

## Virtual Reality Online Museum for Packaging

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**Abstract.** The purposes of this research were to develop online museum for packaging using Virtual Reality. This museum was to be considered as a learning instruction resource outside class to solve the issue of insufficient time in class. The instructors encouraged learners to build up the knowledge by themselves via active learning activities. The sampling group for this study consisted of 40 second year undergraduate students studying at the Department of Printing and Packaging Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi. The students could access the museum by downloading the data from the internet and learn by themselves using an avatar to enter the museum. In each exhibition room of the museum for packaging, there were different kinds of packaging along with relevant information. After visiting the museum, the students needed to take a test before going out. The students had to gain at least 80% correct points. The instructors could know each student's behaviors and their progress by the developed software. They could control the activities by using mouse and keyboard. Visitor's activities were also recorded such as date and time of participation. The research results in this phase revealed that the students visiting the virtual reality museum for packaging on the internet showed interest and enthusiasm in learning more. Besides, the students had more time to gain training outside classroom and to learn according to their preferences everywhere and every time. It was found that most students were satisfied with the virtual reality online museum for packaging.

**Keywords:** Online museum, Virtual Reality, Packaging

### 1. Introduction

Packaging is an important part of marketing a product. It catches the customers' attention. It also provides information about the product to the customer; on the other hand it protects the product (e.g. shock-proof, water-proof, dust and dirt). Packaging design as a trade dress is a subtle form of marketplace communication that delivers a powerful marketing tool for promoting sales and brand loyalty. It also may lead to the right to exclude competitors from similar designs. A purposeful approach and a strategic plan may be helpful to devise packaging design features with an eye toward establishing trade dress rights to valuable goodwill for a product line and its company. Care should be taken to harness such trade dress rights and not jeopardize such rights with counterproductive statements in the market. Packaging Design is a course related to the design and the application of the designed package to make the product. Therefore, the course must focus on the design and the package production in team. However, the practice cannot be achieved due to the limitations in budget for non-renewable materials, especially paper, resulting in the students lacking enough materials for practice. Moreover, because of insufficient time in class, the students have to continue their work at home. Other problems also arise such as some students do not work at all whereas other students must work very hard to finish the assignments on time. This is partly because the students live in different locations far away from one another and their free time is not the same due to their selection of different courses. These problems are critical for the students' learning skills. Therefore, innovation should be used in the instruction so that every learner could study together at the time when they are ready such as after dinner time. If virtual reality online museum is applied to facilitate the presentation, the lesson may be interesting due to it is interactive. This is because virtual reality systems have the potential to allow learners

to discover and experience objects and phenomena in ways that they cannot do in real life and provide the capability to create an environment in where the intensity of feedback and training can be systematically manipulated and enhanced in order to create the most appropriate, individualized motor learning paradigm.

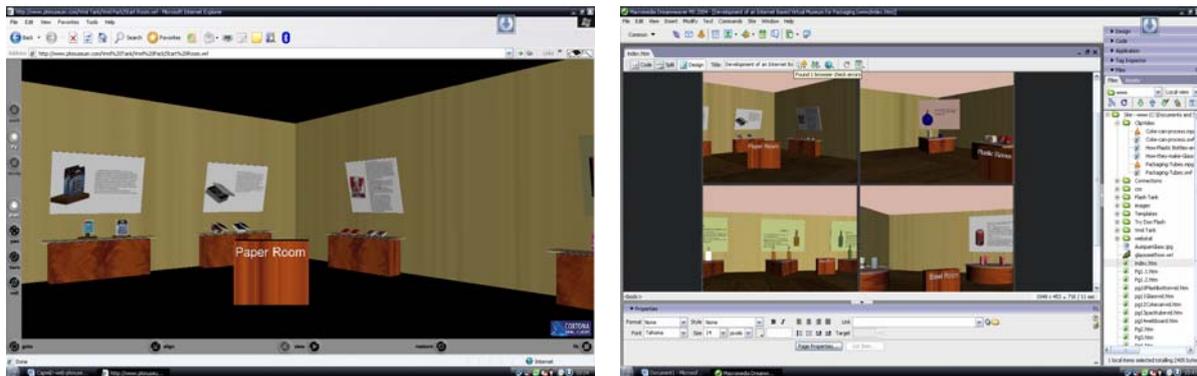


Fig.1 The example of Virtual Reality Online Museum for Packaging

There are many terms for online education. Such as web-based learning (WBL), Internet-based education and education via computer-mediated communication [1]. Web-based learning (a major subcomponent of the broader term "e-learning") is one of the tools with which education is delivered [2].

E-learning covers a wide set of applications and process such as WBL, computer-based and digital collaboration [1]. The term E-learning is often used as a more generic term and as a synonym for online education. WBL can be defined as learning materials which are delivered in a Web browser and can include materials which are packaged on CD-ROM or other media [3]. Further definitions include using the WWW to create a meaningful learning environment through the use of instructional strategies [4]. Designing WBL environments is a combination of pedagogical design and usability [5]. WBL environments need intuitive interfaces and clear information design that will allow users to focus on the learning process [6]. Developing usable WBL environments requires an in-depth knowledge of more than just the technologies involved. According to several web design experts, including Nielsen and Spool, "Usability is often the most neglected aspect of web sites, yet in many respects it is the most important". To ensure usability requires a user-centered design approach together with an understanding of design principles and guidelines. Computer graphics technology enables us to create a remarkable variety of digital images and displays that, given the right conditions, effectively enrich education. Real-time computer graphics are an essential component of the multi-sensory environment of VR. The practical potential of VR is still being explored. VR offers teachers and students unique experiences that are consistent with successful instructional strategies: hands on learning, group projects and discussions, field trips, simulations, and concept visualization. Within the limits of system functionality, we can create anything imaginable and then become part of it. The VR learning environment is experiential and intuitive; it is a shared information context that offers unique interactivity and can be configured for individual learning and performance styles. The constructivist method of design is different from the linear task-oriented method of an instructional system design approach. Designers who use a constructivist method to create learning environments are less focused on a how-to or process approach but emphasis elements that facilitate a learning process. Designers applying this method take into account seven pedagogical goals: 1) to provide an experience with the knowledge-construction process, 2) to provide experiences encouraging appreciation of multiple perspectives, 3) to embed learning in realistic and relevant contexts, 4) to encourage ownership in the learning process, 5) to embed learning in social experience, 6) to encourage the use of multiple modes of representation, and 7) to encourage self-awareness of the knowledge construction process.

We have studied and applied the theory of virtual reality for online learning in the way that the learners could use their previous knowledge, group's opinions and searching from the database/Internet in order to build up new bodies of knowledge in a systematic way. Therefore, in this paper, online learning with virtual reality technology will be presented in order to develop a new instructional approach to make it successful and effective for students to study in groups or individual. The steps in the development will be explained next.

## 2. The approach

Designed to support the creation of high quality models, with the techniques necessary for achieving interactivity. One such tool is 3D program. We investigate the full scope of the 3D then create virtual packaging museum and we demonstrate how best to virtual illustrate packaging can be exploited to achieve interactivity in 3D models use as VRML worlds. And Do testing on real sampler of 3 groups how they reacting with tool. 3D program is an integrated environment for creating professional-quality 3D models. Photo-realistic still images and film-quality animations can be created on a PC using these models. It supports the construction of various kinds of 3D objects. Landscapes of any type can be created from these objects and characters. All of these objects can be arranged in settings and environments. These environments form the basis of the scenes. The characters and objects can be animated - setting them in motion. Then - the whole virtual world can be captured as a film sequence. 3D program is a rich modeling environment that supports a wide range of modeling techniques from low polygon modeling to modeling with compound objects to mesh modeling – all the way to NURBS modeling. Once our basic models have been constructed, we can assign different textures to improve the user's perception of realism. To complete the scene, different light sources (there are various kinds) can be added to illuminate the scene. Cameras can be added to capture other parts of the scene at different time intervals. In our projects, the geometry was created first. Texture maps and materials were then assigned to this geometry. In the case of VR Museum, materials for objects were acquired from digital pictures of actual objects. Finally, lights and cameras were added to construct a full scene. Figure: 1 shows the constructed scene of VR Museum

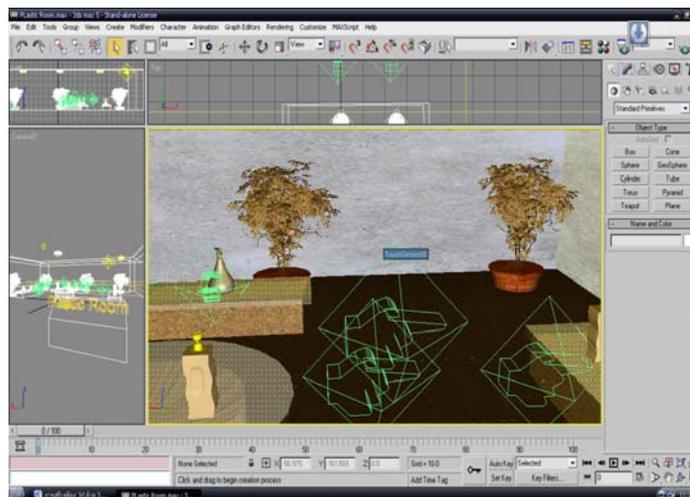


Fig. 1 shows the constructed scene of VR Museum

In VR Museum, more objects were used and this makes the scene far more complex. Buildings were created using elementary shapes such as boxes, cylinders and spheres. For some objects, live photographs were used as textures. In such cases, we tried to using less detail of model objects in order to achieve fast active on web browser. The Virtual Reality aspect of VRML is centered on the metaphor which it pursues: human space. That space is 3-dimensional and defines the ways we move in it, perceive it and interact with it. VRML accordingly includes many of the things that are required in making the virtual world: a way of describing the geometry which creates the objects and spaces we move around in - light, texture and sound. We can approach and view the objects from different angles. We can hear the sound from different positions. The second part of VRML, Modeling Language, describes the process of making a virtual world. While much of VRML is composed and optimized in text, VRML authors typically use other modeling programs for designing and creating 3D geometry in a graphical format. Later, these models, which will constitute a Virtual World, are translated to VRML and viewed using a VRML browser. The browser renders the VRML in real time and turns the code into perceivable space with which we can interact. In 3ds max, interaction in a VRML world is achieved by adding VRML helper objects. During export, the helper objects become VRML nodes. The following helper objects are predefined in 3ds max: Anchor - creates a link in a VRML file. The link is embedded in an object; Touch Sensor – (touch sensor) represents an area of sensitive space that, when



Fig. 4 showed paper and metal section in VR museum

### 3. Experiment Results

An initial pilot study was conducted at Department of Printing and Packaging Technology. The population is Packaging Technology student in Thailand and the sample groups consisted of forty students, the system was evaluated by five experts, and the Index of item Objective Congruence (IOC) is .82 score. The program was corrected and improved before trial with a target group. The target group consisted of 40 packaging students, and they were selected by simple random sampling and survey was on a 5-point Likert-scale (1 = strongly disagree, 5 = strongly agree). On average, the target group believed that the system, they would like to use our system (4.34). The second part of the survey assessed the target group' beliefs about the technology; it was on a 5-point Likert-type scale (1= least important, 5 = most important). Target groups reported a moderate level of sense and for suggesting that the system were lifelike (4.12). However, they found the most value in the fact that online museum help for packaging education (4.28) and they wanted to use this system for study (4.30).

### 4. Conclusion

VR museum is a premium modeling tool .This VRmuseum is able to produce high quality and complex models and gave user good packaging information with the right age's. It has also built-in VRML exporter that handles all elements of the constructed scene and contain user database information. As we have seen in this paper, it has built-in objects and helpers, which used to alone or combined with one another, create the necessary perceptions of interactions. We can conclude that VR museum presents an excellent environment for creating VRmuseum models, which can be produce knowledge to user.

### 5. Acknowledgment

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