berlin & White, 2009). Much work needs to be done to develop the whole teacher to ensure self-efficacy in implementing educational practices that will ensure 21st century student outcomes (Serdyukov & Ferguson, 2011; Nuangchalerm & Prachagool, 2010). Job-embedded professional development afforded to educators through rich, sustained collaborative dialogues is necessary to change practice and drive student learning. Reflective practice through inquiry in real time, results in manageable outcomes. Regularly planned opportunities for professional learning result in constructive coaching practices that allow educators to implement practicable changes that sustain a culture of improvement (DuFour, DuFour, Eaker & Many, 2012; Fulton & Britton, 2011; Darling-Hammond, Chung Wei, Andree, Richardson & Orphanos, 2009).

Frequency and level of inquiry of student practice with 21st century skills across content areas in elementary and secondary urban classrooms where greatest equity gaps reside was measured and related to teachers' self-efficacy in promoting the use of 21st century skills.

V. METHODOLOGY

Research Design

The purpose of this sequential explanatory, mixed methods study was to identify the current levels of instructional practices involving inquiry techniques related to 21st century skills and *Webb's Depths of Knowledge* in use by teachers and determine their levels of self-efficacy in regards to applying such practices. The focus of this paper will be on the qualitative components of the study. To access the work in its entirety, the unpublished doctoral dissertation, *Inquiry-based Instruction: Cultivating Analytical Habits of Mind with 21st Century* Skills (Laliberte, 2014) may be reviewed.

Associations between educator self-efficacy and utilization of 21st century skills across content areas using sequential administration of *N*=2 four-person focus groups explored teacher perceptions and understandings of how teachers may have learned to implement inquiry practices, expanded findings regarding frequency and degree of inquiry practices underway in classrooms, and illuminated educator perceptions of self-efficacy to ensure saturation (Krueger & Casey, 2009).

Sampling Strategies

The target population was comprised of a purposive subgroup of *N*=30 subjects that indicated interest in focus group participation. A total of *N*=2 focus groups were conducted with *N*=4 participants each, equally distributed in terms of educator preparation programs with 50% elementary trained and 50% secondary trained educators. The content areas represented across both groups included English, science, mathematics, special education and English language learners.

Focus Group Moderators Guide

A pre-session questionnaire and moderator's guide were developed in response to quantitative survey data analyses (Krueger & Casey, 2009). The details of the

pre-session questionnaire utilized *N*=6 terms to familiarize participants with the content to be addressed within the session. A focus group practitioner reviewed the initial drafts of both documents for clarity, design and usability and modifications were made to piloted with *N*=7 participants to ensure usability. No changes were required from the piloted questioning protocol specifically ordered to promote relaxed, genuine participation in a 90-minute timeframe (Appendix C) targeting teacher practices, implementation of and confidence in those practices, and various challenges they face in maintaining their practices.

Focus Group Administration

A session moderator conducted sessions, with formal introductions, a review of norms and signing of consent forms by all participants to ensure confidentiality. Upon session completion, participants were provided with participation letters and 20 dollars to show gratitude for their involvement.

Data Analysis

The moderator's guide was developed for an analytic strategy using emergent design flexibility to allow for discovery to be used in facilitating participant discussions as they evolve (Patton, 2002). Each purposeful grouping was designed to accommodate *N*=4 participants. Inductive analysis and creative synthesis (Patton, 2002) were applied to create replicable and valid inferences from scripts achieved by content grouping around common themes (Krippendorff, 2013). Responses were coded (Berelson, 1952), and clustered (Krueger & Casey, 2009; Miles & Huberman, 2013; Patton, 2002; Yin, 2009).

Thick, rich descriptions were generated (Lincoln & Guba, 1985; Patton, 2002) to add transferability (Polit & Beck, 2008) based on Trochim's concept of Proximal Similarity (2006), with dependability, data collection and analysis documented to contribute to confirmability (Krefting, 1991; Yin, 2009).

Trustworthiness. Prolonged engagement was used to establish study credibility (Lincoln & Guba, 1985) through researcher visits to *N*>300 classrooms across the two school districts participating in the study to understand social settings and cultures through established professional relationships that foster participant trust with a range of district members. Building-level member checking with building principals further reinforced participant credibility. Thick, rich descriptions were used to found study transferability (Lincoln & Guba, 1985; Polit & Beck, 2008). Purposeful sampling maintained homogeneity and allowed for proximal similarity (Krueger & Casey, 2009; Trochim, 2006). Two external auditing processes were used to establish dependability and define process and product alterations (Polit & Beck, 2008). Questioning route audits prior to and after focus group completion was used to address confirmability. Transcripts from many study stages were used to establish an audit trail (Lincoln & Guba, 1985).

Limitations

Audience abilities to provide honest responses at the expense of social desirability may be of issue (Krueger & Casey, 2009). Impacted by a mandated employee evaluation system that overshadows all initiatives, data may be compromised without a pledge to isolate study findings from evaluation processes.

School financial challenges may be of concern as workforce reductions have profoundly affected employee morale. A clear statement of purpose was communicated to uphold confidentiality and ease anxiety.

Delimitations

The mixed method nature of this study was designed to expand depth of findings and minimize researcher bias. Urban school sites were selected for data collection to ensure study focus in the areas of greatest need, where proficiency gaps have widened for minority and special education students.

VI. Findings

Focus Group Composition. Qualitative findings were derived from the transcripts of the two focus groups comprised of *N*=8 overall participants from urban schools with relatively large student populations between 1000-2000 students at the secondary levels. Participants represented veteran and early career teachers from elementary and secondary preparation programs. Overall group dynamics in both sessions were collegial with much support and interaction between members. Commonalities were established during introductions such that discussions flowed respectfully, characterized by sufficient airtime, respectful attention to differing perspectives, and seemingly genuine responses.

Qualitative Research Questions: Thematic Analysis. Krippendorf's (2013) content analysis method was used to analyze the focus group transcripts for emergent themes by grouping or forming clusters. The clusters were coded into categories for final analysis of the six emerging themes extracted from the data to answer the qualitative research questions (Miles & Huberman, 2013).

Theme 1: Student Skills and Extended Thinking. Discussion in both sessions was initiated with a common exchange to establish exactly what student skills are important to be practiced in 21st century classrooms and how those skills set the precursor for the extended thinking applications that all teachers should be striving for their students to master. Participants spoke of the ever growing and changing world their students are being prepared for and the critical skills they believe their students must excel at to be competitive on local and global scales. Technology surfaced as an important skill set for student proficiencies through several opportunities in both sessions. Although important, discussion focused more on other skills that could be enhanced with or without technology access.

Much emphasis was placed on a variety of collaborative experiences for students. Participants felt group work to solve real world problems was important for global success. They noted that students needed to experience perseverance to discover and make connections with the world. Creativity was viewed as a necessary component of the problem solving. Students need practice in answering thoughtful, essential questions that should be posed routinely. One participant specified,

> Instead of asking who, what, where, when, why, we're asking explain, differentiate, compare, contrast, to get them to think deeper than just recall…deeper utilization of core tasks by giving an open-ended question and where they go with it is sometimes a place you're not thinking.

This affords students opportunities to "think outside the box" and extend their thinking beyond finite solutions to enter innovative mindsets. Another participant agreed with the need to probe deeper to fully understand student responses.

All participants recognized communication as one of the most important skills to be focused on in classrooms. Students need to be able to express their ideas effectively through verbal, written and non-verbal methods. The importance of this skill was considered paramount in the discussions at both sessions. Students need to be able to develop cultural awareness to understand and collaborate effectively with others. Participants felt students needed opportunities to express their ideas, feeling, thoughts and personal interests on their personal learning journeys. They believed at a time when communities are becoming more diverse, there might be too much structure imposed on classrooms such that succinct timelines overshadow opportunities for students to communicate. Students have really rich experiences from their cultures and personal experiences outside their classrooms and as they progress in grade levels towards high school they are able to share less such that their camaraderie disappears. The participants were concerned student communication might be limited to texting which has reduced students' abilities to:

> Hold detailed conversations that express ideas, and thoughts, and feelings, and interests…that's being lost and is a key to 21st century skills that help them survive later on. It's learning how to express what they're thinking and feeling, beyond just a step-by-step process of how to solve a problem. I think that's a 21st century skill that we are forgetting.

Another participant built on to this thought by stating that over the last three years ACCESS testing for English language learners in her district has revealed that speaking is on a steady decline.

It is imperative to consider the teachers interacting in every classroom with the students tasked to learn there. The participants uncovered a number of qualities

that have direct impacts on promoting or stagnating student mastery of 21st century skills as related to the educators that set classroom expectations.

Theme 2: Qualities and Characteristics of Teachers. Overall, participants believed the major drivers behind the educators that routinely expect their students to practice 21st century skills in their classrooms possessed innate energy and passion to do what is best for their students. One participant summed it up,

> I think most of it wasn't taught in a college classroom. They [teachers] have some kind of passion, something that they are really passionate about. They bring it into the classroom and say, how can I use this to inspire the same kind of passion for learning in my students?

Participants noted motivated teachers "find teachers who are doing the same thing." They seek professional collaboration to build personal knowledge, gain access to resources to progressively grow in their profession and cultivate their students and are reflective practitioners seeking the best for students.

Participants did not think that most of the skills employed to promote 21st century skills amongst their students were taught in a college classroom. They hoped that current teacher preparation programs have evolved to include instruction to equip new teachers with the skills to require students to practice 21st century skills in the classroom, but did not know definitively if such changes have been implemented. Participants in both sessions noted that contractually scheduled professional development has provided all teachers with opportunities to build on previously instilled skills and knowledge to expand classroom practices.

All elaborated on the time it takes to implement new practices in the classroom and noted that specific opportunities scheduled by the district or contractually mandated help to support teachers in seeking new professional development

opportunities, which may be necessary to ensure the widespread implementation of 21st century skills in all classrooms. Conversations deepened around the idea of widespread implementation such that participants acknowledged the need for clarity of concepts. "Oh, yeah. We've got to get our kids prepared for these skills. I don't know if we all know what that looks like."

Theme 3: What Does this Vision Look Like? Participants noted the need to be explicit in defining 21st century skills and setting expectations for their students. They stressed the need for school-wide expectations that are consistently defined at local, state and national levels. Participants all noted they knew they should be implementing 21st century skills in their classrooms, but admitted they were not exactly clear on what an effective 21st century classroom looks like. They expressed the need to set a common language that is expected across schools with standards and benchmarks in place to set direction for their students. They articulated the value of identifying a classroom that meets the standard, using that as a model that can be observed for best practices with opportunities to personally implement those practices in a timely fashion and seek feedback from other practitioners regarding effectiveness of implementation. One participant summed up the group's exchange:

> It's our responsibility whether we like it or not. I think that's the kicker. What we do with that responsibility may vary from teacher to teacher because I don't know if we all have the same common language around it…it's going to look different. It won't be consistent.

Participants then discussed the need for administrators to drive the direction by identifying school-wide strategies with expectations for implementation in creating a common culture to be understood and expected by all. One message must be disseminated that is clear and consistent for all to implement. Participants cited

school-wide practices that were addressed in this manner that resulted in successful practices. The one caveat that was presented is the risk of scripting school-wide strategies. Many times implementation can be managed in a step-wise manner reducing new strategies to mere procedures. If care is not taken to ensure open-ended questioning and reflection of outcomes, students may become procedurally competent but may lack transfer skills for new situations. One participant asked:

> Are we setting them up to just be able to follow specific prompts because again in the same school everyone is using a lot of the same prompts, a lot of the same techniques. Are we minimizing their ability to think on their own versus go from your room, to your room, and having the same prompts and expectations versus being challenged and thinking outside the box?

The use of open-ended questions with multiple answers that require evidence to support claims and show thinking was noted to be a key to averting procedural risks.

Theme 4: Boundaries and Challenges of Change. With the concept of a clear direction set to implement change with 21st century skills practiced in all classrooms, participants identified additional challenges to be considered. One participant noted:

> We find pockets of adults that really struggle with the big picture. If I'm an adult who …its hard for me to think of the big picture, how can I teach students to do that? If I struggle to critically think, how can I teach my kids? If I'm struggling to convey my message, I won't want to do collaboration. It really speaks to your own skills. That's one of the big struggles.

In the event that teachers may lack skills or confidence to adopt new practices, delivery of the necessary professional development and the implementation plan must be carefully orchestrated. Professional development delivery could be by an external expert, a teacher leader, or a trusted administrator. A supportive culture of low risk must be established for successful implementation to be a possibility.

Participants noted a variety of challenges that inhibit effective changes from sustaining to attain long-term commitment that included lack of student attendance, social promotion, home life, home situations, lack of motivation, lack of time to effectively train, implement, and practice new strategies, lack of adequate schedules, flexibility, resources and technology to support implementing new strategies effectively, high anxiety, lack of confidence, and fear of failure with perceived punitive consequences for teachers who need time to implement new practices well. Clearly stated, "not all teachers are comfortable with an open-ended question." Another participant added, "No. It's scary. You don't know where to go with it. Some may not know where to go with it."

Participants noted that a change in culture is necessary for successful implementation. Students are expected to "engage in the process of asking and answering questions by communicating and evaluating and going back and forth" with new situations which takes time and transfer of ownership for learning from the teacher to the student. This culture shift requires an educational leader to set direction and establish a trustworthy culture where it is safe for educators and students to take risks and try new strategies. Without this there is:

> High anxiety to get through something. I think that prevents a lot of teachers. I think some of our personal skills in our content area or just in our practice prevents us from kind of taking that leap into these skills.

One participant noted, "I think realizing it's okay not to know the answers. Together, we'll be able to do it. That's hard. That took a while for me to be willing to take that risk." Participants estimated only 10% of their colleagues were not afraid of taking the risk to try new strategies in their classrooms.

Understanding the cultural climate is a necessary component of developing and implementing a successful change management process. Theme 5 attempts to outline characteristics that may differ between elementary and secondary teacher preparation and how such differences may impact K-12 transformations.

Theme 5: Elementary Versus Secondary Preparation, Myth or Reality? It is interesting to note that when both groups discussed evident differences between teachers prepared to teach elementary education and those prepared to teach secondary education the first thing noted in both sessions was that secondary teachers know their content and are experts because they focus in on one subject while elementary teachers need to teach 4-5 contents; clear differences in focus of "depth over breadth." One participant stated, "I think secondary are more confident, but I also think they expect it to be done without perhaps teaching how to do that." Another participant clarified:

> At the secondary level you have a confidence in their content level, versus their ability to help students learn the content, versus at the elementary and middle school you're focused on how do I get these kids to learn what I am supposed to teach them. It's like the opposite; it's the ying and yang. It has to start meshing. Until the secondary level teachers are trained on strategies to teach and help these kids learn how to learn content, we're never going to be…we're never going to catch up.

Differing expectations for higher order thinking may exist for elementary teachers versus secondary teachers. One member reflected:

> I remember my first observation a few years ago; I was doing kindergarten, teaching them their letters. My one fault was I didn't ask any higher level questioning. I said, 'I'm teaching them letters and sound, I don't know what higher level questioning I could be asking.' So, I felt confident in what I was doing, but I didn't meet the mark as far as asking higher-level questions. I didn't feel it was a bad thing because it didn't apply to what I was doing.

Another participant stated:

> I think some elementary school teachers think that and feel a lot of their students aren't able to think critically…they don't want to challenge them. I think some high school teachers are the same way. I think there's been a paradigm shift lately, too, especially with the expectation that all students can learn. Because when I first started teaching, I never heard that. You can think it would be something that you can just know intuitively. But it wasn't like it was preached.

This same participant elaborated on current efforts to narrow achievement gaps through differentiation to get all students to think critically at higher levels. This approach is a significant shift from former secondary practices that tracked students applying different achievement expectations depending on course levels.

> I have found …the behavior issues are sometimes a product of not challenging [students] to do these things. It's like when they are taking up space and not having to think and not having to collaborate and not having to do the things we have them do now, they tend to wander. They're focused and doing something that requires critical thinking, requires them to work with other students to figure it out. Some of the behavior issue is fear of the teachers to worry about certain groups. I can't have them do this. They'll break the lab equipment.

One secondary level participant reflected:

> I think my content knowledge allowed me to take the risk of having students do all those things. I enjoyed doing it. I enjoy problem solving. I enjoy coming up with an answer especially for a problem that they don't think has an answer…. I think it's the content knowledge that allows that to happen.

Another secondary participant referred to a class she teaches that is not in her content area, "I stress everyday".

Differences appear to exist in perceptions and personal identities between elementary and secondary prepared educators. Clear benefits may be evident in establishing collaborations between educators and other stakeholders across levels given the diversity of perspectives encountered in this small sampling of educators. Further emphasis on collaborative benefits is apparent with the next theme.

Theme 6: Benefits of Collaboration in Real Time. Participants noted that several collaborative efforts could support daily practices of 21st century skills in their classrooms by forming partnerships with administrators, parents and extended community members in developing a number of collaborative supports. Participants noted that school-wide initiatives make a difference but they must not be competing for time and other valuable resources. If there are too many competing priorities, all stakeholders lose the ability to focus and create sustainable impacts. It allows teachers to feel their time is undervalued and leads to frustration. Stability of teacher assignments was noted as an important factor in sustaining established collaborations. If assignments vary yearly, it is difficult for teachers to build confidence in their instructional practices and maintain collaborative efforts.

If targeted and implemented as part of a larger initiative with administrative support, sustainable results can be attained that positively impact student outcomes. One participant alluded to a data analysis process she engaged in regularly with her assistant principal and fellow teachers that shared students. They were able to identify students that needed additional attention and shared findings with parents to initiate support from home. Student successes increased from these efforts. The biggest issue with this practice was the time involved in organizing and analyzing the data. “Not everybody wants to put that time nor do they feel that they should do that time or have that time.”

Purposeful approaches to instruction and assessments with students as invested collaborative partners could help to sustain culture changes.

> We don’t have the same kind of students we have had. You ask them to do something now and they try because they’re invested and because they have to

> do this. Maybe not in every class but enough classes that they're willing to participate…nobody leaves the test blank anymore. It's like they all try.

This participant cited state test scores that rose significantly from early scores of 8-15% proficiency up to scores in the range of 42-45% proficient because students invested in their work. Significant changes in curriculum, instructional practices, and formative and summative assessments resulted in sustainable improvements on state test performance. Widespread daily collaborations became commonplace where teachers capitalized on each other's strengths and supported each other's needs to the direct benefit of their students.

> Now we're teaching different. It takes more time and effort. I think some teachers could be intimidated by that. To do it, what it boils down to was that when you put in the time and effort and overcome whatever initial fear you had or trepidations, you find that you become a much more effective teacher.

Supplemental Findings

A key finding that emerged involved perceptions of participants in regards to the new teacher evaluation system that is in its second year of full implementation in all districts throughout the state. Teachers have not yet relaxed and released the anxiety they have harbored over the mixed messages surrounding the system and its link to teacher accountability. One participant simply noted, "you're pushing people away versus pulling them forward. I'm watching people take less and less risks because of fear." Another participant stated, "…you'd see the administrator walking and you're, oh great, this is a new lesson. I'm not sure how it's going to go and they're going to see everything wrong, and I'll get written up on it." This process clearly does overshadow many of the risks teachers are willing to take regarding implementation of new practices in their classrooms. It was not formally assessed in

this study, but its influence did surface in respect to considerations regarding teacher practices in their classrooms.

VI. Conclusions

The qualitative research questions afford a look into how teachers perceive their surrounding environment might influence the details of their practice. Six themes were extracted from the data using Krippendorf's (2013) content analysis method to derive in vivo or inductive codes for grouping into clusters that addressed the qualitative research questions (Miles & Huberman, 2013). The clusters that emerged from this work included: 1) Student Skills and Extended Thinking, 2) Qualities and Characteristics of Teachers, 3) What Does this Vision Look Like?, 4) Boundaries and Challenges of Change, 5) Elementary Versus Secondary Preparation, Myth or Reality?, and 6) Benefits of Collaboration in Real time (Figure 2).

Overall, participating educators described their use of inquiry in the classroom to be something they believed they were responsible to employ to allow their students to excel in the multicultural society of their present and future endeavors. They admitted that change can be intimidating and they believed they were not prepared in their teacher preparation programs to work with the skills and knowledge that has become an integral component of current academic expectations in their classrooms.

Participants noted that ideal professional development opportunities are strategically designed under a leadership team in an area of focus with adequate time and resources set to implement sustainable change. They expressed definite

advantages in establishing relevant professional development that may be contractually stipulated into the workday as time was noted to be one of the scarcest of resources. They stated a variety of reasons why colleagues might not participate.

Classroom modeling and collaborative practices were paramount in ongoing professional development, as all expressed concerns that educators might not have one clear, consistent vision with the necessary depths of understanding required to implement sustainable changes to meet the 21st century needs of all students. Participants acknowledged definitive beliefs that there are differences to be considered when working with elementary and secondary educators. Incorporating the best of both worlds when planning ongoing development was suggested.

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APPENDIX A

Qualitative Instrument

Inquiry-based Instruction: Cultivating Analytical Habits of Mind

Focus Group Pre-Session Questionnaire

During today's discussion, we will reflect on several key terms related to this study. Please take a few moments to briefly describe, in sentence or phrase, what comes to mind when you read the following terms listed below:

a. 21st Century Skills:_____

_____

b. Inquiry:_____

_____

c. Problem Solving:_____

_____

d. Critical Thinking:_____

_____

e. Analysis:_____

_____

f. Synthesis:_____

_____

APPENDIX B

Focus Group Moderator's Guide

Inquiry-based Instruction: Cultivating Analytical Habits of Mind

I. Information about the Focus Group:

Participants (general): _____ Moderator: _____Group_____

Date: _____ Time: _____ Place:_____

II. Consent and Introduction

- Introduce yourself.
- Review the study's purpose, how long you expect the focus group to take, and your plans for using the results.
- Note that the interview will be audio and video-recorded and that you will keep their identities confidential.
- Distribute consent forms, pre-session questionnaire

Ground Rules

Question Sequence

1. **Ice Breaker Question:** Tell us your name, what grade and content area you teach and how long you have been teaching (limit to 1 minute per participant).

2. **Introductory Question:**

   a. On the questionnaire you were handed when you arrived, we asked you to think about your personal definitions of several terms. We are going to explore those definitions and meanings in the next hour.

   Let's start with the first word on that list: What is the first thing that comes to mind when you hear the term *21st century skills*? (limit to 60-90 seconds per participant)

3. **Transition Question:** Let's take a moment to reflect on the other terms listed on that questionnaire: pick one of those terms (inquiry, problem-solving, critical thinking, analysis, or synthesis) and give us your definition and an example of how you use it or see it enacted in your classroom? (track your time closely so you leave adequate time for your content questions … no more than 10-12 minutes for this section)

4. **Content Questions**

   4a. Content #1: Think about those teachers you know that expect their students to practice 21st century skills routinely in their classrooms…how did they learn to do this?

   Probe: What are those teachers doing to lead change and increase student practices of 21st century skills in your schools?

4b. Content #2: Now reflect on your own practices for a moment: think about how often you require your students to practice 21st century skills in your classroom. In what ways are you able to accomplish this goal through your teaching practices?

Probe: what enables you or prevents you from doing more in your classroom regarding 21st century student practices?

4c. Content #3: In what ways can you describe how you incorporate new strategies into your teaching (schedule, differentiated roster, common planning time, professional learning community, etc) that may facilitate the introduction of 21st century student practices?

4d. Content #4: Do you think teachers prepared to teach in secondary grades would be more or less confident to expect their students to problem solve, analyze and think critically than their colleagues that teach at elementary grade levels

Probe: How confident are you in requiring your students to problem solve, analyze, and synthesize information in your classroom

4e. Content #5: What are some challenges that prevent teachers from requiring problem solving, analysis and synthesis of information from their students on a daily basis?

Probe: How might these challenges be addressed?

5. **Closing Question/debriefing:** "If you were asked by your superintendent or school administrator to be part of a team of teachers to implement the use of problem solving, critical thinking and inquiry across the curriculum, what would you say?"

6. "What else would you like to tell me about requiring your students to use inquiry, problem solving, and critical thinking skills in your classroom and across your school on a daily basis?"

III. Wrap Up and Thank Participant for Time

- Thank you very much for your time today. I appreciated hearing your insights on this topic. I am doing this study to understand how often students are asked to use inquiry skills in the classroom and explore what might be required to expand the use of these skills into daily practice across the curriculum. This focus group was conducted specifically to help me understand what supports might be needed to increase student expectations to practice inquiry in the classroom daily. Is there anything we missed in our discussion? Would you like to add anything before we conclude?

Emergent Themes					
Student Skills and Extended Thinking	**Qualities and Characteristics of Teachers**	**What Does this Vision Look Like?**	**Boundaries and Challenges of Change**	**Elementary Versus Secondary Preparation, Myth or Reality?**	**Benefits of Collaboration in Real Time**
• Engineering, building, design, technology	• Passionate, inspiring, energized	• Global, schoolwide strategies	• Lack of time, competing priorities, short-lived goals	• Differing expectations for higher order thinking	• Sustainable change and stability of successful practices
• Perseverance, collaboration, solve problems together	• Knowledgeable, and can share knowledge	• Common, consistent language and culture	• Students lack basic skills, poor attendance, inadequate homelife, social promotion	•Secondary teachers are more confident, elementary not confident	• Accountable talk and reflection on practice
• Global success, rich experiences, cultural interactions, diversity, ever-changing world	• Reflective, questions practice	• Standards, benchmarks	• Limited resources, technology, funding, lack of parental involvement	• Secondary content focus versus elementary teaching strategies	• Supportive, flexible culture with collegial support
• Communicate (visual, verbal, written), critically think, creative	• Confident to incorporate new strategies, risk taker	• Technologically enhanced, skills ready	• Lack of motivation, poor student engagement, behavior issues	•Elementary is broad not deep	• Accountability from administration to teacher, students, families
• Inquiry, discover, synthesize, explain, differentiate, compare, contrast	• Strives to deliver best to students	• Explicit, one message without competing priorities	• Ineffective teachers, lack 21st century skills	• Content knowledge provides confidence to take risks	• Focused initiatives benchmarked to meet standards
• Higher level, focus, fruitful, thoughtful, essential questions	• Collaborative with colleagues, values modeling	• Educational leadership of administrators, teacher leaders, experts	• Lack of autonomy, fear, estimated <10% of colleagues not afraid to take risks	• Teachers can know content and not expect students to think critically	• Consistency in expectations focused on rigorous outcomes
• World connections, think outside the box, too much structure limits expression	• Responds positively to change	• Balance of big picture and strategic details	• Lack of collective, collaborative, supportive efforts	• Depth versus breadth, need teacher preparation to address content and teaching strategies K-12	•Attain common goals from K-12 while maximizing time, resources

Figure 2. Thematic Analysis: Teacher Descriptions for Practice and Acquisition of Inquiry Skills

APPENDIX C