# Improving Teacher Education through Inquiry-based Learning

Evan T. Ortlieb

Ph. D, Assistant Professor

Texas A&M University - Corpus Christi

Department of Curriculum & Instruction

Early Childhood Development Center 219H

6300 Ocean Drive Unit 5834

Corpus Christi, Texas 78412-5834, USA

E-mail: evan.ortlieb@tamucc.edu


Lucia Lu

Ph. D, Associate Professor

Valdosta State University

Department of Early Childhood and Special Education

1500 N Patterson St., Valdosta, GA 31698, USA

E-mail: lylu@valdosta.edu

**Abstract**

Preservice educators face daunting challenges throughout their professional development, but no challenge is greater than that of contextualizing their instruction within multicultural environments. Addressing the increasing diversity and ever-changing cultures within student populations is often skimmed over within teacher education curriculums; yet, its importance to the success of preservice teachers cannot be understated. Investigators developed two specific projects which led teacher candidates through a qualitative design research study, which aimed to innovate and promote inquiry-based learning within their elementary learners. These practical, real-world applications took teacher candidates through the process of effective instruction: assessment, modeling, scaffolding, and evaluation.

**Keywords:** Inquiry, Research, Preservice teachers, Practicum

## 1. Introduction

Educators face challenges of greater accountability and increasing demands of more diverse and inclusive classrooms in urban areas (AACTE, 2001; Arends, 2001). Raising students' scores on both the traditional standardized tests and high-stakes tests is of central focus; in fact, in many states, teacher pay raises will be associated with student test scores. Meanwhile, teachers are criticized for dumbing-down their instruction, failing to lead students to become critical, creative, and curious thinkers (Lemann, 1999). Teacher candidates learn these struggles early in their education program. Freire (1993) declared that society requires the development of an especially flexible, critical spirit when it begins to transit from one epoch to another. In education, Arthur Wise (2000), the president of the NCATE, expressed similarly that teachers should use strategies to develop critical thinking for problem solving. It is only natural to focus on critical thinking skills; teacher educators must be the change agents if success is attainable.

*1.1 Objective*

Based on the assumption that teaching and learning are inquiry, not the transmission of knowledge (Short, Harste, & Burke, 1996; Wray, 1999), investigators conceptualized that teacher candidates could become change agents within their practicum classrooms. Through the integration of innovation and inquiry-based learning, 46 undergraduate teacher candidates led various inquiries within two public elementary schools in the Southeast.

## 2. Theoretical Framework

Behaviorism has been the dominant theory that views learning as a response to stimuli existing in the environment. In this stimulus-response notion rooted in laboratory settings, humans are passive reactors learning through the

process of imitation, reinforcement, and shaping (Norton, 2003). The S-R unit can be used to examine simple tasks, but not the complex behavior. Yet, humans are thinking beings (Vygotsky, 1934; Zahorik, 1995) bearing insights, reasoning power, and the ability to make decisions. They have "minds" to select stimuli to respond and to choose the best response that makes sense to them. This is the S-MIND-R unit explaining the rational, logical, and cognitive processes that occur between stimuli and responses.

Peirce theorized "anomalies," which humans encounter in the real world, will drive the process of inquiry into the motion of inference (Neilsen, 1989). Peirce's triadic model of inference is the endless cycle of reasoning (Cunningham, 1992; 1998) which is composed of the following processes: 1) Abduction, or the generation of hypotheses from life experience, prior knowledge, conscience, and/or sociocultural modes to deal with the anomalies; 2) Deduction, or the testing of hypotheses against social contexts; and 3) Induction, or the confirmation, rejection, or modification of previous hypotheses. Thinking beings acquire new knowledge by exercising the endless cycle of inference. Findings in neurobiology reveal that newborn babies are born with the intellectual competency to instinctively respond to the environment for survival and for the exploration of the new world (Gardner, 1985; John-Steiner, 1985). Education is used to further mobilize this heavenly bestowed intellectual competence based on learners as inquirers (Wray, 1999), not the passive transmission of knowledge (Short, Haste, & Burke, 1996). Instruction as inquiry can be summarized to have the following purposes: (1) activate prior knowledge, (2) acquire knowledge, (3) understand knowledge (4) use knowledge, and (5) reflect on knowledge (Zahorik, 1995).

### 2.1 Innovation

From the historical perspective on education, we are confronting a lot of struggles just to survive (Shannon, 1990)—such as the concepts of teaching, approaches in literacy, the reform of the school system, the creation of standardized tests for a classless society, and educators' reactions in terms of alternate assessment. Many enthusiastic educators acting as change agents feel insecure, uncomfortable, or dissatisfied with the prevailing instructional strategies or systems in place, and they always exercise their inference to initiate innovation for the survival of themselves and their communities (Dormant, 1986; 2001). Usually the change agents will face a lot of expected and unexpected resistance while they try to convince their colleagues of the benefits of implementing the innovation in the institution (Dormant, 1997). For example, there are still reading educators arguing over the whole language approach and the basal reader approach (Smith, 1994).

In *The ABCD's of Managing Change* (1986, 1997), Dormant, a professor and change consultant in education, business, the military, and social services, proposed a conceptual framework for the practice of change agentry: 1) Adopters who will accept, implement and utilize the innovation; 2) Black box, the innovation invented by the change agents to deal with the anomaly, and to improve the operation in the community; 3) Change agent(s) who feel unsafe, uncomfortable, dissatisfied with the current situation in the community and plan to change. Change agents are innovators who initiate the change, schedule the change, create the climate for change, find the support for change and the resistance to change, involve the people who support change, convince the people who resist the change, and launch or modify the change; and 4) Domain where the innovation implements and the climate for change. Since 1980, Dormant and her change team proposed a series of management skills for change, such as "technology strategies" for the evaluation of innovation; "interpersonal strategies" to deal with the resistance in the domain, to create opportunity for change, to assess the climate for change, to implement human performance by engaging the colleagues into the change, and to be an effective leader to direct the change.

To be human is to engage in relationships with others and with the society (Sun, 2002). When a society begins to move from one epoch to another, it requires the development of an especially flexible, critical spirit, or critical consciousness that is integrated with reality (Freire, 1993) and led to critical action for the epochal transition. In a series of service-learning activities, the investigators strove to awaken teacher candidates' critical consciousness for culture and society in the increasingly diverse and multicultural urban context.

### 3. Methods

This qualitative inquiry utilized naturalistic research techniques that relied upon purposeful sampling, also known as interactional sampling (Stake, 1975). Guba (1978) defined naturalistic inquiry as a "discovery-oriented" approach to research. It is predominantly recognized by its function to minimize researcher bias, since the outcomes and theories of the investigation are not previously known or manipulated. Inquirers understand that conditions change in real-world queries, and they document these dynamic processes. Researchers utilized settings as sources of information, since recording information without considering its context is a fallacy in itself within the field of qualitative research. Geertz (1973) added that:

> If anthropological interpretation is constructing a reading of what happens, then to divorce it from what happens—from what in this time or that place specific people say, what they do, what is done to them,

from the whole vast business of the world—it is to divorce it from its application and render it vacant. A good interpretation of anything—a poem, a person, a history, a ritual, an institution, a society—takes us to the heart of that of which it is in the interpretation. (p. 18)

The settings were local schools in a metropolitan area in the Deep South region of the United States. Preservice teachers entered and investigated their students' particular needs for substantial amounts of time, thus making them crucial to the emergent design of the investigation. Furthermore, continuous interaction and interpretation exemplify naturalistic inquiry and its flexibility (Ortlieb, 2008). It is assumed that frequent and meaningful interaction between researcher and key informants allow for the design to be more precise as the study progresses (Lincoln & Guba, 1985). The insight gained through naturalistic inquiry is difficult to match from more objective, defined research methodologies.

Descriptive data, the second feature of qualitative research, was collected in the exact form that it occurred. For example, collecting "interview transcripts, fieldnotes, photographs, videotapes, personal documents, memos, and other official records" allowed the investigators to review the data at a later time without losing much, if any, richness from the actual occurrence (Bogdan & Biklen, 2003, p. 5). These fieldwork artifacts were reviewed; no assumptions were made and all details were considered into drawn conclusions. Only then could an accurate holistic portrayal of that which was in study be clearly depicted. Qualitative researchers also used inductive reasoning to analyze data. No predetermined hypotheses had to be proven or disproven; instead, "abstractions [we]re built as the particulars that have been gathered [we]re grouped together" (Bogdan & Biklen, 2003, p. 6). Theory was thus developed from analyzing many interconnected pieces and discovering the relationships that exist between them. Emerging from the bottom up, the direction of the study could be fully determined a priori. More directed studies only surfaced after open-ended research data had been gathered.

*3.1 Application*

The methods utilized in this research endeavor were founded on the notions that humans are constructors of their own knowledge, rather than reproducers of someone else's knowledge (Zahorik, 1995), and instruction is based on learners as inquirers instead of instructor's transmission of knowledge (Short, Harste, & Burke, 1996). Without being unrealistic to expect the teacher candidates to make system-wide changes or on the existing teaching theories, teacher candidates were encouraged to employ their intellectual freedom (Smith, 1988) towards innovative strategies for their elementary students through the following *innovative* activities and management strategies:

Part 1: Inference for Innovation

(1) Write observations and critiques on the classroom setting, classroom management, students' learning behaviors, small group activities, teacher's talk, and strategies the coordinating teachers use.

(2) Think about alternate strategies that could be used or modifications to existing ones to impact student achievement.

(3) Find five supporting research-based articles related to the new strategy. The theories should be able to support the implementation of the new strategy.

(4) Talk with peers and the coordinating teacher about the new strategy.

(5) Write lesson plans or proposals for the implementation of the new strategies they plan to use.

(6) Apply the new strategies within instruction during practicum experiences.

(7) Collect student artifacts from the field sites.

(8) Analyze the data and reflect on the effectiveness of the strategy.

(9) Confirm, reject, or modify the strategy execution for future implementation.

(10) Keep a field journal

Part 2: Management of the Infused Strategy

(1) Identify the four factors of the *ABCD's of Managing Change* (Dormant, 1986) based on the school environment.

(2) Create a climate for change.

(3) Demonstrate the strength of the innovation and the weaknesses of the old strategy from aspects of security, perfection, advantages, convenience, economy, and durability (Eli Lilly, 1980).

(4) Analyze possible support systems and the expected resistance inside the institution.

(5) Use linguistic, logical, and interpersonal intelligences to justify your reasoning (Gardner, 1985).

(6) Implement the change.

(7) Assess the change periodically and modify accordingly.

## 4. Evidence

The undergraduate students in teacher education explored alternate means for assisting in student achievement during their elementary-school field experiences using Peirce's triadic model of inference is the endless cycle of reasoning (Cunningham, 1992; 1998). Their enthusiastic proposals for change can be categorized into three topics:

*1. Instructional Strategies*

Most teacher candidates were interested in pursuing instruction related to methods usedin reading education. They wrote proposals such as "using invented spelling instead of the conventional spelling for composition writing in the first draft," "more than one answer - multiple ways of reading responses," "authoring circle for composition writing," "VAKT for phonemic awareness," "sight, sound, and sense for poetry," and "using technology to tutor the at-risk early readers."

*2. Classroom Management*

Some teacher candidates explored alternate methods of more-effective classroom management, including academic rewards like supplying high-interest books for individual task completion and regular on-task behavior. Aligning rewards with scholarship has shown to positively reinforce that behavior (Ortlieb & Doepker, 2011).

*3. Integrity*

Others pursued better methods to reach low-achieving students and their parents. The teacher candidates were interviewed at the conclusion of the semester. They not only possessed the knowledge, skill, and disposition for teaching, but they also were committed to the profession of teaching through conceptualizing innovation and inquiry-based applications into their real-world experiences. Their actions and attitudes were tallied, sorted, and those responses with the highest frequency of occurrence were summarized (see Figure 1). Each aspect is dependent upon the others for the continued success of teacher candidates.

## 5. Conclusion

Inference expands teacher candidates' potential for critical thinking in a society of transition (Lu & Ortlieb, 2009). Maintaining management skills keeps these future change agents in line with their objectives. For the benefits of the students and the community, classroom teachers should be empowered to exercise their inference as well as to provide critical consciousness for changes in their small world (Freire, 1993). Since inference is an endless cycle of reasoning, and society is still in a phase of transition, there is a perfect opportunity to make this transition towards inquiry-based learning. Individual changes, like those of these preservice teachers, are merely hidden streams in the beginning, but they will eventually overflow into the mainstream. Teachers acting as change agents choose to act and not just complain with their current dissatisfaction of instructional systems in place, and they always exercise their inference to initiate innovation for the survival of themselves and their communities (Dormant, 1986; 2001). Preservice teachers in this study identified that which needed revision and made progressive steps towards providing customized learning environments for their student bodies. Inevitably, educators and teacher educators will struggle to continue, and continue to struggle towards these necessary goals (Shannon, 1990).

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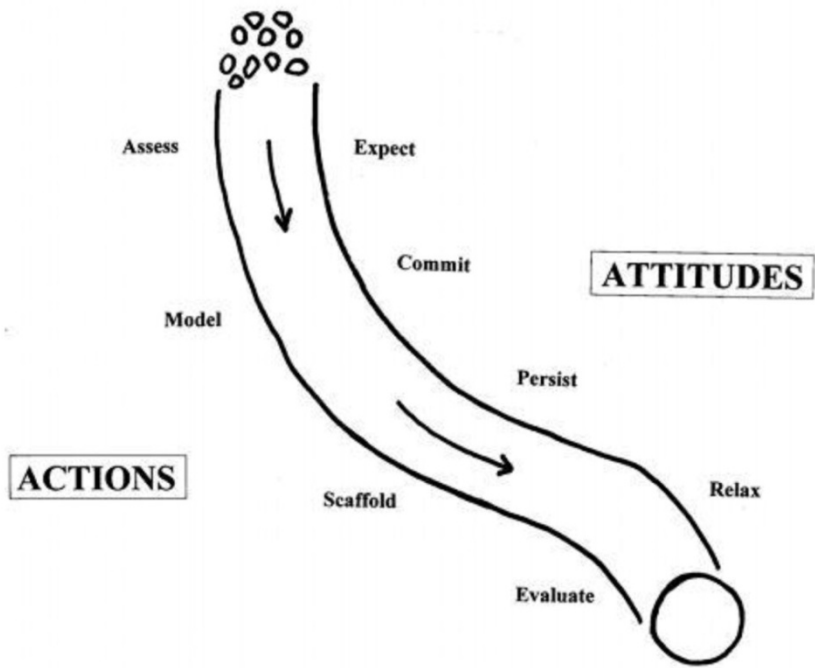Zahorik, J. A. (1995). *Constructivist teaching.* Bloomington, IN: Indiana University Press.

Figure 1. Actions and attitudes of effective preservice teachers.