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# **Inquiry-based Instruction: Cultivating Analytical Habits of Mind**

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## **Inquiry-based Instruction: Cultivating Analytical Habits of Mind**

Global competitiveness challenges regarding 21<sup>st</sup> century workforce skills in STEM-based careers have increased. Strategic interventions for the K-12 educational system are imperative for post-secondary opportunities. This mixed method sequential explanatory, quantitatively dominant study will survey  $N=300$  teachers from urban, suburban and rural RI schools to assess frequency and level of inquiry related to Webb's depth of knowledge and teacher inquiry self-efficacy. Descriptive and inferential statistics ( $t$ -test and ANOVA) will be used to analyze the survey responses and teacher demographic data. Three follow-up focus groups will illuminate teacher self-efficacy regarding inquiry. Findings will be of interest to varied stakeholders regarding workforce readiness through 21<sup>st</sup> century skill proficiency.

### **I. STUDY PURPOSE**

This study will explore teacher self-efficacy in regards to inquiry practices used to develop students' analytical habits of mind accounting for Webb's depths of knowledge (DOK) levels (Webb, 2009).

The following will be addressed:

1. Is there a significant difference across content areas with respect to the frequency and level of inquiry employed?
2. Is there a relationship between the level of educator preparation, elementary or secondary, with respect to teachers' self-efficacy regarding inquiry practices?
3. What are teachers' perceptions of their effectiveness and ability to employ inquiry techniques?

### **II. THEORETICAL FRAMEWORK**

Investigations have addressed the development and employment of inquiry skills in a variety of classroom settings (Furtado, 2010; Justice, Rice, & Warry, 2009; Kuhn &

Dean, 2008; Wu & Wu, 2011). Critical thinking and problem solving skills need cultivation to promote a competitive workforce for global success (Deskins, 2012; Sackes, Cabe Trundell & Flevaras, 2009; Stafford, 2011).

### **III. METHODOLOGY**

Identifying levels of instructional practices involving inquiry related to Webb's depth's of knowledge and determine teacher self-efficacy is the goal.

#### **Participants**

A mixed method sequential explanatory, quantitatively dominant study (McMillan & Wergin, 2010) will randomly sample  $N=300$  teachers from urban, suburban and rural RI schools to assess frequency and level of inquiry related to Webb's depth of knowledge and teacher self-efficacy.

#### **Instrumentation**

Self-administered, Internet delivered surveys designed with Likert scale ratings will address the first two research questions. Three domains related to Webb's depth of knowledge (Webb, 1997) and teacher self-efficacy rooted in work from Bandura (1977a, 1977b, 1982a, 1982b, 1986, 1989a, 1989b, 1993, 1997, 2001, 2006), Bandura, Barbaranelli, Caprara, and Pastorelli (1996), Bandura, Adams, Hardy, and Howells (1980), and Bandura and Locke (2003) regarding the use of inquiry practices and self-efficacy will be included. Frequency will be defined as the number of questions utilized in a 60-minute period. Level of inquiry employed references actionable frames from Webb's depth of knowledge (Webb, 1997). Self-efficacy will be operationally defined as a personal perception of self-confidence.

Sequential administration of 6-8 person focus groups, will further investigate teacher perceptions (Krueger & Casey, 2009). District administrators will coordinate member checking. Purposeful sampling will allow for proximal similarity (Krueger & Casey, 2009, Trochim, 2006). Questioning route details targeting a 10-question framework (Krueger & Casey, 2009) will ensure dependability and confirmability through design and audit processes. Session tape and transcript reviews with data triangulation will certify trustworthiness (Patton, 2002).

### **Data Collection**

Average class sizes in this convenience sample from a non-random single-stage sampling of certified teachers will be self-reported and verified by teacher contracts. Stratification will be conducted by content area to assess generalizability (Creswell, 2011). Teacher preparation as a moderator variable from anecdotal evidence suggests differences between elementary and secondary trained educators. With a Superintendent support email to teachers sample selection from participating districts will be completed via email explaining the study importance with participation links. Survey completion will indicate consent to allow data use in future studies. E-mail reminders will secure optimum response rates. Thank you e-mails of study findings will be distributed via mass e-mailing to all invitees regardless of participation. The survey will request interest in focus group participation.

Focus group member checking will be coordinated with district administrators. Purposeful sampling of the study maintains homogeneity while allowing for proximal similarity (Krueger & Casey, 2009, Trochim, 2006). Questioning route details will target a 10-question framework (Krueger & Casey, 2009). Dependability and

confirmability will be addressed through questioning audits prior to and after group sessions. Session tape and transcript reviews with triangulation of quantitative data will ensure trustworthiness (Patton, 2002).

Participant characteristics will be determined through demographic items to include number of years teaching and elementary or secondary preparation.

### **Data Analysis**

CSV download of results with transfer for quantitative analysis using SPSS will be conducted. Graphic displays for a visual data inspection are not isolated to a single curve location.

Research question 1 will be analyzed using multiple 1-way ANOVAs for each content area in comparison to frequency and level of inquiry. Significant *F* values will be followed by post hoc Scheffe' comparisons.

Research question 2 will employ t-tests to examine the relationship between teacher preparation and self-efficacy in regards to inquiry practices. Internal consistency reliability of the self-efficacy data will be determined from Cronbach's alpha with a criterion of at least .80 before dimension scores are formed. Item-level analyses will also be carried out and effect sizes will be reported for significant findings. An exploratory factor analysis will be conducted for the self-efficacy items to ascertain if dimension-level means can be created.

Research question 3 will be addressed qualitatively from sequential focus groups following the quantitative study component. Replicable and valid inferences will be developed from the focus group scripts through content analysis around common themes (Krippendorff, 2013). Responses to open-ended questions on the survey will also be

coded (Berelson, 1952) and clustered into manageable classification categories (Patton, 2002) with further organization into dendograms (Beck & Gable, 2012). Support for the transferability of qualitative findings will be based on Trochim's concept of Proximal Similarity (2006).

#### **IV. Educational Implications**

Proficient development of students' critical thinking and problem solving skills will indicate transferability (Common core, 2012; Council of Chief State, 2011; Kuhlthau, Maniotes, & Caspari, 2007; A Nation at risk, 1983; National Research Council, 2012). Improvements in instructional practices that foster inquiry-based habits of mind will result in maintenance of global U.S. competitiveness (Porter & Rivkin, 2012).

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