

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

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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

An easy experimental facility for observing tsunamis and disaster reduction

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An easy and inexpensive experimental facility is designed for students in classrooms to learn tsunami events. The idea of the facility arising from those applied in dam-breaking experiments as the formation mechanism are quite similar for tsunami generation and dam-breaking flows. The main facility is an acrylic tank which is divided into two regions by a movable gate. At the downstream region, different layouts of acrylic cylinders are placed to simulate the planting of coastal vegetation which is found to be capable of efficiently reducing the flood disaster. When the gate is suddenly pulled up, the water in the upstream region will quickly flow to the downstream region as a tsunami-like bore, and finally goes outside of the open end of the tank. The longest distance of the flow out of the tank is measured by a video camera. Finally the longest distances of all layouts are compared to find out the best design of layout for reducing the flow speed. The experiment not only can be performed in classrooms, but also provides an insight to the role of coastal vegetation in disaster reduction.

Keywords: tsunami, easy experiment, disaster reduction

Ocean education in Taiwan: numbers of students enrolled in marine-related departments

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The numbers of students enrolled in ocean-related departments are statistically studied in this paper. Data in three academic years are analyzed and compared. All of these departments are classified into four groups: marine science, ocean engineering, marine navigation and other related departments. It is found that the total number of students increases quickly from 2001 to 2010 at all level of academic degrees. Moreover, some new departments which include ocean tourism, ocean culture and general marine affairs are established in recent years as more applications and job opportunities of ocean affairs appear.

Keywords: ocean education in Taiwan, marine-related departments, enrolled students

On the theoretical study of internal waves in a three-fluid system

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Surface and interfacial waves propagating in a three-fluid system are studied in present paper. Two inviscid immiscible fluids lying above the other viscous fluid constitutes a three-fluid system. There are three possible wave modes generated in this fluid system: a surface wave between the air and the top fluid, an interfacial wave between two inviscid fluids, and another interfacial wave between the middle and the bottom layers. The study begins with a theoretical analysis followed by the examination of fundamental fluid and wave properties. The corresponding results have many applications in oceanography and fluid mechanics such as internal waves passing over a muddy bottom.

Keywords: three-fluid system, internal wave, viscosity