Innovative Computational Thinking for Teachers to Elevate Competency-Based Education Management to Develop Students' Skills for the Future

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ABSTRACT

Early childhood and primary education are crucial for developing higher-order thinking skills like computational thinking, essential for lifelong learning and innovation. Countries like Finland, Singapore, and South Korea have integrated computational thinking (CT) into curricula, but challenges remain in developing countries like Thailand, due to limited resources, teacher training, and localized process models. This research aimed to 1) develop a learning experience process model for enhancing computational thinking skills among early childhood students through creative innovation projects with institutional participation, and 2) develop a learning activity process model for computational thinking skills among elementary students toward innovation and technology projects based on participatory competency-based curricula. The research sample included 30 kindergarten students (grades 2-3) from Wat Chan School, and 31 students are from Wat Bamphen Bun School ,83 primary students (grades 1-6) from Wat Chan School and 106 students are from Wat Bamphen Bun School. The study employed a participatory action research methodology. Data was collected through pre- and post-tests, expert evaluations, observations, and reflection meetings, analyzed using paired-sample t-tests and thematic analysis for insights into learner engagement, creativity, and innovation quality.

The findings revealed that 1) implementation of the learning experience process model for developing computational thinking skills in early childhood students through creative innovation projects showed statistically significant improvement in post-test scores compared to pre-test scores at the .05 level. Creative innovation assessments for all kindergarten levels achieved "very good" ratings 2) the quality assessment of learning activity process components

for promoting computational thinking skills among elementary students toward innovation and technology projects based on competency-based curricula reached the "highest" quality level. Academic achievement comparisons between pre- and post-learning assessments for grades 1-6 students showed statistically significant improvement in post-test scores at the .05 level across all grade levels in both schools. Computational thinking skills assessment for elementary students demonstrated statistically significant improvement in average academic achievement from pre- to post-learning at the .05 level across both schools and all grade levels.

Keywords: Computational Thinking, Competency-Based Education, Participatory Action Research, Early Childhood Education, Primary Education