# A Preliminary Study on Context-Aware Ubiquitous Learning Strategies Integrated Affective Tutoring System

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**Abstract:** Affective tutoring system (ATS) can enhance learner's motivation and effectiveness of learning in Digital Art courses. Past ATS researches and applications are developing on personal computer and in the classroom, but most learner look around Digital Art in gallery. The research of relating to ubiquitous learning is well-developed. In this research, we propose a conceptual model and system architecture on context-aware ubiquitous learning strategies integrated affective tutoring system (ULS-ATS) and a research design to test the system's usability for learner, learner's motivation and effectiveness of learning in Digital Art courses. We expect more new ubiquitous learning strategies of ULS-ATS and more different applications in the future.

**Keywords:** Affective Tutoring System, Ubiquitous Learning, Digital Art courses

## Introduction

In Digital Art courses, researches verified that Affective Tutoring System (ATS) enhance learner's motivation and effectiveness of learning. The systems are developing on personal computer and in the classroom. If learner needs to leave the classroom to Digital Art gallery, existing ATS can't work without PC because of system compatibility. Mobile devices are smaller than PC and have diverse user interface design. In ubiquitous learning, teaching strategies have a lot of difference due to the sensor and environment. In this research we transplant ATS to mobile devices and design a new ATS user interface and integrate ubiquitous learning strategies, so its usability and effect of learners need to be verified.

## 1. Literature Review

### *1.1 Affective Tutoring System (ATS)*

ATS is a system based on intelligent tutoring system and affective interface. Learners use computer to learn with affective agents. ATS can identify learner's emotion by many inputs like facial expressions, sounds, physiology information, and texts in real time. ATS will select different teaching strategies by learner's emotion (Lin, et al., 2012a, 2012b). Recently, some researches show that ATS can enhance learner's motivation and effectiveness of learning on Digital Arts courses (Huang, 2012). Lin, at el. (2011)

proposed a conceptual model and system architecture of Ontology-based affective tutoring system on Digital Arts and verified for good system usability. We will reference to Lin's affective interface design and transplant to mobile devices.

*1.2 Strategies of Context-Aware Ubiquitous Learning*

Ubiquitous learning is a learning environment built by mobile devices, wireless network and sensors at el. U-learning can enhance learner's effectiveness of learning (Chu, Hwang, Huang, & Wu, 2008; Hwang, Yang, Tsai, & Yang, 2009; as sited in Hsieh at el., 2010). Hwang et al. (2008) proposed 12 strategies of context-aware ubiquitous learning. Following are the strategies:

**Table 1. Strategies of context-aware ubiquitous learning (Hwang et al., 2008)**

| | |
|---|---|
| 1.Learning in the real world with online guidance | 7.Identification of a real-world object |
| 2.Learning in the real world with online support | 8.Observations of the learning environment |
| 3.Online test based on real-world object observations | 9.Problem-solving via experiments |
| 4.Real object observation | 10.Real world observation with online data searching |
| 5.Collect data in the real world via observations | 11.Cooperative data collecting |
| 6.Collect data in the real world via sensors | 12.Cooperative problem solving |

## 2. Research Methods

*2.1 Research Subjects*

Our objective research subjects are university students who attend Digital Art courses from Taiwan. We will design a teaching material using the strategies to students of context-aware ubiquitous learning.

*2.2 Context-Aware Ubiquitous Learning Strategies Integrated Affective Tutoring System.*

In order to integrate the strategies of context-aware ubiquitous learning (Hwang, G.-J. et al., 2008) and the affective tutoring system, we design a mobile system called ULS-ATS. When learner learns on ULS-ATS, the teaching agent will select different teaching strategies by learner's status like emotions, location, RFID, NFC tags and other sensors on the device. For example, if ULS-ATS find the learner feel bad, the agent will try to be funny and select a relatively-simple teaching material. Teacher can retrieve the learner's emotion on each course from ULS-ATS's server. Teacher also can adjust the teaching strategies which most people don't interest in and grasp much more learner's learning status instead of only scores.

*2.3 Experimental Design*

We will separate subjects into two groups: experimental group (ULS-ATS learner) and control group (normal learner). Before the course, subjects will finish a pretest. Then they learn Digital Art courses in public gallery. After the course, subjects will fill an exam and two questionnaires: System Usability Scale (Brooke, J. , 1996) and Motivated Strategies for Learning Questionnaire (Pintrich ,1993) to verify the effectiveness of learning, usability of ULS-ATS and learning motivation of learners.

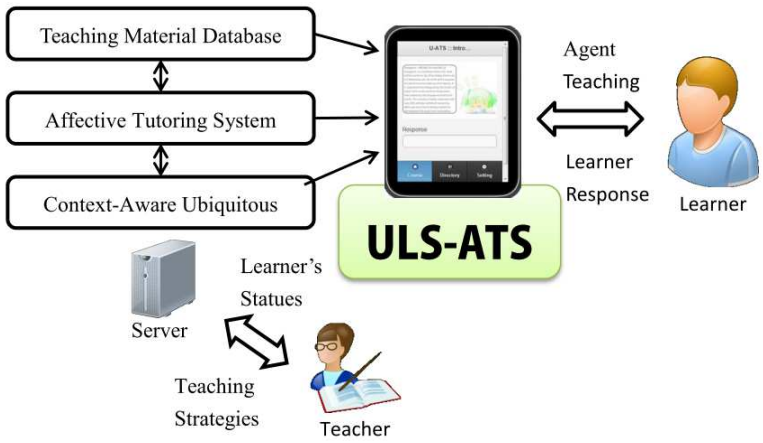


**Figure 1. Conceptual model and system architecture of ULS-ATS**

## 3. Conclusion and Future Work

We had already finished the prototype of teaching materials and ULS-ATS. Following are our future works:

(1) Based on integrating the strategies of context-aware ubiquitous learning to ULS-ATS, we need to develop more detail strategies of learner's emotion.

(2) For student, we'll evaluate the usability of ULS-ATS and apply to Digital Art courses. More, we'll design and evaluate more teaching agents for different populations like senior, junior, university students or maybe students want to design agents by themselves, we have to develop a mobile agent design tool for them.

(3) For teachers, they need a convenient teaching materials design tool and so on they can develop their own ULS-ATS courses.

(4) We'll try to use ULS-ATS with specific teaching strategies on different courses like nature, history.

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