

# Cycling Student-Centered Digital Materials as Model of Enhancing Active Learning Environment

Hussein ZANATY\* and Toshio EISAKA

*Department of Computer Science, Kitami Institute of Technology, JAPAN*

\*D1271300032@std.kitami-it.ac.jp

**Abstract:** This paper provides Cycling Student-Centered Digital Materials (CSCDM) as a model of enhancing active learning environment. The paper introduces three learning phases, Form, In-form and Re-form (FIR) with the 6E model; Engagement, Exploration, Explanation, Elaboration, Evaluation, and Evolution as a learning guide for elementary students in Japan to enhance their motivation and relevance. The CSCDM is designed for twofold; a) to provide intrinsic motivation and learning contents for effective-active learning environment of language and cross culture awareness; and b) Task directions to serve as the learning guide to place student in role more on a long-life educator than on conventional classroom. Within this framework, authors applied the CSCDM design for 5th grade elementary students in an experimental group. The implementation of this study includes three phases; forming digital materials with student-centered engagement, in-forming groups' presentation and correction of languages used, and re-forming new learning contents based on international partner requested topic. Questionnaire in before and after form illustrated the results of CSCDM phases. The results showed a significant learning gain improvement for experimental group with CSCDM method than for control group without it.

**Keywords:** Cycling student-centered digital materials - active learning - Learning cycle - conventional constructional style

## 1. Introduction

A significant body of research on different learning strategies supports the effectiveness of learning approaches in increasing student learning and achievement. These learning strategies include student-centered learning (SCL) and learning cycle (LC). The researchers found that the SCL is a learning environment where students assume responsibility for both identifying and monitoring individual learning goals and selecting means to support their learning (Michael J. Hannafin, Janette R.Hill, Susan M. Land, and Eunbae Lee, 2014). Karplus and Thier (1967) developed the Learning Cycle in 1967 for the Science Curriculum Improvement Study (SCIS). This inquiry-based teaching approach is based on three distinct phases of instruction: 1) exploration provides students with firsthand experiences with science phenomena; 2) concept introduction allows students to build science ideas through interaction with peers, texts, and teachers; (3) concept application asks students to apply these science ideas to new situations or new problems. A popular version of the learning cycle is the 5E Model: Engagement, Exploration, Explanation, Elaboration, and Evaluation (Bybee, 1997). The LC can result in greater achievement in science, better retention of concepts, improved attitudes toward learning, improved reasoning ability, and superior process skills than would be the case with traditional instructional approaches (e.g., see Abraham & Renner, 1986; Beeth & Hewson, 1999;). However, in order for students to accomplish the learning strategies that lead to active learning environment in learning English and cross culture skills, they may need trainings and to learn subject through their own study. This is especially difficult to be utilized at elementary schools in Japan.

In order to strengthen an effective training and guide so that student would engage in new challengeable learning environment, the proposed Cycling Student-Centered Digital Materials (CSCDM) phases named Form, In-form and Re-form (FIR) conducted to enhance students' attainment of knowledge through participating and cycling approach in the 6E model. The FIR phases allowed students not only to engage in student-centered learning activity with teacher's positive interaction, but also to challenge new learning on their own pace and be more metacognitive. In this study, students had opportunity to interpret and re-form their creativity and insightful thinking process into new learning approach with international partner as following;

- The CSCDM processes are used to provide not only intrinsic motivation in science (Hanuscin & Lee, 2008), but also the instructional purpose for learning based on effective-active learning environment of language and cross culture awareness.
- Task directions are served as the learning guide to achieve higher learning outcomes for both summative and formative goal in order to place student in role more on a long-life educator than on conventional classroom.

To evaluate the effectiveness of using CSCDM 6E model to enhance active learning environment of English and cross culture awareness, two research questions are posed for pedagogical objectives;

1. What learning attitude will students develop via CSCDM 6E model?
2. What will students learn of language and culture both explicit and implicit in the CSCDM 6E model?

## 2. Methodology

Drawing on the active learning environment of learning cycle, this study demonstrates the 6E of CSCDM and its FIR phases in cross-culture classes at an elementary school in Kitami city in Japan. Thirty students participated. They formed 6 groups and engaged in cross-culture project. Then for each phase, they needed to develop their learning approach according to the task directions. The purpose of this paper is to describe how we developed and implemented the CSCDM three phases illustrated in 6E model in elementary cross-culture class. Though we present this approach from our perspective as educators, we also suggest directions for research regarding the impact of this model comparing with the 5E model presented by Bybee (1997). Figure 1. shows both LC and CSCDM approaches.

### Form phase

This Form phase is based on two concepts of instruction: (1) the *concept engagement*, which provides students with opportunity in engaging in student-centered active learning, connecting their past and present learning experiences, and being motivated in effective-active learning environment; (2) the *concept exploration*, which provides students with opportunity to investigate and develop their contents with different technology tools and solve problems. Each group was to interact and clarify their contents. By exposing these concepts, students were able to experience in variety of roles such as; innovators, self-developers, problem-solvers, co-thinkers, challengers, meaning-makers, and active producer.

### In-form phase

This In-form phase is based on two concepts of instruction: (1) the *concept explanation*, which allows students to compare idea with ideas of other group in an interactive learning environment. Teacher works on target mother-language sentences. The Assistant Language Teacher (ALT) checks target English sentences. This is the time in which the teacher connects students' knowledge to the target contents; (2) the *concept Elaboration*, which provides students with opportunity to extend their contents in cross-culture project. By exposing these concepts, students were able to expand their learning approach and their ability of English communication and cross-culture awareness.

### Re-form Phase

This Re-form phase is based on two concepts of instruction: (1) the *concept Evaluation*, which allows students to exchange feedback with international partner, learn new method, and evaluate their own contents; (2) the *concept Evolution*, which provides students with opportunity to re-form their strategy

based on international partner requested topic. The international partner requests new culture topic. This is the time in which new learning cycle task takes place. By exposing these concepts, students were able to reflect, and challenge in new learning situation on their pace. On the other hand, this study provided another sub-concepts as following;

1. it transforms learner's outcome from understanding materials (Sutherland, 1996) to developing and contributing learning material,
2. it transforms learner's engagement from cooperative learning (Johnson, Johnson, & Smith, 1991) to cooperative educator,
3. it assists elementary school teachers to improve student's co-thinking ability (Byrd, 2008) up to contents-developing ability.

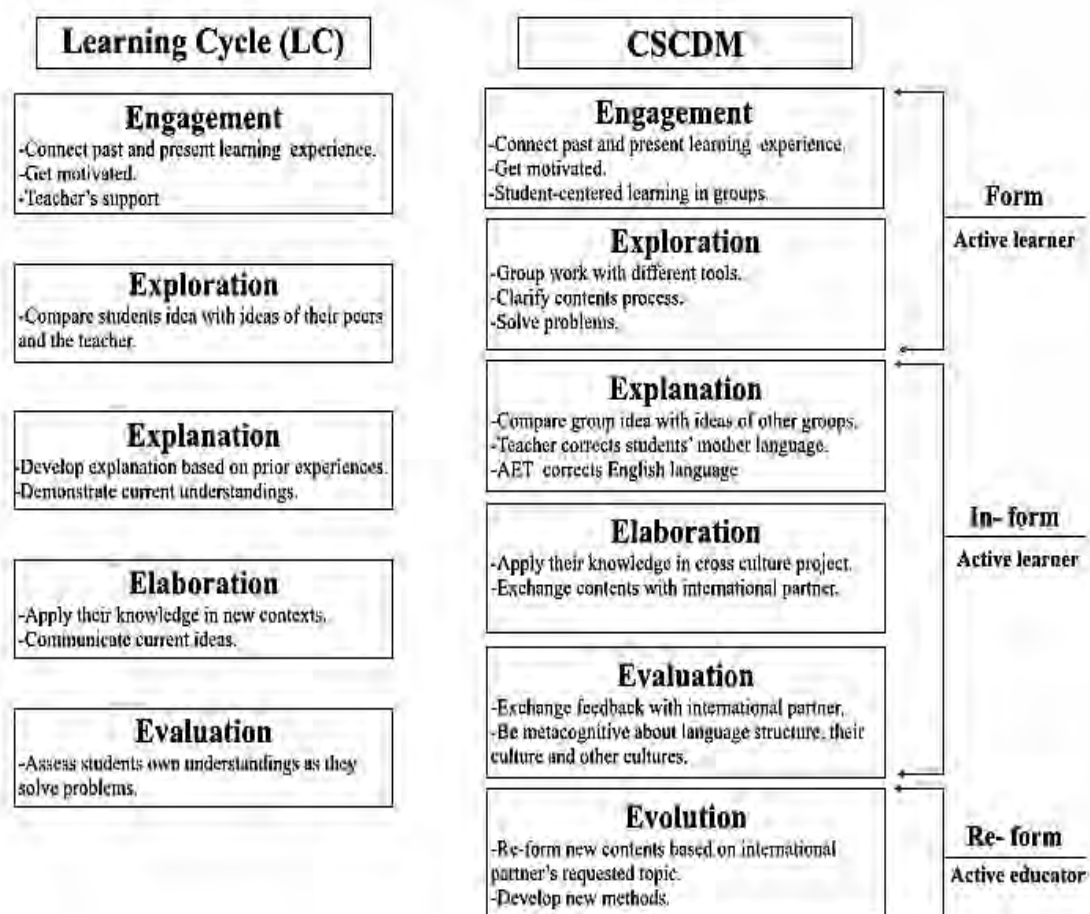


Figure 1. LC and CSCDM Approaches

### 3. FIR Instructional Implementation and its evaluation

The CSCDM and its FIR phases of 6E model experiment were utilized compared to the conventional teacher-centered teaching. The main participants in this study were 30 fifth-grade Japanese elementary students with the collaboration of two elementary teachers and the authors, the assistant language teacher (ALT) at the same school, in a rural area of Kitami city of Hokkaido prefecture, Japan. The same students explored two learning style as control group who explored conventional constructional style, and as experimental group divided into 6 groups with the FIR method. The students ranged in age from 10 to 11 years of age. There were 20(67%) males and 10 (33%) females in the class. The both (proposed and conventional) CSCDM study were conducted over a three-month period, twice a month according to the school curriculum in the year of 2013-2014. The implementation of the study designed in 6 classes in 45 minutes each in project work. Students engaged in creating digital materials on their culture and school life based on the CSCDM instructions. Students produced digital learning materials

to be displayed at the school library and engaged in additional activities in which they apply their formed experiences to new learning form. The new learning form used in new cycle learning approach. From student questionnaire result, we note that, respondents said that the FIR process is effective to be implemented at school (66.6% respondents). In term of motivation, respondents of (53.3%) agree that the FIR motivated them to achieve their learning goal. See figure 8. Almost (70%) respondents agree that they could work in their pace with FIR than traditional class. In term of multimedia tools, (53.4%) agree that FIR provided variety of learning tools in order to develop their content. In term of engagement, (66.8%) respondents agree that they engaged full time in process. Also (66.7%) respondents agree that they enjoyed the FIR class. In order to confirm the former result, (73.4%) respondents disagree on the statement of “*I did not enjoy FIR class*”. Another two statements were investigated on which style do students admire. The first statement of “*I like traditional class better than FIR class*” (30%) respondents agree, (43%) disagree and (26.7%) respondents said “*I don know*”. The second statement of “*I prefer FIR style more than traditional class*” (36.8%) agree, (30%) disagree and (33.4%) said “*I don know*”.

#### 4. Conclusion

CSCDM and its FIR phases of 6E model manage and guide several learning activities, such as: developing approaches, strategy-maker, monitoring process, community educator. Among the advantages that the student also gets the followings:

- Gradual achievement of the contents subject and progressive development of the individual and group learning approach.
- Gradual progress in learning approaches and the significant transformation from knowledge-receiver to educator.
- Gradual progress in learning skills such as strategy-maker and active-distributed learner.
- Gradual progress in interactive learning style through communicative activity, self-engagement activity and innovative activity
- Gradual progress in conceptual and cognitive learning outcomes through positive learning environment and developing learning concepts for better learning assessment.

#### References

- Abraham, M. R., & Renner, J. W. (1986). The sequence of learning cycle activities in high school chemistry. *Journal of Research in Science Teaching*, 23(2), 121-143.
- Beeth, M. E., & Hewson, P. W. (1999). Learning goals in exemplary science teacher's practice. *Science Education*, 83(6), 738-760.
- Bybee, R. W. (1997). *Achieving scientific literacy: From purposes to practices*. Portsmouth, NH: Heinemann.
- Hammer, P. C., & Hixson, N. (2013). Evaluation of the Student-Centered Arts- Learning Environments (SCALE) Project: 2013 report. Charleston, WV: West Virginia Department of Education, Division of Teaching and Learning, Office of Research.
- Hanuscin & Lee. (2008). Using the Learning Cycle as a model for Teaching the Learning Cycle to Preservice Elementary Teachers; *Journal of Elementary Science Education*, Vol.20, No.2, pp. 51-66.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (1991). *Active Learning: Cooperation in the College Classroom*. Edina, MN: Interaction Book Company.
- Karplus, R., & Thier, H. D. (1967). *A new look at elementary school science*. Chicago: Rand McNally.
- McComas, W. F., III. (1992). The nature of exemplary practice in secondary school science laboratory instruction: A case study approach (Doctoral dissertation, University of Iowa, 1991). *Dissertation Abstracts International*, 52(12), 4284A.
- Michael J. Hannafin, Janette R. Hill, Susan M. Land, Eunbae Lee (2014). Student-Centered, Open Learning Environments: Research, Theory, and Practice, *Handbook of Research on Educational Communications and Technology*, pp 641-651
- Sutherland, T.E. & Bonwell, C.C. (1996). Using active learning in college classes: a range of options for faculty, *New Directions for Teaching and Learning*, Number 67. Jossey-Bass: San Francisco, California.
- Suzanne Goodney Lea & Jack Byrd, Jr. (2008) *Guidebook for Student-Centered Classroom Discussions*, IF... Interactivity Foundation. 1st. ed. Section One. P. 6