Research of Learning & Teaching Via Inquiry
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Genesis and Evolution of the Learning Cycle


As the learning cycle evolved so did its theory base and we can’t explore the learning cycle without an examination of the concomitant theory base. It would be like examining the products of science without experiencing the processes of science. The learning cycle glues together the elements of its theoretical foundation, which currently are a) nature of science, b) purpose and standards of school science and c) constructivist learning theory. Figure 1 lists primary events in the chronology of the genesis and evolution of the learning cycle and its theory base, which span 50 years.

Beginnings

The origin of the learning cycle can be traced back to the late 1950s before the term ‘learning cycle’ existed. Early phases of the learning cycle emerged and evolved for about a dozen years before ‘learning cycle’ was used with science curriculum and in the literature. Professor Robert Karplus, a physicist at the University of California Berkeley, who is known for launching the learning cycle approach to science. It began while he was voluntarily teaching in the area’s elementary and junior high school classrooms. From his experiences with elementary and junior high school students, Karplus became interested in developing a program for elementary school science.

Assessing Understanding of the Learning Cycle: The ULC


An 18-item, multiple choice, two-tiered instrument designed to measure understanding of the learning cycle (ULC) was developed, field tested, from the learning cycle test (LCT) of Odom and Settle (1996). All question sets of the LCT were modified to some degree and five new sets were added resulting in the ULC. The ULC measures a) understandings and misunderstandings of the learning cycle, b) the learning cycle’s association with Piaget’s theory of mental functioning, and c) applications of the learning cycle. The resulting ULC instrument was evaluated for internal consistency with Cronbach’s Alpha statistic, yielding a coefficient of .791.

Why the Learning Cycle?


The learning cycle is a way to structure inquiry in school science and occurs in several sequential phases. A learning cycle moves children through a scientific investigation by having them first explore materials, then construct a concept, and finally apply or extend the concept to other situations. Why the learning cycle? Because it is a theory-based design for inquiry that works when implemented well.

The Cognitive Level of Medical Students/ Residents and Its Correlation to Knowledge Retention in Lecture Versus Simulation Learning

Alberto de Arciniega, MD, OUHSC

Problem Statement: There is a contradiction of information of the benefit of simulation in medical education. Our aim is to study the effects of simulation versus lecture learning and its effect on long-term knowledge retention.

Decreasing Cognitive Load during a Laboratory Investigation Using Less-detailed Instructions

Brandi Williams, Science Teacher Moore Public Schools

Problem Statement: Laboratory investigations must be written in a manner that decreases students’ cognitive load so that students are able to generate the intended data, and show understanding of the science concepts that the lab was designed to help them learn.

Primary Events in the Evolution of the Learning Cycle Terminology and Theory Base

Evolution of the Learning Cycle

Evolution of the Theory Base

Student Acquisition of Biological Evolution-Related Misconceptions: The Role of the Secondary School Life Science Teacher

Tony Yates, OBU Professor

Problem Statement: What is the role of the secondary school life science instructor in student acquisition of biological evolution-related misconceptions?

Exploring American Indian Students’ Perceptions, Attitudes, and Misconceptions of Scientists and the Nature of Science

Geary Crofford, Dean of Academics Sequoyah Schools

Central Research Question: What are the perceptions, attitudes, and misconceptions of American Indian high school students regarding scientists and the nature of science?

Scientists’ Self-Perceptions: A Phenomenological Study of Natural Scientists in Academia

Florence McCann, OU Teaching Assistant

Problem Statement: The purpose of this study is to explore the self-perceptions of twenty-first century scientists as previously defined. Efforts will be made whenever possible to access the self-perceptions of female and traditionally under-represented ethnic minority scientists. An in-depth understanding of scientists’ self-identities will be developed that reflects the association between identity and agency in their practice of science (Roth & Calabrese Barton, 2004) by examining the lived experiences of scientists. This is an exploratory study designed literally to allow scientists to “speak” in their own words about science, themselves as scientists, and their relationships with the public.

Cultural Practices’ Impact on Muslim Elementary Pupils’ Conceptions of Nationally Set Astronomy Concepts

Wahid Shihabi, Tulsa Junior College Professor

Problem Statement: To explore how Muslim pupils’ prior knowledge, associated with their cultural practices pertinent to observing the sun’s various positions in the sky, the day and moon phases throughout a lunar month, shape their understanding of the apparent patterns of celestial motion and moon phases. Others include: 1. How Islamic cultural knowledge of the sun’s apparent position in the sky at various prayer times shapes elementary school pupils’ conceptions of the patterns of motion of the sun, moon and stars, at an Islamic private school, compared to the expectations set by the science education standards. 2. How observance of holy lunar months, by elementary school pupils at an Islamic private school, impacts their understanding to the phases of the moon, based upon the expectations set by the science education standards.

Application of Learning Cycles in Medical Education

Mohana Shukry, MD

Problem Statement: This study is designed to compare the effects of two different teaching designs: inquiry via the learning cycle and exposition via the lecture. The learning cycle has not been implemented in medical education before, but problem based learning has been used and compared to the traditional lecture-based practices. The major focus in studies of the effectiveness of problem-based learning has been on students’ knowledge base and not the application of this knowledge (Kelso & Distelhorst, 2000). Factors that Influence Work Engagement Which is Exhibited Through the Use of Inquiry Teaching Methods by Science Teachers

Sharlene Kleine

Research Questions: What personal factors contribute to the work engagement of science teachers who choose to use inquiry-based teaching methods? What professional factors contribute to the work engagement of science teachers who choose to use inquiry-based teaching methods?