Constructing Checklist of IOOI Theories Framework for Pre-Service Business Teacher to Enhance Content Design Usability

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ABSTRACT

During 2004 fall and 2005 spring, we offered 3D Maya modeling course to embed ICT affordance into pre-service business teacher education. The core activity of project-based learning is to design prototyping courseware and to visualize the concept of dynamic market activity contextually in Ba-Gua Shan community across our two campuses. Modeling action is built upon the framework of IOOI (Inside-Out-Side-In). Design processes apply scenario scripting and concept mapping. In this paper, we review both the learning outcome and instructional development for using IOOI framework. Data analysis technique adopted open coding to deal with the focus group protocol from last class. Research result would propose a checklist of IOOI theories framework for future study.

INTRODUCTION

The Needs of Using IOOI Framework

Today, we are in a media rich and network speedup era. The communication skills through visual thinking and thinking visualization become significant in global workplace and schooling, especially in creative industry sector. We need to construct a model for cultivating market concept locally and globally in business education. This model must carry out both “teacher-as-designer” and “teacher-as-learner” at university level. We also address that the roles of educational media literacy in business education are embedded in information communication technology (ICT) either design-with-ICT or learning-through-ICT. Therefore, the analytic proposition for visualization is: design-with-ICT walks through the Inside-Out pathway, and learning-through-ICT walks through the Outside-In pathway. Such two-way path finding becomes an iterative process to enhance the usability of developing digital learning content.
The Questions for Constructing Checklist of IOOI Theories framework

Our purpose in this study was to develop a checklist for university instructors who want to use IOOI theories framework as a tool to mapping the benefits and obstacles of ICT embedded course, especially at 3D modeling field. Next section we would discuss the IOOI theories framework in detail. There we formulate the research questions into two categories: designing-with-ICT and learning-through-ICT.

The Research questions guided with learning theories under IOOI framework would include:
1. What are the benefits and obstacles from designing- with-ICT process?
2. What are the benefits and obstacles from learning- through-ICT process?

LITERATURE REVIEW

How IOOI Works

There are eight pair-wise comparable learning theories that support using IOOI framework to modeling the concept of dynamic market activity in Ba-Gua Shan Community.

<table>
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<tr>
<th>Outside-In Path Learning-through-ICT process</th>
<th>Inside-Out Path Designing-with-ICT process</th>
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<tr>
<td>1. Induction</td>
<td>1. Deduction</td>
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<td>2. Bottom-Up Data Driven</td>
<td>2. Top-Down Concept Driven</td>
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<td>3. Exogenous Construction</td>
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<td>5. Mental Image</td>
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<td>8. External Learning Condition</td>
<td>8. Internal Learning Condition</td>
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Figure 2. The Two Clusters of Learning Theory in IOOI Framework (Modified from MeiChung Lin, 2004)

What to Modelling

In 2003 year, the residents celebrated 280 years of Changhua city anniversary and won the first ranking of outsider visiting flow. Ba-Gua Shan community locates at the downtown of Changhua city. From the view of globalization process, it is important to model market activity and to introduce the city to outsiders. We produce four episodes to cover a day in Ba-Gua Shan community and deal with four types of market: (1). Emerging market, (2). Market place, (3). Night market, (4). Charter market. A narrative based scenario scripting would interpret the meaning of four type market activities for the residents and the outsiders.
Concept mapping for Analysis Dynamic Market Activity

Above four market activities have the common and the specific concept. To conceptualize the dynamic market activities, we use concept-mapping technique to analyze content and the result is shown as following.

Figure 4. Concept mapping for modeling dynamic market activity

RESEARCH DESIGN

Design Process and Research Methodology

The design process began with “Finding Market in Ba-Gua Shan” project as title to call for students’ engagement. The whole pipeline would be divided into four segments: pre design, design, prototyping, and evaluation. Constructing Checklist should be considered as an iterative process that could enhance the content usability.

(1) Pre design: Instruction focused on reference collection. Learners conducted field study and video capture skills to improve the reliabilities and validities of scenario scripting. Then they needed to determine the complexity of modeling. Iterative process needed to identify the representation of market activity and to painting the iconic / symbolic to enhance mental image. Learner center on Outside-In pathway would be examined in this segment.

(2) Design: Instruction focused on modeling. In computer lab, each multimedia computer installed 3D Maya software personal learning version and the instructor began to teach how to model objects.

(3) Prototyping: Instruction focused on usability. Learners were requested to show how to model and what for. Brainstorming is key step in this segment. Learner center Inside-Out pathway would be examined in this segment.
(4) Evaluation: Instruction focused on learners’ learning outcome and focus group protocol. One of the researchers conducted focus group. The other conducted coding to form thematic analysis.

Focus Group Protocol

(1). Organized discussion: We selected three of four project teams in one class. The size for each focus group was ten. Within each half hour group interview, listed generic ill-structure questions were discussed and student-led voices were recorded (Krueger, & Casey 2000).

(2) Collective activity and interaction: Data analysis also covered team project activity and interaction during four segments, including scenario scripting, storyboard, concept modeling objects, narrative story and web based learning log.

Sample of Coding Schema

All data were coded, either voice or non-voice types from organized discussion, collective activity and interaction. We believe that different learner’s role would be identified through his/ her voice. Collective activity and interaction help us to confirm his/her needs for operating a successful learning and design experience.

RESULT

Benefits and Obstacles

(1) What are the benefits from learning- through-ICT? When we guided image analysis to enhance case reasoning for dynamic market activity contextually in Ba-Gua Shan community and to form a narrative interpretation, visual thinking activated learner’s concept formulate/attainment by linking semantic network to mental image memory. In this bottom-up data driven orientation, we open up a sort of educational opportunity for learner’s exploration toward social culture reflection upon localization and globalization. Exogenous construction of dynamic market concept became more effective in the outside-in pathway.
(2) What are the obstacles from learning-through-ICT? Visual thinking workout was important activity in pre-design segment. Such instructional practice offered both an educational opportunity of learning-through-ICT and a culture grounding type of knowledge representation about marketplace. Therefore, images, carried rich facts, common, and rule, would be processed into abstraction and conceptualization. That means learner needed to deal with knowledge-in-action at real world situated marketplace and what knowledge they had in mind from economics education. However, narrative interpretation activity was limited by learner’s existed marketplace concept, explaining the linear of supply and demand interaction. Learning-through-ICT would be not able to activate information process for knowledge creation if the instructor had the difficulty to prompt visual thinking. Almost learners recognized the value of visual thinking as an educational opportunity of learning-through-ICT, but many stated that lack of visual thinking supported textbook and software interface was the main inhibiting factor.

(3) What are the benefits from designing- with-ICT? Learners identified they have higher self-respect of professionalism when they straggled and worked hard to carry out creative instructional design by visualization technology. Walking through designing-with-ICT, learners experienced powerful high realistic image rendering by 3D Maya. Moreover, Learners acted multiple roles to be learner-as-trainer, learner-as-manager, and learner-as-researcher. Cooperative instructional design emerged in an active way. Unlike visual thinking pathway, learners in the thinking visualization pathway start with narrative story scripting. They needed to conduct deduction of marketplace and discussed each other what they thought. That is top-down concept driven forced learners to determine the common mental image and what would be visualized later on. The performance of visualization would be measured not only endogenous construction but also knowledge reconstruct. As learner identified, the note taking was valuable to remind new comers about the collaborative teamwork and group interaction.

(4) What are the obstacles from designing- with-ICT? Almost learners recognized the value of thinking visualization process as technology affordance of designing-with-ICT, but many stated that lack of powerful hardware and time consuming were the main inhibiting factor. The frequent questioning was: should I need to have 2D design experience before jumping into 3D design?

Checklist for Linking I001 Framework to Usability

According to above benefits and obstacles, we listed following checklists for both learning-through-ICT and designing-with-ICT. We also believe that the outside-in pathway and inside-out pathway interaction happened during each segment. Instructional strategies needed to pay more insight on how visual thinking and thinking visualization enhance content design determination.

1. Checklist for Outside-In pathway
   1) Using semantic network to elaborate concept induction.
   2) Referencing images to enable bottom-up data driven workout.
   3) Interpreting images to request exogenous construction.
   4) Exploring discovery between concept generic from images and what had in mind.
   5) Identifying social-culture iconic / symbolic from images.
   6) Brainstorming visual thinking performance each other to formulate narrative concept.
   7) Creating new knowledge among images memory.
   8) Evaluating external learning condition of visual thinking performance
2.Checklist for Inside-Out pathway
1) Grouping project to start concept deduction.
2) Storyboarding to enable top-down concept driven.
3) Encouraging collaborative instructional design to request endogenous construction.
4) Affording technology to perform thinking visualization.
5) Modeling objects to visualize mental image.
6) Linking modeling to prior knowledge.
7) Reconstructing concept by flexible knowledge represent.
8) Evaluating internal learning condition of thinking visualization performance.

**DISCUSSION AND THE FUTURE STUDY**

We interpreted the space of the dynamic market activities in Ba-Gua Shan community and script down what space meaning to resident and outsider. In Ba-Gua Shan community, market development related to economics culture, life change. However, finding buyer and finding seller still was the market foundational activity.

For the future study, measurement method for keeping stop checkpoint to evaluate checklist still is a challenge task. This paper had done some directions to enhance iterative production of multimedia content. We constructed IOOI framework to link learning theories for media cognitive economic. The checklist might save the future comers to carry out thinking visualization and visual thinking with maximal benefits and minimal obstacles.

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**REFERENCES**

