Engaging Students With Experiential Website Design As Online Learning Media: Comparative Studies of Interactive Parallax Scrolling Technique on Commercial Website

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ABSTRACT

This research aims to formulate a user experience framework for the experimental of online education media. Encouraged by changes in the methods and learning behaviour of generations born in the early 1990's or known as Y generation who deeply aware of heutagogy, an ideological form of education in which they are the truly owner of their learning process. The expansion of information, technology and its usage has led to the increase used of new learning media such as electronic learning (e-learning), Massive Open Online Course (MOOC), distant learning and future of online education which activate immersive experience (sensory, affective, intellectual and behavior) as key strategy. Innovative learning media is urged to be present both as an educational instrument and methods for these new digital native learners especially in the pandemic situation. Website as an online media platform has advantages in the form of easy access without the need for installing software or apps, minimizing hardware constraints that students have. This essay is a preliminary study conducted as qualitative descriptive analysis to identify immersive experience design elements that are highly utilized in several artefacts as case studies on commercial websites. The first experimental stage is collaborating experience with website platforms through interactive parallax scrolling techniques. Furthermore, this identification led to the experimental stage of immersive technology for the future stage of research. As result, a design framework model was synthesized from the modification of the user experience elements framework.

Keywords: Experiential Learning, User Experience Design, Web Design, Parallax Scrolling.

1. BACKGROUND

The term Generation Y came to the fore in 2000 to describe the generation born after 1980 and described as "digital natives" who grew up amid rapid technological developments and information connectivity [1]. Therefore, generation Y has a very good digital literacy level, especially in the use of media technology as a primary learning tool. Generation Y grows up in an environment that supports participatory learning that emphasizes active collaboration between peers group with interactive learning, encapsulated in the elements of game mechanics. This insight can encourage lecturers to innovate more effective methods and learning media. Based on preliminary observations through structured interviews and focus group discussions with middle-level undergraduate students regarding the theory-based learning process in the visual communication design department, Universitas Multimedia Nusantara, it was found that lecturers were still considered as a determining factor for the success of a learning achievement in a lecture. The key factor is the ability of lecturers to reconstruct teaching material through verbal ability. In a parallel theory class taught by several lecturers, the success factors of learning vary depending on the character, interpersonal skills, and lecturers' communication in delivering material in class; this is what we usually call as teacher based learning. In an effort to support a deeper understanding of lecture material, students often look for alternative sources through the internet such a e-learning, MMOC (Massive Open Online Course) or other online education that can

support students' understanding of lecture material outside the classroom. However, online education also has its own distinct set of challenges, particularly in areas where active learning strategies are required for effective teaching [2]. Glance, Forsey and Riley (2015) concluded that most online education are characterized by the presence of video lectures, formative quizzes and automated assessment and/ or peer- and self-assessment, these are generally divided into asynchronous and synchronous methods [3]. Such elements resemble what might be referred to as classic didactic tools that are often criticized for their emphasis on students as passive knowledge consumers and their limited suitability in the pursuit of active learning strategies.

Kolb (1984) introduces the concept of experiential learning as one of the other pedagogy methods. Kolb describes the elements of experiential learning in 4 interrelated axes: see-do, think-feel. This model is known as for stage learning cycles [4].
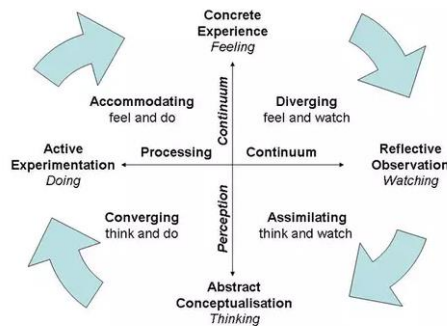

Figure 1 Kolb (4) Four Stage Learning Cycles

The continuum process explains that in the experiential learning process, learning is not just an activity of transferring knowledge or a process of duplicating information from educators to students but an activity that triggers affection in actions and reactions. Thus, the outcomes of active learning activities can be effective if students can observe, interact, analyze and feel the sensations as cognitive senses. This approach is commonly used in a practicum-based learning class. The challenge is to bring complex class materials into distant effective learning media as experimental online education. One of the options is storytelling methods, where Kolb's stage learning cycles can be delivered as a narrative story.

Storytelling activity is an expression of human emotional experiences with the world around them both real and imaginative. In other words, storytelling is a form of expression of an experience, and to build an optimal narrative story is to simulate that experience in an authentic way. The theoretical approach in building experience elements is extensively used in the field of marketing and visual communication design, especially

in the field of commercial experience. Commercial brand's objective is to build positive consumer perceptions by creating authentic experiences with the ultimate goal of building retention or loyalty. Brakus describes brand experience as a subjective consumer response (sensation, feeling and cognition) and a behavioral response generated by other stimuli such as visual identity, packaging, advertising and others [5]. In these perspective, consumer responses are built through their experiences actively interacting (persuaded) with each existing stimuli. To build experience, there are 4 dimensions which are grouped based on the stimuli category, namely: sensory, affective, behavioral and intellectual. These stimuli can be seen on the latest website designs that optimize the customer experience. Some commercial websites use parallax scrolling technique as an element of the experience. Through the interaction of the movement of 2 layers of visual elements or more, the parallax scrolling technique is able to present stimuli to a website media. This platform is common, easily accessible and has high compatibility for any online learning platform that is often used such as laptops (with various browser apps and operating systems) smartphones, tablets and smart tvs. The website's ability to present this experience is the basis for developing interactive learning media using the parallax scrolling technique.

2. OBJECTIVES

. This preliminary research aims to formulate a user experience framework to improve understanding of how the parallax scrolling technique can improve experiential learning for future online education development.

H1: Innovative commercial website design (especially parallax scrolling technique) share the same key strategies (storytelling, experience elements) with future online learning media design.

The objectives to identify experience design elements (sensory, affective, behavior & intellectual) on several commercial website and to see how they can share the same framework design to design effective online learning design on website platform.

3. METHODS

The research was conducted as a literature review and qualitative descriptive analysis to identify immersive experience design elements highly utilized in several artefacts as a comparative study. The case study was selected by purposive sampling categorized based on the innovation approach on website design as the main channel for online education. The first experimental stage is collaborating experience (immersive) with website platforms through comparative study to identify design elements & techniques used. Furthermore, this framework will lead to the experimental stage of future immersive technology research.

4. LITERATURE REVIEW

4.1. Immersive Experience Design

The term "immersion" has been discussed and used by researchers in the technology field for decades. The term is widely used to describe experiences in games, paintings, literature and cinema. However, Slater's & Wilbur's (1997) state immersion definitions as:

"a description of a technology, that describes the extent to which the computer displays are capable of delivering an inclusive, extensive, surrounding and vivid illusion of reality to the sense of a human participant. [6]"

Immersion appears to be less of a psychological process and more of a physical process where our bodies and senses are tricked into behaving and reacting like the virtual environment is real. Technologies background on web page, video instructions, smartphone apps can be embodied for their abilities to modify the cognitive factors regulating body and space experience.

One theoretical approach in building intensive elements of experience is widely used in the field of marketing and communication through the concept of brand experience. In other words, the consumer's response is built through his experience of actively interacting with every stimulation that exists. In building a brand experience, there are 4 dimensions which are grouped by categories of stimuli, namely: sensory, affective, behavioral and intellectual [4].

- **The sensory dimension** is related to the activation of the human senses which includes hearing, vision, smell, touch and taste.

- **The affective dimension** is related to stimuli that evoke positive or negative feelings or sentiments.

- **The intellectual dimension** is related to how media or content stimulate user to critical thinking and curiosity.

- **Behavioral dimension**, is the dimension that triggers user to behave and act certain manner.

Three components of user experience has been defined as instrumental, non-instrumental and emotion Instrumental qualities refer to the system's usability while non-instrumental qualities refer to its visual appeal [7]. Both instrumental and non-instrumental qualities affect user emotions. Today, interactive systems are no longer designed to be just usable, thy also need to be aesthetically appealing. On education strategy, visual and experience are requirement to reach student learning effectiveness.

4.2 Design Elements & Interactive Strategies

Kitson as documented 33 immersive and interactive experiences review and presented in 12 themes and 6 of them were related on how it can be used as interactive online learning strategy [8].

- **Connection**: Users can feel a sense of belonging and relatedness through telepresence and communication.

- **Emotional expression**: Emotions of the users can be expressed through audio and visual mappings, mainly through capturing physiological markers such as arousal.

- **Movement**: Users physically moved their bodies in order to interact with the system. Movement was used as a way to promote health.

- **Nature elements**: These experiences involved some aspects of nature. Some experiences used natural sense (water, fire) as a visualization.

- **Playfulness**: Users were invited to interact with the system that supports curiosity and creativity in order to make the experience as inviting and non-invasive as possible. This was achieved through exploring a narrative.

- **Social presence**: Users interacted with other users at the same time.

In building website-based media, the principles of human-computer interaction and user experience, usability, and user-centred design need to be used to build the framework. One model that is projected to be used is the model elements of user experience. This model was originally designed by Jesse James Garret for the implementation of experiential design on website, but this has evolved along with the evolution of other media formats and functions that can adopt these elements of experience [9]. This element contains a structure for designing an interactive media user experience by describing the process based on layers of strategy, scope, structure, framework to the surface that displays the interface design and is related to sensory experiences.
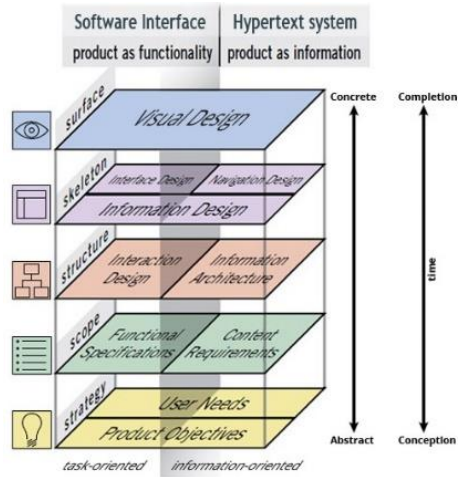
Figure 2. User experience design diagram (2010)

4.3 Parallax Scrolling

Parallax technique has become a popular technique in website design, especially in recent years, appearing for the first time as a computer graphics technique to give 3-dimensional illusions to video games in the 1990s. Now the parallax technique is used with the same concept but is operated via scroll navigation. on the mouse interface or touch screen navigation. Layers and dimensions of the background accompanied by different tempo movements can create an aesthetic experience for the user. In addition, scroll navigation in parallax technique gives full control to the user in determining the tempo of learning.
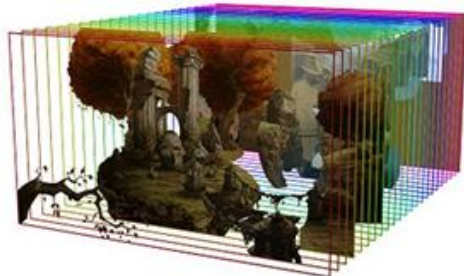

Figure 3. Parallax Layers Perspective from the Game "The Whispered World" (2010)

Each student needs to be positioned as an entity with different learning methods and patterns, according to Gardner's concept of multiple intelligence.

However, in another study (Frederick, 2013) concluded through a series of tests on web users that the use of parallax does not have a significant impact on user experience nor does it increase user loyalty, brand perception and purchase interest on product and service-based websites [10]. But on the other hand, the parallax technique has an impact on increasing the pleasure and satisfaction factors for users. This conclusion can be retested by seeing how the parallax technique can act as a stimulant that can enhance students' learning experiences.

In the educational media context, the scrolling navigation design function provides full control for the user in determining the tempo of learning. This has a significant impact on students' learning style.

5. COMPARATIVE STUDY

As discussed above, this study was conducted to identify stimuli in the form of dimensions contained in case studies of several websites selected by purposive sampling by considering their empirical characteristics as dependent variables.

- Website sample collection is taken through the website www.awwwards.com which is managed by various creative practitioners in the field of design. Regularly publish nominations for the best websites based on relevant categories (themes, creativity, product and service fields, technology).

- Identified website that has 4 experience dimension with various design elements and interactive strategies. These website are using parallax scrolling techniques as experience strategy.
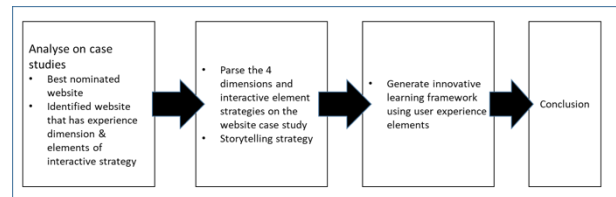

Figure 4. Preliminary Study Phase

The next step is to see how the experiential dimensions and interactive design elements on those case studies work to meet the learning cycle that Kolb introduced. This model will be use as recommended framework for the next generative research. The analysis used five 2 artifacts as case studies :

The Boat (www.sbs.com.au/theboat) & Kopke1638 (www.kopke1638.com)

5.1 The Boat

The Boat is an interactive, digital graphic novel adapted from a short story written by Nam Le, who immigrated from Vietnam to Australia. The narrative follows 16-year-old Mai on her journey to Australia and over 200 other people while illustrating the hardships and challenges that she faced on the boat regarding both herself and the people she befriended.
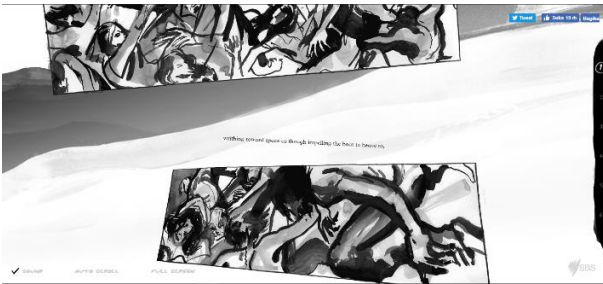
Figure 5. The Boat (www.sbs.com.au/theboat)

Figure 6. The Boat : Movement
(www.sbs.com.au/theboat)

Figure 7. The Boat : narrative and dialogue
(www.sbs.com.au/theboat)

Tabel 1. Interactive Design Elements of The Boat

Interactive Design Elements					
Connection	**Emotion**	**Movement**	**Nature Elements**	**Playfulness**	**Social Presence**
V	**V**	**V**	**V**	**V**	**X**

5.1.1 Sensory & Affective Dimension of The Boat

The interactive graphic novel "The Boat" combines illustrations, sound effects (sound effects of water, wind, human whispers, and Vietnamese instrumental back sound) and 3 dimension movement to give the user a cinematic impression. Using illustrations with Japanese sumi-e ink with black and white nuances as a visual approach, the audience feels claustrophobic in the middle of a tense sea from the selection of art styles coupled with tense music. A 3-dimensional perspective arises through

the parallax technique which gives a creasing in every layer background. Each setting is contextually placed to support the main narrative, for example the scene of Mai's initial journey on a boat hit by a storm is emphasized through various stimuli such as the sound effect of thunderous sounds, movement of images and layout compositions that bring the audience closer to feeling the atmosphere of the refugees as depicted. The sensory & affective dimension are fully developed on.

5.1.1 Intellectual & Behaviour Dimension

The interaction feature on The Boat has 2 options, first with auto scroll and secondly with manual control in the form of scrolling up and down the screen using a mouse or trackpad, this supports linear storytelling so that the audience can read content at their respective tempo by navigating vertically. There is chapter navigation so that users can quickly access the story if needed, the website also has photos & videos of the real displaced victims. The main plot, namely Mai's journey and experience as a refugee from Vietnam is packaged through supporting narratives, namely stimuli that can strengthen the story's dynamic. The use of black and white monotone colors can provide a different color experience because the role of sound effects, composition and layout as a narrative can invite the audience to explore the designed narrative. On this website, the parallax scrolling technique provides usability to adjust the tempo and storyline so that users can interact with the existing timeline. This control makes it easy for the user to repeat the whole story through the diverging stage (feel & watch) to accomodating (active experimentation).

5.2 Kopke

It is an interactive website for a company called Kopke in Portugal that has been developing wine products since 1638. Emphasizing the history and experience of the product that has passed down, the audience is invited to explore the manufacturing process and experience the authenticity of the products offered.
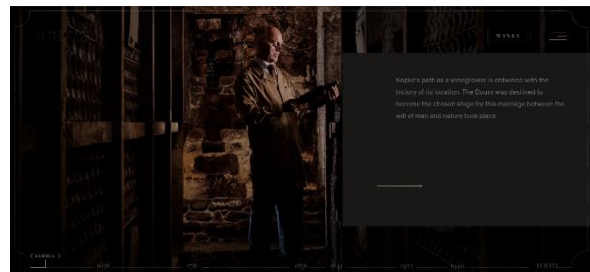

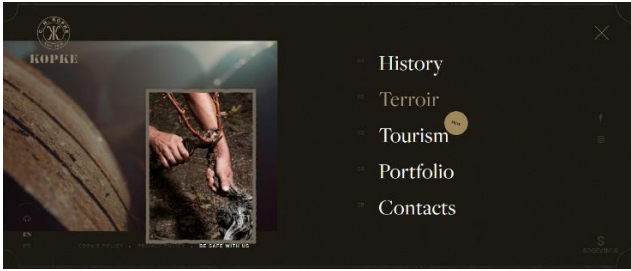**Figure 10**. Kopke (www.kopke1638.com)

Figure 11. Kopke Navigation (www.kopke1638.com)

Figure 12. Kopke History Movement
(www.kopke1638.com)

Tabel 2. Interactive Design Elements of Kopke Website

Interactive Design Elements					
Connection	Emotion	Movement	Nature Elements	Playfulness	Social Presence
V	**X**	**V**	**X**	**X**	**X**

5.2.1 Sensory & Affective Dimension of Kopke

Kopke's strategy (plot) shows product exclusivity through historical translation as a long part of product development. Visually, the colors, composition and layout have a dark, glamorous feel, accompanied by a musical instrument background that accompanies the audience to explore with horizontal navigation, these elements can act as a supporting narrative. The navigation panel is placed on the right side while in the history page, the timeline for information is placed on the bottom side. The visual hierarchy doesn't work very well because each object lacks contrast in size, color or layout. However, the audience can experience the appropriate experience supported by several features and stimuli. The stimuli sound accompanied by background music (stringed instruments) gives an elegant and mysterious cultural nuance in accordance with the narrator's vocals which are closely related to the European accent.

5.2.1 Intellectual & Behaviour Dimension of Kopke

The parallax technique is used to distinguish 2 main layers, the background and the information layer. On the main page, the background uses the WebGl technique, which presents a cinematic video accompanied by voice over narration. Audiences can browse the website through manual exploration or by using the auto feature to enjoy the browsing flow from all navigation automatically. Scrolling is done horizontally making it easy for users to enjoy the wide format or panorama which is the basic background of parallax. The tempo of each layer is different to create a harmonious movement effect accompanied by elegant typeface animation**.**

On this website, the flow of content is not designed entirely through narrative and directed plot. Unlike the previous case studies that have a clear storyline, the ultimate goal of the Kopke website is to highlight the unique value of the wine product that excels the experience from the year of its establishment. users are directed to feel and watch (diverging), think and watch (assimilating), and converging to lead sales (store).

6. CONCLUSION

The two case studies above provide insight into how the experiential dimension and interactive design elements work through the parallax scrolling technique. The use of the parallax technique in combination with other audio-visual stimuli provides a dynamic sensation of experience. This is considered as one of the effective learning alternatives so that students can interact directly with learning materials. These several points can be used as a basis for further research. • With a high level of accessibility and good network connections, website media can be an effective online learning platform, especially in the asynchronous learning method.

• The four stages of Kolb's learning cycle are still relevant to be implemented as experiential learning today. The diverging, assimilating, converging and accommodating stages can be converted into a story plot that makes learning material easier to convey to students. In learning theoretical material, experiential learning can play an optimal role because it adapts to students' learning styles, both audio, visual and kinesthetic.

• Through the experience dimension promoted by Brakus & Zarantonello, the learning cycle process can be activated systematically. In several other cases studies such as The O by Nars, sensory dimensions were developed optimally through audio-visual engineering so that users can experience sensory sensation simulations. An interesting experience will improve students' memory in learning while fulfilling learning outcomes. Therefore, the interactive elements found in the case studies reinforce this experience as instrumental (usability) and non-instrumental (sensory appeal)

• One of the frameworks developed by Jesse James Garret can be used in designing experiences on a structured

website platform. This framework can be used as a basis for further research, namely the design of online learning media that emphasizes experience.

Tabel 3. Adapted User experience framework proposal for online learning design

Element of User Experience	Context		
Surface	Sensory Design		
	Graphic Design (Image)	Audio	Motion
	Shape, symbolism, line, color, spacial composition, texture, dimension, visual rendering	Music, voice over, sound effect	Animation, change, motion, time, rhytm, calculus
Skeleton	Interface Design		Navigation Design
	Graphical ad informational design elements utilized to indicate controls for data manipulation. Parallax Scrolling Tecniques : Horizontal / vertical navigation slideshow, scroll trigger, WebGL 3D, frame image.		
Structure	Interaction Design		Information Architecture
	Task Flow, System Flow, Human Comprehensibility		Textual style, graphic, composition.
Scope	Asynchronous Learning Methods		Content elements
			Text, Pictures, video, diagram, table, statistic etc.
			Immersive & Experience themes : Connection, Emotional Expression, Movement, Nature Elements, Playfulness, Social presence
Strategy	Four Stage Learning Cycle		Subject's learning outcome
	Diverging, Assimilating, Converging, Accomodating		

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