

## Application of Ubiquitous Problem-based Cooperative Inquiry-learning Model on Ocean Education in Taiwan

\*Hsin-Chih Lai<sup>1</sup>, Tsung-Hsun Wu<sup>3</sup>, Tzu-Min Chen<sup>1</sup>, Chien-Chih Wang<sup>2</sup>

1.Department of Engineering and Management of Advanced Technology, Chang Jung Christian University, Taiwan, 2.Graduate School of Business and Operations Management, Chang Jung Christian University, Taiwan, 3.Tainan Municipal Cingcao Elementary School, Tainan, Taiwan

Taiwan is an island located in the transition zone between Asian Continent with Pacific Ocean, it is very important to educate the people who lives in this island with oceanic culture and worldwide viewpoint. In addition, people needs to recognize and protect the ocean to develop the sustainable island, that means every citizen should have well-educated ocean literacy. To enhance the ocean literacy in education processes during the e-learning generation, using information and communication technology (ICT) to improve learners experience and learning outcomes is the most important trend. In particular, how to connect ICT with Inquiry learning is the key issue in completing students' self-leaning ocean literacy. This study using Ubiquitous Problem-based Cooperative Inquiry-learning model (UPCIM, Hung, Hwang, Lee & Wu,2011) to design a self-learning ocean education course, based on collaboration learning and scaffold system to guide students in learning the ocean knowledge step by step by themselves. During the learning processes, the scientific questions could be formed from self-interested question to answerable one. Besides, through the using mobile learning devices and wireless network environment, students can collect the ocean related contents in characters, voice, as well as multi-media format, this design could support the ocean education resources more systematic and unlimited learning area.

This study used quasi-experimental method with 33 students from 5-6 grade elementary of 2 classes. To evaluate learning achievement, all participants was divided into experimental and control groups. The experimental group conducted three phases lessons of U-learning and cooperative inquiry learning. The first phase carried out curriculum of ocean education that enhanced students' basis knowledge before outdoor activity started; Second phase was that teacher implemented curriculum by using tablet computer, and made students not only finish worksheet but write down the results that what they found throng group discussion; Lastly phase was discussion and sharing results for each group at online platform. The control group completed the formal curriculum that teacher gave lessons by traditional way. Both groups were conducted pre-post test by this study designed.

The results indicate those students who accepted the UPCIM learning design are all well-reached the scientific inquiry level which defined by Hung et al.(2011), that shows UPCIM is adaptable in ocean education. Through SPSS statistical analysis, the average growth slope of experimental groups was higher than control groups( $B_{11}=0.31$ ,  $p<0.01$ ), that suggested not only the effect of problem-based learning with mobile leaning, but also in intervention by scaffolding model, ocean literary is highly improved in experiment team rather in control. Two important conclusions are found after the study, at first the UPCIM can reasonable adopt in ocean education, follow the scaffold theory to guide students transforming interesting inquiry to reasonable inquiry, then go to the scientific inquiry in advance; the other one is the learning processes of UPCIM associate with ICT could improve students' ocean literacy, it gets suitable application on digital generation.

Keywords: Mobile Learning, Ocean education, Ocean Literacy, Ubiquitous Problem-based Cooperative Inquiry-learning Model