Abstract

The process of methodological design and iterative development of multimedia learning materials for teaching and learning especially for engaging the learner often needs to be guided by appropriate educational theories or models (Norman and Spohrer, 1996; Mayer, 2001). This paper provides emerging multimedia learning design pedagogy, a hybrid learning model that can be applied to address this issue of how to design for engaging the learner. The hybrid learning model is hybridized from both the Piagetian learning cycle model and the Kolb’s experiential learning cycle model. One of the hybrid learning model’s goals is to enhance the engaging phase in a diverse learning environment that is multimedia in nature.

The inquiry-based learner-centred Piagetian learning cycle represents an inductive application of information processing models of teaching and learning. Findings from cognitive research studies have revealed that the model that is closest to the way the learner learns is that of this learning cycle model (Karplus, 1977; Lawson, 1995). The core idea in the Kolb’s experiential learning cycle model focuses on learning that requires a grasp or figurative representation of experiences as well as some transformation of that representation (Kolb, 1984). Research studies on multimedia design have also found this experiential learning cycle model to be a helpful framework for organizing interactive multimedia learning activities to address learning styles (Bostrum et.al, 1990, Tsoi & Goh, 1999).

The hybrid learning model represents learning as a cognitive process in a cycle of four phases (Tsoi et al., 2004; 2005; 2006). Pedagogical design specificity of the first phase for engaging the learner is illustrated in terms of instructional storyboarding linking to the multimedia learning product developed in the area of science and chemistry education. In the first phase for engaging the learner, multimedia experiences are translated into a beginning idea or concept for concept preliminary exposure. Implications for the science of instruction in multimedia learning pedagogical design for engaging are discussed.

1. Introduction

The process of methodological design and iterative development of effective interactive multimedia learning materials especially for engaging the learner needs to be guided by relevant educational models or learning theories. This issue can be addressed by applying the hybrid learning
model to the pedagogical design of the multimedia learning materials be it delivered in a web-based format or in a CD-Rom.

2. Conceptual Framework of the Hybrid Learning Model

The theoretical basis of this hybrid learning model is derived from the Piagetian learning cycle model and the Kolb’s experiential learning cycle model. The term hybrid will mean the mixing of two different items to give a better product. As such, one of the model’s goals is to enhance the engaging stage in a diverse learning environment that is using multimedia.

The inquiry-based learner-centred Piagetian learning cycle represents an inductive application of information processing models of teaching and learning. Results from cognitive studies have revealed that the model that is closest to the way we learn is that of this learning cycle model. The Piagetian learning cycle model is an inquiry-based student-centered learning cycle representing an inductive application of information processing models of teaching and learning. It has three phases in a cycle: exploration, concept invention and concept application (Karplus, 1977; Renner and Marek, 1990; Lawson, 1995). The exploration phase focuses on “what did you do?” while the concept invention phase centers on “What did you find out”. The third phase is for application.

The Kolb’s experiential learning cycle (1984) represents learning as a process in a cycle of four stages, namely, concrete experience, reflective observation, abstract conceptualization and active experimentation. The concrete experience stage focuses on “doing”. Reflective observation stage is about the “understanding the doing”. The abstract conceptualization stage focuses on “understanding” part while the active experimentation stage is about “doing the understanding”. The core idea in the experiential learning cycle model is that learning requires both a grasp or figurative representation of experiences and some transformation of that representation. Research studies on multimedia design have found this experiential learning cycle model to be a useful framework for organizing interactive multimedia learning activities.

The hybrid learning model termed the TSOI Hybrid Learning Model™ & © All rights reserved represents learning as a cognitive process in a cycle of four phases: Translating, Sculpting, Operationalizing, and Integrating (Tsoi, Goh, & Chia, 2004 & 2005). Figure 1 shows the four phases of the TSOI Hybrid Learning Model™ & © All rights reserved.

3. Pedagogical Application For Engaging

For illustration, in chemical education, the mole concept, an abstract and difficult concept is used (Tsoi et al. 1998). One of the subtopics used is Molar Volume and Molar Mass. Since the focus is on multimedia design for engaging the learner, this paper will provide insights on the application of the 1st phase, the Translating phase for engaging the learner using the multimedia learning materials.

In the Translating phase, the three activities explore the relationship between equal volumes of all gases and number of particles. The multimedia experiences are translated into a beginning idea or concept of equal volumes of all gases contains the same number of particles which is considered necessary to understand molar volume in the 2nd phase, the Sculpting phase. This takes place as a chain of logical events of content sequencing, learner guiding and reflecting shown in Figure 2 as instructional storyboarding.

During the 1st activity, the learner is given a general chemical equation for placing the correct number of flasks of equal size for the general chemical reaction of the...
ratio 1:1:1 in terms of 1 reactant reacting with another reactant to give 1 product. This is then progressed to another general chemical reaction also of the ratio 1:1:1 in terms of 1 reactant reacting with another reactant to yield 1 product. However, this general chemical reaction is represented at the particle level. The question “What have you observed in terms of volume and number of particles? is posed. The idea is getting the learner to use one’s observation skills to look for a pattern relating the volumes of the flask of equal size and the number of particles in the flasks. This is further engaged into the 3rd activity that involves another general chemical reaction of the ratio 2:1:1 in terms of 2 reactants reacting with 1 reactant to produce 1 product. In other words, the three activities are designed in such a way that it progresses from simple to complex. Question for example “How are your observations for this reaction like the observations you made previously? is posed. The purpose is to elicit observational responses as result of using thinking skills of abstracting and comparing by the learner. The response will be “I have observed that equal volumes of all gases contain the same number of particles”. The learner needs to grasp this relationship in order to understand molar volume.

4. Implications

The Translating phase for engaging the learner is similar to exploration phase of learning cycle model and concrete experience stage of experiential learning cycle. The need to first identify the features of the concept is essential so that varied activities in the 4 phases can then be “crafted” to assist the learner to identify these critical features and eventually leading to acquisition of concept mastery. As such, the Translating phase is imperative as it emphasizes concept initial exposure for preliminary experience. Important is also the knowledge and application of multimedia design principles, for example, principles of Multimedia, Contiguity, Modality, Redundancy, Personalization and Coherence (Mayer, 2001). In essence, the Translating phase of the TSOI Hybrid Learning Model™ & © All rights reserved. gives the instructional designer a pedagogic structure for designing to engage the learner in the multimedia learning.

References


Figure 1. TSOI Hybrid Learning Model™ & © All rights reserved.

<table>
<thead>
<tr>
<th>Animation</th>
<th>Narration</th>
<th>Text on Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 After narration, display onscreen text and diagram A. Instructions appear. User to drag &amp; drop the suitable no. of flask A, B. flasks of equal size. a. Instructions fade when user has completed. Diag B as it is. b. When done, onscreen txt display just below Diag B (Diag A&amp;B remain) c. Diag A &amp; B fade! Show diag C. Animate particles A,B,C. After which, display Qn “What have you observed…?” 4s pause before showing next sentence “I have observed…”</td>
<td>Let us investigate some general chem. rxns involving gases only</td>
<td>Molar Volume &amp; Molar Mass Investigating gaseous reactions a. Given following info, how can you produce 1 vol of C? Place correct no. of flask for the gen chem. Rxn. b. 1 vol of A reacts with 1 vol of b to give 1 vol of C</td>
</tr>
<tr>
<td>4.1a Display onscreen txt followed by Diag D. Animate particles E,G,D. After which display Qn “How are your…?” 4s pause before displaying next “Again, I have observed…”</td>
<td></td>
<td>You are to observe the following gen chem. Rxn at room temp and pressure</td>
</tr>
</tbody>
</table>

Figure 2. Instructional storyboard