

The Effects of 10 User Interface (UI) Elements on Game Design Process

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ABSTRACT

This paper aims to seek and identify the relationships between 10 user interface (UI) elements in game design. To study the relationships, 50 games of varying designs and genres were selected and analyzed. The 10 elements in focus are connectivity, simplicity, directional, informative, interactivity, user-friendliness, comprehensiveness, continuity, personalization, and internal use. At the same time, it discusses how the game interface should follow the rules of the user interface to experience optimal gameplay and to derive valuable outcomes and user acceptance of the technology. To that end, the results showed how important it is to incorporate the 10 UI in the game designing process and facilitating higher learning outcomes through understanding and engagement.

Keywords: User interface, Human Computer Interaction, User experiences, Game experience

INTRODUCTION

Recently, video games are reaching the peak of human desire, and new technological discoveries mean that there are constantly significant innovations in video gaming. Playing the game will be more pleasurable albeit time consuming because of the integration of communication, technology, and social elements. However, players may access their games anywhere and at any time via smartphone, tablet, or other devices [1]. As a result, research focusing on user experience (UX) and user interface (UI) design to address the issues of developing new methods, disciplines, tools and techniques in human-computer interaction (HCI) [2] have become an increasing trend.

Game developers and designers are beginning to include HCI techniques and methods into their development processes, particularly for UX and UI, to fully understand and evaluate their outputs and products [3][4]. All of this must be performed to establish a standard in the products, which must be produced with flexible UX and UI [5]. Additionally, game developers and designers, as well as academics, must be assisted in identifying the critical factors in modelling UX and UI that will aid in the future development of successful and productive games [6][7].

This paper identifies the UI elements currently used in game design. The 10 UI elements [8] earlier mentioned were tested and aligned with 50 existing games across genres. The Human-Centred Design Process was used to analyse the effects of UI elements on game design.

BACKGROUND STUDY

User Interface (UI)

The advancement of technology has revolutionized the concept of interface design. It is essential to realize that any new application, software, and website should be designed and developed with efficiency in mind [9]. The UI becomes the fundamental point of human-computer interaction and communication in any device between the user, the application, and the environment [10][11][12]. It indicates an application's capability, credibility, and user acceptance and usefulness. An efficient UI keeps the user aware and engaged in the application, software, and website [13][14]. It might include the display screen, keyboard, mouse, and desktop display connected to visual design [1]. Designing an efficient UI, the process begins with understanding the user needs and interaction, characteristics, learning culture and environment, objective, and motivation [15][16][17][18]. This is because users tend to assess design instantly and are more concerned with usability and friendliness rather than the concept of the design, and if the task is completed successfully and without wasting time.

There are numerous academic research on user interface design. A user interface design for E-Learning software, for example, has been introduced by [16] to improve the learning environment and motivation. The research found that the most important issue in designing learning applications is the user interface. Meanwhile, [19] did a systematic literature review for UI in order to design specific applications like UNESCO World Heritage Site, and recommended the UI guideline for future development. *The Eight Golden Rules of UI* [15], *Additional Guideline for Mobile Interface Design* [20], *User Interface Design Principle* [21], and *Seven Usability Guideline for Website on Mobile Device* [22] have been introduced as a significant guideline for UI. Essentially, *The Ten UI Elements* [8] combine all four guidelines to fill the gap and add a new dimension to the UI itself.

The findings from *The Ten UI Elements* can be implemented in the UI development process. Based on the analysis, the 10 elements are connectivity, simplicity, directional, informative, interactivity, user-friendliness, comprehensiveness, continuity, personalization, and internal. Each element has its own unique characteristics that will assist the designer in establishing and engaging in the design process.

Game Design Process

Game design is about applying the design and philosophy of art to develop a game for entertainment, education, exercise, experimental purposes, and other interactions, such as gamification. It can be defined by a set of game elements and learning theories, game objective and mechanic, interaction, and problem-solving [23]. According to [24], there are three elements in game design to take into account: 1) mechanics and systems (*the rules of objects in the game*); 2) gameplay (*focus on the interaction between player and the mechanics and system*); and 3) player experience (*user experience when playing the game*).

These elements play an important role in game design. Mechanics and system, for example, to achieve designer goals, whereas attentive consideration is implemented as it affects game balance and to ensure smooth functioning of the game world [25][26]. A game mechanism is essential in the game's rule system that addresses the various aspects of interaction throughout the game [27]. For example, during the game, players might trade with one another. The kind of trading, how and when it can transpire, is specified in the rules for each game mechanics. Thus, gameplay could be defined as a specific combination of interaction in game elements [28][29] and impacts the overall composition of the game. This is also described by the game rules, the player's connection to the game, the narrative, and the player's engagement [30]. Gameplay demands extensive skills and requires explicit knowledge of handling the game controllers or keyboard commands [31]. Hence, as stated by [32], gameplay is the set of actions that can be achieved by the player and other parties in the virtual environment throughout the ludic experience. Consideration of the player's experience while playing the game is a crucial aspect of the game design process since it is one of the criteria used to determine a game's success [33]. This experience is gained from the interaction that occurs throughout the game by way of emotion, environment, narrative, and mechanics [34].

Therefore, in game designing, accuracy in the aspect of user interaction and engagement is crucial. There are a few factors that need to be considered following the available guideline and specifications in order to gauge the effectiveness of game elements and user interface design.

METHODOLOGY AND ANALYSIS

This study implemented the Human-Centred Design process model (HCD) (Iso, 1999) as a reference as well as the HCD classification model by [35]. The study covered two out of six stages based on the HCD process model: 1) planning and scoping; and 2) context of use with a focus on the game platform and genre to analyse the effects and relationship of the ten UI elements on game design.

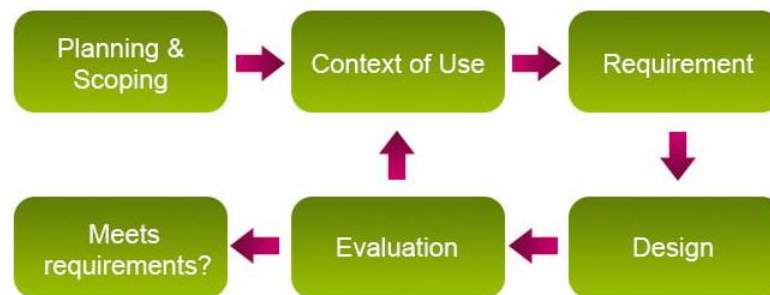


Figure 1.0: Human-Centred Design Process Model

Seventy games were selected based on four-player experience from the UJMM2143 User Interface and Design class at UTAR. Of the 70 selected, only 50 games were “planning and scope” based on three aspects introduced by [35]: 1) why the game is being developed; 2) the objective of the game; and 3) why players play the game. All the games are then compared with the 10 UI elements introduced by [8], to observe and determine the effect on the game design process. Likert scale 1-5 (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree) was used to measure the effectiveness of UI elements on each game. From the results of *Table 1*, it can be summarized that each game had some similarities in the UI elements scale. It also showed that all of the games implemented the HCI technique as stated by [3][4].

Table 1: Fifty selected games vs 10 UI Elements

No	Game	Genre	UI 1	UI 2	UI 3	UI 4	UI 5	UI 6	UI 7	UI 8	UI 9	UI 10
1	hack//GU Last Recode	Action RPG	5	5	5	5	5	4	4	5	4	5
2	7th Dragon 2020	RPG	5	5	5	5	5	5	3	4	1	5
3	Altered Beast PS2	Action	4	3	3	2	3	3	3	5	2	5
4	Among Us	Social Deduction	5	5	5	4	5	5	5	5	4	4
5	Cities: Skylines	Simulation	5	2	4	5	3	4	4	4	5	4
6	Crash Bandicoot N. Sane Trilogy	Platforming	4	5	5	5	5	5	5	5	2	5
7	Devil May Cry 3: Dante's Awakening	Action	4	4	3	3	3	5	3	5	2	5
8	Doodle God	Puzzle	5	5	5	5	5	5	4	5	1	5
9	Epic Seven	RPG	3	4	5	4	5	5	3	3	1	3
10	Fate Grand Order	RPG	3	4	5	4	5	5	3	3	1	3
11	Final Fantasy Dissidia Duodecim	Action	4	4	5	3	4	4	3	3	1	5
12	Game Dev Story	Simulation	5	3	4	5	4	4	4	5	5	5
13	God Eater 3	Action RPG	4	2	4	5	3	4	4	4	5	5
14	God Eater Burst	Action	4	4	5	4	4	4	4	3	3	5
15	God of War: Ghost of Sparta	Action	5	4	3	3	5	4	3	5	3	5
16	Harvest Moon:Friend of Mineral Town	RPG	4	4	3	3	5	3	3	5	1	5
17	Haunt the House: Terrortown	Action Puzzle	5	5	5	5	5	5	4	5	1	4
18	Heroes of Might and Magic V	Turn Based Strategy	3	3	3	4	3	3	4	3	4	4

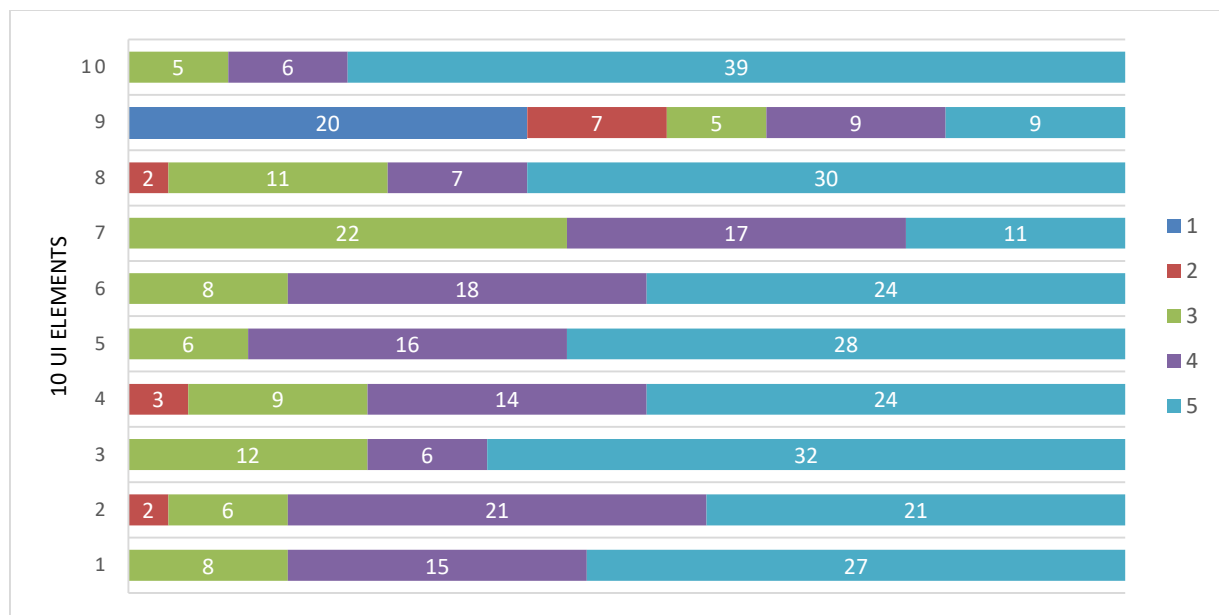
19	Honkai Impact 3rd	Action	3	4	3	4	5	4	3	3	1	3
20	Kingdom Heart 2	RPG	5	4	5	4	5	4	3	5	1	5
21	Kingdom Rush	Tower Defense	5	5	5	5	5	5	5	5	3	5
22	Legend of Zelda:Phantom Hourglass	Action	4	5	5	4	5	4	3	5	1	5
23	Magicka 2	Action Adventure	5	4	5	3	4	4	4	5	5	5
24	Megaman Battle Network 6	Real Time RPG	5	4	5	5	5	5	4	5	4	5
25	Megaman X8	Action	4	4	3	3	4	4	3	3	1	5
26	Metal Slug X	Shooting	5	5	3	2	5	5	3	5	1	5
27	Naruto Shippuden: Ultimate Ninja 5	Fighting	5	4	5	4	5	3	5	4	5	5
28	Naruto Shippuden: Ultimate Ninja	Fighting	3	4	3	2	4	3	3	3	2	5
29	Okami HD	Action Adventure	4	4	5	3	5	4	5	5	4	5
30	Persona 3	RPG	5	5	5	5	5	5	3	5	1	5
31	Persona 4 Golden	Turn Based RPG	5	5	5	4	4	4	4	4	4	5
32	Plague Inc: Evolved	Simulation	5	4	4	5	4	5	5	4	4	5
33	Plants vs Zombies	Strategic	5	4	5	5	5	5	3	3	2	5
34	Pokemon Black Version	RPG	5	5	5	5	5	5	3	5	1	5
35	Pokemon Emerald	Turn Based RPG	5	5	5	5	4	3	4	5	5	5
36	Resident Evil 4	FPS	4	5	3	3	4	3	4	5	2	5
37	Scribblenauts Unlimited	Puzzle	5	5	5	5	5	5	5	5	5	5
38	SD Gundam G Generation:Over World	Strategic	4	5	4	4	4	5	3	3	1	5
39	Shadowverse	Card	3	3	5	5	4	5	3	2	1	3
40	Shining Resonance Refrain	Action RPG	4	3	5	4	4	4	4	5	3	4
41	Smite	MOBA	3	4	5	4	5	4	4	5	5	3
42	Sol Trigger	RPG	5	5	5	5	5	5	3	4	1	5
43	Sonic Forces: Speed Battle	Racing	4	5	5	5	5	5	5	5	1	5
44	Sonic Generations	Platforming	5	5	5	5	5	5	5	5	4	4
45	Story of Seasons: Friends of Mineral Town	Simulation	5	4	4	5	4	4	5	5	3	5
46	Tales of Berseria	Action RPG	5	5	5	5	4	5	4	5	4	5
47	The Elder Scrolls Online	MMORPG	5	4	5	4	5	4	5	5	5	5
48	Undertale	RPG	5	5	3	5	5	5	4	5	2	5
49	Warrior Orochi	Action	4	4	3	3	4	3	3	3	1	5
50	Yugioh Tag Force Arc V	Card	3	3	5	5	3	5	3	2	1	5

U1: Connectivity, U2: Simplicity, U3: Directional, U4: Informative. U5: Interactivity, U6: User friendliness, U7: Comprehensiveness, U8: Continuity, U9: Personalization, U10: Internal.

RESULTS AND DISCUSSION

It was readily visible in the results, the variation of scale in the UI elements. Across 19 game genres, 74.8% agreed that the effect and relationship of the 10 UI elements was clearly defined and stated that the implementation of UI elements in the game design process nowadays is indispensable in the bid to understand user experience (UX). Below is a detailed explanation for each of the elements based on the analysis in *Figure 2*.

Figure 2: The 10 UI Elements Analysis



1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree

Connectivity

In 54% of the games, the connectivity element in indicating the essential relationship of UI to both the developers and the players were apparent. Connectivity improved the gaming experience because player input would have an immediate corresponding effect on the screen. Player immersion which is related to the *Personalization* element to be discussed later, will be effective.

Furthermore, connectivity is also related to in-game notifications. Most games seem to implement this feature as it can inform the player on the details without the player having to regularly check into the UI manually. It saves time and fulfills the definition of connectivity, which is the ability to access information quickly, and within a short time frame.

Simplicity

The simplicity of UI seems to correlate with several game mechanics/elements. In other words, games with simple controls seem to have a simple user interface, compared to games with complexity. Games such as *Among Us (Online Multiplayer)* and *Kingdom Rush (Tower Defense)*, are more casual due to their simple gameplay and controls. Majority of the games (84%) have the simplicity element in their game design processes.

However, simulation games like *Cities: Skyline (rated 2)*, and *Game Dev Story (rated 3)* rated lower due to simulation games relying heavily on UI to manage different game statistics and elements. To add, *God Eater 3 (Action RPG)* has many different gauge bars that the players need to pay attention to while fighting monsters, such as the Health Point bar, Oracle Point bar, Stamina gauge, Burst gauge and so on. All these will split part of the player's attention from the actual gameplay combat.

Directional

Of the 50 games, 38 had a directional element, with top-down interactions that make navigation easier. UI is arranged in an ordered sequence to makes it easier for both the developers and players to identify and navigate the in-game experience.

Meanwhile, the game tutorial, considered as a UI element is used to teach and guide players through a step-by-step procedure. Many games in the analysis have some form of tutorial when a new player starts to play. Having a game tutorial can quickly help players understand the gameplay.

Informative

Most of the games seem to have an informative element to convey important information. For instance, in role-playing games (*RPG*), one will often find a description box displaying details like statistics, rarity and effect descriptions of items or equipment.

Action games like *Magicka 2* and *Okami HD*, however, use a less descriptive design. This could be due to the aesthetics of the game genre which encourages player experimentation on the different controls and settings. Unlike *RPG* which is more stats-oriented, action games are more about reflexes and navigation.

Interactivity

Of the games, 88% have a relationship with an interactivity element. It showed how this UI element played a crucial part when it came to having clear and simple navigation. It is influenced by *simplicity* and *directional*. It beckons players to get on the game at any time with the positive interaction it offers as well as the overall good user experience to be had. To support this explanation, the interactive element in *Figure 1* seems to be more-or-less the average or between the *simplicity* and *directional* ratings.

User Friendliness

From the analysis, 84% of the games have user-friendly UI designs, except for the games that were rated 3 such as *Altered Beast*, *Harvest Moon*, *Heroes of Might and Magic V*, *Naruto Shippuden*, *Pokemon Emerald*, *Resident Evil 4*, and *Warrior Orochi*.

Despite all being from different genres, one thing they had in common was that they were older games, released in 2004, 2006, and 2007. Their designs followed the older design requirements and characteristics. Most of the other games in the list were newer in release, suggesting the improvements in design choices created a more user-friendly UI.

Comprehensive

Usage of appropriate text or symbols will help the user understand the functions of the UI. Referring to *Figure 1*, no games rated below 3. This indicates that the games in the list mostly employ terminology that can relate to real-life or common sense across the game platform. Using terms that are easy to comprehend, it can help newbies, players who are new to gaming to form some basic “*video game literacy*”. For example, *Health Points (HP)* is a term which only exists in video games, but the words “*Health*” and “*Points*” are understandable English terms that are not too difficult to learn.

Continuity

Continuity refers to the consistency of UI designs and controls connecting the player and the game. It can help players learn to use the UI through repetition and avoid having distractions. More than 70% of the games rated 5, which means most of the interface is designed in fixed patterns. This element is efficient across genres but especially so for *RPG* and *simulation* games, which usually have more game elements to manage. Consistent UI design will make it easier for someone to understand and remember the UI features over time, no matter how complex it may be.

Personalization

Personalization is associated with the *connectivity* element. A responsive UI will improve the gaming experience and engage the player to feeling that they are in command. Many games succeed in doing so by allowing different choices or options for players. For example, *God Eater 3* and *Magicka 2* allow the player to customize button controls to fit their playstyle. Meantime, *Among Us* and *The Elder Scrolls Online* allow players to customize their character, appearance, or outfit.

A few games rated 1 or 2 for this element compared to others. This may be the case for some games because it is an artistic choice decided by the developer. The developer may want the game to play in the way they personally envision.

Internal

Error-prevention is well executed in most of the games listed. This factor is essential to developers since any internal errors may break the game experience or even affect the results of the game. For example, a saving error may result in unreadable saved files, preventing players from continuing their game from where they last stopped, forcing them to start all over again.

An online game that fails to connect to the internet keeps the player stalled on the loading screen as the player cannot enter nor exit the game. Such game-breaking errors are usually checked and rechecked before a game is released. Thus, most of the games available do not have major issues.

CONCLUSION AND FUTURE WORK

It is extensive to examine the UI elements that lead to effectiveness and relationship in the game design process. It proves that any game genre can embed specific UI elements within their development processes. As stated by [3], the implementation of HCI techniques in any product development can establish positive implications; beneficial for users as it indirectly creates a good learning environment. This paper supports that such knowledge is advantageous for the game design process. All the elements clearly show their relationship in the various games across genres.

This paper also highlights all the UI elements connected with UX and support to contribute game experience for players. Advancement in designing UI must be prioritized frequently with deep research and systematic review to help players understand the game environment and structure in more detail. In conclusion, by considering *The Ten User Interface Elements* as a benchmark in the game design process, game developers will focus more on players in all aspects.

No doubt, even further research is needed to validate and understand the UX and game experience. An empirical study about UX and UI will produce a better result in-game environment and contribute enormously to research and community.

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