

Qin Wei. (2024). Development of Small Private Online Course (SPOC) on Elementary Number Theory Course Based on Constructivism Theory to Enhance Mathematics Logical Reasoning Ability for First Year Students of Xi'an University. Doctor of Philosophy (Curriculum and Instruction). Advisors: Assoc. Prof. Dr. Suwana Juithong, Dr. Wassarprn Jirojphan, Dr. Pimlak Moonpo

ABSTRACT

This research and development research aimed to 1) study the background information of Small Private Online Course (SPOC) on Elementary Number Theory Course to enhance mathematics logical reasoning ability, 2) develop Small Private Online Course (SPOC) on Elementary Number Theory Course based on Constructivism Theory to enhance mathematics Logical Reasoning Ability, and 3) study the result of implementing Small Private Online Course (SPOC) on Elementary Number Theory Course based on Constructivism Theory to enhance mathematics logical reasoning ability. The sample was a class of 40 of the first-year students, majoring in mathematics in Xi'an University, the People's Republic of China. They were derived by cluster random sampling. The instruments used in this research were 1) the SPOC course, 2) lesson plans, 3) the mathematics logical reasoning ability test with .78 of reliability, and 4) students' satisfaction questionnaire with .83 of reliability. The statistics used to analyze data included mean, standard deviation, and t-test for dependent samples.

The research results showed as follows: 1) The background information of the Elementary Number Theory Course and its current problems were principles, objectives, content, instructional strategy, media and resources, evaluation; 2) The SPOC Course was consisted of six components, namely (1) principles, (2) objectives, (3) content, (4) instructional strategy consisted of five steps which were namely Step1: Task Design, Step2 : Complex Environment Design, Step3: Autonomous Problem Solving, Step4: Thinking Stimulation, and Step5: Testing and Reflection, (5) media and resource, and (6) evaluation; And 3) the results of implementation of Small Private Online Course (SPOC) on Elementary Number Theory Course based on Constructivism Theory found that after learning through Small Private Online Course (SPOC) on Elementary Number Theory Course based on Constructivism Theory, the mathematics logical reasoning ability of students ($M = 22.55$, $SD = 4.92$) was higher than before learning ($M = 19.48$, $SD = 4.40$) with the statistical significance of .05 level, (3.2) the students' satisfaction toward mathematical modeling course was at a high level ($M = 4.58$, $SD = .52$).

The innovation of this study is Small Private Online Course (SPOC) on Elementary Number Theory Course based on Constructivism Theory to enhance students' mathematical logical reasoning ability. The teaching steps are divided into 3 phases. In phase 1, which is before class, students participate in designing work and studying content that the teacher has set. In phase 2, which is during the class, the researcher organizes teaching and learning activities which includes teaching media and exercises for students to solve problems independently and develops students' logical thinking abilities. In phase 3, which takes place after class, students complete the test and reflections. This Small Private Online Course develops effective mathematical reasoning.

Keywords: Elementary Number Theory Course, Small Private Online Course (SPOC), Constructivism Theory, Mathematics Logical Reasoning Ability

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