EUROPEAN EDUCATIONAL RESEARCH ASSOCIATION

The Effect of 7E Learning Cycle Instruction on Elementary Science Students' Motivation and Learning Strategy Use

Author(s):Gülsüm GÖK (presenting), Semra Sungur Vural, Ceren Öztekin

Conference:ECER 2013, Creativity and Innovation in Educational Research

Network:27. Didactics - Learning and Teaching

Format:Paper

Session Information

27 SES 08 C, Students Attitudes and Motivations

Paper Session

Time:2013-09-12
09:00-10:30

Room:A-207

Chair:Brian Hudson

Contribution

The Effect of 7E Learning Cycle Instruction on Elementary Science Students' Motivation and Learning Strategy Use

Motivation and cognition are the key variables to foster science learning. This idea has been widely investigated and accepted on the literature. Learners' motivation is integrated with their learning by providing crucial effect on the quality of cognitive engagement in learning activities (Boekaerts, 2001; Pintrich & Schrauben, 1992; Pintrich, Marx & Boyle, 1993).

The instruction is important for promoting students motivation and cognitive strategy use in science classes (Sungur & Tekkaya, 2006). A student-centered learning environment in classrooms may increase student's motivation and strategic effort for understanding by encouraging active learning and engaging students intensely (McNall, 1997; Singh). One such constructivist instructional model is Learning Cycle (Karplus & Thier, 1967). The model was derived from Piaget's mental functioning model and includes seven phases, namely,; Elicit, Engagement, Exploration, Explanations, Elaboration, Evaluation and Extension. The phases comprise activities to elicit prior knowledge and misconceptions, gain students' attention, to let the students explore the concept and realize the insufficient explanations on their minds, to connect students' explanations with scientific clarification, to deepen students' understanding by alternative activities, to evaluate their conception, and finally to transfer the knowledge in new situations, respectively (Allen & Tanner, 2005; Eisenkraft, 2003; Settlage, 2000). The sequence of the phases effectively increase students' knowledge and learning motivation (Liu, Peng, Wu & Lin, 2009)

The first steps of the model may promote students' intrinsic goal orientation and task value through the strategies that create interest in the topic, captivate students' attention, encourage curiosity and recall their prior knowledge. Students' perception of their own progress by realization of deficiency on their knowledge during the exploration phase, reaching scientific explanations on the next phases and their self-awareness on learning at the evaluation phase preserve their self-efficacy and enhance their critical thinking skills (Shunk, 1991). Similarly, students' active participation on the process and facilitator role of teachers encourage self-regulation and interest in learning (Lowman, 1990) as well as learning strategy use. Discussion among students, like performed at explanation phase, is an effective technique to motivate all students (Klosterman & Gorman, 1990)

Considering the Learning Cycle environment, the underlying motivational constructs being examined by researchers include intrinsic and extrinsic goal orientation, self-efficacy, control of beliefs, task value, and test-anxiety. The learning strategies investigated at this study cover rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning and help seeking.

On the basis of findings of relevant research this study aimed at comparing the effectiveness of 7E Learning Cycle method and lecture-based instruction on elementary school students' motivational variables and learning strategies in a science unit known as human body systems. Human body systems were selected for implementation because of the reported difficulty to learn the subject with deficiencies on the relevant knowledge and misconceptions of students (Arnaudin & Mintzes, 1985; Prokop & Fancovicova, 2006). The abstract nature of the concept may result in these undesired results. However, 7E Learning Cycle may support the learning and motivation of students toward the concept.

Method

The subjects of the study were 185 sixth-grade students, attending six intact classes in an urban middle school. The sample included 94 boys and 91 girls, aged between 11 and 15 years. The majority of students came from a middle class background.
For the specified purpose, quasi-experimental design was conducted at the study. Two instructional methods were randomly assigned to intact classes of two different teachers. Each teacher had both 7E Learning Cycle classes and lecture-based classes. The concept taught by both methods was human body systems. Each students in Learning Cycle classes ($n = 95$) worked on hands-on and minds-on activities in a constructivist environment. Students in lecture-based classes ($n = 90$) received instruction based on teacher's explanations, discussions, and textbooks. The implementation process took about 8 months.
The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia & McKeachie,1991), was used to measure the students' motivational beliefs and learning strategy use. It is a 7-point Likert scale composed of 81 items. The test has 15 subscales which have the reliabilities ranged from 0.68 to 0.93. The test was implemented to both groups before and after treatment to investigate the effect of treatment on motivation and strategy use.

Expected Outcomes

MANOVA was used to assess the effect of treatment on students' motivation and learning strategy use. Students in the LC classes demonstrated higher scores on four of the motivational variables than students in the lecture based class; intrinsic goal orientation, extrinsic goal orientation, task value, and self-efficacy ($p < 0.05$). On the other hand, control of beliefs and test anxiety variables did not contribute a significant difference ($p > 0.05$). Similarly, students received Learning Cycle instructions reported significantly higher learning strategy use in science class for the following components; elaboration, critical thinking, self-regulation, time and study environment, and effort regulation ($p < 0.05$). However, no statistically significant differences were found with respect to students' rehearsal, organization, peer learning, and help seeking variables ($p > 0.05$).
The results of the study revealed that Learning Cycle method is an effective instructional strategy to promote students' important motivational beliefs such as goal orientation and self-regulation as well as cognitive strategies like elaboration, critical thinking and self-regulation. Considering the value of these variables on the learning, the present study suggests the use of the 7E Learning Cycle instruction to promote students motivation and learning strategy use.

References

Allen, D., & Tanner, K. (2005). Infusing active learning into the large-enrollment biology class: Seven strategies, from the simple to complex. Cell Biology Education, 4, 262-268.

Arnaudin, M. W., & Mintzes, J. J. (1985) Students' alternative conceptions of the human circulatory system: A cross age study. Science Education, 69, 721 – 733.

Boekaerts, M. (2001). Context sensitivity: activated motivational beliefs, current concerns and emotional arousal. In S. Volet, & S. Jarvela (Eds.), Motivation in learning context: Theoretical advances and methodological implications (pp. 17–31).

Amsterdam: Pergamon.

Eisenkraft, A. (2003). Expanding the 5E model. The Science Teacher, 70(6), 56-59.

Karplus, R., & Thier, H. (1967). A new look at elementary school science. Chicago: Rand-McNally.

Lowman, J. (1990). Promoting motivation and learning. College Teaching, 38(4), 136-139.

Pintrich, P. R., Marx, R. W., & Boyle, R. A. (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. Review of Educational Research, 63(2), 167-199.

Pintrich, P. R., & Schrauben, B. (1992). Student's motivational beliefs and their cognitive engagement in classroom academic tasks. In D. H. Schunk, & J. L. Meece (Eds.), Student perceptions in the classroom (pp. 149–184). Hillsdale: Lawrence Erlbaum.

Pintrich, P. R., Smith, D.A.F., Garcia, T., & McKeachie, W. J. (1991). A Manual for the use of Motivated Strategies for Learning Questionnaire (MSLQ). Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning., The University of Michigan.

Schunk, D. H. (1991). Self-efficacy and academic motivation. Educational Psychologist, 26(3 & 4), 207-231.

Settlage, J. (2000). Understanding the learning cycle: Influences on abilities to embrace the approach by preservice elementary school teachers. Science Teacher Education, 84(1), 43-50.

Sungur, S, & Tekkaya, C (2006). Effects of problem-based learning and traditional instruction on self-regulated learning. The Journal of Educational Research. 99, 307-317.

This proposal is part of a master or doctoral thesis.

Author Information

Gülsüm GÖK (presenting)
Erciyes University
Elementary Education
ANKARA

Semra Sungur Vural
Middle East Technical University, Turkey

Ceren Öztekin
Middle East Technical University, Turkey