Effects of Positive Reinforcement by Token Economy on In-class Responsibility Behavior Development of Pre-service Teachers

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Abstract: *This research was aimed 1) to study the effects of positive reinforcement by token economy on responsibility behavior in classrooms and 2) to compare the responsibility behavior in classrooms before and after the implementation of the positive reinforcement by token economy. The comparison was referred to the criteria of 80 %. The participants were pre-service teachers enrolled in the History and Development of Mathematics Course in the first semester of the 2021 academic year. The participants were obtained thought purposive sampling. The instruments for data collection included a self-responsibility evaluation form and a self-reflection form. The main statistics for data analysis included mean, standard deviation, and percentage. The findings of the research revealed the following. 1. The positive reinforcement by means of token economy to affect the responsibility behavior in classrooms came in the forms of class participation points and compliments. 2. The responsibility behavior in classrooms of the participants after the positive reinforcement by means of token economy was greater when compared to the criteria of 80 %.*

Keywords: *Pre-service Teachers, Responsibility Behavior, Token Economy.*

I. INTRODUCTION

The development of competency-focused curricula is based on key principles as stipulated in the National Scheme of Education B.E. 2560-2579 (2017-2036) (Office of the Education Council, 2016). The scheme specifies guidelines for competency-focused curricula development to provide human resources with skills, knowledge, abilities, and competencies through testing systems, and measurement and assessment of learning outcomes to enhance qualifications to meet labor market requirements. Teaching and learning management of educational institutions must be linked to the labor market through curriculum development, teaching management, and measurement and evaluation. This kind of connection can be achieved through cooperation between educational institutions and workplaces. According to the Second 15-year Long Range Plan on Higher Education (2008-2022), by the end of the plan, the mathematics teaching and learning for student teachers shall enhance competency in various fields and can be used to practice professional experience during study. In addition, student teachers must be equipped with essential skills and techniques for teaching mathematics.

The researcher has been studying various teaching methods in order to find a solution to problems concerning students' irresponsible behavior in classrooms. Literature review indicates that mathematics teaching with positive reinforcement by token economy yields effects on disciplinary behavior in classroom. It enables students to improve disciplinary behavior. Positive reinforcement is appropriate for solving short-term teaching problems. It also helps students to build positive attitudes towards mathematics, leading to better learning achievements (Sumetpunyo, 2018). It is important to instill discipline in students when teaching in the classroom. Discipline is the ability to control oneself or other people. Teachers should be aware of discipline as much as teaching methods. It is not easy for teachers to make students achieve self-discipline. One of the major obstacles in teaching them to achieve self-discipline is their responsibility in the classroom. of the students. Self-discipline can only be achieved when it is taught, trained, learned, and practiced. In the classroom, teacher-

student agreements must be established and clarified. Agreements must be accepted by all the students; for instance, no teasing, no talking, no using cell phones, no doing homework of other subjects, or no beautifying. A good solution to student behaviors is positive reinforcement by token economy (Noppornchrenkul & Adulkasem, 2018). Iawcharoen (2018) adds some examples of positive reinforcement such as giving compliments, giving homemade items (paper worms, paper butterflies) and purchased items (cartoon pens, pencils, erasers, snacks).

It is, therefore, worth doing this research on effects of positive reinforcement by token economy on in-class responsibility behavior development of second year pre-service teachers in History and Development of Mathematics Course, Faculty of Education, Roi Et Rajabhat University, Thailand.

II. CONCEPTUAL FRAMEWORK

The conceptual framework in this research is based on the action research cycle of PAOR originated by Kemmis and McTaggart (1998). The independent variable was the positive reinforcement by token economy whereas the dependent variable was the in-class responsibility behavior of the second-year pre-service teachers. The cycle of the action research is presented in Figure 1.
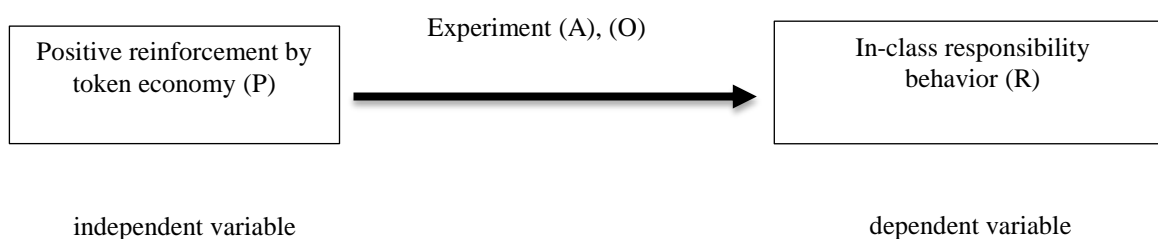
Experiment (A), (O)

| Positive reinforcement by token economy (P) | → | In-class responsibility behavior (R) |

independent variable   dependent variable

Figure 1. Conceptual framework based on the action research cycle of PAOR

III. RESEARCH OBJECTIVES

3.1 To study effects of positive reinforcement by token economy on in-class responsibility behavior.
3.2 To compare the in-class responsibility behavior before and after implementing the positive reinforcement by token economy referred to the criteria of 80 %.

IV. RESEARCH METHODOLOGY

4.1 Research design

The research design was action research. The methodology was based on the PAOR cycle originated by Kemmis and McTaggart (1998). The cycle is consisted of 4 stages; planning, acting, observing, and reflecting.

4.2 Sample group

The samples of the research included 55 second-year students of the Mathematics Program enrolled in History and Development of Mathematics Course in the second semester of the academic year 2021. The samples were obtained through purposive sampling.

4.3 Instruments

The instruments for data collection included a self-responsibility evaluation form and a self-reflection form.

4.4 Data collection

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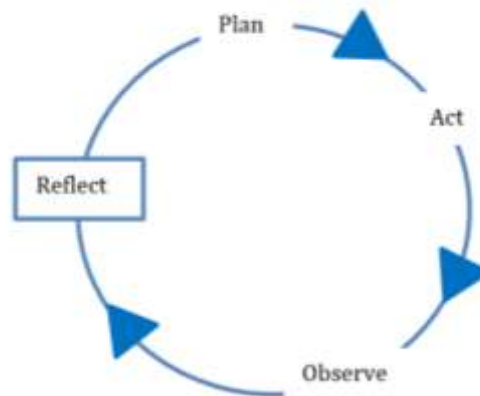

Figure 2. PAOR cycle originated by Kemmis and McTaggart (1998)

Data collection procedure was also divided into 4 stages which are explained in detail below.

Stage 1 Planning

1. The problems and needs of the target students were examined to identify possible solutions. In the examination, an interview, an analysis, and a synthesis were conducted and a scoring criterion was analyzed.

 2. Documentary research was conducted. Concepts and theories related to the positive reinforcement by token economy affecting in-class responsibility behavior were investigated. The findings were incorporated into learning activity planning.

3. The instruments for data collection were constructed.

Stage 2 Acting

The action research was conducted in 2 cycles. Cycle 1 was 6 hours long with a lesson on the history of mathematicians. Cycle 2 was 6 hours long with a lesson on the development of mathematics.

Stage 3 Observing

The students' in-class responsibility behaviors were observed in the 2 cycles. The researcher observed the process of practices and recorded the results of the practices using data collection techniques.

Stage 4 Reflecting

The process of practices was evaluated or examined. Problems obtained from the observing stage were solved. Finally, problems on in-class disciplines of the students were summarized. Guidelines to solving in-class responsibility behaviors in the action cycles were identified.
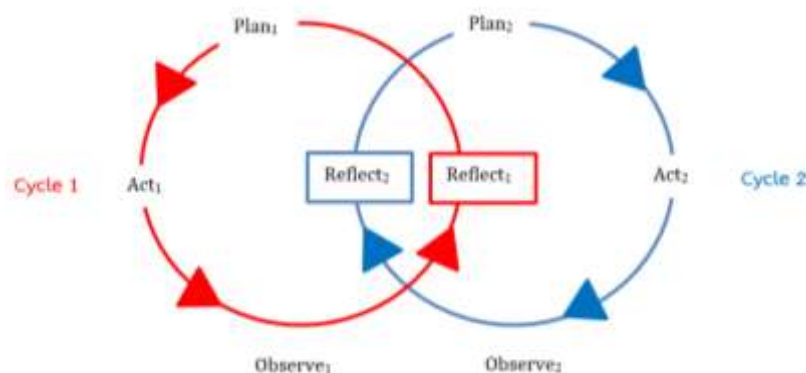

Figure 3. The action research cycles of PAOR

4.5 Data analysis

In this research, the following analyses were done.

1.The appropriateness of the learning management plan and the consistency of the students' self-reflection form were analyzed with mean and standard deviation.

2. The self-responsibility evaluation form was analyzed with the IOC (Index of item objective congruence). The form was consisted of 30 items. The results of the analysis showed that the IOC of the 30 items ranged from 0.67 to 1.00. This indicated that the 30 items were applicable.

3.The students' in-class responsibility behaviors before and after the experiment were compared as a whole and separately. The results of the comparison were displayed in bar charts.

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V.　　　FINDINGS

The objectives of this research were 1) to study the effects of positive reinforcement by token economy on responsibility behaviors in classrooms and 2) to compare the responsibility behaviors in classrooms before and after the implementation of the positive reinforcement by token economy. The comparison was referred to the criteria of 80 %. The research findings are presented in 2 parts as follows.

5.1　　Part 1 The study of the effects of positive reinforcement by token economy on responsibility behaviors in classrooms

An interview among the target students was conducted to investigate their opinions before taking History and Development of Mathematics Course in the first semester of the academic year 2021. The interview revealed that the use of token economy would improve in-class responsibility. Next, the second-year Mathematics students' behaviors were observed in the same semester. In this semester, the class was available both online and onsite. For the online class, it was found that the students muted their cameras and lacked interaction with the teacher and the peers. As a consequence, they misunderstood the assignments and submitted wrong works. The findings from the self-responsibility evaluation form are presented in Table 1.

Table 1. The appropriateness of the learning management plan for in-class responsibility behavior development by positive reinforcement through token economy

List of evaluation	$\overline{X}$	S.D.	Levels of appropriateness
Core content			
1. Consistency	5.00	.000	Highest
2. Validity	4.67	.577	Highest
3. Clarity and comprehensibility	4.33	.577	High
Learning objectives			
4. Consistency with course description	4.67	.577	Highest
5. Coverage of student behavioral traits	4.33	1.155	High
6. Identification of target behaviors for development	5.00	.00	Highest
Lesson content			
7. Consistency with learning objectives	4.67	.577	Highest
8. Correctness	4.33	.577	High
9. Consistency with the curriculum (Revised curriculum of 2019)	4.67	.577	Highest
Learning activities			
10. Consistency with learning objectives and course description	4.33	1.155	High
11. Appropriateness for age and maturity	5.00	.00	Highest
12. Appropriateness for time period	4.67	.577	Highest
13. Student-centeredness	3.67	.577	High
Learning materials			
14. Consistency with learning activities	4.00	1.00	High
15. Consistency with student ability	4.33	.577	High
Token economy			
16. Consistency with student ability	4.67	.577	Highest
17. Interestingness	4.67	.577	Highest
Measurement and evaluation			
18. Consistency with learning objectives	4.67	.577	Highest
19. Clarity of measurement and evaluation criteria	4.33	.577	High
20. Appropriateness	4.33	.577	High
Average	4.52	.570	Highest

The analysis of the appropriateness was done by 3 experts. Table 1 reveals that the average level of the appropriateness of the learning management plan for in-class responsibility behavior development by positive reinforcement is at the highest level (X = 4.52, S.D. = .570).

5.2   Part 2 The comparison of the responsibility behaviors in classrooms before and after the implementation of the positive reinforcement by token economy referred to the criteria of 80%.

The findings from the 2 action research cycles of PAOR are presented as follows:
Cycle 1
Teaching and learning activities of the lesson on the history of mathematicians were carried out. Then, the students completed the self-responsibility evaluation form after class.
Cycle 2
Likewise, teaching and learning activities of the lesson on the development of Mathematics were practiced. The students completed the self-responsibility evaluation form afterwards.
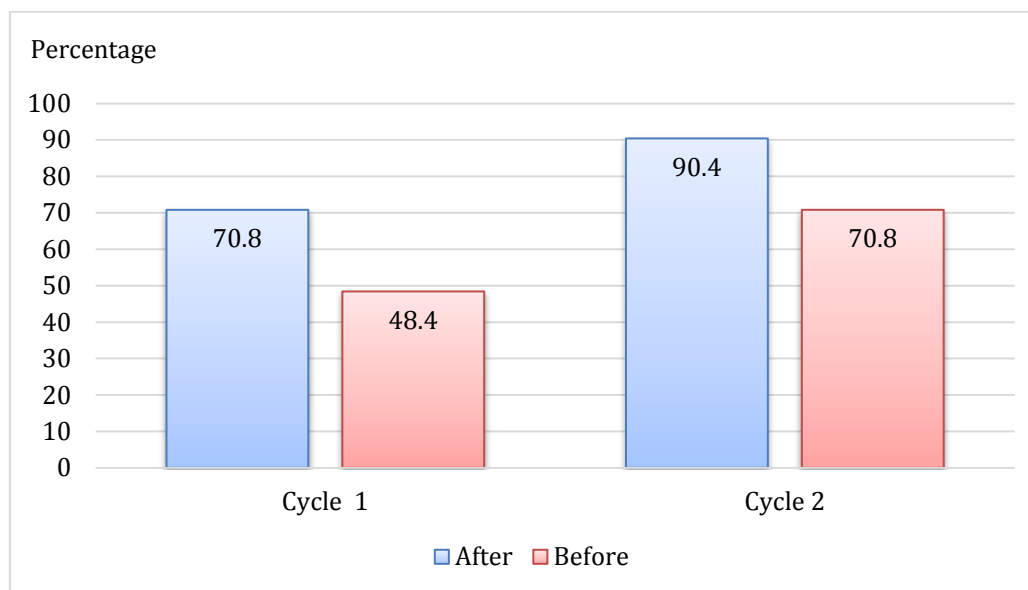
Figure 4. Comparison of means of the responsibility behaviors before and after
the implementation of the positive reinforcement by token economy in the 2 cycles

Figure 4 indicates that the means of the responsibility behaviors after the implementation of the positive reinforcement by token economy improved in the 2 cycles. The result in cycle 2 was higher than that in cycle 1.

VI.   CONCLUSIONS

The conclusions of the findings are based on the objectives of the research; 1) to study the effects of positive reinforcement by token economy on responsibility behaviors in classrooms and 2) to compare the responsibility behaviors in classrooms before and after the implementation of the positive reinforcement by token economy. The conclusions are presented as follows:

6.1 The preliminary interview revealed that the use of token economy would improve in-class responsibility behaviors. After that, the positive reinforcement by token economy was implemented into the classroom. The students completed the self-responsibility evaluation form after class. As a result, the responsibility behaviors after the implementation of the positive reinforcement by token economy improved in the 2 cycles. The token economy affecting the in-class responsibility behaviors most was giving points in addition to the planned measurement and evaluation criteria.

6.2 The overall in-class responsibility behaviors improved after the implementation of the positive reinforcement referred to the criteria of 80 %.

VII.   DISCUSSIONS

The discussions of the findings are also based on the objectives of the research; 1) to study the effects of positive reinforcement by token economy on responsibility behaviors in classrooms and 2) to compare the responsibility behaviors in classrooms before and after the implementation of the positive reinforcement by token economy. The discussions are presented as follows:

7.1 According to the positive reinforcement by token economy to improve the in-class responsibility behaviors, giving points in addition to the planned measurement and evaluation criteria was the most effective token economy. The students showed the highest level of opinions on this token economy. This might be due to the fact that the students became more enthusiastic to the teaching and learning activities when they would gain

addition points. Receiving more points would result in higher achievements. This finding is consistent with Sumetpunyo (2018) who conducted a study on the reinforcement by token economy to improve student disciplines in a history subject. Chocolate desserts are given as rewards to make student disciplines in the class. It was found that the overall disciplines were rated at a high level because chocolate was their favorite. The finding of the present research also accorded with Iawcharoen (2018) who studied the use of token economy to reduce aggressive behaviors of autistic children. Cute cartoon pen were the main objects to keep them disciplinary. The use of token economy was rated at a moderate level as the cute cartoon pen did not reinforce the autistic children much. They were not attractive, but still somehow effective to reduce aggressive behaviors. The present study was also in accordance with Ruang-on (2017) who conducted a study on the effects of positive reinforcement by token economy on the responsibility behaviors towards assignments among vocational certificate students.

7.2 The overall in-class responsibility behaviors improved after the implementation of the positive reinforcement referred to the criteria of 80 %. The means of the responsibility behaviors after the implementation of the positive reinforcement by token economy improved in the 2 cycles based on Kemmis and McTaggart (1998). The results in the 2 cycles are discussed as follows:

Cycle 1: The lesson on the history of mathematicians
In reference to the criteria of 80 %, the means of the responsibility behaviors before and after the implementation were 48.40 and 70.80 respectively. However, these means did not pass the 80% criteria because the token economy was not interesting enough to catch the students' attention. As a result, the in-class responsibility behaviors did not improve as expected. The results in this cycle were taken into consideration for further development in cycle 2.

Cycle 2: The lesson on the development of mathematics
In this cycle, the means of the responsibility behaviors before and after the implementation were 70.80 and 90.40 respectively. These means passed the 80% criteria because the token economy was interesting enough to catch the students' attention. As a consequence, the in-class responsibility behaviors improved as expected.

VIII. RECOMMENDATIONS
8.1 Recommendations for implementation

8.1.1 Positive reinforcement by token economy on responsibility behaviors in classrooms is applicable to students of all levels. Further implementation is recommended.

8.1.2 For online classrooms, effective positive reinforcement by token economy is possible if teachers and students agree on scoring criteria and classroom rules.

8.2 Recommendations for further research

8.2.1 Positive reinforcement through a variety of methods is highly recommended.

8.2.2 Various teaching techniques for the online class should be investigated In order to positively reinforce and promote responsibility behaviors.

IX. ACKNOWLEDGEMENT

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