

**A DEVELOPMENT OF A NON-FORMAL  
EDUCATION PROGRAM TO ENHANCE THE  
COOPERATION IN MATHEMATICS LEARNING  
BASED ON COOPERATIVE LEARNING  
CONCEPT AND CONSTRUCTIVIST THEORY  
FOR NON-FORMAL EDUCATION STUDENTS IN  
BANGKOK METROPOLIS**

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**Abstract:** This study employed the Cooperative Learning Concept and Constructivist Theory to develop a Non-formal Education Program to Enhance the Cooperation in Mathematics learning. The purposes of the research were to 1) develop a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis; 2) experiment a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis; and 3) study the opinions and factors related to the implementation of the developed a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis. This study was based on the Research and Development in which the samples were twenty-two non-formal education students in the Latphrao District Non-formal and Informal Education Center. The *one* group pretest-posttest design i.e. single group experiment design was applied in this study. The program implementation lasted thirteen weeks and the total activities lasted one hundred hours.

**Keywords:** Cooperative Learning Concept, Constructivist Theory, Non-formal Education Program, Mathematics Learning

**Statement of the Problems**

The mathematics learning achievements of the non-formal students have been low as a result of the old learning approach depended on the teachers as the instructor of the course. Also, the learning materials are not sufficient for students to develop their self-study skills. Moreover, the classroom atmosphere is not supportive, therefore the students become independent from each other and lack of cooperation, knowledge sharing and practices of appropriate thinking skills. In this regard, the researcher would like to

study the Cooperative Learning Concept in order to develop a Non-formal Education Program. In terms of conceptual framework, the researcher have applied the Development of a Non-formal Education Program of Holton (2005), developed from the Development of Adult Education of Knowles (1984). The selected framework is composed of suitable processes for a Non-formal Education Program to enhance the cooperation in mathematics learning according to the Cooperative Learning Concept. Firstly, there is the preparation for students before learning to encourage learning confidence. Then, it is to create supportive learning atmosphere which would motivate more students' attention to the lessons. Finally, the initiation of mechanisms for cooperation by assigning students specific roles in working on learning plans together would make learning process smoother and more effective. Accordingly, the researcher have applied the Cooperative Learning Concept as a tool to identify the mathematics teaching process; as it could influence both students and teachers to effectively perform their own duties. In addition, applying this concept would help to bring out the student's self-competencies for the best implementation towards oneself and the group. In order to build self-competencies of students, the researcher has applied the Constructivist Theory focusing on the integration of background knowledge and new concepts gained from self-studying via multimedia or brainstorming among the group. The brainstorming approach including discussions, demonstrations or mathematics activities supporting cooperative learning and constructivist concept would lead students to adjust the knowledge gained into their own concept. Students could also gain mathematics skills according to the objectives of learning. Moreover, they would be able to construct their own knowledge. Applying the group learning approach would create the efficiency and effectiveness of learning. Therefore it would be a guideline for a development of a Non-formal Education Program to enhance the mathematical and analytical skills in mathematics learning. As a result, the learning achievement would be improved and the positive attitudes towards mathematics learning would also be developed. Finally, it could be useful for further development of learning program for a non-formal education focusing on mathematics learning which is the significant foundation for studying other sciences in the future.

**Research Objectives**

1. To develop a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.
2. To experiment a Non-formal Education Program

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to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.

3. To study the opinions and factors related to the implementation of the developed a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.

### Research Hypothesis

1. After the participation in A Non-formal Education Program to Enhance The Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis developed by the researcher, the non-formal education students in Bangkok Metropolis, who participated, would get higher achievement in post-test than in pre-test at the significant level of .05.

2. After the participation in A Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis developed by the researcher, the non-formal education students in Bangkok Metropolis, who participated, would pass the formative evaluation according to mathematics learning indicators.

3. After the participation in a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis developed by the researcher, the non-formal education students in Bangkok Metropolis, who participated, would pass the formative evaluation according to the cooperative learning indicators.

### Research Methodology

The research entitled "A Development of a Non-formal Education Program to Enhance the Cooperation in Mathematics learning Based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis" is conducted according to the research and development approach composed of 3 phases which are:

**Phase 1** Developing a Non-formal Education Program to Enhance the Cooperation in Mathematics learning Based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis. The research methodology has been divided into 2 steps:

**Step 1:** Studying input factors which are:

- 1) The concepts of the *development* of Non-formal Education Program
- 2) The concepts of Cooperative Learning
- 3) The Constructivist Theory

**Step 2:** Developing a Non-formal Education Program

to Enhance the Cooperation in Mathematics learning Based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.

**Phase 2** Experimenting a Non-formal Education Program to Enhance the Cooperation in Mathematics learning Based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.

**Phase 3** Studying the concerned factors affecting the implementation of the developed a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis.

### Research Results

The research results have been divided into 3 parts according to the expected outcomes which are:

1. The cooperative and constructivist activity processes of a Non-formal Education Program to Enhance the Cooperation in Mathematics learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis included the following 8 stages:

- 1) Preparation of knowledge about cooperative learning for students.
- 2) Initiation of learning atmosphere.
- 3) Construction of mechanisms for cooperation in working on learning plans together.
- 4) Investigation of learning needs.
- 5) Identification of the program's learning objectives.
- 6) Design of the program's learning activities composed of processes of cooperative learning;
  - 6.1 Preparation of knowledge about basic skill in mathematics.
  - 6.2 Introduction to lessons and instructions.
  - 6.3 Cooperative for construction of proficiency.
  - 6.4 Cooperative conclusion of the lessons learned.
  - 6.5 Presentation of gained knowledge individually.
- 7) Implementation of the education program.
- 8) Evaluation of the learning program.

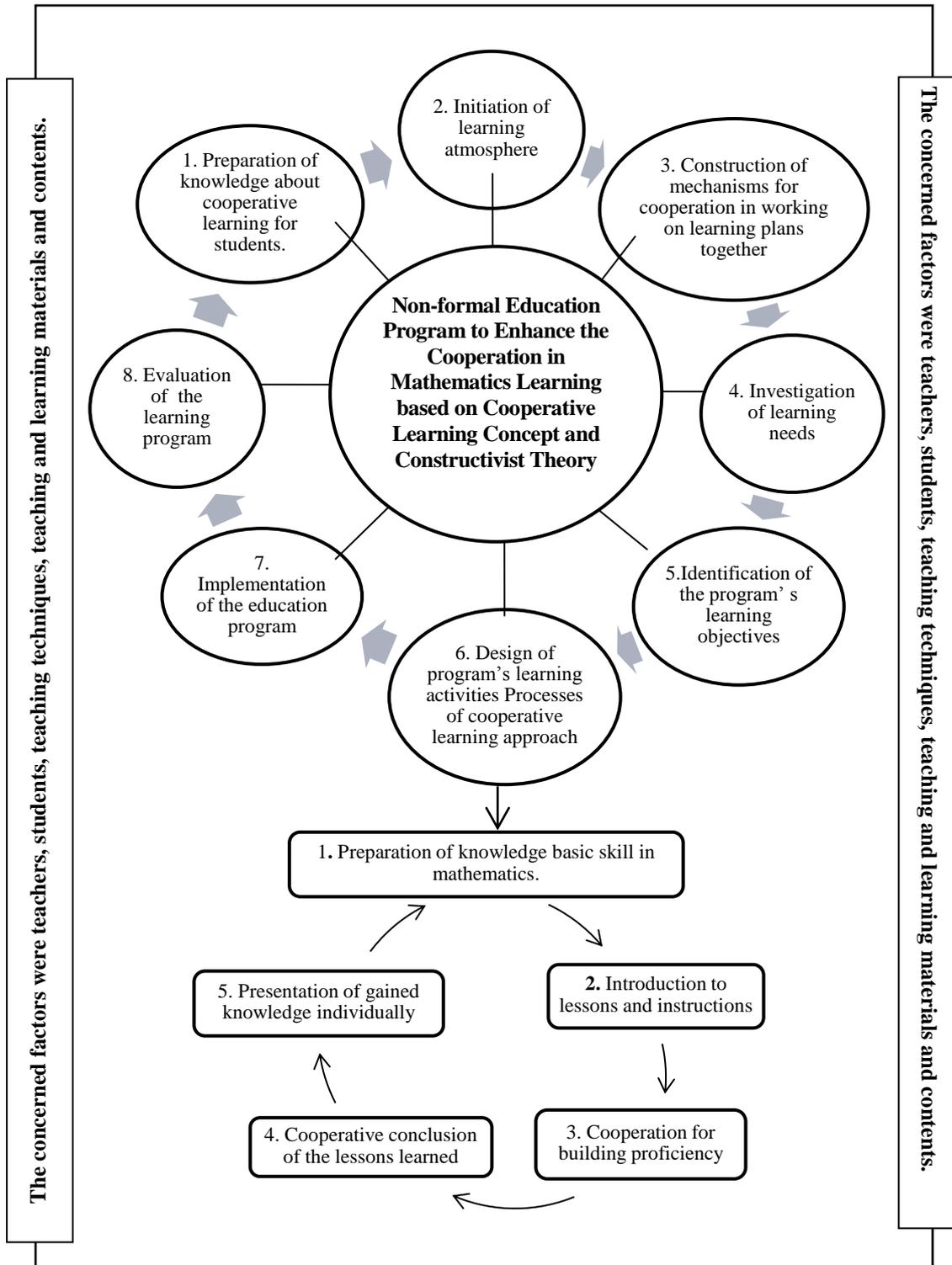
2. The results of the experiment indicated that

2.1) the students' post-test average achievement scores after their participation in the Non-formal Education Program were reported to be higher than their pre-test ones at the significant level of .05.

2.2) the results of the evaluation of the cooperative mathematics learning skills, calculating skills and individual mathematics learning from the cooperative mathematics learning revealed that the students passed the evaluation criteria at 70%.

2.3) the overall evaluation of the learning process was reported to be at the very good level.

3. The opinions and factors related to the implementation of the developed program including teachers, students, teaching techniques, teaching and learning materials and contents were to be considered.



**Figure 1: A Non-formal Education Program to Enhance the Cooperation in Mathematics Learning based on Cooperative Learning Concept and Constructivist Theory for Non-formal Education Students in Bangkok Metropolis**

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