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DEVELOPMENT OF A HEXAGON AESTHETIC USER EXPERIENCE MODEL FOR AUGMENTED REALITY COMICS

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FAKULTI SENI, KOMPUTERAN DAN INDUSTRI KREATIF
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ABSTRACT

This study aims to examine the potential of synergising models from two different theories, known as aesthetic experience (AX) and user experience (UX), which highlight a sizeable theoretical gap for augmented reality comics (AR comics). Thus, a new model called aesthetic user experience (AUX) was purposed in this study. Design Development Research (DDR) model was adapted through research design in this study. Two evaluation phases namely Fuzzy Delphi Method (FDM) and Structural Equation Model (SEM) were used to develop and to test the constructs and elements. Five experts from comics and five experts from AR were selected to obtain the initial AUX constructs. The analysis was conducted based on FDM conditions: threshold, $d \leq 0.2$, expert consensus percentage > 70% and fuzzy score, Amax > 0.5. The FDM results have established seven constructs namely storytelling, amusement, harmony, inspiration, incentive, mindfulness and efficiency. Model validation was performed using SEM through confirmatory factor analysis (CFA). A total of 193 samples (n = 193) comprised of generation Y and millennials (born in 1982–2010) who had knowledge in the creative fields and information technology were selected. This analysis is based on the condition of model fit in CFA: factor loading $\lambda > 0.7$, df < 5.0, CFI and TLI > 0.8, RMSEA > 0.05 to 0.09 and convergent validity (AVE) > 0.45. The CFA analysis confirmed six constructs namely storytelling, amusement, harmony, inspiration, mindfulness and efficiency, hence the name hexagon AUX model. The new proposed model has immense implications for emerging areas of art and technology. Potential applications for the hexagon AUX models can be extended beyond VR comic such as VR drawing, AR painting and immersive digital art installation.

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PEMBANGUNAN MODEL PENGALAMAN PENGGUNA ESTETIK HEKSAGON UNTUK KOMIK REALITI TERIMBUH

ABSTRAK

Kajian ini bertujuan untuk mengkaji potensi integrasi model dari dua teori yang berbeza, yang dikenali sebagai pengalaman estetik (AX) dan pengalaman pengguna (UX), yang menonjolkan jurang teori yang cukup besar untuk komik reality terimbuh (augmented reality comics-AR comics). Oleh itu, model baharu yang dipanggil *aesthetic user experience* (AUX) dicadangkan dalam kajian ini. Model *Design Development Research* (DDR) telah diadaptasi melalui reka bentuk kajian dalam kajian ini. Dua fasa penilaian iaitu Kaedah *fuzzy delphi method* (FDM) dan *structural equation model* (SEM) digunakan untuk membangun dan menguji konstruk dan elemen. Lima pakar dari komik dan lima pakar dari AR telah dipilih untuk mendapatkan model awal AUX. Analisis dijalankan berdasarkan persetujuan FDM: threshold, d≤ 0.2, peratusan konsensus pakar > 70% dan skor fuzzy, Amax > 0.5. Hasil FDM telah membentuk tujuh konstruk iaitu *storytelling, amusement, harmony, inspiration, incentive, mindfulness* dan *efficiency*. Pengesahan model dilakukan menggunakan SEM melalui analisis faktor pengesahan (CFA). Sebanyak 193 sampel (n = 193) terdiri daripada generasi Y dan milenium (lahir pada 1982–2010) yang mempunyai pengetahuan dalam bidang kreatif dan teknologi maklumat telah dipilih. Analisis ini berdasarkan keadaan model sesuai dalam CFA: factor loading λ> 0,7, df <5,0, CFI dan TLI> 0,8, RMSEA> 0,05 hingga 0,09 dan convergent validity (AVE)> 0,45. Analisis CFA mengesahkan enam konstruk iaitu *storytelling, amusement, harmony, inspiration, mindfulness* dan *efficiency*, dan dinamakan *the hexagon of AUX* model. Model baru yang dicadangkan mempunyai implikasi yang besar untuk bidang integrasi seni dan teknologi. Aplikasi yang berpotensi untuk model *hexagon AUX* dapat diperluas di luar konteks komik seperti lukisan VR, lukisan AR dan seni installasi.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

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Since 2013, the printing industry, especially books, magazines, and newspapers, has been through a more robust challenge when there is a decline in sales and acceptances to the media (Abdulah and Ishak, 2016). The issue starting with the declining of newspaper sales like the New Straits Times (NST), which was recorded with the most significant drop of 32.4% to 37,885 copies a day followed by a 25% drop of *Harian Metro* sales. On the contrary, there was a considerable increase in each of these newspapers' digital platforms when NST recorded 12.65 million users in news and information categories. Simultaneously, *Harian Metro* registered 13.07 million users, and *Berita Harian* gathers 41.06 million users throughout 2017 (Alivi et al., 2018 ; Nielsen 2018)

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Likewise, with the National book industry, the fall of physical book sales has made the iconic bookstore MPH close one of its shops located in *One Utama* Kuala Lumpur in August 2018, proving that the book industry is also going through a tough challenge. MPH also expects that there will be another branch closing down as the response to the demand of physical books is getting less and alarming.

Worryingly, Malaysia's desire to develop Kuala Lumpur as a world-class city book by 2020 under United Nations educational, scientific and cultural organizations (UNESCO) will be affected by the national book industry (Sanusi and Adnan, 2014). However, simultaneously, an increase of 2% demand to digital books recorded every month allows a substantial shift of reader trends to favourite books to a more interactive environment (Alivi et al., 2018 ; Nielsen, 2018 ; Santos, 2011)

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Equally important, the comic book industry was also affected by this challenge when the two largest comic producers, DC comic and Marvel, announced a 6.5% drop in 2017 from US $ 1.015 billion down to US $ 70 million by 2016. One of the most prominent factors why this issue occurred is due to the rapid growth of digital environment around the world. By way of example, DC Universe platforms are among the highest platforms streaming content by user (Alivi et al., 2018 ; Nielsen, 2018 ; Santos, 2011; Abdulah and Ishak, 2016).

In August 6, 2015, a local comic magazine created an unexpected history when MOY publication that publishes popular magazines *Apo* and *Ujang* was officially closed for the magazine publication. MOY publishing director admitted that digital readers' trend contributes to the magazine's sale to collapse. Aligned with this, MOY

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has taken a digital approach by setting up *Bekazon's*, which is focusing on e-comics and motion comics besides making online comic sale.

Since the new media's birth in 1995, the changes in life, social, way of thinking, and working environment grow gradually (Alivi et al., 2018). In the publishing area, the newspapers, books, or comics are holistically changing from content form presentation to book production processes involving editing, designing, printing, and distribution. In today's digital era, all conventional content is no longer tied to a particular form. It is more interactive and co-existed with the device that became its reading platform (Abdullah & Ish ak, 2016; Sanusi & Mustaffa, 2015). The birth of new media, as well as internet technology, directly boosts up the method of delivering information. In publication, Silva (2011), mentions that digital publishing is not merely conventional format transfer to digital-only but has distinctive characters such as; interactivity and motion, which completely changed its publication format from conventional to digital screen.

Recently, we are moving towards 4.0 industry revolution that comes with mix reality technology (MR), Virtual reality (VR), augmented reality (AR), and Hologram. They shift the landscape of the publication to something unexpected when text, sound, visual and animation appear in lines not only on screen but beyond that. This has caused greater impact on digital technology. By the same token, internet speed phenomenon and cloud computing has also became a significant contributor to the publishing industry when Nielsen (2018) reported that digital media had grown steadily through the usage of the internet.

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More than 70% of Malaysians from the age of 15 years old and above use the internet, with 98% using the internet via smartphone, each subscribing to a data plan, and 63% using Wi-Fi. Nielsen (2018) also reported an average of 15 hours used by Malaysians using smartphones and the rest for other devices such as laptops and tablets. This trend data demonstrates that the landscape of Malaysian thinking and life has changed holistically and directly affects the national publishing industry.

1.1.Problem Statement

Digital technology allows comics to evolve from conventional printed media to more interactive digital comics, on-screen, non-sequential pages, animations, sound, and special effects. It was coupled with advancement in mobile technologies that plays a significant role in transforming comic art (Arroio, 2011; Smith, 2015).

The transformation of conventional comics into digital comics reflects the growth of comic's demands in digital environment. It started with comics on the web, and then switched to interactive comics and eventually to motion comics. Comics are no longer presented in the traditional forms, but the medium is relevant as technology progresses. In a practical sense, it can be said that comics are an ever-expanding aesthetic object.

The effect of today's digital technology has integrated augmented reality (AR) with virtual reality (VR) into mix-reality (MR) and is widely explored in various fields. AR itself is moving fast in content, visual, animation, media, and interactivity.

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In addition, mobile technology's existent makes AR more relevant to users and achieving high user targets (Jamali et al., 2014). Under these circumstances, there is a wide range of AR-based products on the market such as AR coloring books, prosthetic reality, AR advertising, and AR shopper (Furht, 2011; Webel et al., 2011; Cowling et al., 2017).

Lately, AR products have been improved with new quality and experience to art objects such as drawing, painting, and posters. Undoubtedly, in comics, there has been an emergence of conventional comics that make an AR element a new experience for readers or comic fans. In 2014, an initiative in the Modern Polaxis AR comic book project by Sutu, has incorporated AR experience as a new comic reading medium. Destiny's Sword and the Masters of the Sun comics were involved where these comics are presented traditionally and supplemented with the AR experience. As the result, AR has become a bridge that transforms conventional comics to digital technology.

Theoretically, AR product relates to the science of human-computer interaction (HCI) and uses a user experience approach (UX) as a method of measuring an AR product (Law et al., 2008; Peng et al., 2009; Zaphiris, 2013). In Hassenzahl's (2007) study, there are two primary UX components, which are pragmatic and hedonic. Both components support each other to achieve positive UX. In a pragmatic approach, the focus is on UX products that are perceived to have the ability to support achievements or do-goals. On the other hand, hedonic refers to the ability to achieve goals.

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In the study of Schrepp et al. (2013), pragmatic and hedonic elements were used as an impression guides for the product on its acceptance or rejection. The study stated pragmatics approach includes task-oriented quality aspects, efficiency, and learnability, whereas the hedonic approach focuses on stimulation, aesthetic impression, and novelty.

Empirically, Matcha and Rambli (2011) emphasize that positive UX elements are crucial in a technology product or device to determine the effectiveness and usability of a product to a user. It means that the UX approach is meant to avoid the negative UX into technology product (Azzawi, 2013). In other words, to test or implement a technology product, negative elements of UX such as dislike, frustration, and complexity will be avoided to improve a technology product.

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Usability is also an essential component in UX where the aspects of time, function, priority, and positive experience are incredibly stressful. Considering how the user responds to a product and what is the UX element reaction before, during, and after using a product (Alenljung et al.,2017; Irshad & Rambli, 2016).

Irshad (2013) confirms that a significant UX component is designed to find the emotion. Each product that was created, takes into accounts the positive emotions that come from the user's response to the product. Olsson (2013) advocated in his research by proving a substantial UX in order to measure and collect the user positive feedback for designing UX products and avoiding negative UX (Ritos, 2011; Irshad & Rambli, 2016; Hassenzahl, 2007).

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Conversely, comics are classified as one of the art forms or an aesthetic object and should be measured from an aesthetic perspective. There are narrative, visual and text elements in comics that can be used as a medium of expression to invoke emotion (Muliyadi, 2015; Eisner, 2000; McCloud, 1993).

Moens (2018) inspired AX's characteristics based on elements such as, formalities, content, cognitive, perceptions, and emotions to create a vital component which is essential in assessing and measuring aesthetic objects (Harrison & Clark 2016).

Markovic's (2012) study emphasizes that an art object's context seeks to determine the AX element that will be reflected from contemplating an art object. In the context of AX, the process of appreciating the artwork involves the spiritual sense born of its biological, psychological, and social functions, not just to see or appreciate the beauty of the work from a formalistic point of view. Still, it can evoke aesthetic emotions such as sadness, anger, joy, passion, motivation, or even annoyance.

Redies (2015) mentions that appraisal or appreciating a piece of art needs the beholder to go through five stages of aesthetic judgment which is, formalistic, cognitive, content, emotions, and ultimately AX. On the other hand, the beholder who can only appraise the beauty of a formalistic point of view (color, line, composition, and form) is considered providing a naive assessment and requires an expert appraisal to appraise an artwork.

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Obviously, AX has essentially design to stir the emotion by captivating the negative and positive emotion. In the context of an aesthetic object, the art-forms determines the negative or positive emotional elements such as, joy, fun, amusement, sad, anger, fear and dislike that needs to be reflected on aesthetic object to measure the AX element in the comic (Redies, 2015; Leder et al., 2004).

Based on the literature review, it is safe to say that there was no element of AX in the AR product even though studies were done using aesthetic objects as its subject and vice versa, no UX element in the art-forms was found, despite using AR as its medium. Several studies involving AR products integrating arts as its subject matter were evaluated in UX terms such as time, efficiency, usability and design. However, from design context, the evaluation is limited, which only involves the formalistic elements and discard the emotion factor. In the facet of emotions, it is more than positive emotions such as motivation, passion, and encouragement. In other words, it avoids evoking the negative emotions (Radoslavov et al., 2015; Dirin et al.,2018; Qu et al.,2017; Olson et al.,2011).

By way of example, Morreall (2009) used elements of AX in his study to measure comics such as amusement, the paradox of tragedy, and mental jolt without reference to UX elements even though the comic was already integrated with technologies such as interactive, motion comics, webcomics, and AR comics (Smith, 2015; Ayer, 2014; Wang et al., 2019).

Empirically, there is a clearly a huge theoretical gap between AX and UX when managing art and technology-based products like AR comics. This requires a new

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model to review this product. Among UX features that are featured in AR are efficiency, inspiration, motivation, creativity, and meaningfulness, while AX features in comics are; amusement, harmony, storytelling clarity, and mental jolt (Morreall, 2009; Klaehn, 2015; Plutchiks, 1980; Olsson & Mattila, 2011).

In short, this study suggests the synergising of UX and AX in AR comics should be based on several reasons 1) AR is an HCI-based product and highly relevant to UX as a measuring method while, comics are aesthetic objects and necessarily use AX as their measurement method, 2) UX evaluates users, usability, time, and design, while AX involves feeling, content, and expert appraise 3) UX involves technology products and usability, while AX is an aesthetic object and requires appreciation. AR is produced only in enhanced information, but it is imaginative and enhances emotion experience in AR comics.

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1.2 Research Objective

1. To examine the similarity and dissimilarity of construct and elements in AX and UX
2. To explore the possibility of synergising both AX and UX construct as a new model for New Media Art.
3. To design a desirable AR Comic based from Aesthetic User Experience (AUX) model.
4. To validate AUX model using AR Comic as a stimulus.

1.3 Research Question

1. What is the similarities and dissimilarities of AX and UX construct?
2. What are the constructs and elements suitable to be synergised for AUX model?
3. How to integrate AUX model with exiting process to develop AR Comic?
4. How many construct in AUX model deem to be vital to design desirable AR Comic?
5. What are the vital constructs in AUX model in designing desirable AR Comic?

1.4 Hypothesis

H1 There is a vital construct in AUX model to design a desirable AR Comic

H2 There is a strong conformation construct in AUX model in designing AR Comic.

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Table 1

The relationship between research objective and research question.

No	Research Objective	Research Question
1 2	To examine the similarity and dissimilarity of construct and elements in AX and UX. To explore the possibility of combining both AX and UX construct as a new model for New Media Art.	1. What is the similarity and dissimilarity of AX and UX construct? 2. What are the constructs and elements suitable to be synergised for AUX model?
3	To design a desirable AR Comic based on Aesthetic User Experience (AUX) Model.	1. How to integrate AUX model with exiting process to develop AR Comic?
4	To validate AUX model using AR Comic as a stimulus. .	1. How many construct in AUX model deem to be vital to design desirable AR Comic? 2. What are the vital construct in AUX model in designing desirable AR Comic?

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1.5 Conceptual Framework

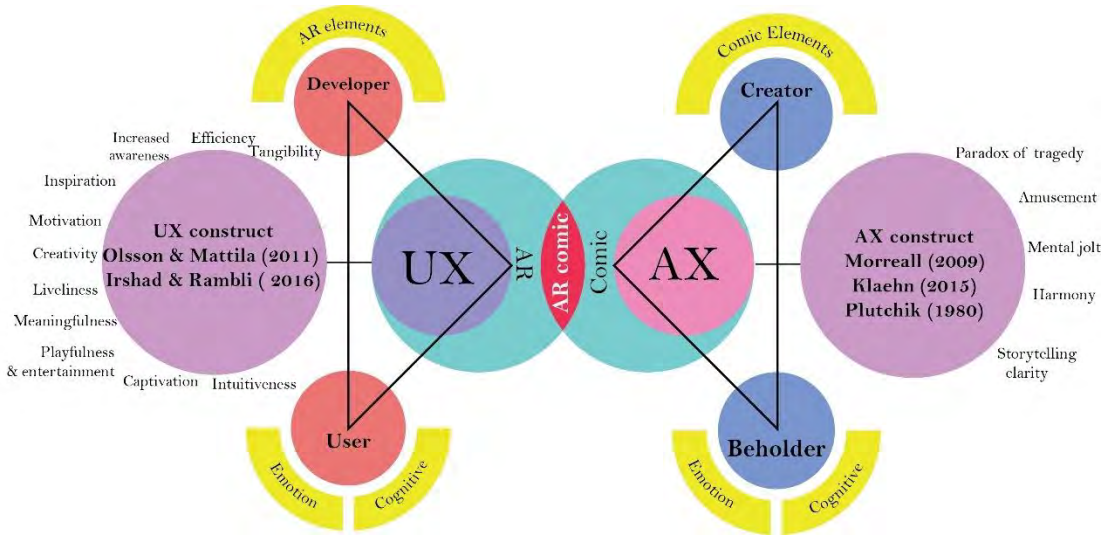


Figure 1. Conceptual framework of synergising the UX and AX in AR comic

In this conceptual framework, it illustrates how AR comic integration based on AX and UX theory. At the development stage, the AR elements are emphasised to meet an AR features such as, to sense properties about the real world, a process in real-time, output (overlay), to provide contextual information, to track real-world object, and mobility. In addition, AR techniques will also be applied in AR comic design, such as, situated visualization, object as context, sensor data as context, the scene as context, and uncertainty as context (Kalkofen et al., 2011; Stefan et al., 2014, Billinghurst et al., 2001 & Braun, 2003).

Meanwhile, at the creation stage, the comic elements become a guideline to create a comic content using AR. According to the comic principles, this element is essential for the content, technical and comics narrative. The intended element are trails, distance pacing, narrative subdivision and fidelity, sustained rhythm,

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gradualism, motion, spatial depth, animated comic book panel, cinematic adaptation, screen-based format and genres (McCloud, 2000; Smith, 2015).

Users need to contemplate AR comics with cognitive and emotion in order to appreciate an AR Comics and reflects the experience in three focused time which are, before, during, and after using the AR comic products. The user cognitive elements need to be regulated because, according to Markovic (2011), prior knowledge is significant in order to contemplate an aesthetic object and give an assessment to an art-forms.

The appraisal of AX and UX ratings against AR comics depends on what elements evoke the user's emotion. In AR, several UX elements react to AR products such as, efficiency, inspiration, motivation, creativity, liveliness, meaningfulness, playful and entertainment, captivation and intuitiveness (Olsson & Mattila, 2011). Conversely, in comics, the cognitive shift occurs when the user reads the comics and produces an AX element. Cognitive shifts such as amusement, arouse, funny, the paradox of tragedy, tragic and mental mode jolt generating bizarre and fantastic modes toward comics (Morreall, 2009).

However, there are many AX and UX elements that need to be considered when measuring AX and UX in AR comics, as outlined by Plutchik (1980), such as contempt, aggressiveness, optimism, love, submission, awe, disapproval and remorse as well as technical elements in UX product such as time, effort, device and design (Parrot, 2001; Matsumo & Hwang, 2011).

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1.6 Significant of research

This study aims to develop a model from a combination of AX and UX to the development of AR comics. The problem statement mentioned earlier clearly shows the need to carry out this research. Positive impacts are expected to few benefits, such as; 1) printed comics will be used extensively because AR comic requires image data to read AR content digitally. This means comics in physical form are needed in line with the AR content that will appear. 2) propose the addition of AX to UX theory since UX is a theory that works with HCI and aesthetic objects require AX as a measurement method and propose the addition of UX to AX theory since AX is a theory that works with aesthetic objects while AR products need to be measured in UX theory.

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Next 3) propose a new model in product validation based on HCI technology and art-forms that is currently being developed. This leads to the need for a combination of new models to measure or evaluate the combined products in art and technology that is produced rapidly. 4) expand the combination of research methodology by proposing Fuzzy Delphi Method (FDM) and Structural Equation Model (SEM). FDM and CFA are two types of a powerful and reliable analysis instruments. The combination of the two analysers will make this research more credible, and 5) expand media use by integrating aesthetic, AR, animation, mobile and 4.0 industries revolution that touches on inter-media technology.

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1.7 Limitation of research

1. Respondents are the generation of Y and Z (18-35 years old) who are the average mobile technology users, the usage internet and most exposed to new media. Cognitively, they also have prior knowledge of the comics and the revolution of technology that affect them.
2. Existing comics are selected from the latest comic works around 2016 to 2017.
3. Using only AR comic as a stimulus agent rather than a conventional comic or other digital comics.

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1.8 Operational definition

1.8.1 User experience

As it is known that UX covers a wide range of areas, like usability, time, effectiveness, system, design, and aesthetics. However, UX in this study refers to HCI related to technology products relevant to MR in generals and AR in particular (Hassenzahl, 2007; Dirin and Laine, 2018; Irshad and Rambli, 2017)

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1.8.2 AX

AX is a field affiliated with art and art activities, including dance, film, theatre, paintings, and sculptures. It is also referred to as an art-form or an aesthetic object. Relatedly to this study, AX refers to the comics as an aesthetic object that is part of illustration art (Harrison and Clark, 2016; Docherty, 2018; Scarles, 2020).

1.8.3 AR comics

AR comics is a combination of aesthetic objects (comics) with technology products (AR). The name AR comics has been popularized and widely used in AR comics released by Marvel namely Master of the Sun in 2017 and comic painter Sutu in 2014 by releasing AR comics titled "Sutu Eat World". Through this study, both entities are different in terms of their scientific field and two significant theories, namely AX and UX.

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CHAPTER 2

LITERATURE REVIEW

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2.1 Introduction

This chapter will discuss the ideas, concepts, and theories involving UX, AX, comic, emotion, Design and Development Research (DDR) and Augmented Reality (AR) as a niche area of this study. In such a case, this chapter also constructs a methodological review of UX and AX models from previous studies. These models are taken because they are among the most citeable, widely used and often used in UX and AX studies. DDR is a reference for research involving product and model development. Comics and AR are technically and theoretically reviewed from the study's scope in the UX and AX aspects. Emotional components play a role in stimulating UX and AX-based products to understand the UX and AX constructs and elements in AR comics.

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2.2 Human experience in Human Computer Interaction (HCI)

The early Human-Computer Interaction (HCI) discovers the involvement interaction of computer with humans. However, the massive development of the research has widened the role of HCI to multidisciplinary field and encompasses almost all information technology designs and all communication devices.

HCI is a broad constructive knowledge, and it overlaps with user-centred design, user interface, and UX (Law et al., 2008). In many ways, HCI is a forerunner of UX. Despite of the fact that there are significant differences between HCI and UX, HCI is inveighing to be academic and empirical of scientific research while UX invariably focused on the industry and developing products and services. For example, phone applications, web and augmented reality applications. Both fields are closely related to the human interaction and technology product (Peng et al. 2009; Zaphiris, 2013).

When it comes to human experience in HCI, the concept of the experience itself is more closely related to how the human experience interacts with a technology product. Concerning this, Azzawi (2013) outlines the concept of experience in technology, namely, time and experience, as an essential concept in the context of experience because experience has a duration and judgments of such duration changes as the experience unfold (Hassenzahl, 2008) There are two elements of time which are physical time and psychological time. Physical time can be measured by the hour, second, minute and day, while psychological time is tied to two types of time, which

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are prospective time and retrospective time (Schacht and Schacht, 2012; Zhou & Jiou, 2013).

The categorisation is the second concept of experience, purposely used to distinguish the contexts in order to categorise them. Regarding this, a user who interacts with technology products in HCI should also be able to have a sense of contextual changes and react tentatively through thought, perception, action, and speech (Forlizzi & Battarbee, 2004; Huang & Stolterman, 2014; Zarour & Alharbi, 2017;).

The concept of meaning is the third concept that is defines the relationship between signs to their significance semantically. The state or response elicits in a person creating meaning to arise their effectiveness and behavioural responses. In other respect, Samson et al. (2017), states that meaning can profoundly affect the experience that the user may have with the technological devices. Consequently, dynamic meaning occurs with everyday experience, and proponents serve to influence the next experience to create another meaning (Ahsanullah et al., 2015; Hassenzahl, 2008).

On the other hand, the concept of making sense involves the construction of a human system as a perceiver. This is where a person makes connection of events by re-construing the events in the light of existing constructs, and perhaps finding alternative constructs that better fit the data, which means that the event is not just the event itself, but the experience and knowledge also contribute to the event psychology (Basri et al., 2016).

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2.2.1 User experience (UX) concept.

Discussing the UX, it is needed to understand the fundamental concepts of UX. Questions like what experience to measure, how to define the experience in order to react to a technology product and what to do after reviewing each of the potential variables have to be asked. On account of this, Azzawi (2013) has presented four concepts of UX support by Hassenzahl (2007), Alenjung et al., (2017), and Olsson (2013). In this study, the concept of UX will be fully applied in the process of producing AR Comic as a platform or as a supplement to AR Comic's features.

The first concept is experience as quality. Determining the quality criteria of experience on an interactive technology product should look holistically about the application of the product, handling and understanding the mechanism, identifying the feelings that are present when they use it and the suitability in the context of the product. In addition, the aesthetic aspect of the product is also considered to meet the needs of consumers (Law et al., 2009; Nikov & Gumaia, 2016). Experience reflects on how people interact with the environment by suggesting that the environment is a stimulus incorporating different modalities. The environment also functions as an enlightening experience involving main responses, namely pleasure, arousal, and dominance. Cherubini and Oliver (2009) mention how people interact with the environment and technology ensues the processes information and suggests emotional reactions that will occur.

Experience as a process proposed a cognitive process to the sensory stimulation method. This stimulus leads to an evaluative assessment that eventually emerges as an

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emotion. This evaluative evaluation also involves three main stages of people's interaction processing with products, namely visceral, behavioural, and reflective (Dirin & Laine, 2018; Wang, 2016; Basri et al., 2016). The fourth concept is the process of UX that highlighted three main components in user experience research that covered several areas including HCI, product design, environmental psychology, social psychology, and technology. The first component is an interaction that can be defined as an action and sensory stimulation perception between user and technology. It is closely incorporated in the usage and control of technology to achieve the necessary information. The perception also emphasizes how they understand what they are supposed to reflect (Samsons et al., 2017).

Construction is the second component in the concept of processes based on the user's experience. Construction plays a vital role because it has a massive impact on users themselves. Basically, construction is a fundamental process for user experience and responds on how the user has a meaningful relationship with technological devices, the narrative aspect, and the experience that fits in with other experience and their general life, sense of time, also the idea of people creating the conceptualisation of their world around them and creating meaning.

The final component is evaluation. It reflects the concept that prioritises evaluative response or consequences of experience. Hence, it encompasses physiological reactions that are reflective, affective, emotional assessment, and aesthetic response (Church & Cherubini, 2010). This reaction is calculated when humans interact with technology-related products.

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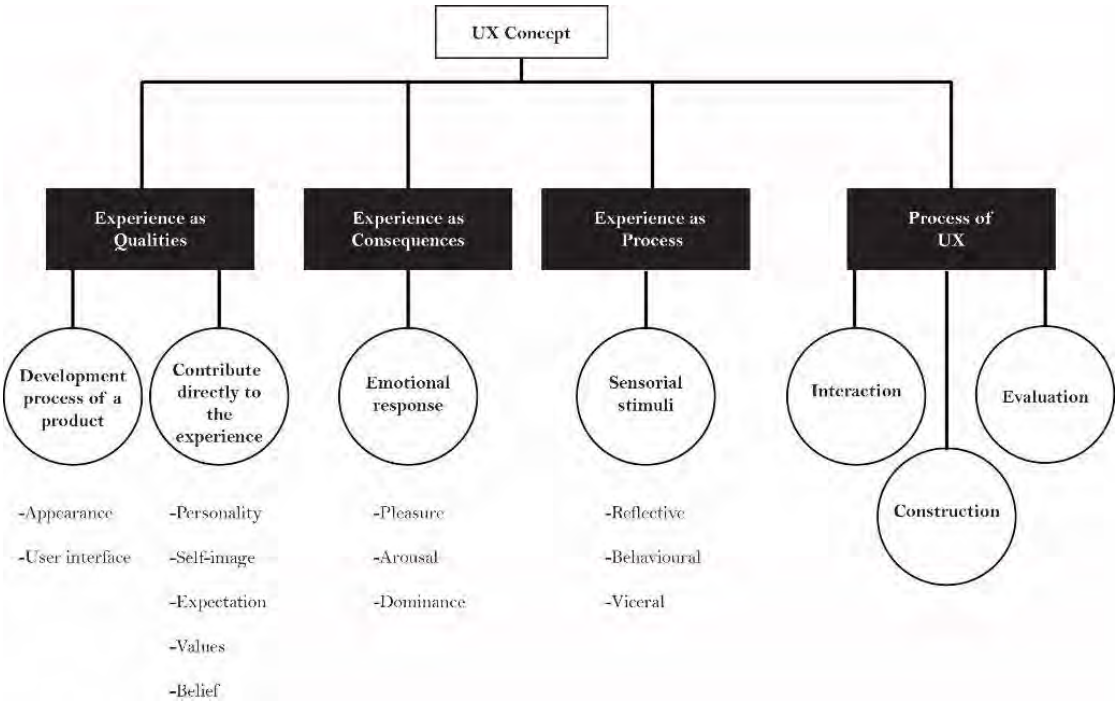


Figure 2. The visual mapping on the concept of UX Azzawi (2014).

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Formally, ISO 20101 defines UX as an element involving human perceptions and responses or expectations of responses using a product, system, or service. It is relevant to the UX, which encompasses emotions, beliefs, preferences, perceptions, and physical and psychological responses. Hence, the use of such products also serve as potent reflexes to the behaviour and achievements that occur before, during, and after using the product.

Concerning this, Thielsch and Thielsch, (2018) emphasise that there is a difference between usability and UX. In contrast, UX has a global objective goal to achieve effectiveness, efficiency, satisfaction and enhance holistic UX from anticipation, interaction, and reflection of the experience. While usability is how the

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user can use the product alone. Usability test only wants to know whether or not the product can be used.

In a practical sense, UX is an effort to approach and research the user as a human being rather than scrutinising feedback on the product itself instead. It aims to identify and overwhelm the issues by adhering to the UX method and the reason something is being done.

Hassenzahl and Tractinsky (2006) point out that the focus of UX is on the positive outcome of the interaction and the usability theory. It diffuses the pragmatic aspects that can be objectively defined. If it involves the UX to measure such aspects of the stimulus, product introduction, appeal, aesthetics, trust, and privacy, which are very subjective, the effects are dynamic as they are affected by various factors.

Additionally, Adikari et al. (2015) support the classic definition above by claiming that the UX is associated with vague, dynamic, and challenging- to- quantify concepts such as experience, perception, excitement, and emotion. In other words, user experience research depends on the user itself, the system and the technical functions, products or services, and contextual factors such as social, cultural layers, and other user activities.

Meanwhile, several researchers claim that user experience is the user perceptions integrate interactions with a product, system, and services in effectiveness, efficiency, and the satisfaction (Irshad & Rambli, 2016; Alenjung et al., 2017; Qu et al., 2016; Kuniasky, 2003).

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Nowadays, UX constructs ample explanation from many studies in HCI, especially in AR products. The user needs to go beyond functionality and shift to experiential perspectives to touch on the usability and cognitive, affective, aesthetics, and positive feelings towards the product.

Ritos et al. (2011) mention that UX can be a larger entity, encompassing usability and the pragmatic and hedonic aspect of a system. UX can be an AR system element such as the visual, sound, haptic, and 3D environment from an AR point of view. In a practical sense, UX can enhance the user reality and specific content of a system.

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2.2.2 Model of UX

In this section, the researcher will implement the methodological review of previous UX models to discuss elements, composition, conceptual framework, and essential elements in the UX.

The first piloted model is the UX by Hassenzahl (2007), which involves designer perspective and user perspective. Briefly, this model suggests two different dimensions of hedonic and pragmatic approach. Pragmatic refers to products that perceive the ability to support achievement or "do-goals," whereas hedonic relates to the capabilities seen to support the achievement of the product's goals (Olsson & Mattila, 2011).

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In a practical sense, this hedonic and pragmatic model clearly distinguishes three facets of hedonics, namely stimulation (novelty, change and personal growth), identification (communication of identity to relevant others and relatedness), and evocation (provoking memories and symbolizing). This facet is the leading proponent of the hedonic approach.

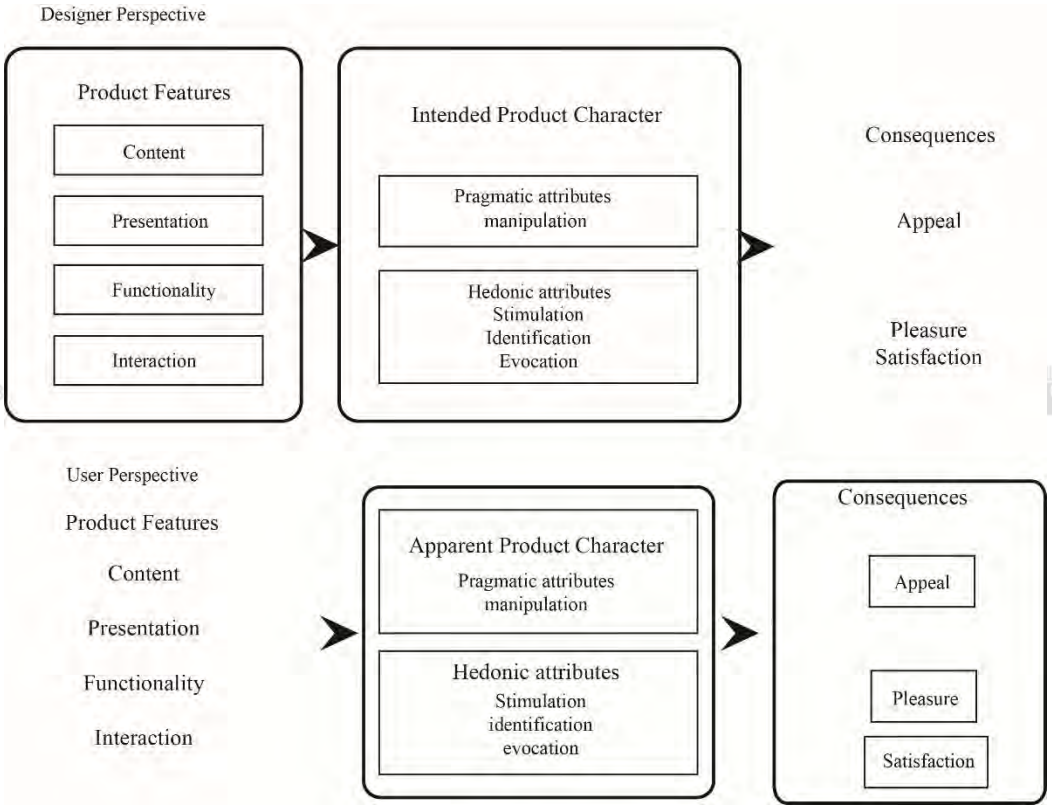


Figure 2.1. The hedonic and pragmatic model of UX Hassenzahl (2007)

This model also assumes that the user observes certain features of interaction products and triggers diverse perceptions. In that case, the design, purpose or function, and the social status and style become elicit features for the user. Admittedly, the experience is bound to the real situation. It involves all kinds of

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emotions, sensations, and thoughts (Zhou and Jiao, 2013; Peng et al., 2009). Naturally, this is quite complex and difficult to construes, but it is an essential factor. The actual experience is presented in four different ways in an explicit part of the models.

First, it is assumed that product perceptions are influenced by experience. In other words, users have an idea of the product and have the ability to satisfy and have their own goals. Still, experience recons trough their perceptions of the product holistically. Second, a user may repeatedly probe perceptions during the experience to get an idea on how they change over time (Irshad & Rambli, 2017). Third, this model explicitly differentiates between perception and global evaluation (good-bad & satisfaction).Similarly, users can use the product as hedonic and should not imply that, there is a feeling of like or dislike in certain circumstances. Fourth, for the impact of the user's general state, two different modes of use define goal and action. In goal-mode, it describes the achievement of do-goals and has particular relevance that determines all actions. In action- mode, the action is at the fore. It determines do-goals are “unstable”.

Fundamentally, the pragmatic product is assessed without a strong argument to be the goal. For example, the user's view of the purpose and function of a product surpassed his experience. In another way, it suggests the ability to make telephone calls whenever needed, but not a particular suitability of the phone to make romantic calls. Thus, although do-goals (making telephone calls) are products of superordinate be-goals (being related to others), individuals make a clear distinction between both aspects (Alenljung et al., 2017).

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The idea is to bring be-goals idea closer and significant to the user. The implication is more interesting because the hedonic account is related to past experiences, for example, souvenir products that may be related to a person's event will give meaning to him. On account of this, the user focuses on the primary function of the product and aspect preference (pragmatic), which is vital for the past experience (hedonic) when it wants to have the product user's focus on pragmatic interactive products (usability) and beauty (design) (Church & Cherubini, 2010; Gamberini et al., 2016).

On the other hand, based on the user's general definition of this model, the UX apparently depends on the hedonic and pragmatic perception. To design the measurable and manageable UX component of timing, relevant and modifying elements are required as main interaction features.

2.2.3 Multi-layered mobile augmented reality (AR) for positive UX

Mobile augmented reality (MAR) is an innovative model theory framework of interfaces for contextual data in mobile application variations. MAR allows users to contemplate real objects coupled with information generated by computers in a mobile environment. The UX of MARs is very challenging as it suggests that users need to predict or visualize visuals and information displayed.

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This model is amenable as Hassenzahl (2007) definition of user experience that suggests four crucial aspects of user experience: subjective, experience, perception, emotional response, and product environment situation. This MAR model's main objective is to implement the design of research for MAR products based on positive user experience.

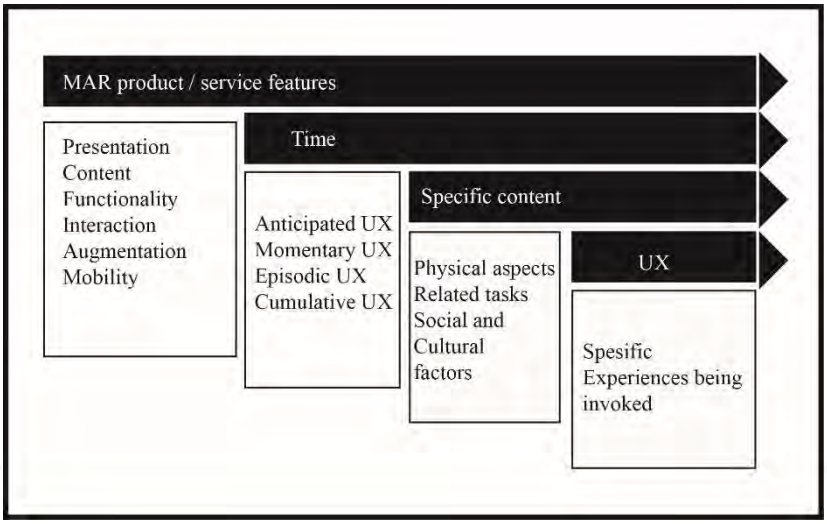


Figure 2.2. MAR framework for positive UX Irshad and Rambli (2016)

A multi-layered conceptual framework is proposed to accumulate a positive UX's needs to illustrate the instrument and design the MAR product. On the other hand, the factors to be considered when planning MAR for UX include essential dimensions such as time, specific context, and how these components cultivate improve UX (Knowles et al., 2014).

Meanwhile, AR standards must focus on UX aspects such as presence, ergonomics, usability, and the environment as the UX in AR foremost from a mobile environment with extraordinary determination. Concerning this, the MARs are

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grouped into six categories; where the first one is presenting the look and feel of a product which has a high impact on UX. The design and presentation of MAR applications, primarily displaying real and virtual content, colors, images, and other media, invoke users' emotional experiences. The impact of MAR applications' presentation and design aspects varies from person to person, depending on their context of use (Olsson, 2013; Irshad & Rambli, 2017). The second category is information content, and the most crucial aspect of MAR applications. The type of visual information ranges from simple informational notations to complex 3D modelling, resulting in different requirements for sufficient user experience.

Service functionality depends on the type of MAR applications. Educational and medical-related applications may provide different functionality to the users compared to advertising and commercial MAR applications. This functional diversity will directly impact the UX of a person. The functionality provided by MAR applications is unique as it combines the real and virtual world elements; thus, evoking new experiences for the user (Lei et al., 2016; Han et al., 2018; Azzawi, 2013).

The fourth category is interaction, as the key difference of MAR applications from conventional interaction in the usage context. The AR experience is delivered on mobile devices, and the user expects to perform the task while they are on the go instantly. (Shin & Jennings, 2013). Augmentation is another category supplemented essential attribute of handheld AR applications with the ability to augment the information in real surroundings. Augmentation is considered a separate product feature as it offers a unique set of UX that includes additional features such as

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emotion, experience, time, and specific content. Augmentation provides user control over the real environment, and practical information is accessed by a single touch (Djamasbi & Wilson, 2017). Hence, streamlining background information and customize augmented content in MAR applications can enrich UX.

The final category is mobility as an essential product feature of handheld AR applications. Typically, it is referred to the usage of the technology being used in mobile contexts and activities in general and allowing interaction anytime and anywhere. Furthermore, it relates to the possession of mobile devices such as smartphones or tablets.

As mentioned earlier, the time element of AR application used by the user shall postulate and invoke specific experience within the specified time. In a practical sense, this experience is measured four different times in a MAR application by anticipating UX (before usage), momentary UX (during usage), episodic UX (after usage) and cumulative UX (overtime).

Simultaneously, the unification of different aspects that decipher the user's experience is essential to ensure that the experience is complete. It involves physical aspects, related tasks (time, meaning), and social culture (religion, language, organization, social needs). Hence, aspects of prior experience that can influence the positive UX and the cognitive user, besides the features of the MAR system design and interaction itself (Olsson, 2013; Irshad, 2013)

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2.2.3 UX for augmented reality

Admittedly UX is used together with usability in various relativity; researcher identify the user experience as a substantial entity encompassing pragmatic and hedonic systems. Aligned with this, AR is defined through UX and depicted as media-visual, sound, haptic, and other similar aspects intrinsically enhancing user realities in specific contexts.

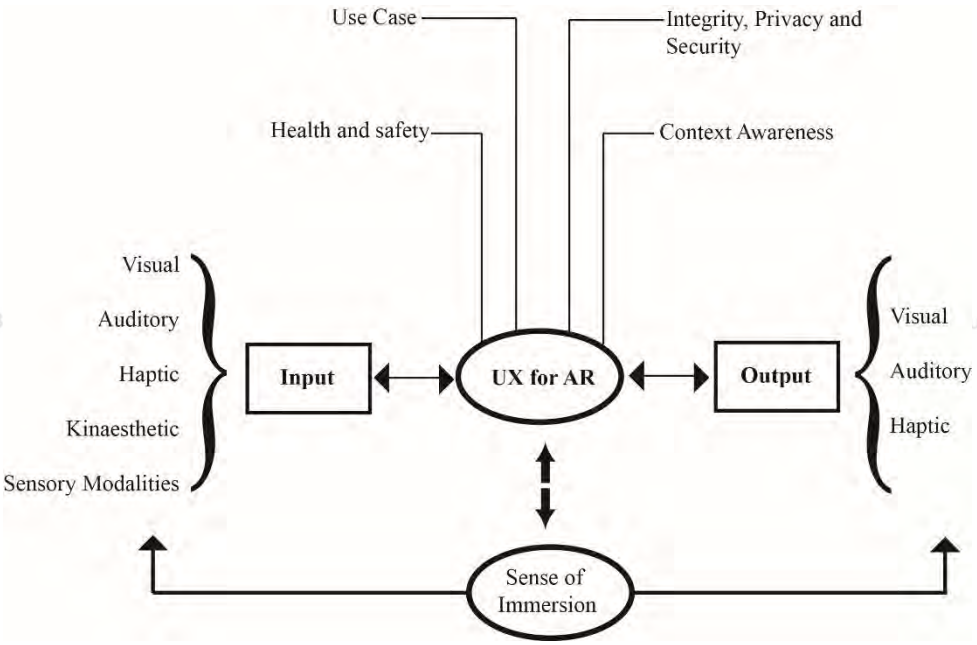


Figure 2.3. UX for AR (UX4AR) Ritos (2011)

Specifically, Ritos (2011) model is an action plan of AR and aims to be the catalyst to every AR prototype activity using standard method. In the meantime, this framework has also identified and avoided the worst aspect of AR that potentially affects the UX.

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Therefore, this study describes the input and output methods in achieving a sense of immersion in UX. There are several elements in the input construct; the visual input usually implied using a camera for tracking and context identification. Likewise, applications range from simple tracking to placing virtual objects on top of the target to determine gestures and navigate through interfaces. The auditory sound can be useful as input, both for direct voice commands and inferring the user context, from ambient noise levels, patterns, or detected frequencies. The same aspects that affect visual were applied in this case.

Tactile, that classifies all interfaces require contact (touch) with the surface, either a keyboard, a joystick, a touch-screen, or a mouse. Once again, the aspects affecting UX are similar as above, with one added issue involving obtrusiveness for mobile, untethered systems. Kinaesthetic, reflection of recent advancements in motion tracking technology, enables various executions with Kinect to be implemented in augmented reality (Kuniavsky, 2013).

The interaction paradigm where systems without the need for body-worn and sensor cultivating the high potential in the context of AR and once again the element of ease of use, responsiveness, and accuracy is a factor capable of affecting the user's experience and sensory modalities is the use of various schemes in order to improve the accuracy of the sensory modality, especially when the sensory modality combines more than one senses (sensor fusion) and is often referred to as a hybrid sensor. Active (sensor-emitter) tracking technologies required powered-device installation, and researcher are usually susceptible to interference, whereas inertial sensors, although completely passive (Grubert et al., 2016).

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On the other hand, for the output component, it is a strong link and supports input requirements. In the output component, visual is the leading and most important aspect of postulating a clear picture of imagination by illustrating the agreed concept. Visuals in AR also range from simple information annotations to complexes in various UX needs (Mahlke, 2008). Overall, visual aspects should be assessed from UX perspectives, namely, presentation media quality (field of view, brightness, contrast, depth perception, and ease of use), content quality (realism, abstraction, and frame rates) synthetic world consistency and stability (registration, temporal and spatial stability). The auditory output is relatively easy to implement with reasonable quality as the technology available can produce low-cost audio and unmatched tools. This is because the audio-only uses the devices that are already embedded in it.

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In other respect, sound can be disruptive towards the user and their environment, having noteworthy safety and privacy implications; therefore, apart from an appraisal of how sound feedback does contribute to UX, the health and social aspects of using sound as an augmentation method should be included. Haptic reflective from the user's perspective, holistically UX adheres the ease of use, precision and ergonomics. Although visual and audio are synthetic paradigms present throughout AR, such as haptic interface where users can touch and perceive objects in the form of force feedback systems as in controlling consoles game which means the AR system drives more audio stimuli and potentially improves the sense of immersion in the synthetic approach of users.

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Simultaneously, the model considers a several factors that play a role in achieving a sense of immersion for UX. Those factors are context-awareness, health and safety, integrity, privacy and security, and use case. The contextual environment in AR aims to enhance the context of awareness among consumers. It is relevant to extracting information about location, attitude, intention, and environment (Qu et al., 2017). Meanwhile, health and safety are the concerns in all AR phenomena. Despite the excitement that augmentation can increase reality, unwise execution and implementation may jeopardize the implications of psychological health, motivation, and emotional awareness. To this end, AR remains personal experience to a great extent. Enormous implications regarding interaction, researcher can expect a change of this paradigm. For this reason, integrity, privacy, and security issues can be more dangerous when users violate virtual security, not hiding information and sharing personal aspects that will elicit opportunities for virtual rights and ethics violations (Han et al., 2018).

In other respect, all the concepts discussed contribute to the sense of immersion and the sense of presence in an augmented and virtual environment reality. Sense of immersion is also an integration of attitudes toward the system and the importance of AR technology phenomenon in the UX field.

From the analysis of the three UX models, it was found that it agrees with the nature of UX, which is more to the reflection of technology products, systems, and services. In the context of HCI, technologies involving devices and systems are measured by positive UX. Hassenzahl (2007), model concept, refers to designer perspective and user perspective differ from the concept introduce by Irshad and

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Rambli (2016), namely subjective experience perception, emotional response, and product environment. On the other hand, Ritos (2011) introduces the concept of an action plan of AR and aims to be the catalyst to the standard method of every AR prototype.

Ritos (2011) emphasizes that AR through UX is depicted as media, visual, sound, haptic, and other similar aspects that enhance user realities. With UX process involves inputs (visual, auditory, tactile and kinaesthetic), sensory modalities (a combination of sensor fusion and sensor-emitter), output (visual, auditory andhaptic), and context awareness (health, safety, integrity, privacy and security).

Hassenzhl (2007) also emphasizes hedonic dimensions and pragmatic approaches by expressing three facets, namely: stimulation (novelty, change, personal growth), identification (communication of identity to relevant others and relatedness), and evocation (provoking memories and symbolising).

Based on the implementation of the design research for mobile augmented reality (MAR) products through positive UX, Irshad and Rambli (2016) introduced the components of MAR products, namely, presentation, information content, services functionality, interaction, augmentation, and mobility. In addition, time is an essential element in this model and is classified as anticipated UX (before usage), momentary UX (during usage), episodic UX (after usage), and cumulative UX (over time).

To sum up, the UX elements for Hassenzahl (2007), based on designer perspective and user perspective, namely pleasure, satisfaction, appeal, and

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consequences meanwhile Irshad and Rambli (2016), are more extensive with a specific experience being invoked from a positive user experience, based on Ritos (2011) sense of immersion and arousal.

Table 2

Summarise the previous model of UX by Hassenzahl (2007), Irshad & Rambli (2016) and Ritos (2011).

Model	Concept	Main components	Processing flow	UX elements
Hassenzahl (2007)	Involves designer perspective and user perspective.	Hedonic dimensions & Pragmatic approach	Three facets of hedonic 1. Stimulation (novelty, change, personal growth) 2. Identification (Communication of identity to relevant others & relatedness) 3. Evocation 4. (provoking memories & symbolizing.)	Designer perspective : Intended product character User perspective: Apparent product character -Pleasure -Satisfaction -Appeal -Consequences
Irshad & Rambli (2016)	Subjective experience perception, emotional response and product environment.	Implementation, the design of research for mobile, augmented reality (MAR) products based on positive UX	MAR products 1. Presentation 2. Information content 3. Service functionality 4. Augmentation 5. Mobility Time 1. Anticipated UX (before usage) 2. Momentary UX (during usage) 3. Episodic UX (after usage) 4. Cumulative UX (overtime)	Specific experience being invoked by positive UX.
Ritos (2011)	An action plan of AR and aims to be the catalyst to the standard method of AR prototype.	AR through UX	Input a. Visual b. Auditory c. Tactile d. Kinaesthetic Sensory modalities Combination of sensor fusion and sensor-emitter.	Sense of immersion and arousal.

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2.2.4 The elements of UX

Under the circumstances, the knowledge of end-users potentially requisites what kind of experience is expected to evoke. Concerning this, the research knowledge preparedness to be used in UX design, especially in MAR service. The UX itself involves several stages of the mental process, which must be passed. Among them is the stage of developing (developer) to the end-user (target users). In a practical sense, these stages involve several elements likewise, valuable, UX characteristic, emotion, usability, assessable and desirable (Qu et al., 2016 & Klingbeil et al., 2017).

Under the circumstances, Olsson and Mattila (2011) have collected the UX constructs elements from previous studies using technology, including the usage of AR technology. They have summarized their UX characteristics with the component technologies shown in table 2.1.

Table 2.1

Summary of the characteristics of expected mobile augmented reality user experience (Olsson and Mattila, 2011).

UX characteristic	Description of the experience	Technology components
Experiences originating mainly from service functionalities		
Efficiency	Efficiency in ad hoc information retrieval in various contexts: saves time and effort and facilitates performing everyday tasks	AR, Embeddedness, Context-sensitivity
Empowerment	Gaining new practical benefits by enabling novel activities and sources	Embeddedness, Context sensitivity
Increased Awareness	Increased awareness and of one's surroundings and the digital affordances in it, thus creating feelings of discovery and insight	AR, Embeddedness, Context-sensitivity

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Table 2.1 *(Continue)*

UX characteristic	Description of the experience	Technology components
Inspiration	Feeling of being encouraged, cognitively stimulated, and eager to try new things or appropriate the service for new purposes	AR
Motivation	Feeling of being more motivated to participate or to do tedious tasks as results of the novelties in MAR (e.g., the way of interaction, proactivity)	AR, Context-sensitivity
Surprise	Positive surprises and wonder due to surpassed expectations and receiving extraordinary information automatically	Context-sensitivity, Embeddedness
Connectedness	Feeling of having novel ways for social interaction and being connected with and aware of other people using MAR services	Mobility, Embeddedness
Collectively & participation	Sense of community, participation, and belongingness by collectively creating and producing AR content	Embeddedness, Mobility
Creativity	Creative, self-expressive, and artistic feelings in creating AR content and in mixing the digital with the real world	AR, Embeddedness
Liveliness	The service and environment feeling vivid and dynamic because of steadily accumulating and updating content related to surroundings	AR, Embeddedness, Mobility
Meaningfulness	AR content feeling personally meaningful and relevant, as well as reliable, up-to-date, and corresponding to the real-world objects	Context-sensitivity, AR
Playfulness & entertainment	Feelings of joy, amusement, and playfulness that arise from intriguing and productive content as well as novel ways of interaction	AR, Embeddedness
Captivation	The feeling of being immersed and captivated in the interaction with the AR	AR
Intuitiveness	Feeling of naturalness and human-likeness in interacting with the AR information and intuitiveness of how AR content is aligned to real world	AR, Embeddedness
Tangibility	Feelings of concreteness and coherence of environment-related content, which lead to senses of presence and unity with the surroundings	AR, Embeddedness

Wang (2016) states that UX elements are essential variables serve as aesthetic response or can be defined as emotional UX. In short, this element can be categorised into three different types of variables namely, sensory aesthetics that refer to sensations that give pleasure through the arousal of the sense, formal aesthetics that are related to aspects such as shape, complexity, and rhythm and symbolic aesthetics, which explains the connotative of associational aspects of the stimulus.

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As suggested by Hassenzahl and Tranctinsky (2006), psychological needs are an important component of UX. Therefore, emotions are also an integral part of UX and become central in the empirical research measurement. Based on the previous discussion in the field of UX, the emotion coexists with a positive experience as a guideline to HCI products and services. On account of this, Partala and Kallinen (2011), listed ten satisfying emotional experiences and ten unsatisfying emotional experiences in interacting with UX devices. In short, ten elements of satisfying emotion using UX devices show a high rating and prove that positive UX elements are emphasized in the study closely related to UX. Both of the ten elements of emotional experience are determined, alert, inspired, attentive, active, interested, enthusiastic, proud, strong, and excited.

Meanwhile, Mahlke (2008) describes an integrated research approach to the experimental study of emotional user reaction presented as segments in three central components of UX. UX's user reactions mentioned are subjective feelings, motor expression, physiological reactions, cognitive appraisals, and behavioural tendencies.

To put it another way, Saariluoma and Jokinen (2014) outlined an emotional UX concept based on three main components: basic emotion, core effects, and appraisal process of emotion. It will be discussed in the next topic of emotion that psychologically basic emotion is based on universal emotion that usually affects the body responses and universal emotional signs with facial expressions. In the HCI field, the studies of emotions are usually published when the usage of a device or a technology product as users reflected from experience towards the product (Dirin & Laine, 2018; Nikov & Radoslavov, 2015).

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In similar manner, core affect, which is defined as the most straightforward possible part of the emotional process, is still accessible by consciousness. On the other hand, the core effect is integrating hedonic and arousal component values and can be identified as a single key in the circumflex concept of valence-arousal (Hassenzahl, 2007; Partala & Kallinen, 2011).

In a similar vein, an appraisal theory defines emotion as a process, not a state which recursively interacts during the appraisal and results in a change in cognitive, physiological, motivational, expression, and subjective feeling responses (Bilgihan, 2016).

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2.3 Aesthetics experience (AX)

Hagman (2005), in his paper mentions, Plato states that AX is the reflection of idealistic aesthetic objects such as flowers, mountains, beautiful faces, music, theatre, dance, and painting. The uniqueness of relationship on the aesthetic objects and the preoccupation of experience serve as a source of AX (Perlovsky, 2014).

Hence, Parsons (1987) emphasizes that each level of response to the aesthetic objects indicates the level of comprehension of the beholder's knowledge and experience about the artwork. However, even though both are emotionally and cognitively intertwined, Parson insists on choosing that cognitive is the central role in conveying the AX. He believes that cognitive recapitulates form and meaning to the

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emotion. To illustrate the element of AX, Parson has named five domains of AX which are, favouritism (stimuli of pleasure), subject (subject realism is an essential consideration), expression (metaphors for ideas & emotions), medium (form & style), and judgment (personal meaning).

Meanwhile, Housen (1983) expresses the method of prearranged interviews to gather the overall AX of beholders with scrutinizing of affective and spontaneity will explain the reaction of AX. Hence, Housen also identified a five-stage of aesthetic development which is, accounted reaction of the viewer egocentric, constructive as the language of art, classifying as a theory and decoding the knowledge, reflective metaphors to support emotional reactions and re-creative integrates all previous levels. It is associated with comics and serves as an aesthetic object through a similar creative process.

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Moens (2018) claims that aesthetic experience is often associated with perceptions and feelings. In contrast, the sensitivity towards both is integrated with the idealistic feelings such as refine pleasure, delight, awe, admiration, and joy. Furthermore, affects and passions are considered to be of unique positive value (Schoeller & Perlovsky, 2016).

On another occasion, Harrison and Clark (2016) postulated that AX is a form of subjective judgment that is definitely a different aspect among individuals. It accurately refers to a sense of taste that mostly related to the ability of humans being of cultivating perceptions and sensitivity to the aesthetic objects around them (Uribe, 2013; Bundgaard, 2015).

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However, emotion and sensation are a proponent of mental experience, therefore, the AX source not only to the object or pleasure but also to the subjective knowledge of the universal idea (Pelowski, 2015). Docherty (2018) emphasize this subjective knowledge as compiling the universal conceptualization that shapes the basis of our judgment.

Schaeffer (2015) argues that a person could ripen his critical judgment in aesthetics through personal experience and academic studies. Hence, a person has to be neutral without prejudice to the aesthetic object itself. Thus, it will form a special relationship between perceptions, cognitive and emotion (Schoeller & Perlovsky, 2016; Verheyen, 2015; Tschape, 2013).

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In other respects, Rose in Carrol (2003) claims that AX is a complex psychological activity between the primary and secondary processes and between fusion and separateness. She further added that AX construct triangulation between self, memory, and art objects that reflect the activity or movement of the imagination of AX (refer to figure 2.4). Rose asserts that the beholder's experiences accumulate two sources of pleasure which are the temporary experience of boundary and fusion, where opposites coexist and harmony reigns, and the return to a sense of single psychological separateness and recognition of one's capacity to withstand the loss.

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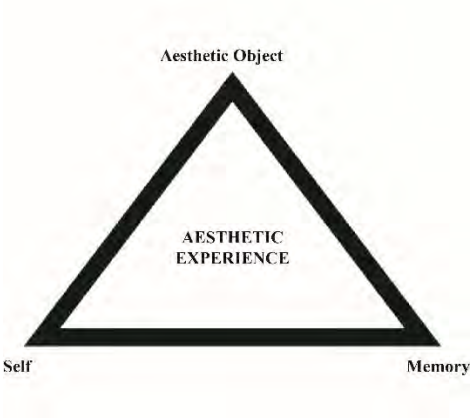


Figure 2.4. The triangulation between self, memory, art objects, and AX. Carol (2003)

By all means, AX involves a phenomenon (objects, events, sounds, or other perceptions) or a set of phenomena (a set of objects, a sequence of events, melodies, or complex perception structures) that are ideal. Although it is a subjective matter of discussion based on the objective of the object, it certainly carries excitement, sadness, miracle, and admiration (Ingman, 2018; Xenakis & Arnellos, 2015).

In discussing the AX, besides its definition, researcher requires explicit clarification about the AX concepts and ideas. Carrol (2003) has outlined the four concepts of AX, such as, traditional, pragmatic, allegorical and deflationary account.

Basically, this traditional account is merely used for the sake of art. This means it only verbalizes at the formal elements in art in terms of its shape, form, content and does not apply in the sense of something else or experience. On the other hand, the traditional account requires an experience to be aesthetics that the agent believes or finds the experience for its own sake.

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As mentioned earlier, the form of art is the expressiveness form that needs cognitive and perceptual abilities in order to believe that the experience is valuable for its own sake. Therefore, the traditional account of AX not in terms of the state's internal features but the causal conditions that assist the agent of belief to that experience are intrinsically valuable.

Relevant content experience is the crucial point for the pragmatic concept. In this case, the aesthetic object will affect the beholder's everyday experience, or relevant experience can affect aesthetic objects, and it is amenable to qualitative feeling. The qualitative feeling is a mechanism named beauty responsive mechanism. It acts to govern the sensible approach towards contemplating the aesthetic object as reacting to the rhythm so that qualitative feelings appear selectively. Therefore, such qualitative feelings can be manifested by everyday experiences (experiential) and create a free play imagination either between artists or beholder on the aesthetics objects.

Imagination freedom as a self-conception based on prior experiences and relevant experiences will illustrate an image or aesthetic object in work. AX is an allegory and metaphorical in creating the artwork. It can be abetted through perception, imagination, and sensation of the beholder and the artists. Intrinsically, the experiential will construct the consciousness, represent the sensual ability, and counter social experience.

The deflationary account involves appreciating the design and aesthetics object. Hence, interpretation needs to be done to appraise or detect expressive quality in

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isolated form and content. By all means, the artist and beholder's relevant experience becomes crucial in unifying the aesthetics object and their experience.

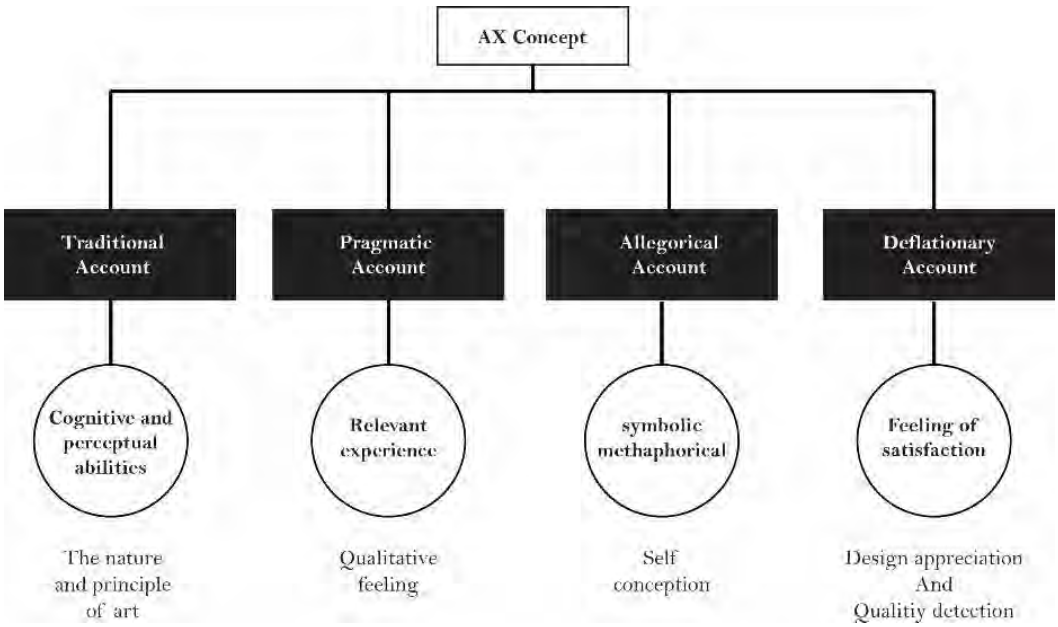


Figure 2.5. The AX concept Carrol (2003).

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2.3.1 Model of AX

In this section, the researcher will implement a methodological review based on previous aesthetic experiences models to discuss elements, composition, conceptual framework, and essential elements in the aesthetic experience.

The first piloted model is the AX by Redies (2015) that involves external information and internal representation in the encoding process to recognize the congruence of AX. This model also firmly adheres to three main components, which are cognitive, emotional, and perceptual.

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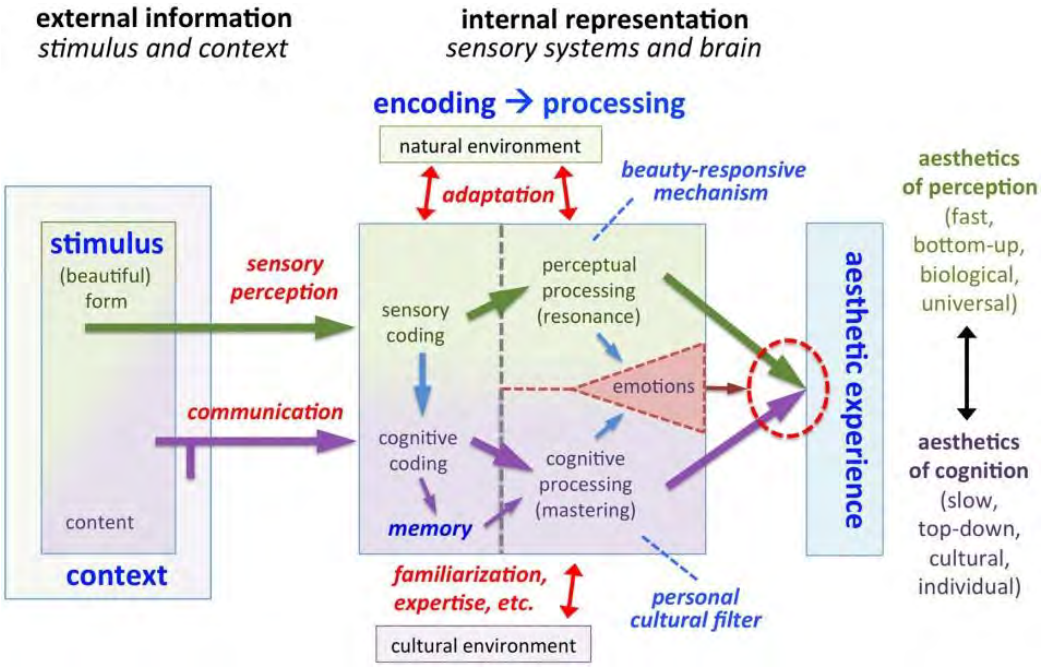


Figure 2.6. AX model by Redies (2015).

The stimulus is a direct liaison between the beholder with an image or an art object or an artistic activity such as dance, theatre, and film. In this study, the aesthetics objects are visual displays or visual scenes, whether static or movable, like animation and video.

On the other hand, an aesthetics object is an amenable artwork with good quality that stimulates the eyes, thereby stimulating beholder emotion (Gladden, 2018; Carrol, 2003). In fact, aesthetic objects here refer to traditional, modern, or post-modern artwork. In other words, the aesthetic objects cannot be performed without the knowledge and experience to control the quality of an aesthetics object.

Intrinsically, content can be depicted as a person, natural or animate object, their action or relationship with each other. It can also be recognized to the concept of

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social, political, and philosophical emotions that the artist intends to convey in their artwork.

Contexts are practicing as dependent contents on the contexts of the works. The contexts of the presentation of artworks have a sense of AX to the beholders. Undoubtedly, both contents and contexts are shaped by the artist's cultural environment and individual experiences link the beholder’s experience. Contents and contextual features that influence AX include habits, prototypes, authenticity, satisfaction, ambiguity, personal sense, passion, passion, historical information, the understanding of the social status, and material sake. The context also influences artwork's style and affects the artwork's content (Costa & Ferro, 2018). For example, expressions in the artwork vary from artists living in the rural area to artists living in metropolitan cities.

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The internal representation of sensory coding and cognitive coding in this model is defined as translating external information into the brain's further information activities system. Hence, the external information code is a stimulus form encoded by a sensory mechanism, and this is the first stage of visual processing.

The contents information and context codes are coded in cognitive systems through various visual channels, texts, forms, and artwork meanings. Ironically, the artists have an intuitive and explicit knowledge of how the beholder contemplates the work and how the cognitive system processes the brain's visual information (Freeman, 2018; Pelowski, 2015; Bungaard, 2015).

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The first stage of the processing system only includes the basic visual level, a small retinal area such as color, luminance, and movement, and only touches the basic principles of art alone. Furthermore, for a higher stage of primary visuals are mapped to what is depicted as hyper columns, which is the processing of local information to a broader visual area beyond the main visual context. In effect, the higher visual cortical areas become specialized in processing specific aspects of visual information.

The beauty responsive mechanism is a system where beauty and preoccupation are not defined by observing the elicit beautiful objects, but beauty and preoccupation requisite artistic qualities that will stir the emotions (Liu et al., 2018). Inevitably, artworks involve the formalistic and content of the work holistically between the local and global art principles according to the context and content of an artwork.

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Cognitive coding and processing are formed by the experience gained throughout the daily experience of a person. The cognitive code refers to the explicit information about what is described in work, in which it is produced and the way it is presented (Matthes, 2018; Pearce et al., 2016; Harrison & Clark, 2016). Hence, the cognitive process code refers to the use of information knowingly to understand the contents of artwork and the artists' intention. Therefore, the signs, icons, and symbols in the artworks convey the artists' explicit contents in the artworks. Again, the experiences, skills, knowledge, and expertise are crucial to producing artwork, appreciating it, and evaluating the artworks.

Emotional processing can play a role during the creation of artworks and the process of artworks appreciation. Artists convey basic emotions such as happiness,

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melancholy, disgust, fear and anxiety through elective perceptions to communicate with beholders (Menninghaus et al., 2018). In this model, the basis of emotion can affect the beholder experience. For example, in local information, blue and yellow perception of artwork may provide a different AX, which is blue may motivate while yellow pushes to raw emotions.

This final stage model is the AX that will occur when both processing modality (perception, emotion, and cognitive) recapitulates triad criteria. As mentioned earlier, in this model, three central components such as cognitive, perceptual, and emotional, will play a role in producing artworks (artists), appreciating the artworks (beholders), and evaluating the artworks (expertise, artist, and beholder). Moreover, the three variables are pre-requisite to measure the AX (Thompson, 2018; Ingman, 2018; Xenakis & Arnellos, 2015).

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2.3.2 Model of aesthetic appreciation and aesthetic judgement

The next model to discuss is aesthetic appreciation, and aesthetic judgment. A model by Leder et al. (2004). This model proposes some of the processing stages involved in the AX process. Among the key components highlighted in this model is the AX that is intrinsically generated by the cognitive process and the affective states that enhance the process of a particular relationship. This model's critical purpose is to nurture and increase interest and appreciation of aesthetic objects that proponent the emotional state.

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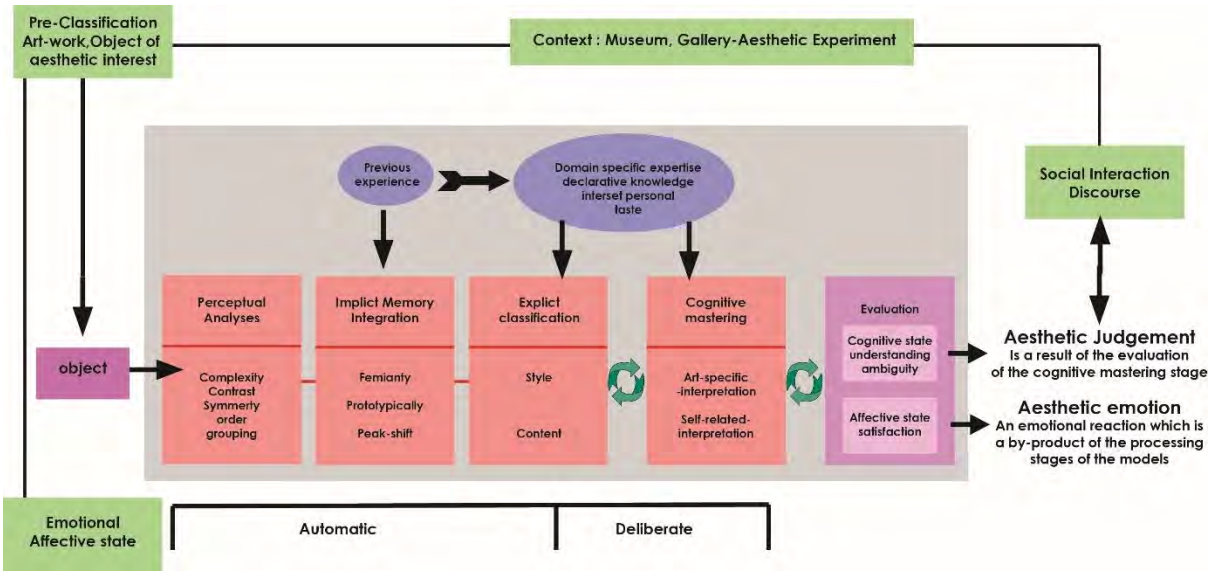


Figure 2.7. A model of AX. Leder et al. (2004)

There are main output elements in this model, namely aesthetics, emotions, and aesthetics evaluations. Focusing on cultivating the understanding of cognitive processes in the beholder's cognitive system, this model proposes five stages with different cognitive analysis processes and has crucial stimulus variables, and may affect aesthetics processing. The variables that are provided probably incomplete and too general (the basics emotion) only used to measure an AX.

The model's context and input notably emphases their appearance, whether they are in galleries, museums, and exhibitions. It must be stressed that it is not only focusing in the context of fine art but also in arts, comics, animations, dances, theatres and acting (Hagman, 2005; Schoeller & Perlovsky, 2016). As long as, they are within the scope of the aesthetic objects by practicing aesthetic principles in the process of creation or appreciation to measure the AX, it may occur. The context to aesthetic objects is essential for expressing a positive emotion of aesthetics objects and inapt the beholder's external emotions that may include disjunctively the AX.

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In the perceptual analyses stage, only optical considerations are required. Artworks are analysed with a perception process focusing on the formalistic features of the artworks. In addition, the aesthetical information on visual art at this stage also stems from the perception of the artwork, likewise blurry images, the complexity of the work, the colour, the abstract symmetry, and the gestalt characteristics (Parsons, 1986; Moens, 2018; Housen, 1983). Thus, it will be postulating an early impression on the perceptual stage of analysis.

Implicit memory integration is an artistic process that is closely related to the implicit memory or implied AX. Using mere-exposure paradigms, some studies have found that recurring processes increase effective choices for stimuli which suggests the implicit memory describes the work based on prior or implied memory and the experience registered in the human cognitive system (Schindler et al., 2017 & Leder et al., 2004).

On the other hand, explicit classification is a modality processing that is greatly influenced by the expertise and knowledge of the expert, creator, and beholder (Mastandrea, 2015). Content and style are also determined by the beholder's expertise and knowledge, which is limited; the AX output becomes naive (Markovic 2011). Hence, both expertise and knowledge are essential pre-requisite for construal understanding and evaluating any kind of artwork.

The cognitive mastering and evaluation stage are the level of feedback between artworks and beholder, artists, and art experts. There is a difference in expert appraisal

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with a lesser extent without knowledge and experience about the artwork (Carrol et al., 2012). Putatively, art experts will decipher at the overall and scrutinizing the aspects of the formality, context and content while the beholder may only contemplate only on the surface.

Although the beholder in this model is considered naive, at the same time, emotionally and cognitively of the beholder perceptions should also crucial and need to measured (Redies 2015). For that reason, the beholder will associate artworks with their emotional state and accumulate in the brain's cognitive system and emit them with perceptions with cognitive support. This model also named five levels of expertise that will influence the AX, of which five levels are adapted from Parsons (1987) as discussed in the previous topic.

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Moreover, the personal taste variables have been incorporated into this model, which is amenable to affect an AX. In fact, this personal taste is also a daily experience and prior experience registered in the cognitive memory system that enables it to influence the AX.

Affective and emotional processing in the context of the presentation of the work ancestor to the nature of the field, whether paintings in the gallery or exhibitions, as well as acting on stage and comic book. This model believes that a positive emotional effect will be obtained if this context is implemented (Tschaepe, 2013; Thomas, 2009).

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AX is dependent on the subjective well-being of information processing and is often described as a pleasure and happiness as a positive state. However, it can also direct on the negative area if there is a disinterest processing. The isolation of cognitive and emotional judgments is essentially crucial in the AX (Liu, 2018; Gladden, 2018; Uribe, 2013). In the same manner, this is a sub emotion for this model in defining that the art is distinctive and involves the inner sense. In addition, some stimulus objects are not the same as their AX and are not the same as their satisfaction.

In brief, AX is an attractive notation to psychology because it involves cognitive and emotional processes in order to processing an aesthetic object. It can be measured by unifying the catalyst stimulation, which is systematically varied in just one dimension, such as colour and line. Observation by generating different levels of choices at different information processing and processing allegory information into cognitive brain system can be tested using the catalyst stimulation, which is systematically varied in just one dimension such as colour and line. This is by generating different levels of choice at different information processing and processing allegory information into system cognition (Matthes, 2018; Schoeller & Perlovsky, 2016; Antwerp, 2015; Tschape, 2013).

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2.3.3 Components of AX: Aesthetic Fascination, Aesthetic Appraisal and Aesthetic Emotion.

Markovic (2012), focuses on two essential factors found in this model which is the AX and affective tone. Hence, these factors include descriptors such as exceptional, profound, unique, awful, delightful, fascinating, eternal and unspeakable. These descriptors have been based on positive emotions such as, lovely, charming, cheerful, and negatives, such as; scary, disgusting, hateful and angry.

This model also elicited that the effects of artworks that meet aesthetic knowledge shall cultivate the aesthetic valuation encompass both positive emotions (excitement, pride, affliction) and negative emotions (anger, disgust, and contempt). Furthermore, the interest factor became the primary component established in this study. It fulfilled the AX in five different ways to dealing with artwork introduced by Parsons (1987), favouritism, preference for beauty, expressiveness, style and form and autonomy.

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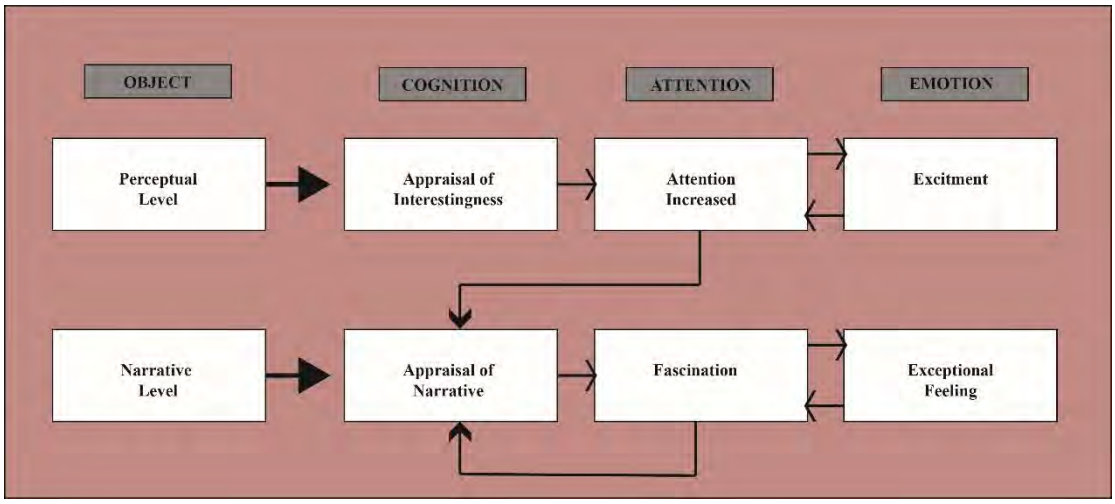


Figure 2.8. The two stages of functional relationship between the cognitive, attentional, and emotional aspects of AX of an object. Markovic (2012).

Basically, this model has two general stages of AX, namely the initial and the main stages. The initial stage begins with perceptions and cognitive assessment of fundamental properties such as formalistic elements, complexity, regularity, and composition (Redies, 2015; Hagman, 2005; Verheyen, 2015). At the main stage, the assessment is continued by focusing on a more complex detection. This process is a composite equation and historical interpretation with implicit symbolism.

This stage of evaluation will enhance one major domain call attraction, which is this phenomenon will reign the energy to the cognitive system and recapitulates aesthetic experience feedback on narratives and aesthetic compositions.

For that reason, the cognitive domains play a central role in this model as they work to control and gives sense to the whole process. For instance, cognitive domains are needed to describe allegorical symbols that usually explain an artwork's implicit meaning.

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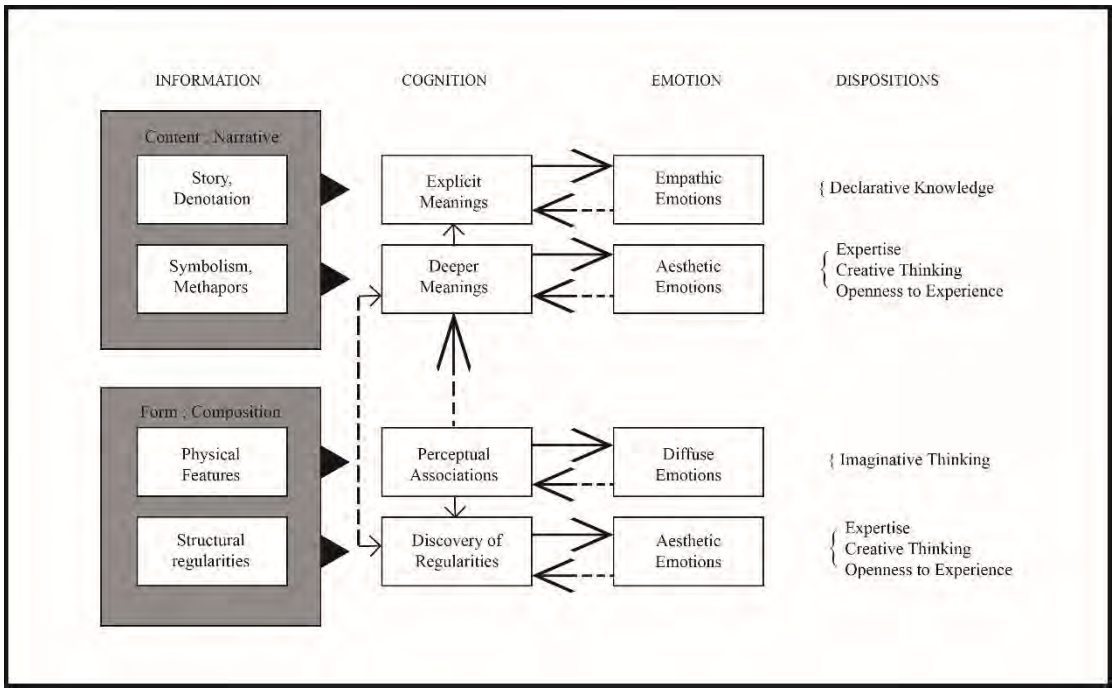


Figure 2.9. The model shows four parallel streams of aesthetic information processing Markovic (2012).

In the aesthetic information-processing stage, it must be stressed that the external information domain is divided into two aspects and processed through the two corresponding levels namely narrative and formal composition. The narrative level is a temporal semantic structure that provides various types of narrative information, including stories and discourses. On the contrary, narrative art means literacy, theatre, film, and painting (Carroll et al., 2012).

It describes the events passing through several stages: before the state, expositions, complications, and equilibrium. On the other hand, the discourse is expressive, which adds effective or connotative meaning to the story and issue. Therefore, the term of symbolism, mythological ideology and mythology in the discourse domain are often used to convey expressions (Thomas, 2009). Ensues two narrative levels linked to a two-way connection, which abet a better understanding of

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stories and issues. Alternatively, otherwise, the story and the issue can make the meaning more symbolic.

The processing of form and composition specifically describes that each aesthetic object have some physical form that determines the style and the art aspects of the artwork. So that, particular compositions such as colours, lines, shapes, sounds and sign are uni-modal amenable painting are visual works and music is the art of auditory (Housen, 1983; Moens, 2018; Schaeffer, 2015).

In addition, perception overwhelms narrative levels symbolically, such as the use of red colour explaining the spirit. The line variations can drive dramatic effects and some phonemic features in poetry delivering experiential a variety of aesthetic effects. However, the perceptual and imaginative cognitive ability levels of implied meanings sometimes plunge into a more complex structure (Mastandrea, 2011). Consequently, most studies suggest that the expert's role becomes the determinant of the assessment of a complex aesthetic object (Schaeffer, 2015; Verheyen, 2015; Matthes, 2018).

This phenomenon is because the evaluation of symbolism, creative thinking and openness to experience play an important role in understanding the complex equations implicit in the artwork. Apart from that, in this model, it is clear that aesthetic emotions are extraordinary practical tools that function specifically and would not be changed to daily emotions; nonetheless, the daily emotions likewise a prior experience registered as a factor that cultivating an aesthetic experience.

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To summarise, aesthetics could be defined as a feeling and has an implausible relationship with AX and art-form. Hence, symbolic structures and composition rules can contribute to aesthetic emotions such as admiration, excitement, enthusiasm and fascination. In like manner, it is also called as a qualitative feeling of an extraordinary feeling in a normal mental state on daily basis. An individual can be fascinated by a particular object, but another person pays more attention to aesthetic objects that have more attraction. In fact, the subjective experience produces positive emotions such as happiness or harmony and harmful as unpleasant and disinterest, but both are feelings that evoke aesthetic evaluation.

By analysing the three models, researcher can classify that each model leads to the same goal, but the way and methods may be slightly different. Without a doubt, Redies (2015) involves external and internal information in the encoding process to recognise the congruence of AX. Conversely, the Leder et al., (2004) implement the process stage involving the process of AX with the development of the cognitive and affective state. Meanwhile, Markovic (2012) emphasises an AX factor and affective tone factor.

Markovic (2012) introduces positive and negative emotions and involves several stages of the AX process, namely the initial stage, the main stage, aesthetic information processing, and form and composition. Almost similarly, with Redies's (2015) that is firmly dependent on cognitive, emotional and perceptual components. In a practical sense, comes along with stimuli, content and context, internal representation sensory system and brain as well as beauty responsive mechanism. In other respect, Leder et al. (2004) also states the components of nurture in order to

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increase the interest of appreciation of AX that proponent the emotional state by explaining the five-stage processing aesthetic object namely, context and input of the model, perceptual analyses, implicit memory integration, explicit classification and cognitive mastering evaluation.

To sum up these analyses, all three scholars agree with AX elements that involve emotions in appreciating and assessing the aesthetic object and receiving any form of emotion occur from contemplating the aesthetic object. In addition, cognitive elements in aesthetics object assessment are also seriously taken not to deny the role and experience of artists, beholders and experts in an art object process.

Table 2.2

Summarise the previous model of AX by Redies (2007), Leder et al., (2004) and Markovic (2012).

Model	Concept	Main components	Processing flow	AX elements
Redies 2015	Involves external information in the encoding process to recognise the congruence of AX	Cognitive, emotional and perceptual.	**Stimulus** Something as direct between the beholders with an image or artwork. **Context & Content** Depicted as a person, natural or animate object & the relationship with each other. Context is depended onto the content of the artwork. **Internal representation sensory system & brain** Sensory coding & cognitive coding-the translation of external information into further information. **Beauty responsive mechanism** Beauty and preoccupation requisite artistic qualities that stir the emotion	**Cognitive processing** Reflection of the daily experience of a person **Emotional processing** Occur when the creation of artworks and appreciation of artworks. **AX** Basics emotion-through elective perception to communicate with beholders.
Leder, Belke, Oeberst et al. 2004	Propose a processing stage that involves AX process generated by the cognitive process and affective states.	Nurture and increase interest and appreciation of AX that proponent emotional state.		

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Table 2.2 *(Continue)*

Model	Concept	Main components	Processing flow	AX elements
Markovic 2012	Ax and affective tone	Positive & negative emotion	**The initial** Perception & cognitive assessment of fundamental properties (formalistic elements) **The main stage** Focusing on more complex detection. Process of a composite equation & narrative interpretation. **Aesthetic information processing** Narrative (literacy, theatre, film & painting. The temporal semantic structure provides narrative information, stories and discourse. **The processing of form and composition** Aesthetic objects have some physical form that determines the style & the art aspects of the artworks.	**Cognitive** Explicit meaning, more profound meaning, perceptual associations & discovery of regularities **AX** Emphatic emotion & diffuse emotions.

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2.3.4 The elements of aesthetic experience

Under the circumstances, the AX involves several stages of the mental process, which must be passed. Among them is the stage of creating (artist) appreciation (artist, beholder, expert) and appraisal (artist, beholder and expert). These stages are based on cognitive, emotional and perceptual domains to ensure the synergising of AX.

Intensely, Schindelr et al. (2017) have studied over 50 emotions applied to aesthetic objects and events such as concerts, musicals, dances, art exhibitions and films. At this point, Schindelr et al., (2017) proposed seven emotional constructs, namely, negative emotions, prototypical aesthetics emotions, epistemic emotions, nostalgia, animation, sadness and amusement. Under the circumstances, this study has

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developed a new method to measure AX name AESTHEMOS by combining a top-down theoretical approach with a bottom-up empirical approach.

In the discipline of comic art, AX's element has been long practised as an affirmation of the imagination and surprises inveighing beyond the soul's pleasure are called playful or humorous. It is necessary to strengthen the integration between humour and AX designed to evoke amusement regardless of what aesthetic paradigm is in the various comic genres such as satire, parody, lampoon, burlesque, caricature, farce, slapstick and limerick.

At this point, Morreal (2009) has present nine elements of AX in comic art. Indeed, the highlighted aesthetic experience is categorised as amusement, Paradox of tragedy and mental jolts. In contrast, each category has aesthetic emotion with different modes in order to respond to the aesthetic experience in comic art.

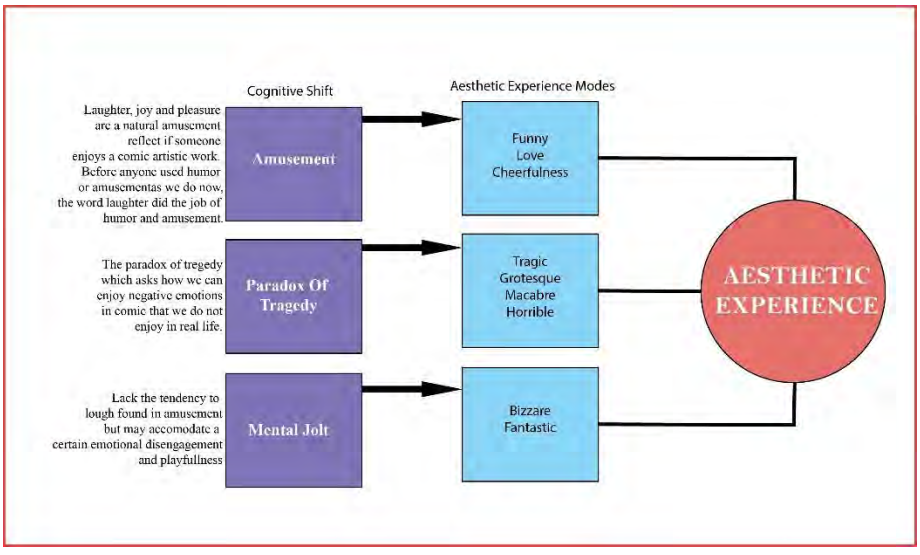


Figure 2.10. Morreall's (2009) cognitive shift of AX in comic art.

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In other respects, comic book artists Breyfogle in Klaehn (2015) conducted an interview session to describe the most important criteria on the aesthetics principle of comics and the aesthetics response, which is similar to AX. Arising out of this, AX response suitable serve as a construct for expert review, which is the constructs is directed towards AX in comics. The two components are list in the table below:

Table 2.3

Breyfogle in Klaehn (2015) aesthetics principle of comics and aesthetics response.

Aesthetics principle of comics	Aesthetics response
Harmony	Verisimilitude, accuracy
Humanism	Authenticity
Naturalism	Drama
Storytelling clarity	Surprise, amazement

In short, AX elements are usually present in aesthetic objects or aesthetic activities such as painting, sculpture, sculpture, theatre, film, comic, illustration and dance. These elements have been validated and studied following the specifications of aesthetic objects or aesthetic activities. In this study, the elements of AX in comics have already been studied and validated to guide future research potential.

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2.3.5 Discussion review between AX and UX models of current issues and trends in art and technology.

Referring to the Google scholar database, there are more than 700 000 articles discussing the UX model since 2017 and there are over 20000 articles focusing on discussing the UX model for AR. For AX, there are more than 70 000 articles talking about AX models and more than 17 000 articles of AX for comic. The springer publisher database listed only 290 articles for the UX model and 269 for the AX model.

However, when referring to this study, the methodological literature review technique is used by selecting only the sources that are referenced by most scholars and the ones that give a complete idea of the AX and UX models. Methodological review is not too focused on what the scholar says but how it is said (method of analysis). It covers a theory, substantive field, research approaches and analysis technique. This methodological review allows the researcher to expand knowledge such as, ontological and epistemological, quantitative and qualitative integration, sampling and process flow (Tseliou, 2013; Atchan et al., 2016; Fàbregues et al., 2020).

In the face of industry 4.0, the art discipline is exposed to direct technological advancements. There is no elongated a boundary between art and technology where today in the digital world numerous art products merges with technology and produce new media art products.

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When examined in a methodological review of the AX and UX models, the researcher found that they stand on their respective fields in measuring instruments, models or products regarding art and technology. Theoretically, AR product relates to the science of human-computer interaction (HCI) and uses a user experience approach (UX) as a method of measuring an AR product (Law et al., 2008; Peng et al., 2009; Zaphiris, 2013). In Hassenzahl's (2007), there are two primary UX components, which are pragmatic and hedonic. Both components supported each other to achieve positive UX. In a pragmatic approach, the focus is on UX products that are perceived to have the ability to support achievements or do-goals. On the other hand, hedonic refers to the ability to achieve goals.

Conversely, comics are classified as an art form or an aesthetic object and should be measured from an aesthetic perspective. There are narrative, visual and text elements in comics that can be a medium of expression to invoke emotion (Muliyadi, 2015; Eisner, 2000; McCloud, 1993). When a comic is classified as an art object its nature is to capture the aesthetic experience with the emotions, perceptions and cognitive of beholders.

Furthermore, recent research produced in art and technologies outlines some important contents; 1) to capture, create, production and distribution of art through digital technologies and platforms. 2) to support arts organizations to catalogue, link and archive digital content for current and future audiences, and form partnerships that will help more people access art on digital platforms and 3) to digitize gallery space in virtual space and give audience space to enjoy artworks (Vert et al., 2019; Baharuddin et al., 2020; Aitamurto et al., 2018).

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The advancement of AR technology leads to the creation of special applications such as “Smartify” and “made in corby” by recent research that use of AR technology to the gallery space and the art works. This study found the potential of AR in the arts can enhance the online experience, online curation will lead to cultural experience and reach audiences using social media to showcase digitized material and help to further increase audience understanding and engagement with museum and art gallery pieces (Scarles et al., 2020; Qu, 2017; Copic, 2016).

Touching on the artwork, observing the latest trend of AR potential to artworks is to emphasise art engagement experience. Indeed, the artwork expresses more provocation and captivates the audience, while enhancing their aesthetic emotions and examining the content of the artwork. This process applies to the values of discovery, collaboration and self-experience (Dudley et al., 2018; Cho et al., 2016; Vert et al., 2019).

Recent research in AR technology also uses art as a medium of study but assessed only the technical and usability elements. In addition, the art is used only to enhance the user experience in using the application. For example, studies on the potential use of AR technology for drawing, colouring and drawing applications highlight technical issues such as timing, effectiveness, haptic and output from those applications (Bhaduri et al., 2018; Cho, 2016; Ding, 2017).

Without a doubt, AR technology exists and provides a platform to various fields including art. The combination of art and AR technology needs to be evaluated

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from the point of view of AX and UX. Model reviews also prove that both technology and art stand by the name of their respective fields.

In short, technology will continue to evolve and art will also evolve with technology. Art and technology combined will produce innovative models, theories or products along with the available media. Reflecting on this situation, researchers have reviewed in detail in previous chapters and the combination between the AX and UX models appears to be more significant.

2.4 Emotion

This topic discusses about emotions and the knowledge scrutinising the relation to the science of UX and AX. Certain types of emotion that can be measured qualitatively and quantitatively depend on the goals in a study. Both AX and UX knowledge involve direct emotions, and these factors contributing significantly to the development of knowledge in both fields.

Under the circumstances, it is hard to define emotion accurately; however, almost close to the meaning of emotion will emerge with feelings, behaviors, physiological changes, and cognitions (Mordka, 2016). Hence, it always occurs in a specific context that influences it, and the primary function is to show information to the individual about their interaction with the environment and situation (Kazanas et al., 2019).

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By the time, Ortony & Turner (1990) states that basics emotions are our daily experience of emotions through routine observations that have been studied. In addition, particular emotions emerge when contemplating or appreciating in an aesthetics object whether paintings, music and films (Mendoza et al., 2012; Badoy and Teknomo, 2013). Concerning this, Ortony & Turner had outlined some basics emotion, or fundamental emotions through some of the scholar studies in his study of basics emotional:

Table 2.4

A selection of lists essential or fundamental of emotions (Ortony & Turner, 1990).

Reference	Fundamental emotion	Basic for Inclusion
Arnold (1960)	Anger, Aversion, Courage, Dejection, Desire, Fear, Hate, Hope, Love, Sadness.	Relation to action tendencies
Ekman,Friesen & Ellsworth (1982)	Anger, Disgust, Fear, Joy, Sadness, Surprise	Universal Facial Expression
Frijda (1986)	Desire, Happiness, Interest, Surprise, Wonder, Sorrow	Form of action readiness
Gray (1982)	Rage and Terror, Anxiety, Joy	Hardwired
Izard (1971)	Anger, Contempt, Disgust, Distress, Fear, Guilt, Interest, Joy, Shame, Surprise	Hardwired
James (1884)	Fear, Grief, Love, Rage	Bodily Involvement
McDougall (1926)	Anger, Disgust, Elation Fear, Subjection, Tender-emotion, Wonder,	Relation to instincts
Mowrer (1960)	Pain, Pleasure	Unlearned emotional states
Oatley&Johnson Laird (1987)	Anger Disgust, Anxiety, Happiness, Sadness	Do not require propositional content
Panksepp (1982)	Expectancy, Fear, Rage, Panic	Hardwired
Watson (1930)	Fear, Love, Rage	Hardwired
Weiner & Graham (1984)	Happiness, Sadness	Attribution independent

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Meanwhile, Plutchick's (1980) has postulates the wheel of eight basic emotions that integrate and link together to recognise the constructs and element of basic emotion.

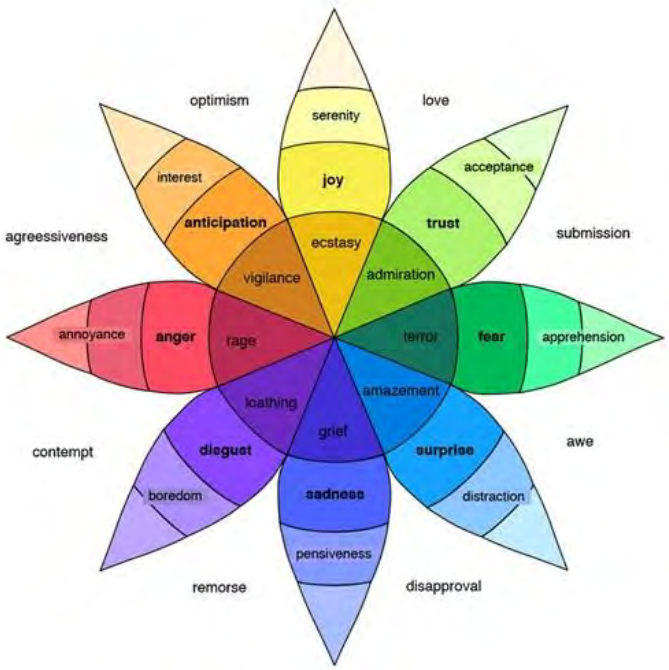


Figure 2.11 Plutchik's (1980) wheel of emotions with eight basics emotion.

In addition, the creation of basic emotions co-exists with eight basic emotions with basic opposite emotion and eight advance emotions. Each composed of two of the basic emotions there is joy opposite to sadness, trust compared to disgust, fear come with anger, surprise and anticipation and vice versa. At the same time, this study continues to find that the nature of advanced emotion is consistent with advance opposite emotion based on several mixed emotions.

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Table 2.5
Advance emotion, compose of emotion and advance opposite emotion, (Plutchik, 1980).

Advance emotion	Compose of	Advance opposite emotion
Optimism	Anticipation + Joy	Disappointment
Love	Joy + Trust	Remorse
Submission	Trust + Fear	Contempt
Awe	Fear + Surprise	Aggressiveness
Disappointment	Surprise + Sadness	Optimism
Remorse	Sadness + Disgust	Love
Contempt	Disgust + Anger	Submission
Aggressiveness	Anger + Anticipation	Awe

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Parrot (2001) categorises emotions with three components, namely primary emotion, secondary emotion and tertiary emotion. Each category is a detail of emotional fragmentation through the process of daily reactions of the situation and environment the category's structure list in table 2.6.

Table 2.6

Categorises emotions: primary emotion, secondary emotion and tertiary emotion (Parrot, 2001).

Primary emotion	Secondary emotion	Tertiary emotion
Love	Affection	Adoration, affection, love, fondness, liking, compassion & sentimentality.
	Lust	Arousal, desire, lust, passion & infatuation.
	Longing	Amusement, bliss, cheerfulness, gaiety, glee, jolliness, joviality, joy, delight, enjoyment, gladness, happiness, jubilation, elation, satisfaction, ecstasy & euphoria.
	Cheerfulness	Enthusiasm, zeal, zest, excitement, thrill & exhilaration.
	Zest	

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Table 2.6 *(Continue)*

Primary emotion	Secondary emotion	Tertiary emotion
Surprise	Surprise	Amazement, surprise & astonishment
	Irritation	Aggravation, irritation, agitation, annoyance, grouchiness & grumpiness.
	Exasperation	Exasperation & frustration
Anger	Rage	Anger, rage, outrage, fury, wrath, hostility, ferocity, bitterness, hate, scorn, spite, vengefulness, dislike & resentment.
	Disgust	Disgust, revulsion, contempt & loathing
	Envy	Envy & jealousy,Torment
	Torment	Agony, suffering, hurt & anguish
	Suffering	Depression, despair, hopelessness, gloom, glumness, sadness, unhappiness, grief, sorrow, woe, misery & melancholy.
	Sadness	Dismay, disappointment & unpleasure
	Disappointment	
Sadness	Shame	Guilt, shame, regret & remorse
	Neglect	Homesickness, defeat, dejection, insecurity, embarrassment, humiliation & insult.
	Sympathy	Pity & Sympathy
	Horror	Alarm, shock, fear, fright, horror, terror, panic, hysteria & mortification
Fear	Nervousness	Anxiety, nervousness, tenseness, uneasiness, apprehension, worry, distress & dread.
Joy	Contentment Pride	Contentment & pleasure
	Optimism	Pride & triumph
	Enthrallment	Eagerness, hope & optimism
	Relief	Enthrallment & rapture
		Relief

The development of emotional knowledge nowadays has found various aspects of the research of emotions, cognitive experiences and emotional experiences. Aesthetic objects play a significant role in order to measure the AX and UX through emotion theory.

2.5 Comic

McCloud (1993) expresses the terms of Sequential Art as a basis for the definition of comics. McCloud regards the comic's definition as a picture or a sequential art and juxtaposed images that create the storyline. In comics, it touches on various issues

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such as contemporary fiction, history, folklore, education, mystery, biography, and satire (Cohn 2014). The form of comics quite similar to storyboard drawing, but the aim for output product is different.

Since the first comics book was produced (Circa 1934) the form of reading change with words and pictures. Tom Wolf (1977) in Eisner (2000) writes that for the last hundred years, the subject of reading has been connected quite directly to the concept of literacy, learning to read has meant learning to read words. Still, recent research has shown that reading of words is but a subset of a much more general human activity, which includes symbol decoding. In a general sense, that can be thought of as a form of perceptual activity which includes reading that involves with words and picture as a type of manifestation from reading. Now, over the span of 80 years, comic book features appear in many forms and the comic artist developing their comics with words and pictures (Hague, 2012; Meskin, 2011).

Adjacent to McCloud, Eisner (2000) pointed out that comics are a medium or a way of telling a closely related story related to the writing style. Unlike other mediums, comics' strength is in its storytelling, writing style, and assisted with visual power that gives more imaginative storytelling (Upson & Hall, 2013). Eisner (2000) also note that comic not only medium of communication by storytelling with a combination of images and text, but it is beyond our intellectual process of communication, that is why Eisner state that comic is the form of reading. This assertion is supported by Arroio (2011) that the comic is not just a creator, even comic illustrations only build an intellectual combination between images and text preparation to develop a narrative. Furthermore, Arroio (2011) explains the use of

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speech balloons, panels, and layouts proponents to understand the flow of the story. The comic is a graphic medium in which images are used to convey a sequential narrative by using text, symbolism, design, iconography, languages, and media arts elements to build a sub-text meaning (Tobita & Shibasaki, 2009; Ayer, 2014).

On the other hand, researchers look back at the early explanation of comics claimed by Kunzle 1973, a comic strip is a sequence of separate images with a preponderance of image over text and tells a story that is both moral and topical in the mass medium. However, Meskin (2007) argues that the statement of preponderance is not necessary in order to label the status as a comic. This is due to its difficult to determine what is measurable as a preponderance. Therefore, Meskin rejects the idea of image over text by Kunzle. This is because the images and text are sometimes in line, and sometimes the text is more extensive than the image depending on the comic's context.

Arising out of this, a real definition of comics might give us some standard features of the comic. However, the question is, why continue the attempt to define comics, when many scholars give multi-method how to identify comics. Smith (2015) and Meskin (2007) mention about how to evaluate and interpret comics as comics? Hence, he suggests the need and focuses on how to evaluating and interpreting comics of the various styles, techniques and purposes found in the art form. He also emphasises on how to determining the standard, contra-standard and variable features of the art comics (Samanci & Tewari, 2012).

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Meanwhile, Muliyadi (2015) claims that comic is representative art and symbolism contain satire, critical, and humouristic elements. Besides, Muliyadi expands the comic's definition in the context of art, a sketch or early drawing of an idea for final artwork. Therefore, the core idea of Muliyadi statement is the link between arts and comic emphasises that comic is a form of art. In addition, comics can be displayed in the gallery, the exhibitor in mass production.

Muliyadi (2015) defines the timeline of Malaysian comic and cartoon history with a different era which are, pioneer-era (1930-1957), neo-era (1957-1970), golden era (1980) and pluralist era (since 1990). This timeline is vital to determining the miscellaneous of technique, thought and idea for each era. Nowadays, comics have evolved and present in various forms of media. From the print, web, interactive and virtual. With the explosion of mobile technology, comic exploration becomes broader and more open to making the comic industry more relevant to the current situation.

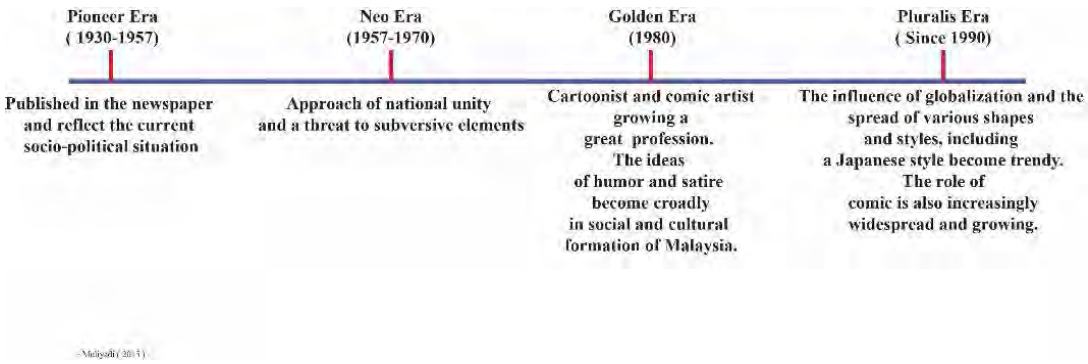


Figure 2.12. Muliyadi (2015) timeline of comics and cartoons in Malaysia.

Comics are a medium of information that is enjoyable. When reading it, readers can feel entertained and informed, with a sense of relaxation. Comics enclosed with the visual power that is prepared with a creative approach (Chute, 2008). McCloud

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(1993) has outlined several elements in a comic production: icon, panel or frame, line, and storytelling.

In addition, McCloud suggests six steps in the production of an excellent comic, six steps that are also widely used by artists to produce works of comics in the comics. The six steps are, 1) idea, this stage is all about collecting and managing theories for the starting materials including philosophical, and emotional content of the work. This stage also used as the basis of a sketch for identifying characters, props and backgrounds. 2) Form, the initial concept idea was worked into an appropriate form to deliver the story's message. This stage determines how the comic artist produced the comic form, whether using digital or manual techniques or even 'inking' thick or otherwise. 3) Idioms, an art elements play an essential role at this stage in which the artist emphasises the style, subject matter and comic genre. Art and comics elements will be fully utilised at this stage. 4) Structure, this stage determines the composition of the comics. How to creatively managed, what should be added and may have to be removed immediately. 5) Craft, the application works with comic skills, practical of artistic knowledge and surface. 6) The production process, determining the value and finishing.

In a similar vein, Eisner (2000) has outlined five elements in order to produce comic art. These elements are the main guideline and may be considered as a comic framework or the way of making a comic pipeline. The element is imagery, timing, frame, expressive anatomy and writing the sequential art.

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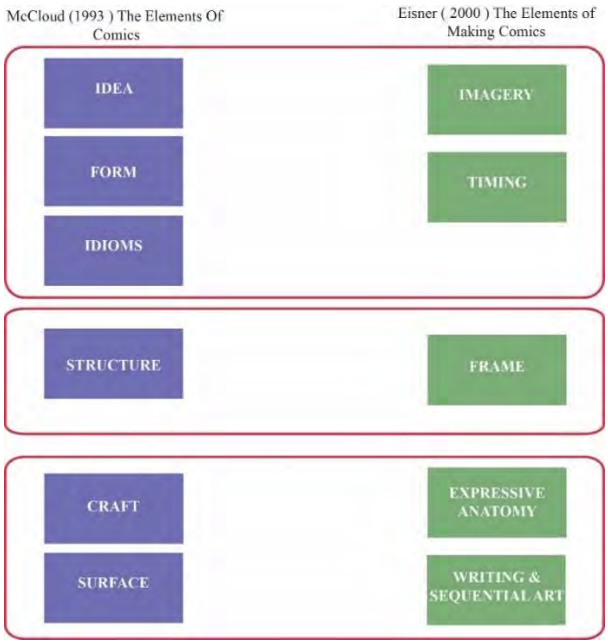


Figure 2.13. The link between McCloud (1993) element of comics and Eisner (2000) the elements of making comics.

Meanwhile, the extraction of Lee (2010) shows similarities in some aspects of Eisner and McCloud's production theory of making comics. Lee's statements are more detailed and emphasised on the technical issues of the comics themselves. Lee felt the right technique of production is essential as well as producing a good storyline. Lee has outlined strategies and steps in producing comics such as form, perspective, foreshortening, human head, amazing anatomy, action and acting, characters and costumes, background, layout, peerless peeling, imaginative inking, lively lettering, crafting colour and commanding cover.

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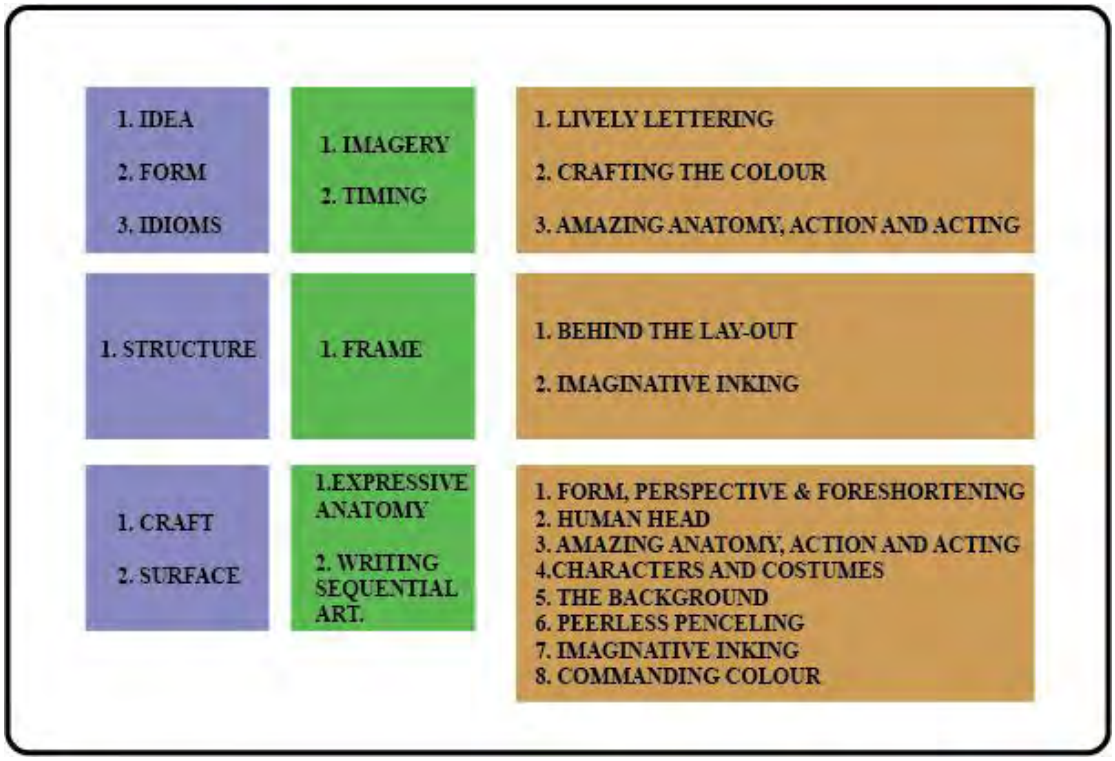


Figure 2.14. The Construction theory of comic elements between Eisner (2000), McCloud (1993) and Lee (2010).

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In conclusion, scholars agree to define comic as a form of art by expressing their comic insights and theories. In addition, comic media has the potential to evolve with ever-changing technology without changing its original philosophical content continually to ensure the comic is always significant at any given time.

2.5.1 Digital Comic

With the rapid advancement and development of the ICT and multimedia technology, many things that have been done manually now have been developed into digital form. Conventional comics are usually painted on paper using ink, pen, and colour printed through newspapers or magazines, but now it has holistically changed through

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ICT and multimedia. The arrival of digital technology has particularly resolved hassles to maintain the product quality of the comic.

Specifically, the digital comic is defined as comics that may be produced manually or digitally but using the digital platform as a medium of presentation and publishing. In the era of ICT and multimedia, this definition of digital comics is expanded to the virtual environment. Digital comics are now published on websites, online, television, and mobile content (Samanci & Tewari, 2012; Wang et al., 2019).

Dittmar (2012), claims that digital comic depends on a computer to process the image into the screen. It contains the process of structuring and pacing the narration in digital format. Meanwhile, Marianthi et al. (2016) and Woo (2012) assert that the digital comic is based on the use of virtual technology. It will facilitate the creation of images, texts, videos, sounds, and animation. The basic format of digital comics related to the nature of the multimedia medium is text, image, video, and sound. On the other hand, Morozumi et al. (2009) emphasise that the significantly different physical features between digital comics and printed comics are sounds and motions, zooming and panning, page or frame, and motion picture.

McCloud (2000), in his account of 'Reinventing Comics', he explains that the potential of multimedia in comics may offer more visual effects with enhancements in terms of sound effects, mobility, and interactivity. Incorporating comics and multimedia promises a new digital environment using particular devices such as CD-ROM, computers, tablets, and mobile phones (Cohn, 2012). In addition, McCloud (2000) defines it as “Infinite Canvas” where the concepts, storylines, styles, and

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comic elements are still present in them are presented in digital environments with multi-dimensional panel structure, sound, special effects, and minimal limitation on animation or movement.

McCloud's infinite canvas provides solutions to the issue of prints and storage of comic materials. Through the digital environment, there is no problem producing more comic pages with only one screen. Its directional reading is multi-dimensional, either vertically or elongated and assisted with music scores, sounds, and special effects. In infinite canvas, McCloud has outlined some of the particular criteria as an addition to the traditional comics are trails that allow canvas panel free moving in sequence in the digital environment, distance pacing that enables readers to manipulate perceptions of time and space, narrative subdivision is the flexibility to divide the comic sections, sustained rhythm as an additional control to the narrative in order to create the mood and presentation. Gradualism is the ability to see the image gradually in order to understand the story directions.

Furthermore, by combining comic features such as style, genres, dialogue balloons and panel structures with interactive media, character and background sounds as if reading balloon dialogue, a little element of animated motion and readers can choose a favourite plot to make comics lives in a virtual environment (Miller, 2005; Wang et al., 2014). For example, the Sinkha graphic novel (refer figure 2.15) in 1995 using CD-ROMs generated using 3D digital image creation with static images and moving images accompanied by background music was arranged sequentially and combined with text.

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Figure 2.15. *Sinkha* Graphic Novel, 1995

In conclusion, it is undeniable that technological development has become the most significant contributor to the evolution of comics from conventional to digital. The evolution of this comic has been enriching new studies and inventions in the field of comics itself. With the digital era, it is also emerging of web-comics, interactive comics and motion comics.

2.5.2 Interactive comics.

Boreczky et al. (2000) claim that interactive media is a two-way interaction with an audience in order to get information by reading, seeing, or listening. Meanwhile, Tobita (2010) defines the interactive communication between user and artefact (comic) that can be invited as a partner involved with communication and act.

The comic is only a medium, and the technology itself makes comics different between the age. Likewise, McCloud (2000) denotes that comic and technology exist

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as pure information and all comic present on screen is digital comic in the technical aspect. Moreover, the interactive comic is the way of communication between artefact and reader. The reader is free to choose from which chapters and frames of the comic that they want to read. Furthermore, the set of interactivities shall stimulate the audience to play with the comic (Samanci et al., 2007; Samanci & Tewari, 2012).

Marianthi et al. (2016) suggest several factors can influence readers in reading interactive comics, which are panel arrangement, narrative story structure and interactivity. This is because some readers are more sensitive to verbal information, while others are more to image information in comics. The reader is free to set up their own point to read based on comic information, whether it word or images (Rigaud et al., 2015).

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Hence, Ayer (2014) suggests that three elements on the interactive comic are appealing to multiple perceptual systems. In contrast, the technology gives the opportunity to add the sound, animation, and sense to touch the image of comics to create the ability for the audience to immerse the presentable storyline. Using sound to create mood, the sound exist in a lot of interactive comics. From background music to specific character sound is created to evoke mood and narrative as well pacing and visual features that can create more aesthetically pleasing experiences where the reader can control the pace and play around with the comics' visual.

Undeniably, the ever-moving technology has had an enormous impact on digital comics. Additionally, with the widespread of internet use, comics are now presented in web pages, videos, interactive web pages, and motion comics.

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2.5.3 Motion comics.

In 2008, Warner Bros. launched the 12 Watchmen (refer figure 2.16) episodes in a format called motion comics. The motion comic features changes such as a comic panel that has been animated with the addition of panning and zoom techniques and is given a sound effect, background sound and character, music and special effects. Warner Bros has also published this series online and in a DVD format.

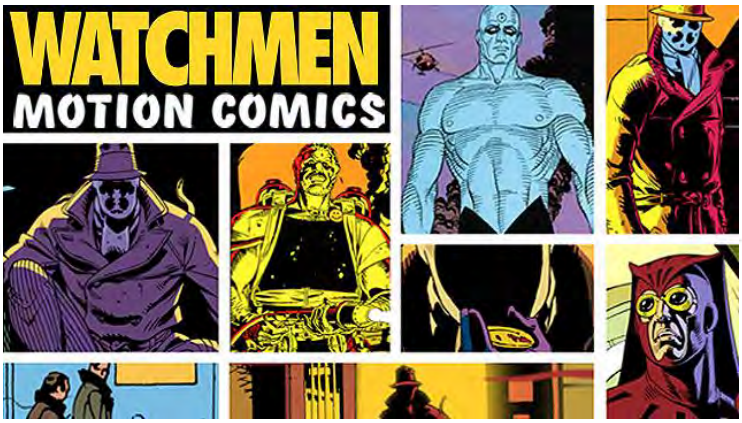


Figure 2.16. Watchmen motion comics 2008

Motion comics can be described as moving comics on paper (screen) and appears like a movie show. The compilation of pictures, sounds, texts and movie concepts is like moving comics (Miller, 2005). Comics are just as a medium, and in the future, it is no longer printed on paper and can be done on the internet (Eisner, 2000).

Hashim and Idris (2016) have outlined the theoretical framework for developing motion comics. The framework can describe as a pipeline by making the production

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process as a base, in which the process is pre-production, production and post-production. In addition, they combine the comics' development theory by McCloud (1993; 2000) integration of A.D.D.I.E model and cognitive multimedia learning by Mayer (2001).

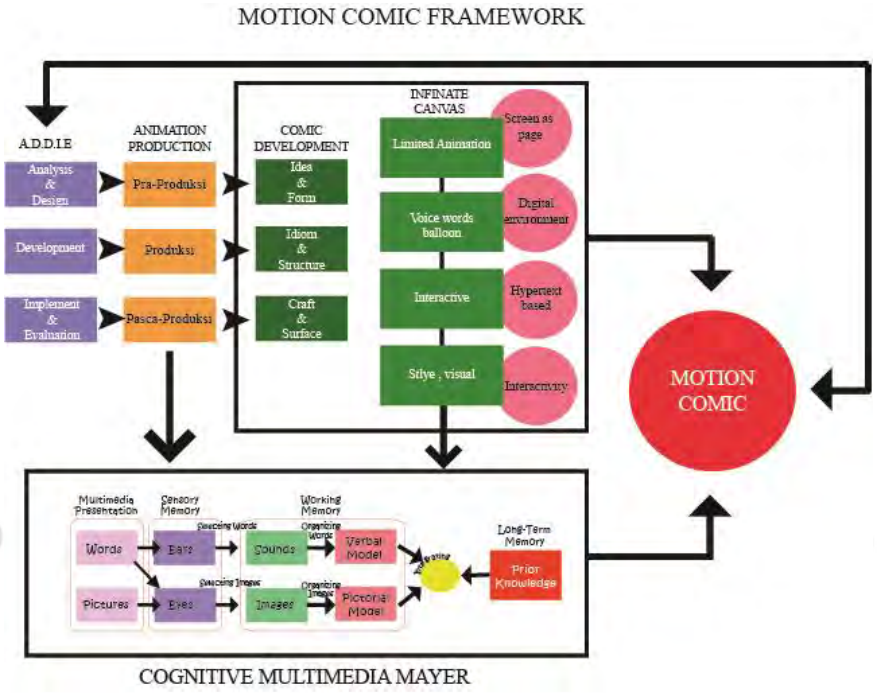


Figure 2.17. Hashim & Idris (2016) the framework of the motion comics construction methods.

Meanwhile, Smith (2015) explains and writes about the aesthetic of motion comics elements in several aspects, including, comic book panel that appears on screen in multiple windows with animation and adapted into single-screen moving image, the motion that moving the character, layer, camera effect and lighting effects, audio with speech balloons present along with the voice over and soundtrack, narrative fidelity created from original comic book material with motion comic adaptation, spatial depth that create a sense of depth, adaptation through the cinematic

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approach, genres, and distribution and formats is based on screen, mobile or television set.

Hence, Smith (2015) also defines the approaches to a motion comic production such as, cinematic, a production approach that subsumes the various properties of the comic book language within a full-screen mise-en-scene. Reconstructed, more elements of the original comic book such as multi-panels, sound effects, speech effect and more are present in the motion comic mise-en-scene and 3D, the combination of comic book artwork alongside and in combination with CGI objects, characters and backdrops. It typically follows the conventional approach to mise-en-scene.

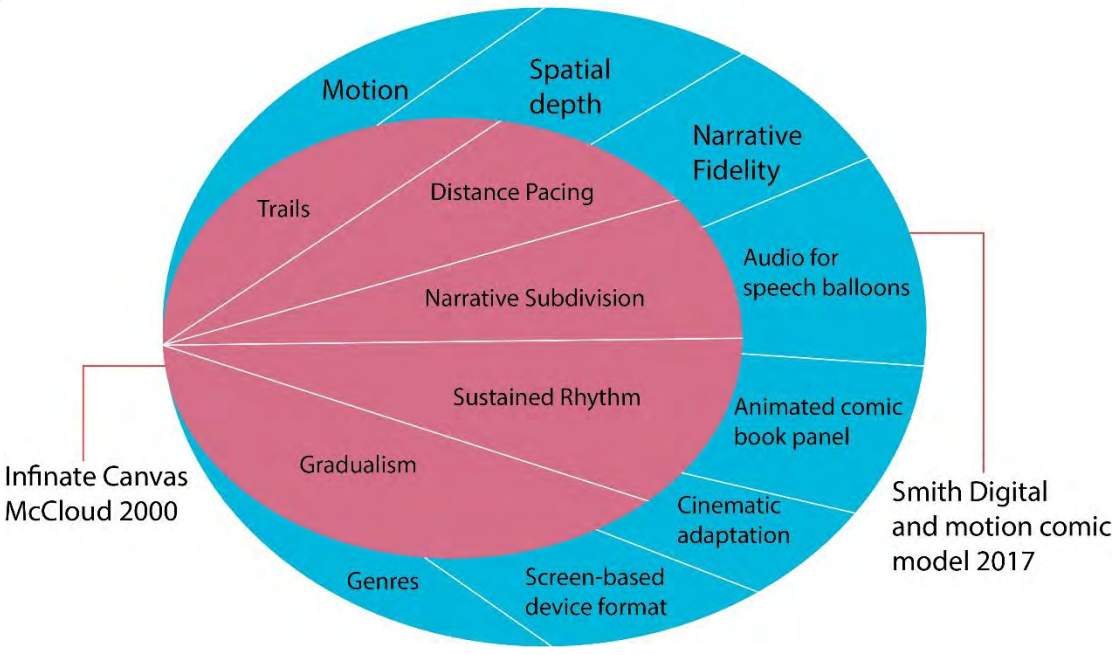


Figure 2.18. McCloud (2000) infinite canvas and Smith (2017) component of motion comics.

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The new era allows explorations of media to be enhanced, being post-modern in which the reconstruction of media and ideas embodies multimedia elements, but the changes of time and technology have embraced the inter-medias potential and media integration enabling virtual reality technology to continue innovating into augmented reality (Steinert, 2015). The potential of augmented reality study on comics is widely open to discourse in the creative field.

2.6 Mix Reality (MR)

Development in the fields of augmented reality (AR) and virtual reality (VR) extremely promises the great change in intellectual, method, and thinking about how the interaction with technology. While mix-reality (MR) increasingly gaining in popularity and relevance in various fields such as education, factories, manufacturing, military, simulation and healthcare, it is still considered limited and requires a truly qualified expert in order to implement the content and the technology (Vassiliadi et al., 2018).

Schneider (2018) states some aspects of reality that particularly beyond the purely visual are considered MR, namely, audio, motion, haptics, taste and smell. Therefore, it can be described as auditory displays that augment the physical world with auditory cues instead of the 3D or 3D environments. It combines visual and audio elements to enable the inclusion of sound design in VR or MR, the motion that was aligning physical and virtual world, haptic as input the form and tangible user interfaces (UI) that lets user literally feel virtual objects with hand, the taste is the

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direction of simulation and experiences the synthetic world, and smell that exists in a virtual environment into authentic smell diffusion.

There is no single definition of MR, and it is highly unrealistic to expect one to appear in the future. Michaud (2017) claims that MR is the blending of physical and digital reality where the physical reality state of things as they actually exist through our human senses without technology and the digital reality is artificially created sensory experiences of people, environments and objects (Jahn et al., 2019). In addition, the MR spectrum shows the blending of physical and digital reality may produce new environments where physical and digital objects can interact with as if all of them were real.

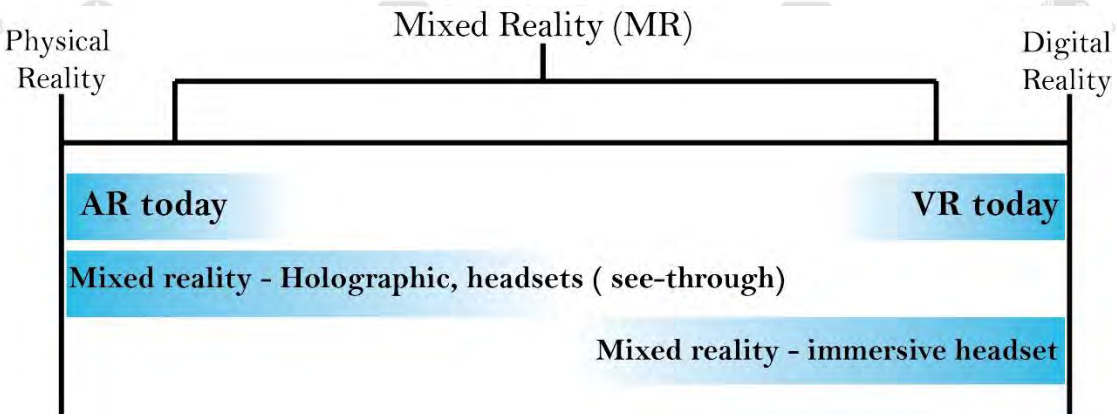


Figure 2.19. MR spectrum the blending of physical and digital reality. Michaud (2017)

In other words, Polap (2018) mentions that MR represents the control collision of VR and AR. In practical senses, the virtual and real worlds come together to create new worlds in which both digital and physical objects can coexist and interact with each other. It is also deciphering the main goal to replace keyboards and flat displays

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with entirely new paradigms for communication and collaboration (Gironacci et al., 2018; Zhang et al., 2018).

In another occasion, Speicher et al. (2019) defines the existing notions of MR in order to synthesize the thematic coding that is a mix of real and virtual objects within a single display on a spectrum between a fully real and full virtual reality. This mix can constitute AR, which is mostly the real world with some virtual objects or augmented virtuality (AV), which is mostly virtual world with some real objects.

MR can be referred as a synonym for AR. This means that the terms are interchangeably for a system or experience that was clearly AR or providing a definition of AR to explain their understanding of MR. Collaboration shows the MR describes the interaction between an AR and VR user that potentially physically separate.

MR is also a combination of AR and VR. Hence, the whole system combining distinct AR and VR parts that interact with each other but are not necessarily tightly integrated or an app or device that can switch between AR and VR as necessary.

2.7 Augmented reality (AR)

This topic begins with Sutherland's (1965) quote, which is scientifically observed when it can be understood as a trigger of the augmented reality (AR) technology.

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"The ultimate display would, of course, be a room within which a computer can control the existence of matter. A chair displayed in. Handcuffs displayed in such a room would be confining, and A bullet displayed in such a room would be fatal. With appropriate programming, such a display could literally be the Wonderland into which Alice walked. The user of one of today's visual displays can easily make solid objects transparent and can see through matter".

Over a decade, AR technology is proliferating. Until this day, the technology is evolving with the development of AR theories, production methods and models related to this technology. Look back at the 60's when "Sesorama" was created in 1962 using digital computing (refer to figure 2.20). Morton Heilig, a cinematographer, brings viewer into the onscreen activity by effectively taking all the sense and calling the project as "the cinema of the future". Arising out of this, in 1968, Sutherland was the first one to create an AR system using an optical see-through head-mounted display that allows user to interact with virtual objects.

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Figure 2.20. Sesorama 1962.

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The term AR first appeared in 1992 in the research project by Caudell and Mizell (1992) during the process of designing and prototyping the heads-up, see-through, head-mounted display (HUDSET) manufacturing processes. In a practical sense, the technology enabling this access interface call heads-up (see-thru) combined with a head position sensor to workplace registration systems. The augmentation of the visual field of the user information concurrent with reality manufacturing task, overwhelm the human-involve operations, and they call the system as an augmented reality (AR) technology (Cabero & Barroso, 2016).

Nowadays, the most recent milestone in HCI produces a paradigm-shift of the emerging world wide web (www), the social web and the mobile device revolution (Saefudin & Wardhani, 2013; Bednarczyk, 2017). Hence, the appearance of AR

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promises the direction, actionable and automatic links between the physical world and electronic information.

In general, Wang et al., (2009) assert that AR is a mobile or incorporated technology that embedded senses, processes and output data in real-time, recognise and track the real-world objects and provides contextual information by registering the human senses. Meanwhile, Marques (2017) claims that AR is a technology that allows an interactive three-dimensional environment and virtual imagery to be overlaid the real objects. This statement is fully supported by Azuma et al. (2001), emphasise that an AR system must have the following properties such as, combination of real and virtual objects in the real environment, the system runs interactively in real-time and it registers real and virtual objects to each other.

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On another occasion, Caudel and Mizell, (1992) describe that AR allows computer generated graphics to overlay a real-life scene and user can interact only with virtual objects, which is one of the limitations of the AR interface. However, this limitation has been overcome by adopting a ubiquitous computing approach, where real objects can consolidate intelligently digital connected and become a smart object in an intelligent space (Jooste et al., 2015; Cowling et al., 2017).

Realising the potential of AR in various fields, Webel et al., (2011) explain the instructions on how to assemble and disassemble a machine using AR information technology proven that AR is a powerful technology to support training in the context of industrial services procedures.

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In other respect, Tech Policy Lab (2015) identify six such features, most of which are present in most AR system namely, sense properties about the real world, the process in real-time, output (overlay) information to the user, provide contextual information, recognise and track real-world objects, and be mobile or wearable.

Carmigniani and Furht (2011) define AR as a real-time direct or indirect view of the physical, real-world environment that has been enhanced or augmented by adding virtual computer-generated information into it. In other parts, Milgram's virtual reality continuum define by Milgram and Kishino (1994) that spans between the real environment and virtual environment comprise AR and augmented virtuality (AV) in between where AR is closer to the real world and AV is closer to a pure virtual environment.

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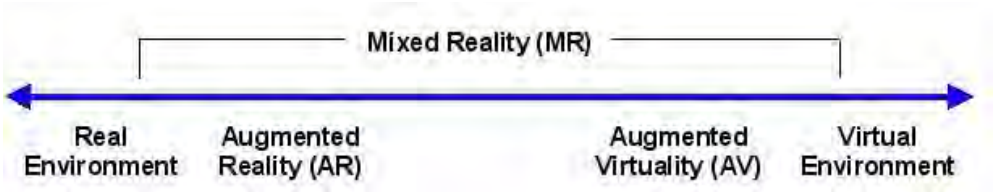


Figure 2.21. Milgram's reality-virtuality continuum (1994).

In a practical sense, Jamali et al. (2014) outline several important AR applications such as displays, input devices, tracking and computers. There are three major types of displays in displays component whereas, head-mounted display (HMD), handheld displays and spatial displays. The HMD display devices install on the head as part of a helmet and places both images of the real and virtual environment in the user views. They may be either a video-see-through or an optical see-through in a monocular or binocular display optic. Second, the handheld displays

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normally employ small devices with a display that user can hold in their hands. Hence, in this display, they use the see-through video techniques to overlay graphics into the real environment.

On the other hand, the spatial AR (SAR) uses video projectors, optical elements, holograms radio frequency, and other tracking technologies to directly display graphical information into physical objects without requiring them to wear or carry the displays.

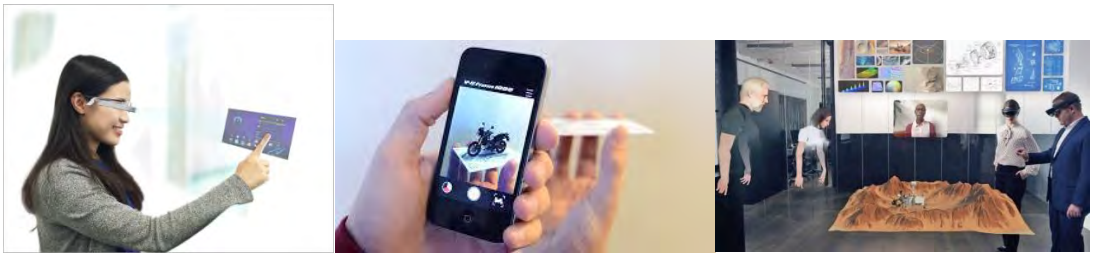


Figure 2.22. The head-mounted AR, handheld AR and spatial AR. Images retrieve from www.astrid.org

The input devices component that they are using are included any type of input devices for the AR system. Some utilize gloves and wireless wristbands. Admittedly, in this age, smartphones are fully utilized in AR system as a pointing device, for instance in google sky map application that requires the user to point the phone in the direction of the planets (Kalkofen et al., 2011).

Conversely, tracking devices consist of digital cameras and other optical sensors, GPS, solid-state compasses and wireless sensors. Basically, the user uses this device's technology with different usability. Each of these technologies has a different level of accuracy and depends significantly on the type of system being developed

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(Alvares & Ternier, 2012; Heinrich et al., 2019). Computers devices are essential in AR systems. Of course, it requires enough power to deliver AR content. However, the sophistication of technologies now allows the mobile computing system to operate well for AR content (Gjosater, 2014).

In addition, there is also an AR mobile system that is currently flourishing massively. The AR system for mobile devices involves the use of wearable mobile interfaces allowing users to interact digitally and mobility information overlap with trigger objects or surfaces in a natural and socially acceptable way (Ajanki et al., 2011; Cukovic et al., 2016). At this point, Krevelen and Poelman (2010) state that a successful AR mobile system depends on having an application that enables for a user to focus on the system or application rather than on the computer devices. It enables users to interact naturally and socially in an acceptable way to provide the user with private information.

Visualisation in a real-world environment inextricably links from the visual interaction between real and virtual images. This type of visualisation is a tool for exploring real-world structures with enhancing contextual information (Ma & Choi, 2007). AR can provide semantics or semiotics to real-world objects or places by augmenting textual or image annotation. Hence, the powerful AR visualisation techniques may use the real-world environment in order to present contextual information to generated images visualisation system (Singh et al., 2004; Diaz et al., 2015).

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2.8 Design Development Research (DDR)

In the context of this study, DDR is a fundamental development in building the AR Comic prototype that will be used as a stimulus to measure AUX toward AR products. With reference to this, the study produced closely related to product development that ensures and validation of AUX model can be a catalyst for the combination of aesthetic experience and user experience.

Fundamentally, DDR is structured and disciplined research specifically in the development of a product or program conducted to develop a product. Richey and Klein (2007) described that DDR tries to set a systematic empirical policy for the manufacture of instructional or non-instructional products, in other words, it is a research-based product and not a technical issue of product development.

At this point, Kara and Cagiltay (2020) support the account above by stating that DDR starts with the problem statement to evaluate and improve the prototype. It is considered to complete the cycle of research. In DDR, the products produced include various forms such as IT artefacts, new theories, design models, industrial designs, untested methods, application of tools and new processes (Richey& Klein, 2014, Gregor et al., 2013, Gagne et al., 2005). Similarly, Gunaydin and Karamete (2016) emphasizing that the first step in DDR is problem identification, and it will be the impetus for product problem-solving. Although there is a problem during product development identification, it is different from problem identification in the whole research because the dimensions of the product's problem are not as comprehensive as the problem in the research holistically.

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To put it another way, Richey and Klein (2007), state that DDR is indeed subject to the effects of environmental factors such as perishable science studies and ever-evolving technological advances. Suggestions for DDR to continue contributing to a study involving environmental change factors include age or education level factors, different organizational contexts and different delivery methods according to dissimilar demographics and usage (Sahrir et al., 2012, Tracey, 2009).

Aligned with this, Adyani et al. (2020) assert that from this DDR the researcher will obtain, guidance for new theoretical constructs, inspiration to develop new hypotheses, identify new variables and expand them, gain a better understanding of the design process in heuristic research and discovery and principles which occurs broadly regarding the design, development or use of a tool or a model (Fryer & Dinsmore, 2020, Blevins& Brill, 2017, Richey& Klein, 2007).

For this purpose, Ellis and Nova (2010) outline the steps in the DDR level for a study and the product is produced, among them are, A)Identify the problem, In DDR studies are driven by problems present in several situations namely, 1) complexity of problems and possible solutions, 2) flexibility and potential change of problem-solving, 3) solutions to human creativity and 5) solutions depend on collaborative efforts. In addition, identifying problems is also based on emerging situations involving technology or organizational management. It will create situations where there are no tools, products, or models to solve the problems that arise.

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After that, B) Identifying the objectives while in this case, the DDR study's objectives are attached to the research questions that are usually the basis of the study. These questions reflect the research problem clearly and do not yet have an empirical answer. Under the circumstances, research questions can set the research framework and determine the initial product development research flow.

The design and development became the next step to plan and develop artefacts in the literature highlights based on specific models specific to the field of study to be embedded into the research phase which includes developing a conceptual framework, planning system development and developing prototypes. Develop a conceptual framework of roles, functions and systems. It is related to the product relationship and the problems that drive the development. Expert panels, interviews, and literature reviews are among the effective techniques for building a conceptual framework and in turn, becoming a guideline for the design process.

Hence, the test and evaluate stage purposely to develop the product by engaging the functions and requirements set through from empirical studies. The researcher's task is to develop a prototype in the context of the problem described in order for the product to occupy the standards of the research. That being so, the testing methods can be done in different ways according to the product context and overall study objectives. Regardless of the method used to evaluate the product, there are three vital considerations for this phase of design and development research, namely, 1) determining the ways in which the product performs and does not meet the identified functions and needs, 2) using processes agreed and supported by the literature and 3) the level of acceptance of the value found on the product.

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To this end, communicate the results and conclusion of the results is the contribution of the research to the body of knowledge. New knowledge is generated through research questions and research objectives. New hypotheses are evolving with literature evidence and support by literature review. It will form the relationship between the answers and the problems that lead to new research.



Figure 2.23. The 6-phase design and development research approach. Ellis & Nova (2010)

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Richey and Klein (2007) outline the DDR approach through four phases, namely, needs analysis phase, design phase, development phase, and evaluation phase. These phases cycle that makes this DDR genuinely structured and systematic development research.

The needs analysis phase is significant as a reason that justifies a development study needs to be made. In such a case, needs analysis focuses on the problems that will be solved by a target group as a basis for identification and evaluation to decision making in human services and product design. In other words, its need assessment process of evaluating the problems and solution identified for a target population. In this process its postulates the importance and relevance of the problems and solutions.

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The design and development phase are the product development phase, model formulation, module development, research framework, strategic plan, guidelines, and policymaker. This phase may involve experts and designers or superior human resources to develop a product.

On account of this, Fariha et al. (2019) stressed that this phase is very fragile in a development study because the product or a model to be developed must be related to the support of theories and phenomena in the field. In addition, development studies are able to strengthen and expand the practice of a field under study.

In the evaluation phase, Park and Lim (2019) described it as testing a product developed based on the usability test of the product itself. Usability is defined as a measure of a product's ability to be developed and used by the user of the product itself. It can be measured in terms of effectiveness, efficiency and consumer satisfaction depending on the product being produced as well as based on the objectives and problems of the research.

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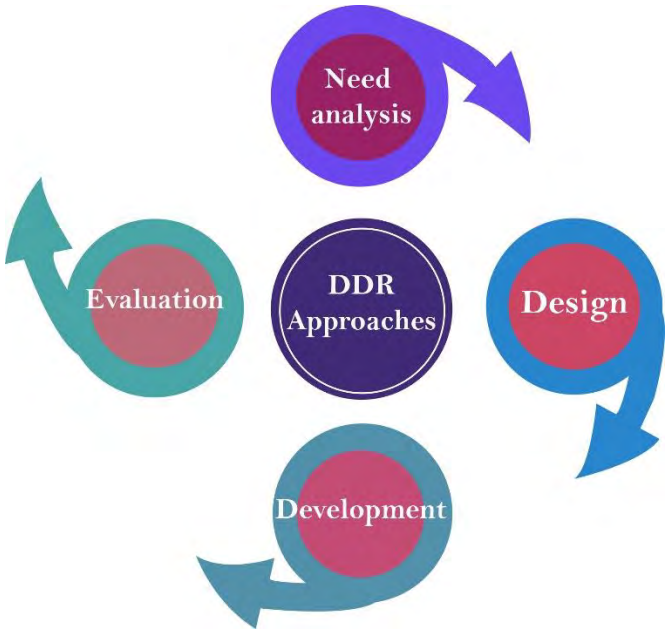


Figure 2.24. DDR approach through 4 phases Richey and Klein (2007).

Referring to this study, the concept and philosophy of DDR in the application begin with need analysis where the researcher sees the needs, gaps, problems, and importance of developing models for two major areas, namely AX and UX on AR comic. The need analysis occurs by doing a methodological review by finding gaps in the previous AX and UX models theoretically, studying the workflow of each model, philosophy, technical, constructs, and vital elements in the field of AX and UX.

After that, the researcher needs to design the initial model based on the design phase's needs analysis. This initial model will be successful in this study after going through the fuzzy delphi method (FDM) through expert consensus. Besides, researchers also need to study the relevance of AX and UX models in more depth, the integration of constructs and elements, and how supporting theories help and reflexes the process of designing the initial model later.

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The development process touches on various aspects, including comic principles, animation principles, AR principles, specialized software, production, and visual study. Researchers need to choose the comic panels that need to develop an AR element in them, and here requires the emotion theory and the principles of comic production. The selected comic panel needs to go through the scene setup process for animation and the AR generation setup.

The evaluation process requires several instruments, including the stimulus (AR comic) developed after the design phase, the initial model resulting from the FDM expert consensus (after going through the model formulation process), and a set of measurement tools to be tested to a predetermined sample. This evaluation process acts as a determinant of the initial model and stimulus as a yardstick for future studies and the prototype development process.

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CHAPTER 3

RESEARCH METHODOLOGY

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3.1 Introduction

This research aims to build a framework for the potential of synergising UX and AX. It begins with exploring and determining the features found in UX and AX towards AR comics.

This chapter describes the main topics and sub-topics of the research, which explains how the tools and instruments use to define the constructs and elements in conducting the research. Undoubtedly, the exploration is carried out on the research design, the population of the research, sample, instrument, and the data analysis.

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3.2 Research design

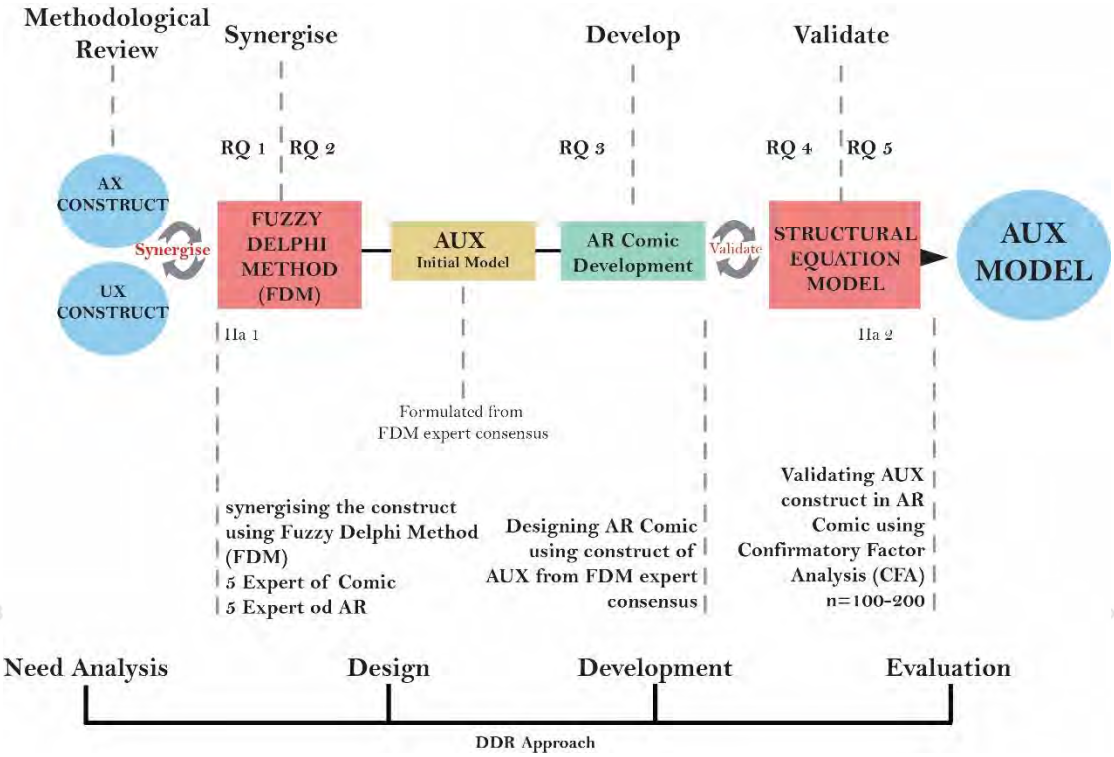


Figure 3. Research design framework

The framework in this research design is a guideline in the process of conducting a research methodology. Undoubtedly, each phase's planning is essential to answer the question of further research to achieve this research's objectives.

The AX and UX construct postulate from methodological review (MR) activity where the process of intensive, selective selection, screening, integration, and critical reading of selected reference materials within the study's scope is applied intensively.

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A MR aims to identify the integration of relevant models and theories. These models are selected based on the frequency of its usage through citation, models that are often referred by other scholars, models that are believed to be completed and provided a clear explanation of the theory. As a result of critical readings, it was made on three models and the idea of UX, Hassenzahl (2007), Irshad and Rambli (2016), and Ritos (2011). Furthermore, through the process of screening, selection, integration, and formulation are critically coupled with identifying UX elements for AR to get the constructs and elements in the UX. The same concept is applied to the theory and the AX model. Three models are integrated, filtered, and formulated to identify the elements of AX for comics and further identify the constructs and AX elements. The three models are Redies (2015), Leder, et al., (2004), and Markovic (2012). On the other hand, the constructs and elements that have been identified are from a study by Olsson and Mattila (2011) for UX in AR and a combination of Morreall (2009), Klaehn (2015), Plutchik (1980) and, Parrot (2001). It is shown in table 3 below:

Table 3

MR proses of construct and element of AX and UX

The construct and element of UX		
No	Construct	Element
1	Efficiency	Time, effort.
2	Increase awareness	Feeling of discovery, feeling of insights
3	Inspiration	Cognitive stimulated, encourages, eager to try new things.
4	Motivation	Being motivated, Interaction proactivity
5	Creativity	Self-expressive, creative
6	Liveliness	Vivid, dynamic

(Continue)

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Table 3 *(Continue)*

The construct and element of UX		
7	Meaningfulness	Personal meaningful, relevant
8	Playfulness and entertainment	Joy, amusement, playfulness
9	Captivation	Captivate, immerse
10	Intuitiveness	Human likeness, naturalness
11	Tangibility	Concreteness, coherence
The construct and element of AX		
No	Construct	Element
1	Amusement	Love, funny, cheerfulness
2	Paradox of tragedy	Tragic, Grotesque, Macabre, Horrible
3	Mental jolt	Bizarre, fantastic
4	Harmony	Verisimilitude, accuracy
5	Storytelling clarity	Surprise, drama, amazement, authenticity

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3.2.1 Synergise phase

The synergise phase process involves the empirical approach of data through the fuzzy Delphi method (FDM). In this case, the constructs and elements that have been identified during the SLR process will be recursive as question items for expert review (Manakandan & Ismail, 2017; Husain et al., 2018). Arising out of this, ten experts are appointed to respond to the question items from the constructs and elements of UX and AX. Appointed experts represent five for AR and five for comics. This FDM aims to gather expert consensus by gaining reliability of construct and elements. It will help create the initial model of the combination of AX and UX on AR comics.

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3.2.2 Develop phase

Between the synergise and development process, a process called formulation is the process where the AX and UX constructs have gone through the process of acceptance, rejection, merging, and rebranding to produce the initial AUX model. This stage will be the guideline for the next process in this pipeline research cycle. On account of this, the AR and comic elements will also be considered a significant component in formulating new constructs and elements for the progression new model. This phase is also developing AR Comics from existing conventional comics on the market based on AUX framework.

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3.2.3 Validate phase

The constructs and elements in the new model for the AR comic will be forwarded to validate the process of AUX model. Hence. The process uses Structural Equation Model (SEM) through confirmatory factor analysis (CFA) to scrutinise AUX's synergising's potential results. CFA also aims to compare two different models' ability for the same set of data, test the relationship between two or more factor loading, and test whether a set of factors are correlated or uncorrelated. The CFA is a part of the Structural Equation Model (SEM) that will elaborate more depth.

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3.3 Stimulus

In this study, the FDM expert consensus stimulus is exiting AR Comic title Master of the Sun from Black Eye Peace production. The researcher will develop an AR Comic from AUX model based on local exiting conventional comics in the market.

3.4 The procedure for selecting the respondents

The selection of respondents for this research is congruent to the design phase and processes. Two phases require a participant of respondents, which is the first phase (synergise) and the third phase (validate).

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3.4.1 Experts phase respondents

The selection of respondents for this phase comprises an appointed panel of experts to validate constructs and elements in the previous MR process. Concerning this, ten is appointed, each representing comics and five others representing AR. Experts' selection is determined by more than ten years in comics industry and has produced conventional and contemporary comics. The criteria considered are qualifications for AR experts, involvement in the new media industry and recognised expertise. Because

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these two experts are heterogeneous, therefore, a total of ten experts are sufficient to obtain empirical data (Clayton, 1997).

Based on the discussion and reference of literature review, the expert's selection for this phase are as follows:

1. An academician who is an expert in the field of a comic.
2. Local comic artists are actively producing comics in contemporary and conventional.
3. An academician who is an expert in the field of AR
4. New media industry players produce AR as their main product.

3.4.2 Validate phase respondent

In this phase, it is estimated that 200 respondents are involved, and the researcher will use confirmatory factor analysis (CFA) as tools to measure the item. In this study, researcher have used purposive sampling technique to select respondents to be involved. Purposive sampling, also known as judgmental, selective, or subjective sampling, is a form of non-probability sampling in which researchers rely on their own judgment when choosing members of the population to participate in their surveys. (Tongco, 2007). These respondents consisted of students or anyone in the field of creativity and technology, such as animation, game design, advertisng design, graphic design, multimedia, art and design and applied art. Piaw (2009) mentioned that the sample size for CFA is a minimum of 100 respondents.

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Markovic (2012) claims that respondents involved in the related field can cognitively control and provide feedback that coincides with prior knowledge (Desiderio 2018; Decoster, 1998). Respondents among the student of the related field of new media between the ages of 19 and 35 are exposed to more than 98% of mobile devices and penetration in internet usage. They are also known as generation Y and z and are sometimes called millennial generation (Bencsik Et al., 2016 and Kelan & Lehnert, 2009).

3.5 The procedure of fuzzy delphi method (FDM)

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As the FDM method is known to be a method of solving blurring and vague ideas as a result of expert opinions and consensus. As is known, FDM is one of the modified Delphi techniques that brand an empirical study of qualitative data or text to quantitative data numbers.

3.5.1 Formulation of FDM questionnaire elements

There are several elements of the questionnaire in the FDM method. It is based on a literature review, pilot study, and experience (Azargoon et al., 2019; Jamil et al., 2014). Instead, Roy and Garan (2012) introduce that expert reviews and focus groups are also essential elements in FDM. It can be summarised in the formulation of the FDM questionnaire from the

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literature review, pilot test, researcher experience, experts group and focus group. In this study, the study items were collected through methodological review and combined randomly to be generated as items to the expert consensus.

3.5.2 The implementation process of FDM

There are three processes of FDM method, namely triangular fuzzy number, defuzzification and ranking. The triangular fuzzy number represents the values m1, m2 and m3, which is the m1 = minimum value, m2 = reasonable value and m3 = maximum value. Purposely, to produce a fuzzy scale in order to translate the linguistic variables into fuzzy numbers. On account of this, the higher of the fuzzy scale of the exact data will obtain (Jamil et al., 2014). Conversely, the defuzzification process involves media values between fuzzy numbers (0-1), and the significant value is below 0.2. This means that measure items or constructs are accepted based on expert consensus. Meanwhile, the proses of ranking are to manage the construct and item according to the chronology of the main and ultimate construct that been occur by expert consensus. The FDM implementation steps are summarised as follows:

1. Expert selection.

   As the previous discussion, the expert's selection purposely determines the importance, needs and priorities of the variables to be measured

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with linguistic variables. In FDM, the researcher may choose to meet face-to-face with experts to facilitate the discussion process and describe the issues that may exist in the item.

2. Determination of linguistic variables based on the triangular fuzzy number.

   The triangular fuzzy number represents m1, m2, and m3 values for minimum, reasonable and maximum values. The fuzzy number scale is generated using the triangular fuzzy number to translate linguistics variables into fuzzy numbers. It can be shown in the figure below.

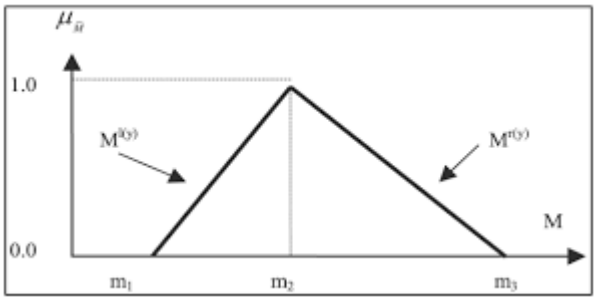


Figure 3.1. Triangular fuzzy number. Mustafa and Darusalam (2018).

3. Fuzzy scale level

   There are several levels of fuzzy scales, namely, the level of consensus of the seven-point fuzzy scale, the five-level fuzzy scale of consensus, the seven-position alternative level, and five fuzzy scale interest level. In this research, the researcher chose the level of agreement of the fuzzy scale 7 points for linguistic consensus and the discourse process to the fuzzy scale. It can be shown in table 3.1.

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Table 3.1

Seven-level fuzzy scale of consensus (Jamil et al., 2014).

Linguistic variables	Fuzzy scale
Extremely disagree	(0.0,0.0, 0.1)
Strongly disagree	(0.0, 0.1, 0.3)
Disagree	(0.1, 0.3, 0.7)
Moderate	(0.3, 0.5, 0.7)
Agree	(0.5, 0.7, 0.9)
Strongly agree	(0.7, 0.9, 1.0)
Extremely agree	(0.9, 1.0, 1.0)

4. Experts consensus

   Percentage of experts review must exceed 70% for each item, otherwise, items or construct need to be discarded or the second round of the expert's review should be implemented if the item is considered crucial (Shubashini et al., 2015). In FDM if the overall percentage has been reaching the expert consensus; therefore, the construct and element are acceptable.

5. Defuzzification process

   This process determines the expert consensus using the alpha cut formula where the alpha number value should be below 0.2. If there is an item over than 0.2, it will be deducted because it does not show a consensus between experts.

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6. Ranking

   The ranking process is organising, managing, removing and integrating constructs and elements according to priority and sequentially. It is essential to define the constructs and elements in the expert consensus.

3.6 Factor analysis procedure

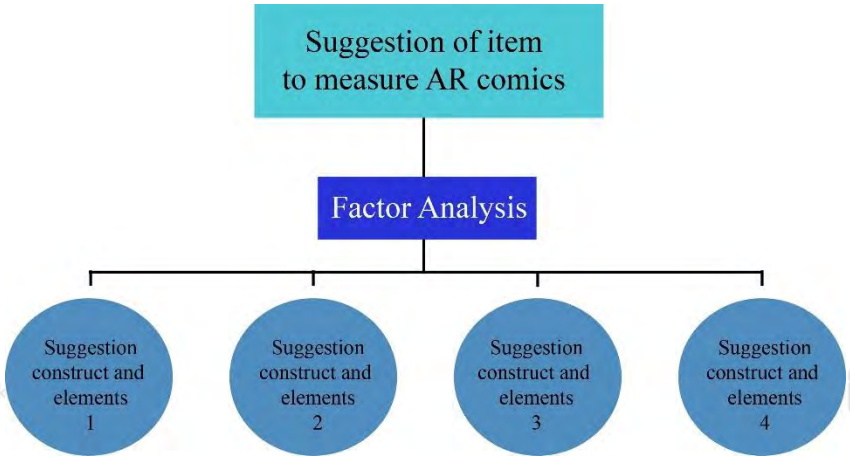


Figure 3.2. The concept of factor analysis (Piaw, 2009).

As known, factor analysis is a procedure that is often used by researchers to identify, reduce and compile some items of the questionnaire into certain constructs in the research. In the factor analysis, each questionnaire item is considered as a factor. Factor analysis involves three stages:

1. Identify the correlation between factors

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Based on the assumption that all constructs and elements correlate with each other, the factor analysis is conduct to determine the strength of constructs and elements in measuring a phenomenon. In addition, factor analysis is conducted to reduce items that overlap. It will outline confusion on constructs and elements besides items with high correlation will be arranged in certain constructs (Sarmento& Costa, 2019; Myers et al., 2011; Arifin& Yusoff, 2016).

2. Extract factors

The next process is to pull out the factors and put into particular constructs under the AUX model. The process starts by selecting a combination of highly correlated factors and contributes to the most variant changes when integrating into the main and the significant factors. The main and considerable factor is the high correlation and will confirm the construct of expert consensus within the AUX model (Prudon, 2014 & Lievens& Anseel, 2004).

3. Understanding factors structure

The next procedure is a twist factor from extracted factors to understand the structure of the factor that is still blurry and difficult to describe. In factor analysis, scattered factors are dispersed and not on their axis, so in this procedure, the twist factor is performed to obtain a clearer picture of the factor structure. In this study, a twist factor was performed to obtain the AUX model factor structure (Alumran et al., 2012 & Prudon, 2015).

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3.7 Structural Equation Model (SEM) through Confirmatory Factor Analysis (CFA)

In SEM, there are two-step approaches to measuring analytical data. The first is to measure the model that explains the connection between latent (unobserved) variables and their indicator (observed) variables (Joreskog & Sorbom, 1993). The second is to measure model fit, reliability, and convergent validity through CFA. Taken together, SEM allows researchers to directly or indirectly evaluate the effects of hypotheses on study variables (Baistaman et al., 2020; Awang et al., 2015; LaNoue et al., 2015).

Simultaneously, SEM is a useful multivariate statistical technique that allows researchers to look at the interrelationships among variables, the relationship between the multiple variables (independents), and the level of dependent variables (Marsh et al., 1996).

CFA is a powerful statistical tool to assess and examine the nature and relationship between latent constructs. Basically, latent construct comes from theory, and researchers need to build indicators to measure latent constructs (Myers et al., 2011). On the other hand, CFA explicitly tests a prior hypothesis about relationships between observed variables (Test, score, or rating) and latent variables or factors (Griffin& Steinbrecher, 2013; Hair et al., 2019; Arifin& Yusoff, 2016).

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Basically, CFA is one of the families of methods known as the Structural Equation Model (SEM) that plays an essential role in measuring structural analysis models (Handley & Benton, 2009). Forming theoretical formulations and data collection is an essential aspect of CFA that allows researchers to specify precise and even highly complex hypotheses based on ongoing studies. To test the hypothesis, it must be converted into a model (Hu & Bentler, 1999).

Model fit test is an indicator of the difference between observed variables and the covariance matrix. Many indicators can be used to evaluate the fit model, including Normed Fit Indices (NFI), Comparative Fit Indices (CFI), Relative Fit Indices (RFI), Tucker-Lewis Indices (TLI), and Root Mean Square Error of Approximation (RMSEA) (Hair et al., 2019; Muthen & Muthen, 2002; Jackson et al., 2009).

According to Hair (2019), there are four models of fit indices in evaluating the model, the model fit test which represents the minimum value of discrepancy per degree of freedom (Cmin / DF) should be below 5, Comparative Fit indices value (CFI), and Tucker Lewis indices (TLI) can range between 0-1 where values greater than 0.9 good fit, 0.8 marginal fits and below 0.7 poor fits (Lievens & Anseel, 2004; LaNoue et al., 2015; Hu & Bentler,1999; Handley& Benton 2009). Marginal fit is considered mediocre, but the model is considered fit (Joreskog & Sorbom, 1993; Handley & Benton, 2009). Another hand, the Root Mean Square Error of Approximation (RMSEA) values of 0.01, 0.05, and 0.08 indicate excellent, good, and

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mediocre fit respectively, and some go up to 0.10 for mediocre (Alumran, 2012; Awang et al., 2015; Islam, 2019).

Convergent validity (AVE) is an approach to evaluating how well a measurement confirms with the theoretical expectation (Mello & Collins, 2001). To establish convergent validity the value obtained needs to be more than 0.45 between the correlation variables in the convergent validity test. This will indicate that the item being tested has a high correlation among measures (Agarwal, 2013).

Through that approach, in this study, the researcher looked at the values of CMIN / DF, CFI, TLI, and RMSEA in evaluating the fit model for the AUX model. The value's description is as follows: CFI Acts to analyze the fit model by testing the data discrepancy with the model proposal. Meanwhile, CFI was able to explain the issue of sample size in the chi-square test and normed fit indices.

$$CFI = 1 - \frac{\text{Max } [X^2 \text{ proposed model} - df \text{ Proposed model}, 0]}{\text{Max } [X^2 \text{ null model} - df \text{ null model}, 0]}$$

TLI is also known as non-normed fit indices (NNFI). It is a combination of parsimony measures with comparative indices between the model proposal and the null model.

$$TLI = \frac{\frac{X^2 \text{ null model}}{df \text{ null model}} - \frac{X^2 \text{ proposed model}}{df \text{ proposed model}}}{\frac{X^2 \text{ null model}}{df \text{ null model}} - 1}$$

RMSEA is a measure that serves to correct the tendency of chi-square statistics to reject models with large samples. It prevents the issue of sample

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size by analyzing the discrepancy between the proposed model, optimally optimizing the parameters and population of the covariance matrix.

$$RMSEA = \sqrt{max(\frac{X^2\ Prposed\ model - df\ proposed\ model}{df\ proposed\ model\ x\ (N-1)}, 0}$$

Where N is the sample size and df the degrees of freedom. Additionally, RMSEA provides a one-sided test with the following hypothesis. The CFA was carried out using the Analysis of moment structure (AMOS) 25.0 version. This study analysis intentions to regulate the suitability of 7 constructs that were developed and can be used to analyze the latent variables. All items loaded in the CFA measurement model need to achieve convergent validity.

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3.8 Questionnaires and respondent

As we know the factor analysis, the size of the respondent is vast, with the number of respondents is at least 100 respondents. However, in this study, a total of 193 respondents are suggested to confirm the data more reliable and firm (n=193). This study uses purposive sampling technique by selecting samples according to the suitability and requirements of the study (Tonco, 2007). Apart from respondents' need to have prior knowledge on that particular subject or in creative technology, the selection of respondents is also selected among generation Y or group called millennials born in 1982-1994 and generation z that is post-millennials born between 1995 to 2010. Both generations have grown up in a world that has been transformed by new technologies that serve new ways of communicating, working, and creating

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knowledge through the internet (Bencsik Et al., 2016 and Kelan & Lehnert, 2009). In constructing the items, the researcher adapted the item framework from Aesthemos (Schindler et al.,2017) which incorporates almost the majority of aesthetic activities such as dance, painting, drawing, acting, singing and theatre. Likert scale adaptation 1-5 is generated to obtain more convincing scores. Examples of Likert scale-like table 3.2 below.

Table

3.2 *Likert scale level for factor analysis.*

Likert level scale	Likert scale
Strongly agree	5
Agree	4
Moderate	3
Disagree	2
Strongly disagree	1

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3.9 Summarise

This whole chapter explains the approach or method used to develop the approach, framework, or guideline of synergizing UX and AX in AR comics. As discussed earlier, there are two theories of two different disciplines in the joint integration of AR comic product formulations. These two theories were formulated using FDM and CFA to develop the AUX framework and validate it. An expert consensus is required to confirm the constructs and elements in the SLR process and new constructs and elements to be tested to obtain empirical data that is more convincing.

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CHAPTER 4

RESULTS OF THE FUZZY DELPHI METHOD (FDM) ANALYSIS

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4.1 Introduction

This chapter describes the findings of the study through the synergistic phase using FDM. Briefly, if re-highlighted through methodological review (MR), ideally, the review's process is included in the needs analysis, which is the first step to identify research problems in the model of design and development research (DDR).

Basically, Augmented Reality Comics (AR Comics) is a combination of 2 major fields, namely AR in Human-Computer Interaction (HCI) and Comics (art-forms), which adheres to the elements and principles of art. Ideally, integrating these two fields explains why we need a new model since AR is basically measured using user experience (UX), and comic is described in terms of aesthetic experience (AX)

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(Hassenzahl, 2007; Olsson& Mattila, 2011; Irshad& Rambli, 2016; Ritos, 2011; Redies, 2007; Leder et al., 2004 & Markovic, 2012).

In the needs analysis, methodological review was conducted with a total of 3 AX models, and 3 UX models were analysed in identifying problems, work-flow, processing system, and output of both models in two significant areas of knowledge as the basis for the design of Aesthetic User Experience model (AUX). The same goes for previous theories, concepts and studies, along with the concept of emotional theory which is integrated as an element of psychology to support and becomes part of the link between AX and UX indirectly.

Table 4

The activity and research question of FDM analysis.

Activity	Research Question
Construct and elements Design Stages of AX and UX model.	What is the similarity and dissimilarity of AX and UX construct? What are the construct and elements suitable to be synergise for AUX initial model.
AUX model development stage. Validation of constructs and model elements based on expert consensus using FDM.	How to integrate the AUX model with the exiting development process for AR comic.

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The model design process using FDM is the initial phase aimed at obtaining the key constructs and elements required to produce a complete AUX model. In the needs analysis phase in DDR, the method of finding through MR was produced in the context of this study. Researchers analyse previous models and theories to identify needs and similarities or inequalities between the constructs and elements of AX and UX (Richey & Klein, 2007; Blevins & Brill, 2017; Adnyani et al.2020).

The study journey begins with identifying the key constructs and elements in designing an AUX model for an AR comic. Researchers have analysed models, conceptual frameworks, theories and related studies from competent scholars in the field to obtain reliable constructs and elements to produce AUX models. The following is a summary of the analysis that has been generated.

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Table 4.1

The MR on the previous model of AX.

Model	**Concept**	**Components**	**AX element**
Redies, 2015	External information to recognise the congruence of AX	Cognitive, emotional and perceptual	Basics emotion
Leder, Belke, Oeberst et al., 2004	Cognitive process and affective states to generated AX	Interest and appreciation	Pleasure and happiness
Markovic, 2012	AX and affective tone	Positive and negative emotion	Emphatic emotion and diffuse emotions

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Table 4.2

The MR on the previous model of UX.

Model	Concept	Components	UX element
Hassenzahl, 2007	Designer perspective & user perspective	Hedonic dimensions & pragmatic approach	Pleasure, Satisfaction, appeal, consequences.
Irshad and Rambli, 2016	Subjective experience, perception, emotional response & product environment	Design & research of Mobile augmented reality (MAR)	Specific experience invoked by positive UX
Ritos, 2011	Method of AR prototype	AR through UX	Sense of immersion & arousal

Ideally, these models are studied in depth to comprehend how the concepts, supporting theories, processing flow, components, and AX or UX elements are generated through the AX and UX products being studied. This study may indirectly support the researcher to observe more deeply with reverence to the cognitive elements, perceptions, emotions, and output on each model produced. Regarding this, AX touches a lot on the emotional experience, aesthetic response, positive and negative emotions, cognitive, perception and aesthetic objects that are usually in the field of art-form. On the contrary, UX takes the positive emotions as a basic elements and emphasis on devices and users at the point to improve the products. (Schoeller& Perlovsky, 2016; Bundgaard, 2015; Carol, 2003; Azzawi, 2013; Alenjung, 2013; Cherubini and oliver, 2009).

The study of MR has led to the discovery of elements of AX specific in the field of comics that have been emphasized by Morreal (2009) and Breyfogle in

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Klaehn (2015) by being integrated with emotional theory by Plutchick (1980) and Parrot (2001). The methodological review process summarizes the AX constructs and elements in the comics as follows:

Table 4.3

The construct and elements of AX in comics.

No	Construct	Element
1	Amusement	Love, Funny, Cheerfulness
2	Paradox of tragedy	Tragic, grotasque, macabre, Horrible
3	Mental jolt	Bizzare, fantastic
4	Harmony	Verisimilitude, accuracy
5	Storytelling clarity	Surprise, drama, amazement, authenticity

Simultaneously, researchers also found a UX element that focuses on the use of AR; it is combined with UX that connects users with devices, services and HCI products. Construct and element are as below:

Table 4.4

The construct and elements of UX in AR

No	Construct	Element
1	Efficiency	Time, effort.
2	Increase awareness	Feeling of discovery, feeling of insights
3	Inspiration	Cognitive stimulated, encourages, eager to try new things.
4	Motivation	Being motivated, Interaction proactivity
5	Creativity	Self-expressive, creative
6	Liveliness	Vivid, dynamic
7	Meaningfulness	Personal meaningful, relevant
8	Playfulness & entertainment	Joy, amusement, playfulness
9	Captivation	Captivate, immerse
10	Intuitiveness	Human likeness, naturalness
11	Tangibility	Concreteness, coherence

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Arising out of this, constructs and elements AX and UX are combined and arranged alternately. During the process of validation of constructs and elements by experts later, the constructs and elements do not lead to the elements in stages.

In the expert consensus process, the researcher has appointed ten experts comprising the president of the Malaysian comics activist's association (PEKOMIK), academia, comic CEO, AR Developer, AR experts and comic experts. This process is included in the synergising and formulated phase in the development of the AUX model.

As described in chapter 3, the study data analysis for the fuzzy delphi method is based on the conditions contained in the triangular fuzzy number and defuzzification process. The first condition is about the triangular fuzzy number which involves the threshold value (d) where the value (d) of each element must be less than or equal to ≤ 0.2 (Azargoon et al., 2019; Jamil et al., 2014).

While the second condition is regarding the percentage of experts who require that the percentage of expert consensus must exceed or equal to ≥70% (Shubashini et al., 2015), next, the threshold value (d) and the percentage value of the expert in the analysis using Microsoft Excel software are guided by the following formula:

$$d(\bar{m},\bar{n}) = \sqrt{\frac{1}{3}\left[(m1-n1)^2 + (m2-n2)^2 + (m3-n3)^2\right]}$$

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Hence, the third condition is about defuzzification because the value of fuzzy score (A) exceeds or equal to the value of a-cut, which is ≥ 0.5 (terry 2019). The value of this fuzzy score was also analysed using Microsoft Excel using the following formula:

A= 1/3 * (m1 + m2 + m3)

4.2 Research question 1: What is the similarity and dissimilarity of AX and UX construct?

Research question 1 was answered by conducting FDM analysis according to the acceptance conditions of FDM towards the constructs and elements that have been collected through the methodology review process. The analysis as follows:

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Table 4.5

Threshold value (d) and percentage consensus for AX construct (amusement)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik president	0.320	0.155	0.153
Comic M CEO	0.076	0.101	0.240
Comic Expert 1	0.232	0.291	0.240
Comic Expert 2	0.232	0.155	0.153
Comic Expert 3	0.232	0.101	0.100
Developer AR MTDC 1	0.076	0.291	0.100
Developer AR MTDC 2	0.076	0.101	0.153
Developer Expert 1	0.320	0.101	0.153
Developer Expert 2	0.076	0.396	0.153
Specialist AR	0.232	0.101	0.100
Threshold value (d)	**0.187**	**0.179**	**0.155**
Consensus percentage	**40.0%**	**70.0%**	**80.0%**

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Table 4.6

Overall of the Threshold value (d) and percentage consensus for AX construct (amusement)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Love	0.187	40.0%	0.460	0.660	0.840	0.653	Reject
Funny	0.179	70.0%	0.600	0.780	0.920	0.767	Accept
Cheerfulness	0.155	80.0%	0.640	0.820	0.950	0.803	Accept

Table 4.7

Threshold value (d) and percentage consensus for AX construct (Paradox of tragedy)

Expert	Element			
	Element 1	Element 2	Element 3	Element 4
Pekomik President	0.025	0.275	0.177	0.171
Comic M CEO	0.025	0.336	0.177	0.136
Comic Expert 1	0.235	0.031	0.129	0.171
Comic Expert 2	0.235	0.275	0.129	0.136
Comic Expert 3	0.317	0.275	0.375	0.171
Developer AR MTDC 1	0.235	0.031	0.177	0.380
Developer AR MTDC 2	0.317	0.031	0.177	0.171
Developer Expert 1	0.025	0.031	0.129	0.380
Developer Expert 2	0.025	0.031	0.129	0.136
Specialist AR	0.025	0.336	0.177	0.476
Threshold value (d)	**0.147**	**0.165**	**0.178**	**0.233**
Consensus percentage	**50.0%**	**50.0%**	**90.0%**	**70.0%**

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Table 4.8

Overall of the Threshold value (d) and percentage consensus for AX construct (Paradox of tragedy)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Tragic	0.147	50.0%	0.520	0.720	0.890	0.710	Reject
Grotasque	0.165	50.0%	0.320	0.520	0.720	0.520	Reject
Macabre	0.178	90.0%	0.420	0.620	0.810	0.617	Accept
Horrible	0.233	70.00%	0.420	0.620	0.800	0.613	Accept

Table 4.9

Threshold value (d) and percentage consensus for AX construct (Mental jolt)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.115	0.176
Comic M CEO	0.144	0.042
Comic Expert 1	0.277	0.217
Comic Expert 2	0.277	0.042
Comic Expert 3	0.115	0.217
Developer AR MTDC 1	0.115	0.042
Developer AR MTDC 2	0.408	0.217
Developer Expert 1	0.115	0.042
Developer Expert 2	0.115	0.176
Specialist AR	0.277	0.176
Threshold value (d)	**0.196**	**0.135**
Consensus percentage	**60.0%**	**70.0%**

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Table 4.10

Overall of the Threshold value (d) and percentage consensus for AX construct (Mental jolt)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Bizzare	0.196	60.0%	0.620	0.790	0.920	0.777	Reject
Fantastic	0.135	70.0%	0.700	0.870	0.970	0.847	Accept

Table 4.11

Threshold value (d) and percentage consensus for AX construct (harmony)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.076	0.114
Comic M CEO	0.178	0.142
Comic Expert 1	0.178	0.249
Comic Expert 2	0.215	0.249
Comic Expert 3	0.178	0.142
Developer AR MTDC 1	0.215	0.249
Developer AR MTDC 2	0.076	0.142
Developer Expert 1	0.076	0.142
Developer Expert 2	0.178	0.142
Specialist AR	0.076	0.142
Threshold value (d)	**0.145**	**0.172**
Consensus percentage	**80.0%**	**70.0%**

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Table 4.12

Overall of the Threshold value (d) and percentage consensus for AX construct (Harmony)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Verisimilitude	0.145	80.0%	0.660	0.840	0.960	0.820	Accept
Accuracy	0.172	70.0%	0.640	0.810	0.940	0.797	Accept

Table 4.13

Threshold value (d) and percentage consensus for AX construct (Storytelling clarity)

Expert	Element			
	Element 1	Element 2	Element 3	Element 4
Pekomik President	0.071	0.126	0.153	0.038
Comic M CEO	0.084	0.126	0.153	0.162
Comic Expert 1	0.071	0.126	0.025	0.231
Comic Expert 2	0.084	0.126	0.242	0.162
Comic Expert 3	0.071	0.126	0.025	0.231
Developer AR MTDC 1	0.084	0.126	0.242	0.162
Developer AR MTDC 2	0.084	0.126	0.025	0.231
Developer Expert 1	0.084	0.126	0.025	0.038
Developer Expert 2	0.084	0.126	0.153	0.038
Specialist AR	0.309	0.126	0.025	0.162
Threshold value (d)	**0.103**	**0.126**	**0.107**	**0.145**
Consensus percentage	**90.0%**	**100.0%**	**80.0%**	**70.0%**

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Table 4.14

Overall of the Threshold value (d) and percentage consensus for AX construct (Storytelling clarity)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Surprise	0.103	90.0%	0.800	0.940	0.990	0.910	Accept
Drama	0.126	100.0%	0.600	0.800	0.950	0.783	Accept
Amazement	0.107	80.0%	0.720	0.890	0.980	0.863	Accept
Authencity	0.145	70.00%	0.720	0.880	0.970	0.857	Accept

Next, the fuzzy Delphi method analysis report regarding the UX construct for AR is presented, starting with the tangibility construct, which contains two elements:

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Table 4.15

Threshold value (d) and percentage consensus for UX construct (Tangibility)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.268	0.099
Comic M CEO	0.268	0.391
Comic Expert 1	0.283	0.099
Comic Expert 2	0.283	0.294
Comic Expert 3	0.268	0.391
Developer AR MTDC 1	0.415	0.294
Developer AR MTDC 2	0.051	0.161
Developer Expert 1	0.051	0.161
Developer Expert 2	0.051	0.161
Specialist AR	0.268	0.099
Threshold value (d)	**0.221**	**0.215**
Consensus percentage	**30.0%**	**60.0%**

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Table 4.16

Overall of the Threshold value (d) and percentage consensus for UX construct (Tangibility)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Concreteness	0.221	30.0%	0.500	0.690	0.850	0.680	Reject
Coherence	0.215	60.0%	0.600	0.780	0.910	0.763	Reject

Table 4.17

Threshold value (d) and percentage consensus for UX construct (Intuitiveness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.040	0.432
Comic M CEO	0.281	0.132
Comic Expert 1	0.281	0.132
Comic Expert 2	0.270	0.547
Comic Expert 3	0.281	0.432
Developer AR MTDC 1	0.281	0.547
Developer AR MTDC 2	0.270	0.423
Developer Expert 1	0.040	0.132
Developer Expert 2	0.270	0.132
Specialist AR	0.270	0.132
Threshold value (d)	**0.228**	**0.304**
Consensus percentage	**20.0%**	**50.0%**

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Table 4.18

Overall of the Threshold value (d) and percentage consensus for UX construct (Intuitiveness)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Human likeness	0.228	20.0%	0.500	0.700	0.860	0.687	Reject
Natural	0.304	50.0%	0.420	0.600	0.750	0.590	Reject

Table 4.19

Threshold value (d) and percentage consensus for UX construct (Captivation)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.230	0.156
Comic M CEO	0.230	0.700
Comic Expert 1	0.102	0.114
Comic Expert 2	0.453	0.156
Comic Expert 3	0.102	0.398
Developer AR MTDC 1	0.102	0.283
Developer AR MTDC 2	0.453	0.156
Developer Expert 1	0.162	0.114
Developer Expert 2	0.230	0.283
Specialist AR	0.102	0.283
Threshold value (d)	**0.217**	**0.264**
Consensus percentage	**50.0%**	**50.0%**

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Table 4.20

Overall of the Threshold value (d) and percentage consensus for UX construct (Captivation)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Captive	0.217	50.0%	0.660	0.830	0.930	0.807	Reject
Immersive	0.264	50.0%	0.620	0.790	0.900	0.770	Reject

Table 4.21

Threshold value (d) and percentage consensus for UX construct (Playfulness & entertainment)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik President	0.203	0.148	0.164
Comic M CEO	0.348	0.148	0.458
Comic Expert 1	0.203	0.403	0.227
Comic Expert 2	0.348	0.109	0.095
Comic Expert 3	0.203	0.148	0.164
Developer AR MTDC 1	0.062	0.284	0.227
Developer AR MTDC 2	0.336	0.148	0.095
Developer Expert 1	0.348	0.403	0.164
Developer Expert 2	0.203	0.109	0.095
Specialist AR	0.062	0.148	0.227
Threshold value (d)	**0.232**	**0.205**	**0.192**
Consensus percentage	**20.0%**	**70.0%**	**60.0%**

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Table 4.22

Overall of the Threshold value (d) and percentage consensus for UX construct (Playfulness & entertainment)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Joy	0.232	20.0%	0.560	0.750	0.890	0.733	Reject
Amusement	0.205	70.0%	0.600	0.790	0.920	0.770	Accept
Playfulness	0.192	60.0%	0.660	0.830	0.940	0.810	Reject

Table 4.23

Threshold value (d) and percentage consensus for UX construct (Meaningfulness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.086	0.245
Comic M CEO	0.086	0.112
Comic Expert 1	0.168	0.440
Comic Expert 2	0.086	0.112
Comic Expert 3	0.168	0.440
Developer AR MTDC 1	0.384	0.148
Developer AR MTDC 2	0.306	0.112
Developer Expert 1	0.086	0.112
Developer Expert 2	0.168	0.112
Specialist AR	0.086	0.245
Threshold value (d)	**0.162**	**0.208**
Consensus percentage	**80.0%**	**60.0%**

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Table 4.24

Overall of the Threshold value (d) and percentage consensus for UX construct (Meaningfulness)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Personal meaningful	0.162	80.0%	0.580	0.770	0.920	0.757	Accept
Relevant	0.208	60.0%	0.640	0.820	0.930	0.797	Reject

Table 4.25

Threshold value (d) and percentage consensus for UX construct (Liveliness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.210	0.192
Comic M CEO	0.046	0.201
Comic Expert 1	0.046	0.065
Comic Expert 2	0.046	0.201
Comic Expert 3	0.210	0.065
Developer AR MTDC 1	0.210	0.192
Developer AR MTDC 2	0.210	0.192
Developer Expert 1	0.647	0.192
Developer Expert 2	0.046	0.065
Specialist AR	0.046	0.201
Threshold value (d)	**0.172**	**0.157**
Consensus percentage	**50.0%**	**70.0%**

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Table 4.26

Overall of the Threshold value (d) and percentage consensus for UX construct (Liveliness)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Vivid	0.172	50.0%	0.540	0.740	0.900	0.727	Reject
Dynamic	0.157	70.0%	0.680	0.850	0.960	0.830	Accept

Table 4.27

Threshold value (d) and percentage consensus for UX construct (Creativity)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.088	0.122
Comic M CEO	0.088	0.031
Comic Expert 1	0.088	0.031
Comic Expert 2	0.220	0.031
Comic Expert 3	0.172	0.031
Developer AR MTDC 1	0.220	0.031
Developer AR MTDC 2	0.088	0.031
Developer Expert 1	0.768	0.122
Developer Expert 2	0.088	0.031
Specialist AR	0.088	0.031
Threshold value (d)	**0.191**	**0.049**
Consensus percentage	**70.0%**	**100.0%**

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Table 4.28

Overall of the Threshold value (d) and percentage consensus for UX construct (Creativity)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Self Expressive	0.191	70.0%	0.660	0.840	0.940	0.813	Accept
Creative	0.049	100.0%	0.860	0.980	1.000	0.947	Accept

Table 4.29

Threshold value (d) and percentage consensus for UX construct (Motivation)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.188	0.198
Comic M CEO	0.188	0.061
Comic Expert 1	0.064	0.198
Comic Expert 2	0.064	0.354
Comic Expert 3	0.204	0.061
Developer AR MTDC 1	0.204	0.333
Developer AR MTDC 2	0.064	0.354
Developer Expert 1	0.188	0.061
Developer Expert 2	0.188	0.061
Specialist AR	0.495	0.198
Threshold value (d)	**0.185**	**0.188**
Consensus percentage	**70.0%**	**70.0%**

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Table 4.30

Overall of the Threshold value (d) and percentage consensus for UX construct (Motivation)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Being Motivated	0.185	70.0%	0.700	0.860	0.950	0.837	Accept
Interaction Proactivity	0.188	70.0%	0.560	0.750	0.900	0.737	Accept

Table 4.31

Threshold value (d) and percentage consensus for UX construct (Inspiration)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik President	0.242	0.240	0.174
Comic M CEO	0.153	0.153	0.174
Comic Expert 1	0.025	0.100	0.508
Comic Expert 2	0.153	0.153	0.059
Comic Expert 3	0.025	0.153	0.218
Developer AR MTDC 1	0.242	0.240	0.218
Developer AR MTDC 2	0.025	0.153	0.174
Developer Expert 1	0.153	0.100	0.059
Developer Expert 2	0.025	0.100	0.174
Specialist AR	0.025	0.153	0.174
Threshold value (d)	**0.107**	**0.155**	**0.193**
Consensus percentage	**80.0%**	**80.0%**	**70.0%**

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Table 4.32

Overall of the Threshold value (d) and percentage consensus for UX construct (Inspiration)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Cognitive stimulated	0.107	80.0%	0.720	0.890	0.980	0.863	Accept
Encourages	0.155	80.0%	0.640	0.820	0.950	0.803	Accept
Eager to try new things	0.193	70.0%	0.720	0.870	0.950	0.847	Accept

Table 4.33

Threshold value (d) and percentage consensus for UX construct (Increase awareness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.217	0.458
Comic M CEO	0.176	0.093
Comic Expert 1	0.042	0.093
Comic Expert 2	0.042	0.093
Comic Expert 3	0.042	0.161
Developer AR MTDC 1	0.042	0.093
Developer AR MTDC 2	0.217	0.093
Developer Expert 1	0.176	0.093
Developer Expert 2	0.176	0.232
Specialist AR	0.217	0.161
Threshold value (d)	**0.135**	**0.157**
Consensus percentage	**70.0%**	**80.0%**

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Table 4.34

Overall of the Threshold value (d) and percentage consensus for UX construct (Increase awareness)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Feeling of discovery	0.135	70.0%	0.700	0.870	0.970	0.847	Accept
Feeling of insights	0.157	80.0%	0.640	0.830	0.950	0.807	Accept

Table 4.35

Threshold value (d) and percentage consensus for UX construct (Efficiency)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.155	0.203
Comic M CEO	0.101	0.051
Comic Expert 1	0.155	0.203
Comic Expert 2	0.291	0.191
Comic Expert 3	0.101	0.051
Developer AR MTDC 1	0.396	0.191
Developer AR MTDC 2	0.101	0.051
Developer Expert 1	0.101	0.051
Developer Expert 2	0.101	0.203
Specialist AR	0.291	0.051
Threshold value (d)	**0.179**	**0.125**
Consensus percentage	**70.0%**	**70.0%**

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Table 4.36

Overall of the Threshold value (d) and percentage consensus for UX construct (Efficiency)

Element	Triangular Fuzzy number condition		Defuzzification process condition			Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Time	0.179	70.0%	0.600	0.780	0.920	0.767	Accept
Effort	0.125	70.0%	0.680	0.860	0.970	0.837	Accept

4.2 AUX model formulation

The formulation process of the AUX model is a structured process preliminary with the MR, the assortment of AX and UX constructs and elements, the integration of models and theories as well as obtaining expert consensus through the FDM scientific process.

The following process formulation of the AUX model from the result of the findings of the expert consensus in the FDM process earlier. In this process, the acceptable constructs and elements will be organized to determine through the process of accumulation, merging, altering and renaming constructs and elements appropriate to the AR comic. The ranking of each element will also be studied as a guideline to merge, accumulate or alter the constructs and elements affording to the AX and UX models as well as the MR process carried out.

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These processes involve discussions with FDM experts and refer to models and theories that can validate AUX constructs and elements. The following includes a report of the overall construction and elements:

Table 4.37

overall acceptance and rejection construct and element of AX and UX

Construct	Element	Percentage	Threshold	Fuzzy score	Consensus	Ranking
Amusement	Love	40%	0.187	0.653	Reject	
	Funny	70%	0.179	0.767	Accept	2
	Cheerfulness	80%	0.155	0.803	Accept	1
Paradox of tragedy	Tragic	50%	0.147	0.710	Reject	
	Grotasque	50%	0.165	0.520	Reject	
	Macabre	90%	0.178	0.617	Accept	1
	Horrible	70%	0.233	0.613	Reject	2
Mental jolt	Bizzare	60%	0.196	0.777	Reject	
	Fantastic	70%	0.135	0.847	Accept	1
Harmony	Verisimilitude	80%	0.145	0.820	Accept	1
	Accuracy	70%	0.172	0.797	Accept	2
Storytelling clarity	Surprise	90%	0.103	0.910	Accept	1
	Drama	100%	0.126	0.783	Accept	4
	Amazement	80%	0.107	0.863	Accept	2
	Authencity	70%	0.145	0.857	Accept	3
Tangibility	Concreteness	30%	0.221	0.680	Reject	
	Coherence	60%	0.215	0.763	Reject	

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Table 4.37 *(Continue)*

Construct	Element	Percentage	Threshold	Fuzzy score	Consensus	Ranking
Intuitiveness	Human likeness	20%	0.228	0.687	Reject	
	Natural	50%	0.304	0.590	Reject	
Captivation	Captive	50%	0.217	0.807	Reject	
	Immersive	50%	0.264	0.770	Reject	
Playfulness & Entertainment	Joy	20%	0.232	0.733	Reject	
	Amusement	70%	0.205	0.770	Reject	1
	Playfulness	60%	0.192	0.810	Reject	
Meaningfulness	Personal meaningful	80%	0.162	0.757	Accept	1
	Relevant	60%	0.208	0.797	Reject	
Liveliness	Vivid	50%	0.172	0.727	Reject	
	Dynamic	70%	0.157	0.830	Accept	1
Creativity	Self-Expressive	70%	0.191	0.813	Accept	2
	Creative	100%	0.049	0.947	Accept	1
Motivation	Being motivated	70%	0.185	0.837	Accept	1
	Interaction proactivity	70%	0.188	0.737	Accept	2
Inspiration	Cognitive stimulated	80%	0.107	0.863	Accept	1
	Encourages	80%	0.155	0.803	Accept	3
	Eager to try new things	70%	0.193	0.847	Accept	2

Table 4.37 above postulates the value of three main conditions in FDM: Percentage of expert consensus, Threshold (d) value, and defuzzification (Fuzzy score). In this case, the percentage of expert consensus is the main entity, and it is identical significant to be the foundation for the acceptance of constructs and elements, then the threshold value and so on is the fuzzy score (Manakandan & Ismail, 2017).

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The FDM analysis found that four constructs from UX have been completely rejected by expert consensus because they do not meet the three conditions of FDM in which all the elements in it have been denied. The constructs are tangibility, intuitiveness, captivation and playfulness, and entertainment.

Two elements don't meet one of the FDM conditions, that is, the value (d) exceeds 0.2, which is horrible from the paradox of tragedy (AX) construct and amusement from the Playfulness & Entertainment (UX) construct with value 0.233 and 0.205 respectively. Even though the percentage and fuzzy score show an acceptable value, the construct and element are rejected because they don't meet the FDM conditions. The values found were 70%, 0.613 and 70%, 0.770 respectively and the threshold value (d) is 0.233 and 0.205.

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Table 4.38

The acceptable construct and element from the expert consensus of AX and UX.

Component	Construct	Elements
AX	Storytelling clarity	Authencity, surprise, drama, amazement
	Amusement	Funny, cheerfulness
	Paradox of tragedy	Macabre
	Mental jolt	Fantastic
	Harmony	Verisimilitude, accuracy
UX	Motivation	Interaction pro-activity, being motivated
	Liveliness	Dynamic
	Meaningfulness	Personal meaningful
	Inspiration	Cognitive stimulate, encourages, eager to try new things
	Increase awareness	Feeling of insight, feeling of discovery
	Efficiency	Time, effort
	Creativity	Self-expressive, creativity

In the table above shows the accepted constructs and elements of AX and UX. There are two constructs from AX which is, mental jolt and the paradox of tragedy that have only one element after FDM process, while three constructs from UX (liveliness,

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meaningfulness, playfulness and entertainment) have only one element. In such a case, in developing any model, one element is not lucrative to grow a strong correlation between constructs.

For the purpose of formulation, the AUX model, constructs that have only one element will be integrated with the appropriate constructs, and those elements are either added or maintained. Consequently, some existing constructs will go through a rebranding process due to the element's addition or retention. This process is followed according to AX and UX models, emotional theory, DDR, and FDM.

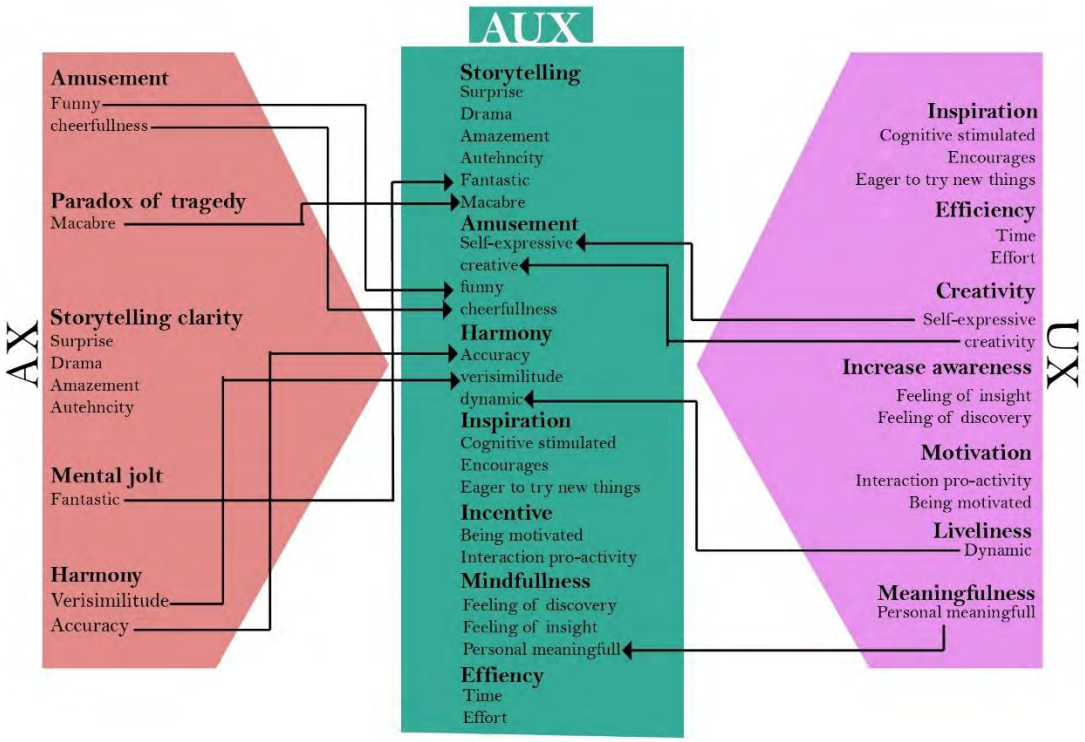


Figure 4. The formulation of the AUX model.

The formulation process begins by analysing constructs with only one element combined with the appropriate construct and has more than one element. With

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reference to this, for AX, two constructs have only one element, which is the paradox of tragedy (macabre) and mental jolt (fantastic), while for UX two constructs have one element namely liveliness (dynamic) and meaningfulness (personal meaningful).

By the same token, some constructs have been retained, and some constructs have undergone a renaming process in terms of construct names due to the addition of elements that make the construct stronger and more appropriate.

The storytelling clarity construct has received additional macabre and fantastic elements from the paradox of tragedy. Mental jolt constructs create the new construct name from storytelling clarity to storytelling only and both elements from the AX component. From MR found that these two elements are very close to the storytelling approach. It will strengthen this construct in terms of adding elements.

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On another occasion, the amusement construct from the AX component has received an additional two elements from the creativity construct under the UX component, namely self-expressive and creative. In other respect, the creation of the amusement construct has four elements: self-expressive, creative, funny, and cheerful. For the harmony construct, the elements have been integrated with the liveliness construct from the UX component, which is dynamic. This construct contains three elements: accuracy, verisimilitude, and dynamic.

The original construction of the UX component that increases awareness has been changed to mindfulness after being added with the personal element meaningful is a construct from the UX component that is meaningfulness. It must be stressed that the UX component's efficiency construct is maintained and the original construct from

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the UX component that is motivation has been renamed to the incentive to make it more suitable for the AUX model to be developed.

4.3 The Heptagon of Aesthetic User Experience (AUX) Model. Research question 2: What is the construct and elements suitable to be synergise for AUX model.

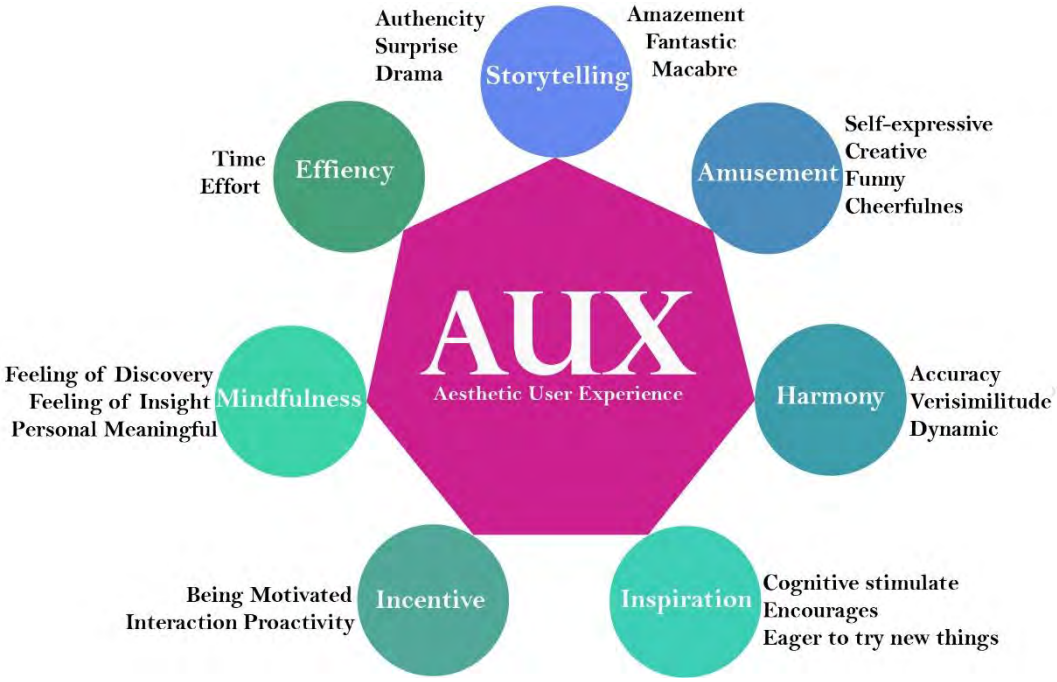


Figure 4.1. The heptagon of AUX model.

The heptagon of the AUX model was taken in conjunction with celebrating the shape of a heptagon that has seven corners representing the seven AUX constructs and 24 elements embedded in it. In such a case, it becomes the basis and guideline for the production of aesthetic products that use HCI devices. The description of each construct and element is as follows:

Storytelling

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Storytelling constructs are among the main agendas in the AUX model as a narrative aesthetic product. In this case, it is supported by an element of authenticity that is able to provide novelty value. In addition, surprise, drama, fantastic and macabre elements can stir emotions and publish a sense of amazement.

Amusement

Amusement is self-expressive born from a creative point of view, and in the context of AUX, it is a manifestation of self-expression, creativity, funny and cheerfulness. The value of amusement is applied in AUX as a reflection of the basis of the beholder aesthetic object's emotion and aesthetic experience.

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Harmony

Harmony in the AUX model encompasses the aesthetic and user experience of the aesthetic objects and HCI products. It requires precision from a technical point of view and emotional experience so that the beholder feels something is true and verisimilitude. In addition, it can also implement products that are not static but more dynamic.

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Inspiration

Among the important constructs in AX and UX are cognitive. It plays a big role in stimulating knowledge with existing knowledge and previous experience. It can also be a medium to encourage and shove for the beholder eager to try new things.

Incentive

The incentive is a construct that aims to inspire always to be motivated. The combination of AUX with the device and the aesthetics of the product provides an experience of interaction with the activities offered, giving positive encouragement to the aesthetic object.

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Mindfulness

Mindfulness is an awareness of the need to explore and experience with aesthetic devices and objects. That being so, the beholder will be able to feel of insight and at the same time, grow an experience termed personal meaningful.

Efficiency

Undeniably attainment of something efficiently time and effort are an important thing as its main goal. In the context of the AUX model, the beholder's experience with AUX products is related to time and effort.

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CHAPTER 5

AR COMIC DEVELOPMENT

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5.1 Introduction

This chapter describes the Augmented reality comics (AR Comics) production process based on emotion models and theories, comic principles, animation production, and augmented reality project setup. It is through a structured pipeline process and combined with academic and technical theories of the production process.

AR comics development is in the development stages in the Design and Development research (DDR) model. In the previous study, DDR, according to Kara and Cagiltay (2020), the development phase in DDR is vital because it is a stimulus material that usually combines various areas of expertise, especially when it involves the application of new tools or new processes.

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Richey and Klein (2007) put the development phase in third place after the need analysis and design phase in the complete cycle of DDR. The development phase is related to the formulation model, module development, research framework, strategic plan, and guideline. This phase will involve expert, designer, superior and developer to produce products based on need analysis.

This study was devided into several flow processes for the development phase, starting with selecting comic panels, animation development, AR development, and AR comics combination process to evaluate the.

5.2 Research question 3: How to integrate AUX model with exiting process to develop AR comics.

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Research question 3 is the development phase of AR comics and the integration of several processes from animation, comics, and AR. The process is described in more depth in figure 5 shown below:

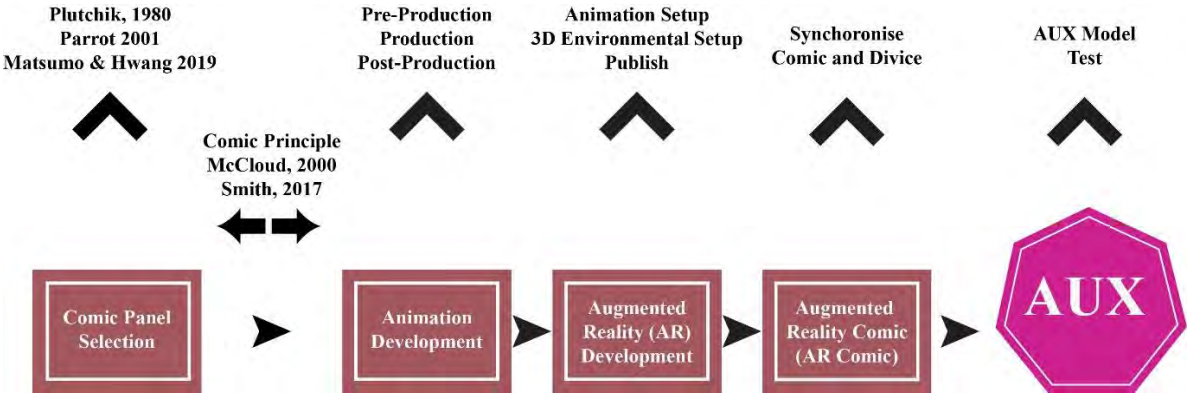


Figure 5. AR comic development pipeline.

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5.3 Comic selection phase

In the stage of comics selection, the researcher has listed comics that met industry standards and become the trend of today's generation as well as having local characteristics but able to reach international standards. The researchers chose *Silat Boy,* publish by *Komik-M*. The comic artist was Ben Wong. This comic is about silat, which is self-defence originated from Malay culture. Ben Wong was also appointed as the recipient of the Manga award in Japan. The selection of this comic is through discussions with the CEO of *Komik-M* and the artist himself.

In comics, the narrative is communicated through a series of panels that will form the storyline. The story structure, such as character recognition and situation, the agents of conflict, conflict, climax, and ending of the story, is conveyed in a continuous flow of drawings between imagery, storyline, dialogue, composition, and gesture.

McCloud (1993) explains that comic panels created have main panels that are usually keys panels as a hint of purpose and sub-panels that will support the main panel to give the story more impact. McCloud further explains that there are six ways to build a panel in comics, namely, 1) moment to moment, a single action depicted in a moment, 2) action to action, a single subject in a series of actions, 3) subject to subject, a series of subject changes in the same location, 4) location to location, transition crossing different distances of time or space, 5) aspect to aspect, the transition from one aspect of a place, idea or atmosphere to another aspect and 6) non sequitur, a series of irrelevant stories.

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In fact, the study on AR comics necessitate researchers have adapted the digital and motion comics framework (Smith, 2017), which outlines comic elements in the digital format presented in the screen namely, motion, spatial depth, narrative fidelity, audio for speech balloons, animated comic book panel, cinematic adaptation, screen-based device format and genre. In general, this element is continuous with the infinite canvas model (McCloud, 2000) which discusses comics in digital format to publish infinite canvas elements, namely, trails, distance pacing, narrative subdivision, sustained rhythm and gradualism.

In the theory of aesthetic experience (AX), an aesthetic object is seen in terms of perception, cognitive and emotion, and it is related to the artist and beholder. The work is produced based on a specific stage starting from the perceptual analysis that taction on the formalistic aspects of the work, story or rational issue based on experience, literature review and memory, style and content, cognitive mastering when the cognitive shift occurs from the interpretation of the work and evaluation mind that explains the negative or positive feeling towards an art object.

On the other hand, when criticizing the theory of emotions, Parrot (2001) has outlined six primary emotions namely, love, joy, surprise, anger, sadness, and fear as the basis for explaining the basics of emotion in this study. This theory is supported by Plutchic (1980) and reputable by Matsumo and Hwang (2019).

To emphasize, researchers has integrated comic theory and elements, AX models and emotional theory as strategies in comic selection. Six comic panels or six

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comic scenes have been selected from primary emotions (Parrot, 2001) and comic panel elements (McCloud, 1993, 2000; Smith, 2017; Eisner, 2000).



Anger



Joy



Fear



Love



Sad



Surprise

Figure 5.1. Comics panels selection.

5.4 Animation development

This subheading explains the process of designing and developing animations in line with the requirements of augmented reality (AR) and adheres to the principles of comic panels. This process includes pre-production, production, and post-production processes.

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5.4.1 Pre-Production

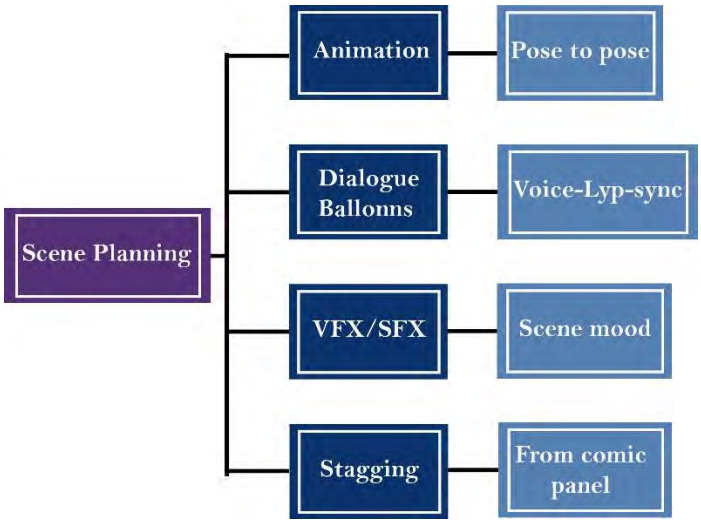


Figure 5.2. Pre-production pipe-line.

The pre-production process begins by designing an animation scene based on the comics panels that have been selected. This animation scene includes determining timing, pose to pose, action, expression and flow. In this study, the principle of comic production had to be applied together with the principle of animation following the infinite canvas concept (McCloud, 2000) and the principle of digital and motion comic (Smith, 2017).

Among the advantages found in comics is that dialogue and scripts are available, and dialogue, sound and voice can be done based on existing comic scripts. Smith (2017) explains that one of the elements in the digital and motion comic framework is audio for speech balloons so it will be designed as audio to substitute the speech balloons in comics (McCloud, 2000; Eisner, 2000; Lee, 2010).

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Figure 5.3. Animation planning and scene setup.

Hence, the use of the effect is also determined and deliberate during this pre-production process. Six comic scenes were selected to endure the augmented process, and these six panels represent six primary emotion (as explain in chapter two). The effect will be designed based on the emotional mood of each comics scene.

In this process as well, the researcher needs to advent in terms of staging the layout design of the animation. For this reason, because comics have their own layout panel consisting of a key panel and supported panel based on moment to moment, action to action, subject to subject and

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location to location. Nevertheless, the animation has to synchronise and adapted that principle.

5.4.2 Production

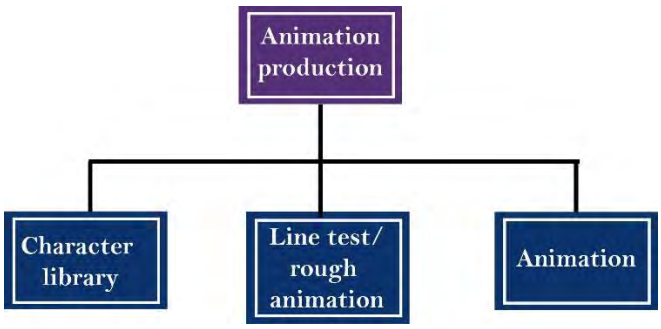


Figure 5.4. Production pipe-line.

Notably, the production process began with the character library, where each character involved in the scene will be made into a library according to the required poses. Character library is important to enable the animation process to be done with similar size, pose and action. The advantage of the character animation is when going through the library process is that the animation can be developed repeatedly and reduce the time of errors during the animation process.

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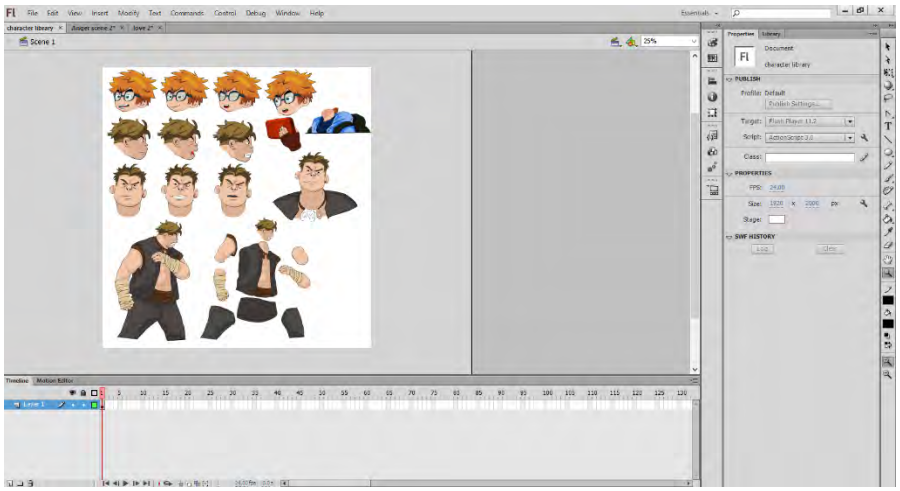
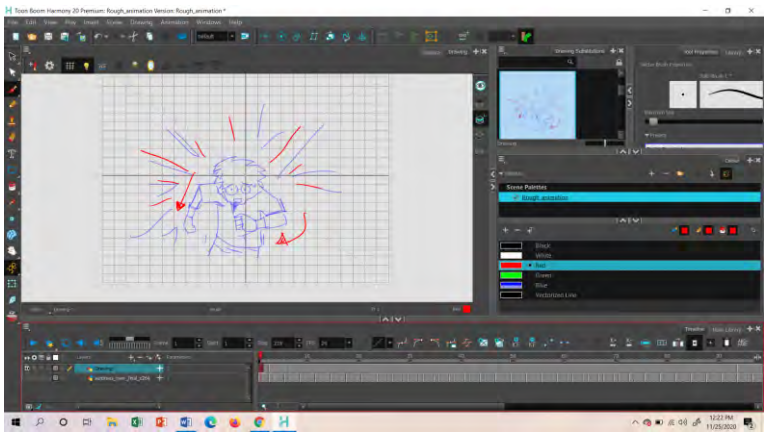


Figure 5.5. The character library

At the same time, each scene needs to go through a rough animation and line test process to ensure that the pose to pose action matches the proposed scene. The line test also aims to determine the animation duration to coincide according to the planned.



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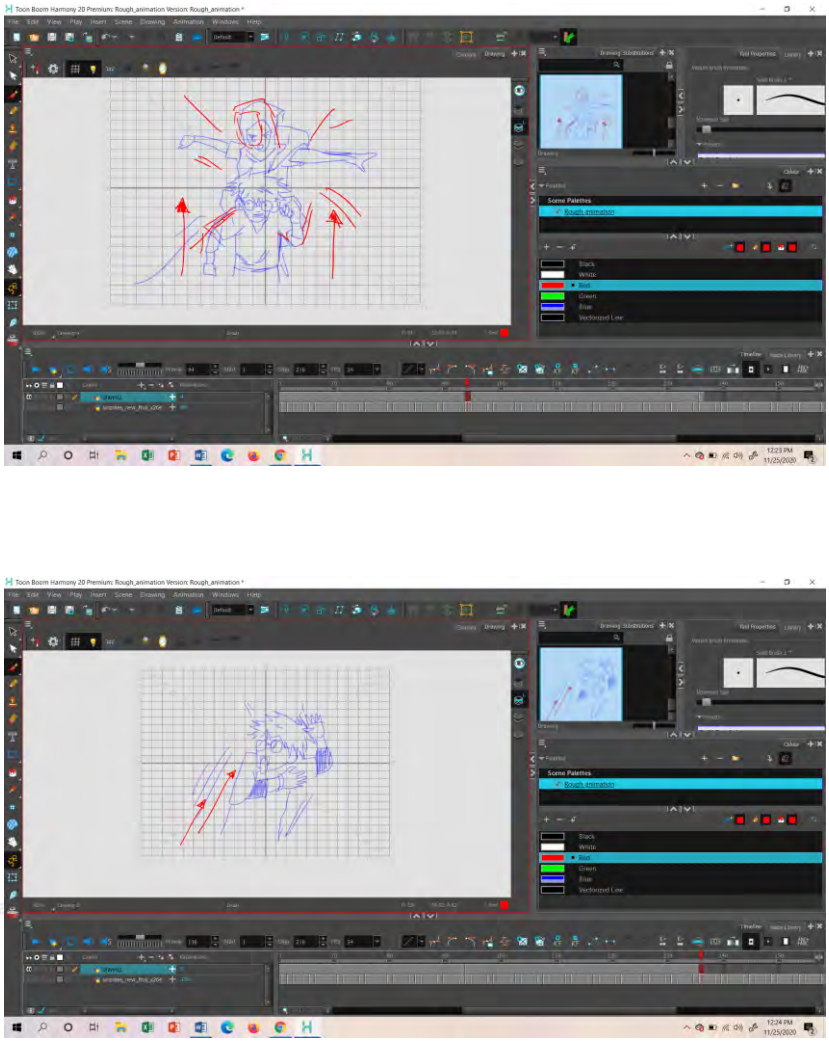


Figure 5.6. Rough animation process

The animation process is easier with the character library and rough animation as a guide. The finished character will be customized with rough animation starting with key-frame, namely first frame, last frame, anticipation, overshoot and in-between. In this process, the color and clean-up are completely done until the final touch-up.

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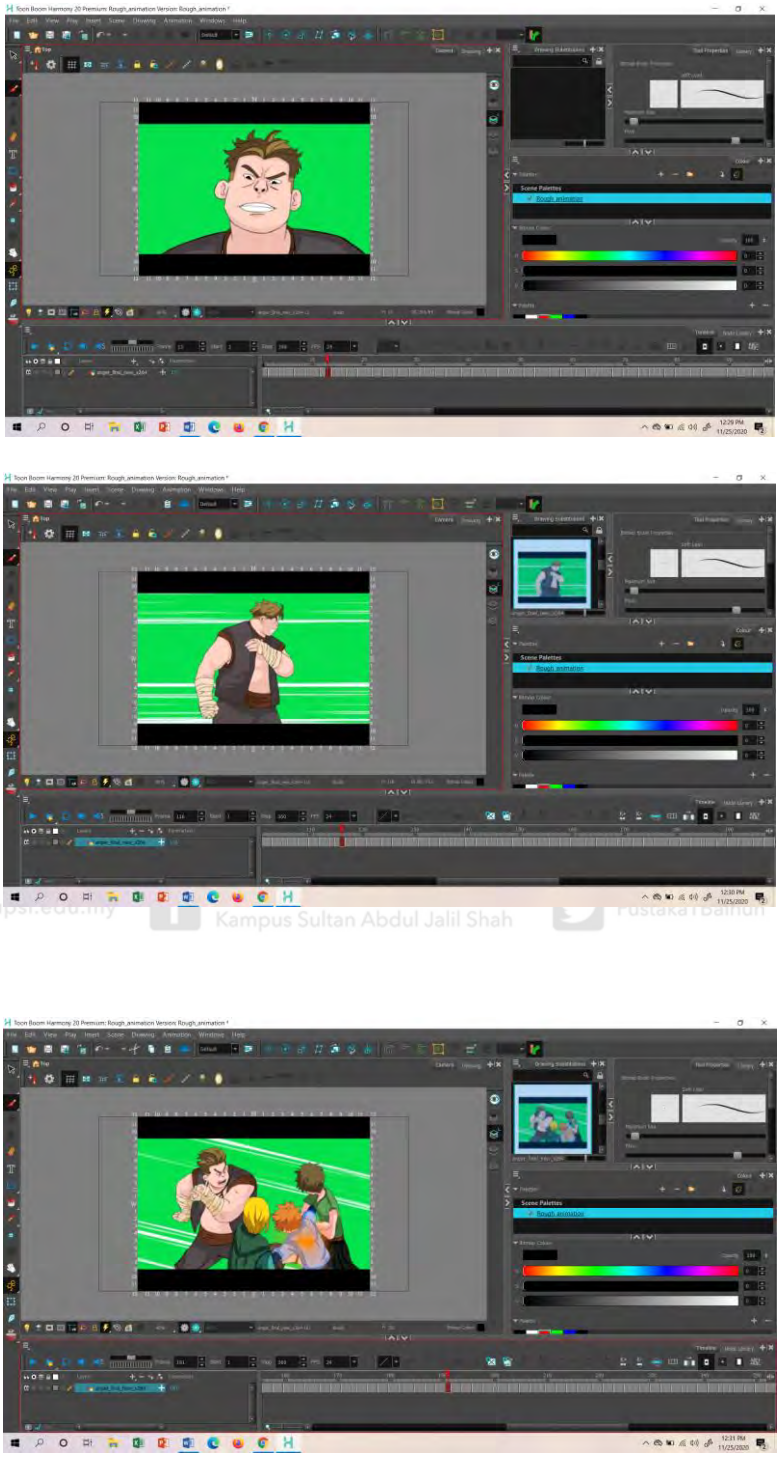


Figure 5.7. The clean animation process

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5.4.3 Post-production

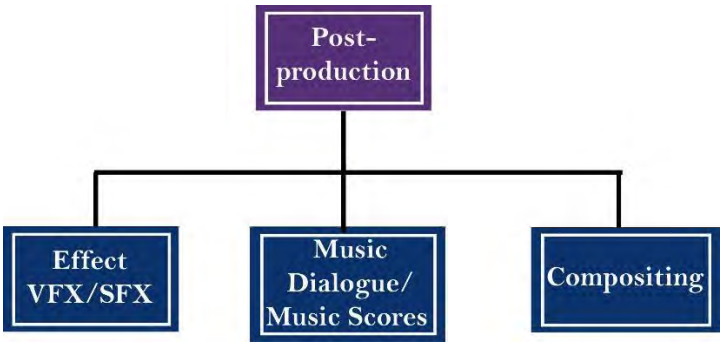


Figure 5.8. Post-production pipe-line.

The animated scenes that have been prepared in the software like data management. In this process, the sound is entered, and lip-sync is performed to synchronize the sound with the character's lips. Background music is also included according to the mood that has been identified.

In this post-production process, the visual effects (VFX) and sound effects (SFX) were designed as planned in the previous pre-production process. The design for these two effects has been available in the pre-production and production process and re-arranged in the composite process.

Compositing is the last step before rendering took place to make a full animated video to be set up in the AR platform. In this process, the arrangement of animation, sound, VFX, SFX, and background music was made simultaneously, and the final trimming was completed to be rendered into a whole animated video.

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Figure 5.9. Visual effect editing

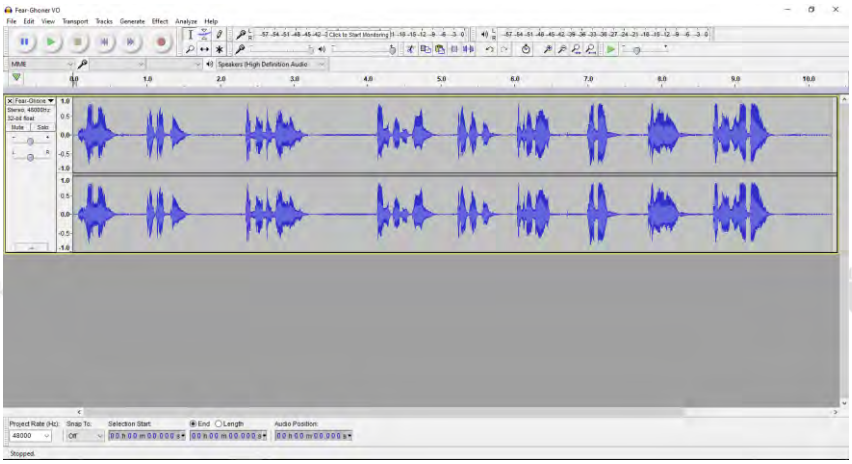


Figure 5.10. Voice over-editing



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Figure 5.11. Final compositing

5.4.4 Augmented reality comic (AR comic) development

The AR Comic process begins with the setup of video animation into the AR platform. In this study, the researcher uses the Artivive bridge platform to generate AR content through Artivive databases that will be set up in the Artivive bridge platform.

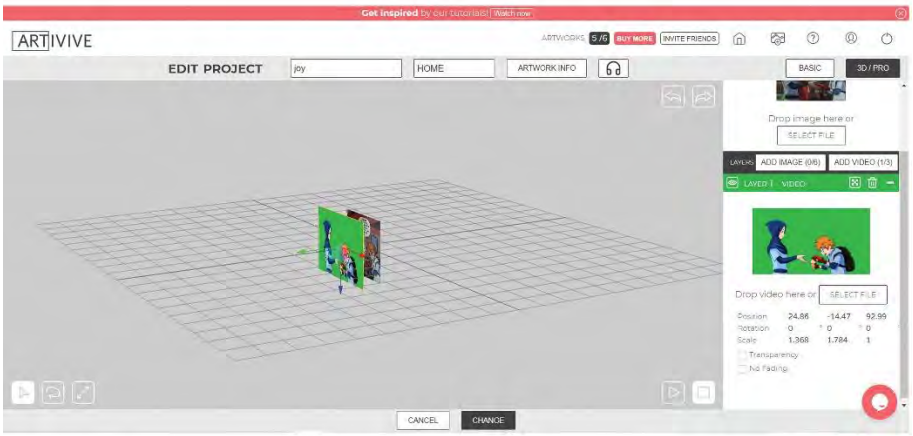
In the artivive bridge platform, images are used as a trigger to augment the content. In this study, the comic scenes that have been selected are the trigger images to the animation that has been produced. AR will allow video animations that have been set up according to a predefined format to become video overlays into a life scene stored on an artivive platform server.

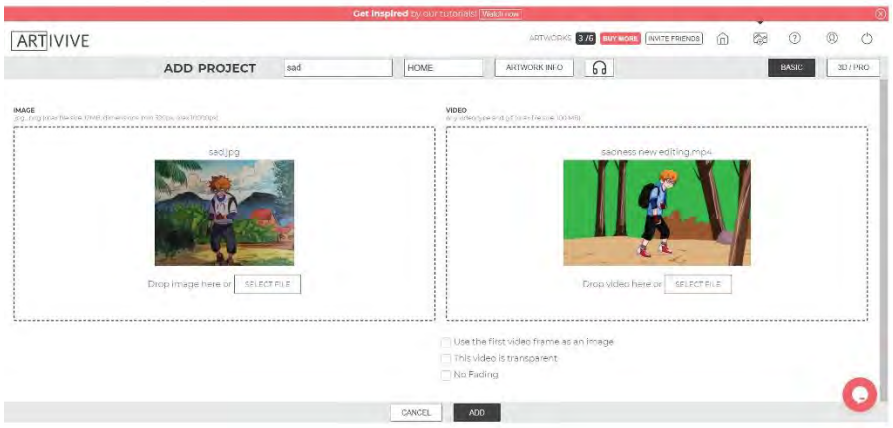
The advantage of AR is able to produce AR content with a 3D environment that will evoke an incredible experience for the user. In addition, sound, effect, and interactive elements can also be set up in this

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artivive bridge platform. However, in this study, the interactive element is placed at a low level because the nature of the comic is one-way reading material and the AR element is positioned to see how the AX and UX combine.





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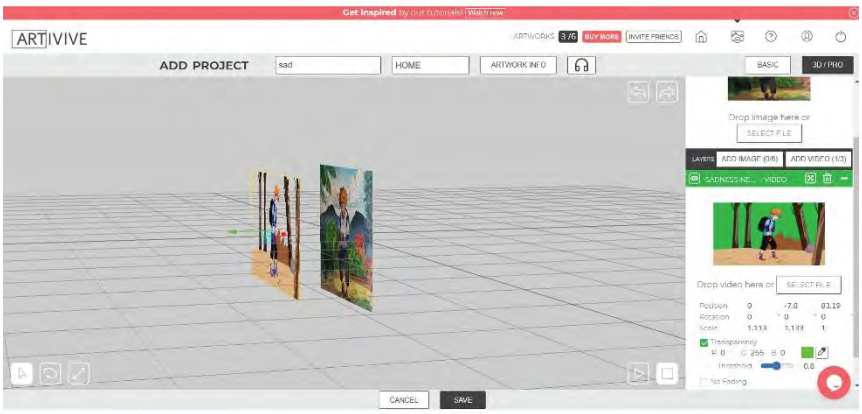


Figure 5.12. AR project setup

In conclusion, this chapter stretches an overview of the pipeline or stages in producing AR comics. Begin with the selection of comic panels based on the theory of basic emotions continued with sketches, pose setup and basic principles of comics and animation production. The animation produced needs to be in line with the AR platform's technicalities to create a multilayered environment for the AR comics.

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CHAPTER 6

THE FINDINGS OF CONFIRMATORY FACTOR ANALYSIS (CFA)

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6.1 Introduction

This chapter describes the findings of the study through validating phase using CFA. In chapter 3, CFA is a powerful statistical tool in analysing the nature and relationship of latent constructs. The next strength of CFA is to be able to test the main hypothesis about the variance between observed variables, namely test, score, or rating with factors.

Basically, to conduct the model findings analysis from several processes to get expert consensus whether from delphi technique, exploratory factor analysis (EFA), or whatever empirical method should be carried out, and the initial model should have at least three constructs with two or more elements and at least one or more measurement items.

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6.2 Model process evaluation

Next, for the second evaluation phase, the researcher will describe in detail the analytical process for the model evaluation findings. The construction of the questionnaire for this phase involves two main parts, which were the repondents' demographics (part A) and the AUX model with the given AR comics stimulus (part B).

The initial AUX model of expert consensus contained seven constructs and 23 elements, with the element range for one construct being two to six elements for one construct. By adapting Aesthetic emotion assessment tools (Aesthemos) by Schindler et al. (2017), and combining key theories in this study such as AX, UX and emotion theory, the researcher developed the item as an observe variable to run CFA. Details for the construct and elements areas in the table below:

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Table 6

The constructs, elements, and measurement item for AUX initial model.

Bil	Construct	Element	Question		CFA code
1.	A) Storytelling	1) Authencity	1.	This work looks original	AUT1
			2.	I think that was genuine	AUT2
			3.	I felt rightfulness	AUT3
		2)Amusement	1.	It was prestige	AMU1
			2.	It was delighting me	AMU2
			3.	It put me on joviality	AMU3
		3)Surprise	1.	It was so astonishing	SUR1
			2.	It shocks me	SUR2
			3.	It sways me	SUR3
		4) Fantastic	1.	It was impressive	FAN1
			2.	It was overwhelmed	FAN2
			3.	I felt fascinated	FAN3
		5)Drama	1.	It was dramatic	DRA1
			2.	It was exhilarating	DRA2
			3.	It was thrilling	DRA3
		6) Macabre	1.	It scared me	MAC1
			2.	I felt grisly	MAC2
			3.	It wasn't very comforting	MAC3
2	B) Amusement	1) Self-expressive	1.	It stirred my emotion	SEL1
			2.	It touched me	SEL2
			3.	I felt inspired	SEL3

(Continue)

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Table 6 *(Continue)*

Bil	Construct	Element	Question	CFA code
3	C) Harmony	1) Accuracy	1. It was exactness	ACC1
			2. I found it precision	ACC2
			3. It was correct	ACC3
		2) Verisimilitude	1. It was truth	VER1
			2. It is some credible	VER2
			3. I found it reliable	VER3
		3) Dynamic	1. This work is powerful	DYN1
			2. I felt aggressive	DYN2
			3. It activated my thoughts	DYN3
4	D) Inspiration	1) Cognitive	1. I felt refreshing	COG1
			2. I felt intellectually challenged	COG2
			3. I was mentally engaged	COG3
		2) Encourages	1. It moves me on	ENC1
			2. It was so promising	ENC2
			3. I found it very responsive	ENC3
		3) Eager to try	1. It intent my curiosity	EAG1
			2. It's sparked my desire	EAG2
			3. It was desiderated	EAG3
5	E) Incentive	1) Being motivated	1. I felt Gripped	BEI1
			2. It motivates me to act	BEI2
			3. It aroused me	BEI3
		2) Interaction proactivity	1. It activated my reaction	INT1
			2. It's was energetic	INT2
			3. I felt connected	INT3
6	F) Mindfulness	1) Feeling of discovery	1. It established my sense of finding	FOD1
			2. It was a growing realization	FOD2
			3. It developed my sense of learning	FOD3
		2) Feeling of insight	1. It improves my perception	FOI1
			2. It's touched my instinct	FOI2
			3. I felt appreciate	FOI3
		3) Personal meaningful	1. It was express my feeling	PER1
			2. It is evocative	PER2
			3. I found it significant	PER3
7	G) Efficiency	1) Time	1. It has an appropriate duration	TIM1
			2. The work augmented in suitable speed	TIM2
			3. The content instantly augments	TIM3
		2) Effort	1. It strived me	EFF1
			2. It advances with unflinching determination	EFF2
			3. It gives it a fly	EFF3

The researcher has produced two sets of questions containing 69 measurement items to be distributed to respondents. One set of items was reversed in terms of

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numbering so that it did not match the other set to obtain consistency of feedback from respondents. This is because the number of items is quite large and there was a probability that respondent's motivation will be disrupted.

As explained in previous chapter, the selection of respondents is based on the respondent's prior knowledge on that particular subject or in the field of creative technology, the selection of respondents is also selected among generation Y or group called millennials born in 1982-1994 and generation z that is post-millennials born between 1995 to 2010. This is necessary so that the respondent can reflex with exact cognition and can provide feedback that matched with the given item. The planned strategy is to select respondents among students in generation Y, millennials, and Z who are on average 18 to 35 years old who are exposed to more than 98% of mobile devices technology and penetration in internet usage.

Pandemic covid-19 has changed the original planning of the researcher in terms of data collection in the field. Researchers have transformed face-to-face data collection plans to online and this has resulted in model evaluations being disseminated with more local universities, polytechnics, and colleges.

To achieve that objective, the researcher has contacted the lectures and industry players of several organizations involved in assisting in data collection. Researchers have supplied AR (Artivive) applications to educators to disseminate to students for use as AR platforms. Comics pages containing AR comic content are also supplied to serve as trigger images and respondents have to answer item measurements through the google form application and respondents can only answer once.

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6.3 Model evaluation study: demographical respondents

The researchers have successfully collected 193 respondents (N = 193) from the previously distributed online test in the next step. As described in the chapter, respondent n = 193 is a good number range and qualifies for conducting CFA.

Most of the age respondents who can be collected in this study are 18-22 years old by 78.5%, 23-27 years old, 17.5%, 29-31 years old 3.5%, and 1.5% aged 32-35 years old. As expected, the age range of 18-35 years can respond to the model evaluation, and as many as 51% of the respondents are male, while 49% are female.

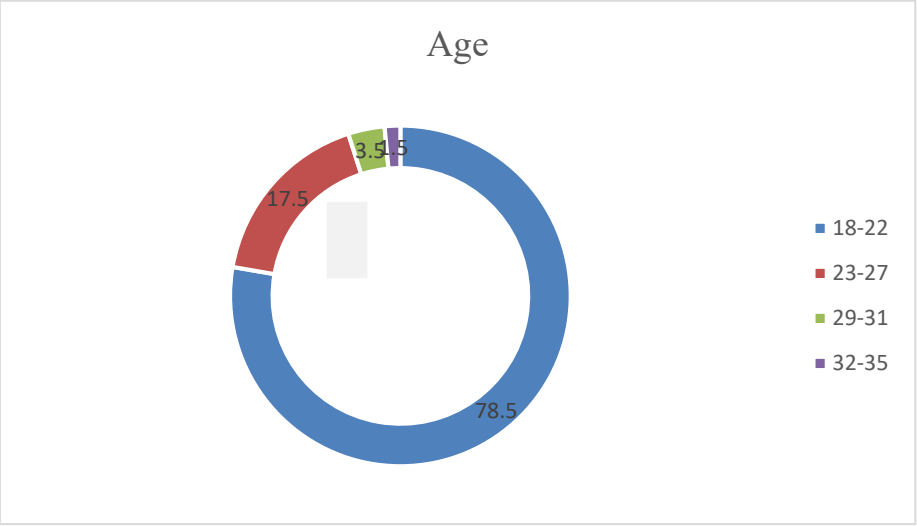


Figure 6. Percentage of the respondent's age

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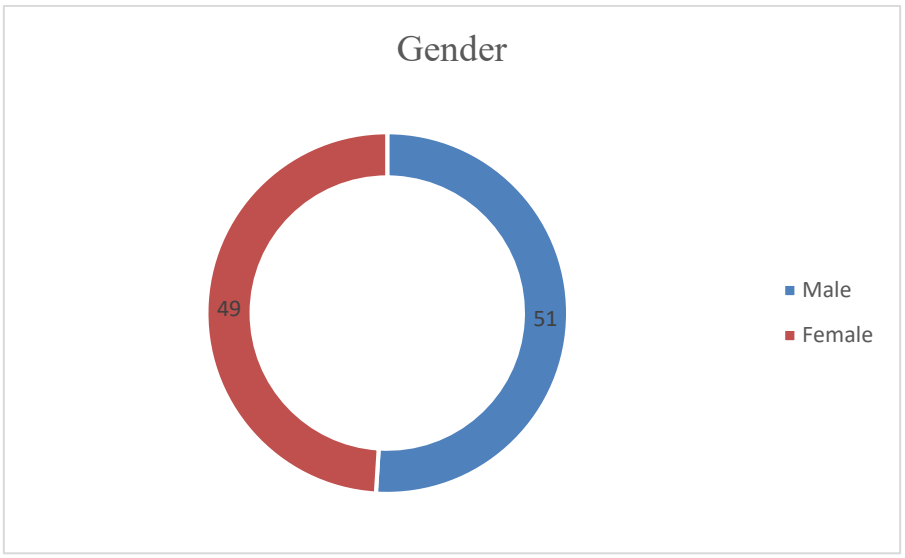


Figure 6.1. Percentage of the respondent's gender

It was also reported that the average respondent was in the creative field, which is the animation field of 54.5%, followed by multimedia 34.5%, Graphic design 23.5%, then advertising 14%, comic and cartoon 9.5%, and game design 7%.

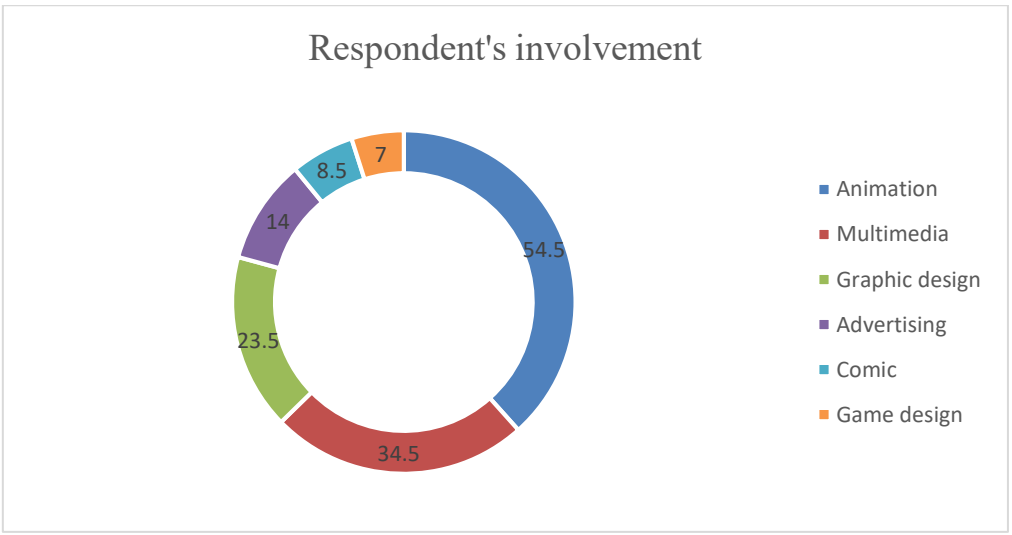


Figure 6.2. Percentage of the respondent's field and involvement

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The findings also found that the respondents involved in the evaluation process of this model came from 11 major institutions in the country including; Sultan Idris Education University (UPSI) 32.8%, Community College, 10.6%, Tun Hussein On University (UTHM) 9.6%, Malaysian University of Kelantan (UMK) 10.6%, Kuala Lumpur University (UNiKL) 8.6%, National Academy of Art, Culture and National Heritage (ASWARA) 7.1%, Multimedia University (MMU) 7.6%, Mara University of Technology (UiTM) 6.1%, Malaysian University of Sarawak (UNIMAS) 6.1%, Polytechnique 2.5% and Cal Poly Pomona USA 1%.

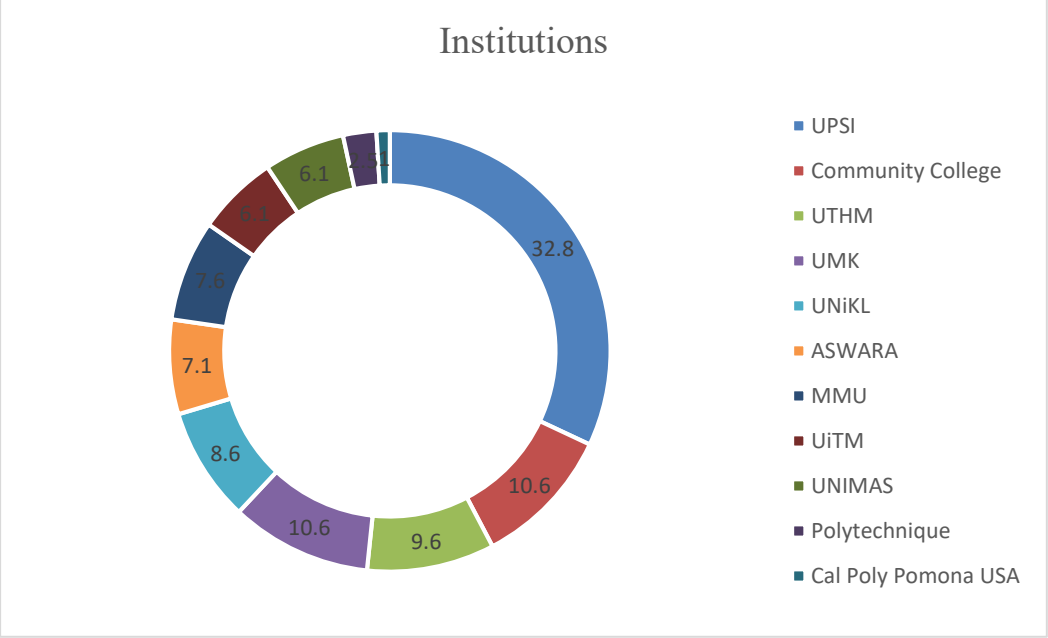


Figure 6.3. Percentage of the respondent's Institution

Apart from the basic demographic questions, the researcher also added some demographic information aimed at proving the consistency of the data and strengthening the model. It also serves as an additional factor in the discussion chapter and helps the researcher make decisions. As many as 80.9% of respondents read

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comics with a frequency of once a month, as much as 42.3% once in two weeks 26.4% and once a week as much as 33.7%.

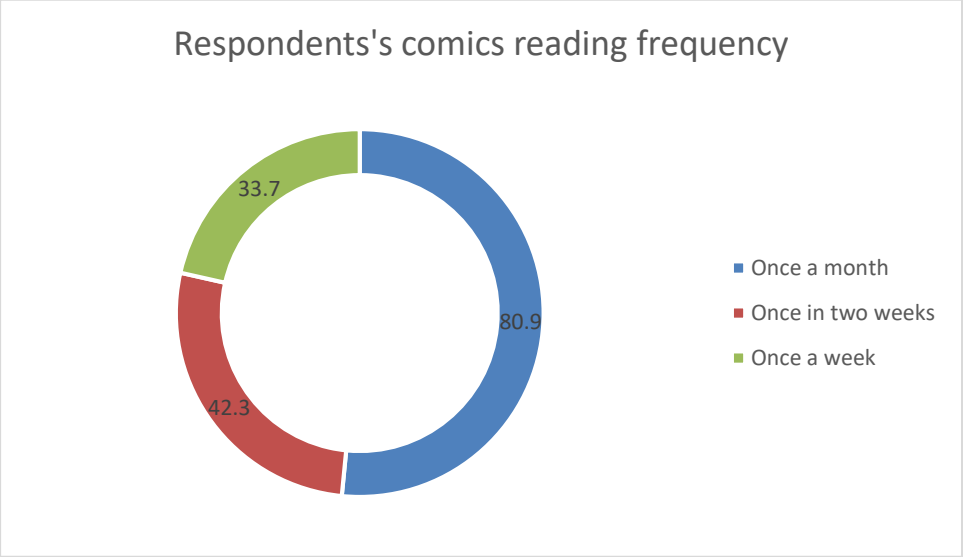


Figure 6.4. Percentage of the respondent's comic reading frequency

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Next, most respondents chose the action comic genre by 75%, followed by 61.6% for the comedy genre, 44.5% romance, 36.6% thriller, and 36% sci-fi. It seems to coincide with this study because it uses action comics to be used as a stimulus. Respondents also preferred international comics over local comics with 88.6% compared to 48.2%.

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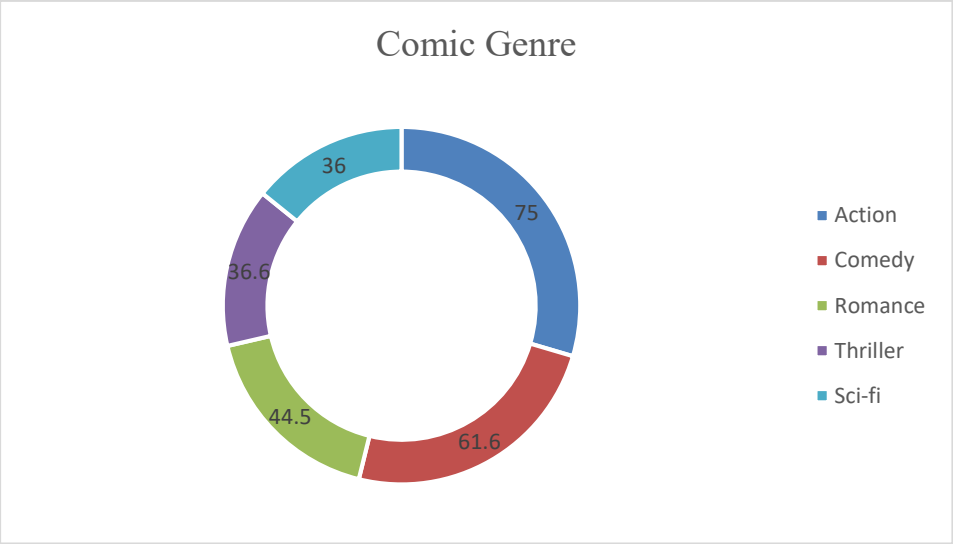


Figure 6.5. Percentage of the comic reading genre.

6.4 Reliability analysis

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Reliability analysis aims to ensure that each item of the questionnaire is reliable and understood by the respondent to provide the best response and achieve objectives. This analysis's is an important role proves that each item is capable of measuring the constructs found in this model. The construct reliability analysis process is usually seen on the value of Cronbach's Alpha findings (Kim, 2013; Cisar& Cisar, 2010; Mya et al., 2020)

Additionally, the explanation on the strength of the survey items' reliability value and the value of corrected-item total correlation is also included. The entire item consists of 69 and acquires a value $\alpha = .98$. as shown in the table below:

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Table 6.1

Alpha Cronbach's reliability analysis

Reliability Statistics

Cronbach's Alpha	N of Items
.989	69

This high Cronbach alpha value means that the respondents answered all the question items well and it can be seen more clearly with the findings of total item statistics in the table below explain that all items are useful when all item-total correlation values show a positive value. From the findings from this reliability test, it can be concluded that all items found in this study are suitable for measuring constructs based on Cronbach's alpha value of .98, and the item-total correlation value shows a positive value. These results also prove that this model's items have a high-reliability value.

Table 6.2

Reliability test analysis

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VER1	267.695	2101.369	.664	.989
SEL2	267.545	2093.938	.736	.989
DYN3	267.365	2098.725	.718	.989
ACC1	267.585	2100.525	.703	.989
BEI3	267.655	2097.202	.622	.989
FUN3	267.500	2100.171	.658	.989
EAG3	267.825	2100.718	.641	.989
FAN1	267.150	2113.043	.575	.989
INT2	267.310	2091.602	.763	.989
FUN1	267.705	2101.134	.591	.989
DRA3	267.575	2083.120	.765	.989
EAG1	267.450	2088.440	.749	.989
MAC2	267.845	2098.574	.591	.989

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Table 6.2 *(Continue)*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ENC2	267.685	2092.528	.733	.989
SEL3	267.360	2086.041	.753	.989
INT1	267.395	2086.180	.780	.989
SUR2	267.540	2086.973	.735	.989
DYN1	267.305	2092.635	.743	.989
FOD1	267.585	2087.963	.809	.989
CHE2	267.515	2089.869	.734	.989
DRA1	267.485	2086.201	.775	.989
FOI3	267.555	2093.957	.701	.989
AMU3	267.605	2087.406	.785	.989
MAC1	268.270	2112.208	.359	.989
ENC3	267.560	2087.283	.826	.989
FOD3	267.480	2087.969	.814	.989
CRE3	267.535	2090.401	.777	.989
FAN2	267.680	2089.706	.714	.989
FOI2	267.685	2082.689	.820	.989
ACC3	267.645	2097.708	.735	.989
TIM1	267.605	2091.476	.787	.989
CRE1	267.435	2091.383	.771	.989
AMU1	267.615	2096.178	.748	.989
COG1	267.450	2087.123	.817	.989
TIM3	267.660	2083.864	.821	.989
CHE3	267.585	2081.460	.870	.989
SUR3	267.765	2086.502	.746	.989
PER2	267.725	2085.798	.814	.989
COG3	267.780	2080.193	.807	.989
EFF3	267.755	2086.216	.804	.989
VER3	267.635	2084.042	.852	.989
AUT2	267.565	2090.971	.837	.989
VER2	267.600	2087.568	.818	.989
FOD2	267.670	2084.333	.850	.989
EFF1	267.670	2084.102	.865	.989
EAG2	267.615	2084.791	.835	.989
FUN2	267.410	2089.117	.785	.989
CRE2	267.405	2092.081	.778	.989
MAC3	268.130	2105.390	.411	.989
FAN3	267.595	2081.398	.818	.989
AMU2	267.580	2087.752	.833	.989
PER1	267.560	2085.916	.810	.989
TIM2	267.660	2087.824	.832	.989
COG2	267.675	2085.688	.773	.989
CHE1	267.780	2085.791	.792	.989
AUT3	267.705	2083.928	.829	.989
SUR1	267.705	2087.918	.769	.989
DYN2	268.110	2092.983	.574	.989
PER3	267.685	2088.940	.795	.989
BEI2	267.575	2088.115	.780	.989

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Table 6.2 *(Continue)*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DRA2	267.625	2089.210	.764	.989
AUT1	267.445	2094.640	.703	.989
BEI1	267.680	2087.254	.791	.989
EFF2	267.790	2085.302	.806	.989
ACC2	267.700	2084.794	.815	.989
INT3	267.615	2084.349	.798	.989
SEL1	267.645	2082.300	.836	.989
ENC1	267.605	2084.833	.773	.989
FOI1	267.500	2095.236	.718	.989

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6.5 Normality analysis

Normality analysis is performed to determine that the entire data obtained is under normal distribution conditions. The rules of thumb of skewness and Kurtosis are <3 The skewness and curtosis findings show a normal distribution (Islam, 2019; Joreskog & Sorbom, 1993; Kim, 2013), as shown in the table below.

Table 6.3

Normality analysis

Skewness and Curtosis analysis

	Skewness	Curtosis
VER1	-.006	-.955
SEL2	-.410	-.639
DYN3	-.707	-.071
ACC1	-.253	-.613
BEI3	-.588	.146
FUN3	-.451	-.643
EAG3	-.408	.097
FAN1	-.935	.109
INT2	-.925	.351
FUN1	-.353	-.558
DRA3	-.686	-.051
EAG1	-.879	.578
MAC2	-.223	-.487
ENC2	-.285	-.483
SEL3	-.225	.358
INT1	-.125	.398
SUR2	-.693	-.130
DYN1	-.119	.192
FOD1	-.326	-.752
CHE2	-.797	.493

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Table 6.3 *(Continue)*

	Skewness	Curtosis
DRA1	-.728	.069
FOI3	-.555	-.255
AMU3	-.329	-.629
MAC1	-.190	-.638
ENC3	-.688	.318
FOD3	-.734	.288
CRE3	-.617	.052
FAN2	-.589	.039
FOI2	-.533	.104
ACC3	-.134	-.753
TIM1	-.326	-.593
CRE1	-.775	.316
AMU1	-.294	-.224
COG1	-.775	.511
TIM3	-.333	-.358
CHE3	-.702	.601
SUR3	-.495	.034
PER2	-.284	-.234
COG3	-.453	-.104
EFF3	-.431	.180
VER3	-.360	-.378
AUT2	-.538	.695
VER2	-.451	-.188
FOD2	-.245	-.520
EFF1	-.367	-.238
EAG2	-.478	.003
FUN2	-.844	.343
CRE2	-.705	.128
MAC3	-.339	-.771
FAN3	-.702	.388

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Table 6.3 *(Continue)*

	Skewness	Curtosis
AMU2	-.419	-.200
PER1	-.562	.024
TIM2	-.321	-.250
COG2	-.675	.427
CHE1	-.112	-.706
AUT3	-.523	.266
SUR1	-.279	-.383
DYN2	-.227	-.681
PER3	-.322	-.331
BEI2	-.572	.055
DRA2	-.424	-.189
AUT1	-.795	.408
BEI1	-.232	-.627
EFF2	-.194	-.559
ACC2	-.220	-.645
INT3	-.669	.109
SEL1	-.521	-.064
ENC1	-.707	.371
FOI1	-.693	.446

Research Question 4: What are the main construct in the AUX model deem to be vital to design desirable AR Comic.

Next, the fourth research question is answered using Confirmatory Factor Analysis (CFA) statistics. It aims to ensure that the measured AUX model has strengths in the Structural Equation Model (SEM) analysis.

In conducting this CFA analysis, the researcher has used AMOS version 25. Next, the researcher will draw the initial model in with isolated constructs to see the model fit between items and elements. However, the first step in looking at the fit

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model between items and elements is the loading factor, and it is set> 0.7 in this study.

Next, in this study, the analysis is conducted in two stages, namely single factor and multiple factor analysis. For single factor analysis, each construct is carried out by looking at the model fit item with elements. To adequately measure items requires at least 5 to 12 measurement items for each construct.

6.5.1 Storytelling construct analysis

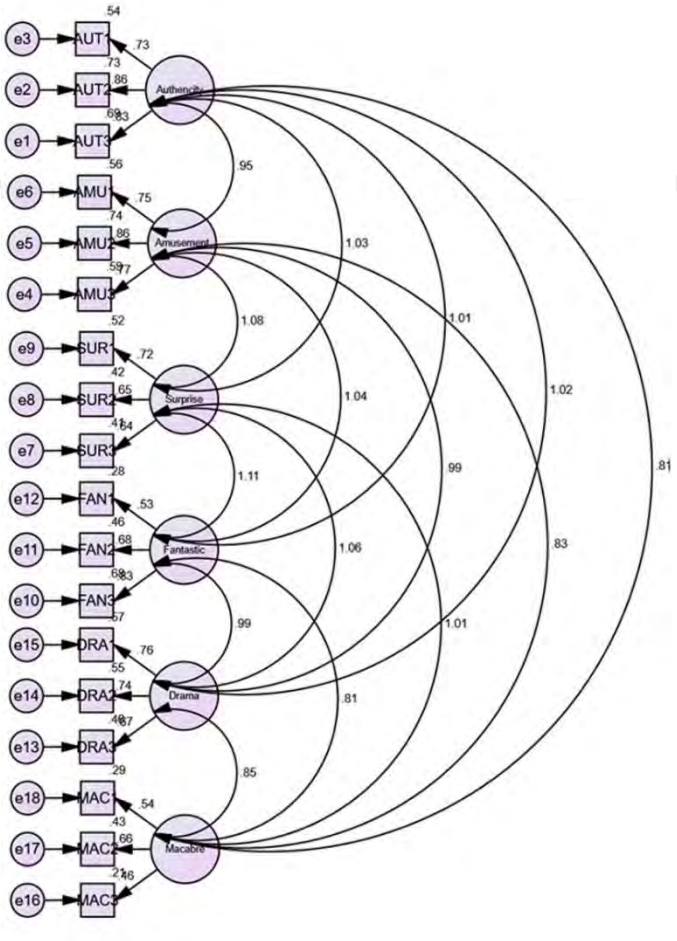


Figure 6.6. CFA single factors for storytelling.

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Table 6.6

Loading factor for storytelling analysis

Element	Item	Loading Factor (ƛ)	Ranking
Authencity	AUT 1	7.3	3
	AUT 2	8.6	1
	AUT 3	8.3	2
Amusement	AMU 1	7.5	3
	AMU 2	8.6	1
	AMU 3	7.7	2
Surprise	SUR 1	7.2	1
	SUR 2	6.5	2 (Rejected)
	SUR 3	6.4	3 (Rejected)
Fantastic	FAN 1	5.3	3 (Rejected)
	FAN 2	6.8	2 (Rejected)
	FAN3	8.3	1
Drama	DRA 1	7.6	2
	DRA 2	7.4	3
	DRA 3	8.7	1
Macabre	MAC 1	5.4	2 (Rejected)
	MAC 2	6.6	1 (Rejected)
	MAC 3	4.6	3 (Rejected)

Table 6.7

X², CFI, TLI, RMSEA and Convergent validity value for Storytelling

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	69	295.821	120	.000	2.465
Saturated model	189	.000	0		
Independence model	36	2340.850	153	.000	15.300

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CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.874	.839	.921	.898	.920
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.087	.075	.100	.000
Independence model	.273	.263	.283	.000

Convergent validity (AVE)

Authencity	0.66
Amusement	0.63
Surprise	0.45
Fantastic	0.47
Drama	0.53
Macabre	0.31

Table 6.7 showed a single factor analysis for storytelling; if seen from the drawing factor loading above, several items obtain a loading factor below 0.7 that is SUR2 0.65, SUR 3 0.64, FAN 1 0.53, and FAN 2 0.68 means this item will be rejected because insufficient loading factor to measure the element. The findings also found that the macabre element was utterly rejected because all three measurement items obtained less than 0.7, which is 0.54, 0.66, and 0.46.

It is also reported that the value of X^2 /df for this analysis is 2,465, where the CFI value of .920 meets the good fit model, the TLI value of .898 marginal fit but very close to good fit and RMSEA .087. These findings prove that single factor

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analysis for storytelling achieves a good model fit. The next finding found that the value of convergent validity (AVE) shows a good value except for the macabre element which is below 0.4 which is only 0.31.

After going through single-factor analysis through CFA, the storytelling construct contains five elements and 11 measurement items, the details of the elements and items are as follows:

Table 6.8

The detail of construct, elemen and measurement item of storytelling

Construct	Element	Item	Code
Storytelling	1) Authencity	This work looks	AUT1
		original	AUT2
		I think that was	AUT3
		I felt rightfulness	
	2)Amusement	It was prestige	AMU1
		It was delighting me	AMU2
		It put me on joviality	AMU3
	3)Surprise	It was so astonishing	SUR1
	4) Fantastic	I felt fascinated	FAN3
	5)Drama	It was dramatic	DRA1
		It was exhilarating	DRA2
		It was thrilling	DRA3

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6.5.2 Amusement Construct Analysis

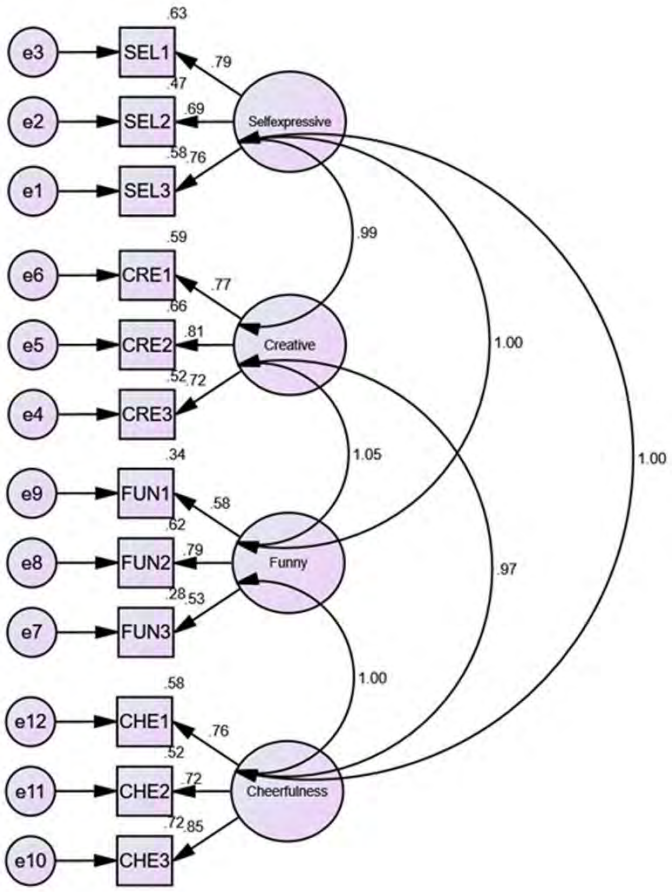


Figure 6.7. CFA single factors for Amusement.

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Table 6.9

Loading factor for amusement analysis

Element	Item	Loading Factor (λ)	Ranking
Self-expressive	SEL1	7.9	1
	SEL2	6.9	2 (Rejected)
	SEL3	7.6	3
Creative	CRE1	7.7	2
	CRE2	8.1	1
	CRE3	7.2	3
Funny	FUN1	5.8	2 (Rejected)
	FUN2	7.9	1
	FUN3	5.3	3 (Rejected)
Cheerfulness	CHE1	7.6	2
	CHE2	7.2	3
	CHE3	8.5	1

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	42	138.824	48	.000	2.892
Saturated model	90	.000	0		
Independence model	24	1481.667	66	.000	22.449

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.906	.871	.937	.912	.936
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.099	.080	.119	.000
Independence model	.334	.320	.349	.000

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CONVERGENT VALIDITY (AVE)

Self-expressive	0.56
Creative	0.59
Funny	0.42
Cheerfulness	0.61

Table 6.9 showed a single factor analysis for amusement; referring to the drawing factor loading above, several items obtain a loading factor below 0.7 that is SEL2 0.69, FUN1 0.58, and FUN3 0.53 this item will be rejected because of insufficient loading factor to measure the element.

It is also reported that the value of X^2 /df for this analysis is 2.892, where the CFI value of .936 meets the good fit model, the TLI value of .912 also meets the good fit model, and RMSEA .099. These findings prove that single factor analysis for amusement achieves a good model fit. Subsequent findings found that convergent validity (AVE) values show good values when all elements get more than 0.4 and this indicates that there is consistency in this construct.

After going through the single-factor analysis through CFA, the amusement construct contains four elements and nine measurement items, the details of the elements and items are as follows:

Table 6.10

The detail of construct, element and measurement item of Amusement

Amusement	1) Self-expressive	It stirred my emotion I felt inspired	SEL1 SEL3
	2) Creative	It was impressed I found it artistic I found it graceful	CRE1 CRE2 CRE3
	3) Funny	I found it very entertaining	FUN2

(Continue)

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Table 6.10 *(Continue)*

4) Cheerfulness	It spurred me on	CHE1
	It fires me up	CHE2
	It bright me on	CHE3

6.5.3 Harmony construct analysis

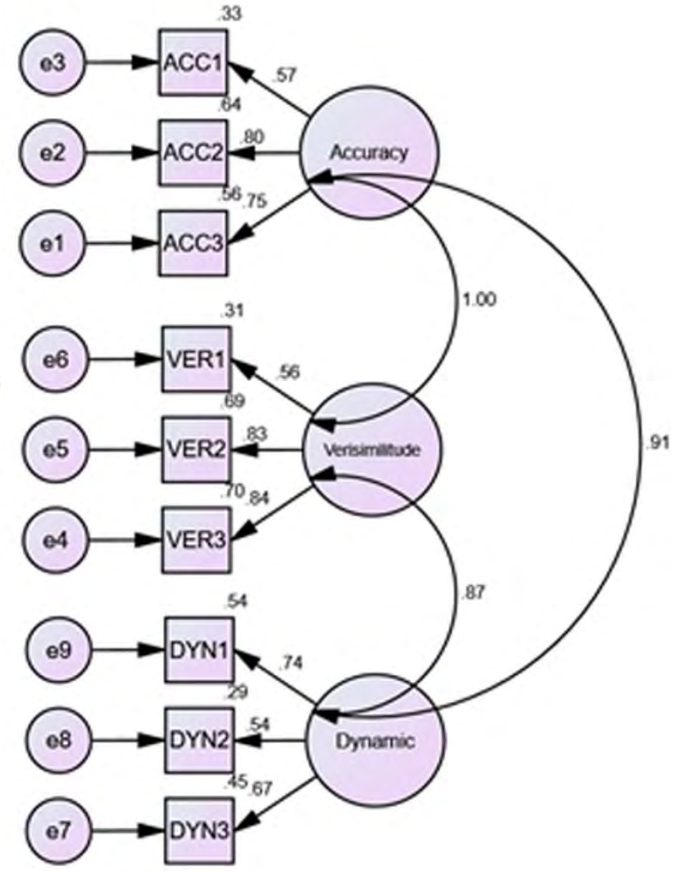


Figure 6.8. CFA single factors for Harmony.

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Table 6.11

Loading factor for Harmony analysis

Element	Item	Loading Factor (λ)	Ranking
Accuracy	ACC1	5.7	3 (Rejected)
	ACC2	8.0	1
	ACC3	7.5	2
Verisimilitude	VER1	5.6	3 (Rejected)
	VER2	8.3	2
	VER3	8.4	1
Dynamic	DYN1	7.4	1
	DYN2	5.4	3 (Rejected)
	DYN3	6.7	2 (Rejected)

Table 6.12

X, CFI, TLI and RMSEA value for Harmony

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CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	52.360	24	.001	2.182
Saturated model	54	.000	0		
Independence model	18	803.543	36	.000	22.321

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.935	.902	.964	.945	.963
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.078	.049	.107	.053
Independence model	.333	.313	.353	.000

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CONVERGENT REALITY (AVE)

Accuracy	0.51
Verisimilitude	0.57
Dynamic	0.43

Table 6.11 showed a single factor analysis for harmony; referring to the drawing factor loading above, several items obtain a loading factor below 0.7 that is ACC1 0.57, VER 1 0.56, DYN 2 0.54, and DYN 3 0.67; this item will be rejected due to its insufficient loading factor to measure the element.

It is also reported that the value of X^2 /df for this analysis is 2.182, where the CFI and TLI value meets the good model fit where both values is .963 and .945, and the RMSEA value is .099. These findings prove that single factor analysis for Harmony achieves a good model fit. Subsequent findings found that convergent validity (AVE) values show good values when all elements get more than 0.4 and this indicates that there is consistency in this construct.

After going through the single-factor analysis through CFA, the Harmony construct contains three elements and five measurement items, the details of the elements and items are as follows:

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Table 6.13

The detail of construct, element and measurement item of Harmony

Harmony	1) Accuracy	I found it precision It was correct	ACC2 ACC3
	2) Verisimilitude	It is some credible I found it reliable	VER2 VER3
	3) Dynamic	This work is powerful	DYN1

6.5.4 Inspiration construct analysis

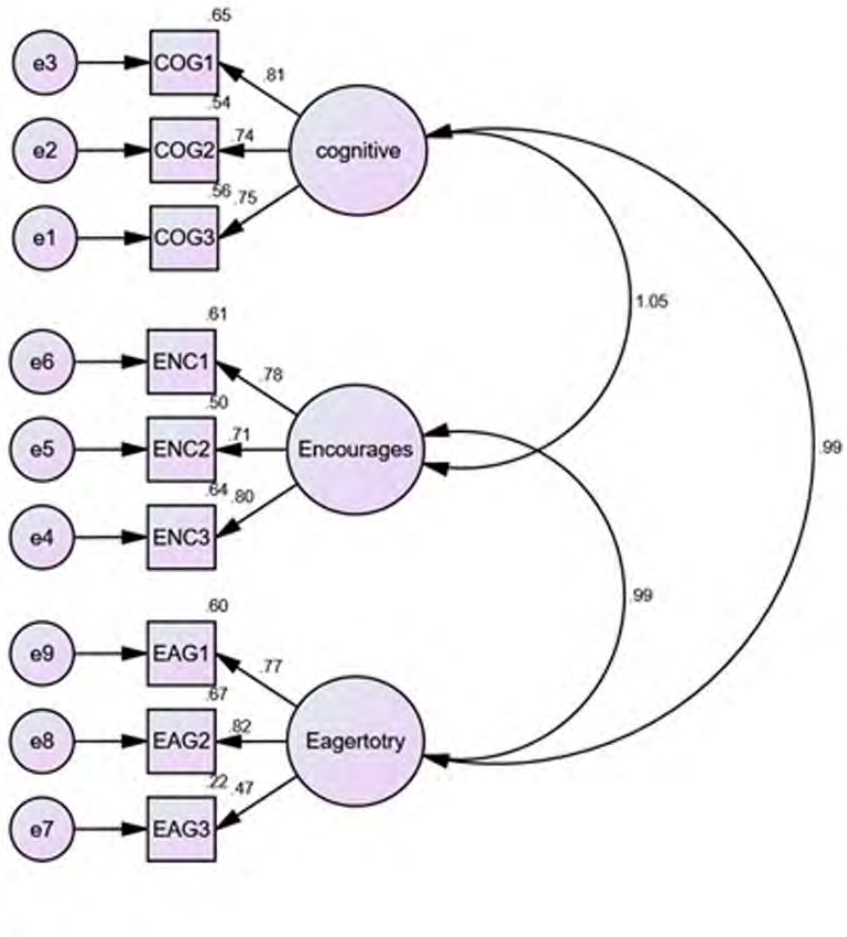


Figure 6.9. CFA single factors for Inspiration

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Table 6.14

Loading factor for inspiration analysis

Element	Item	Loading Factor (λ)	Ranking
Cognitive stimulate	COG1	8.1	1
	COG2	7.4	3
	COG3	7.5	2
Encourages	ENC1	7.8	2
	ENC2	7.1	3
	ENC3	8.0	1
Eager to try new things	EAG1	7.7	2
	EAG2	8.2	1
	EAG3	4.7	3 (Rejected)

Table 6.15

X^2, CFI, TLI and RMSEA value for Inspiration

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	39.253	24	.026	1.636
Saturated model	54	.000	0		
Independence model	18	1016.803	36	.000	28.245

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.961	.942	.985	.977	.984
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.058	.020	.089	.324
Independence model	.377	.357	.397	.000

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CONVERGENT VALIDITY (AVE)

Cognitive	0.58
Encourages	0.58
Eagertotry	0.5

Table 6.15 showed a single factor analysis for inspiration; referring to the drawing factor loading above, only one item obtains a loading factor below 0.7 that is EAG 3 0.47. This item will be rejected due to its insufficient loading factor to measure the element.

It is also reported that the value of X^2 /df for this analysis is 1.636, where the CFI and TLI value meets the good model fit where both values is .984 and .977, and the RMSEA value is .058. These findings prove that single factor analysis for inspiration achieves a good model fit. Subsequent findings found that convergent validity (AVE) values show good values when all elements get more than 0.4 and this indicates that there is consistency in this construct.

After going through single-factor analysis through CFA, the inspiration construct contains three elements and eight measurement items, the details of the elements and items are as follows:

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Table 6.16

The detail of construct, element and measurement item of Inspiration

Cognitive	I felt refreshing I felt intellectually challenged I was mentally engaged	COG1 COG2 COG3
Encourages	It moves me on It was so promising I found it very responsive	ENC1 ENC2 ENC3
Eager to try	It intent my curiosity It's sparked my desire	EAG1 EAG2

6.5.5 Incentive construct analysis

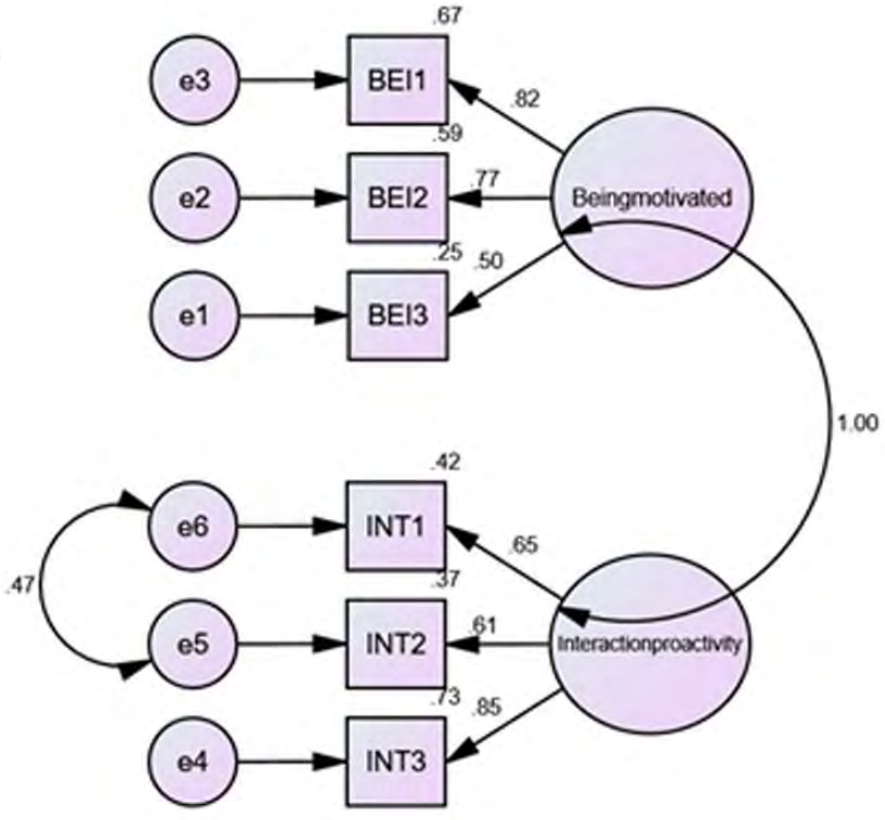


Figure 6.10. CFA single factors for Incentive.

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Table 6.17

Loading factor for incentive analysis

Element	Item	Loading Factor (λ)	Ranking
Being motivated	BEI1	8.2	1
	BEI2	7.7	2
	BEI3	5.0	3 (Rejected)
Interaction pro-activity	INT1	6.5	2 (Rejected)
	INT2	6.1	3 (Rejected)
	INT3	8.5	1

Table 6.18

X^2, CFI, TLI and RMSEA value for Incentive

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	20	20.317	7	.005	2.902
Saturated model	27	.000	0		
Independence model	12	540.675	15	.000	36.045

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.962	.919	.975	.946	.975
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.100	.051	.151	.048
Independence model	.427	.397	.458	.000

CONVERGENT VALIDITY (AVE)

Beingmotivated	0.51
Interactionproactivity	0.5

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Table 6.17 showed a single factor analysis for an incentive; referring to the the drawing factor loading above, there are only three items that meet the factor loading, and the other three obtain a loading factor below 0.7 that is BEI3 0.50, INT1 0.65, and INT2 0.61 and this item will be rejected due to its insufficient loading factor to measure the element.

It is also reported that the value of X^2 /df for this analysis is 2.902, where the CFI and TLI value meets the good model fit where both values are .975 and .946 and but the RMSEA value is 0.10, almost near to poor model fit. This finding is somewhat dubious, especially when half of the item measurement does not meet the loading factor requirement. The number of items left is only three items, which is not enough to measure the construct. The researcher decided to reject this construct from the AUX model and will be discussed in the discussion chapter later. Although convergent validity (AVE) shows good value, but for good reason as described the researcher rejects this construct with empirical results obtained.

After going through single-factor analysis through CFA, the incentive construct contains two elements and three measurement items, the details of the elements and items are as follows:

Table 6.29

The detail of construct, elemen and measurement item of Incentive

Incentive	1) Being motivated	I felt Gripped It motivates me to act	BEI1 BEI2
	2) Interaction proactivity	I felt connected	INT3

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6.5.6 Mindfulness construct analysis

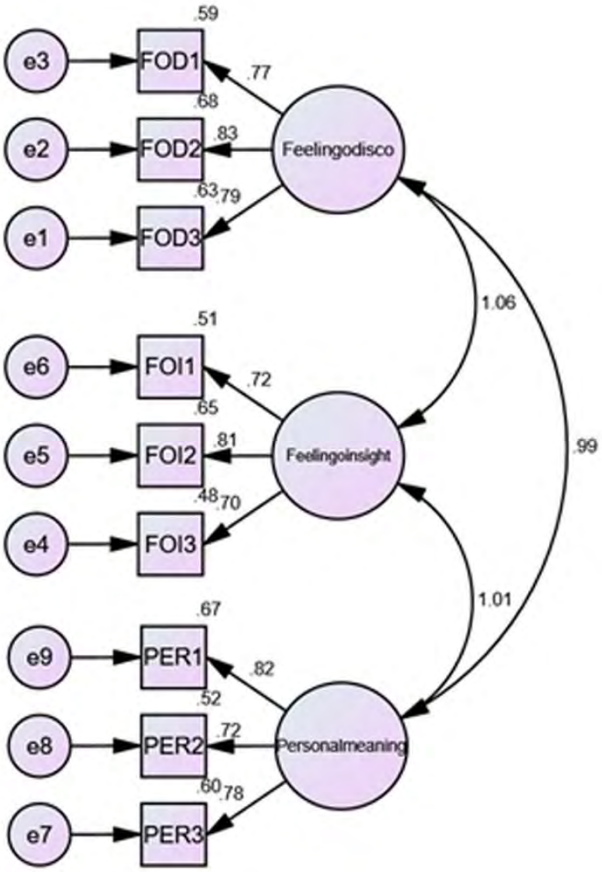


Figure 6.11. CFA single factors for Mindfulness.

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Table 6.20

Loading factor for mindfulness analysis

Element	Item	Loading Factor (λ)	Ranking
Feeling of discovery	FOD1	7.7	3
	FOD2	8.3	1
	FOD3	7.9	2
Feeling of insight	FOI1	7.2	2
	FOI2	8.1	1
	FOI3	7.0	3
Personal meaningful	PER1	8.2	1
	PER2	7.2	3
	PER3	7.8	2

Table 6.21

X^2, CFI, TLI and RMSEA value for Mindfulness

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	43.702	24	.008	1.821
Saturated model	54	.000	0		
Independence model	18	1145.843	36	.000	31.829

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.962	.943	.982	.973	.982
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.065	.033	.096	.191
Independence model	.401	.381	.421	.000

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CONVERGENT VALIDITY (AVE)

Feeling of discovery	0.63
Feeling of insight	0.55
Personal meaningfull	0.6

Table 6.20 showed a single factor analysis for the mindfulness; referring to the drawing factor loading above, all mindfulness constructs meet the factor loading with a substantial value of factor loading, which means the measurement item creates the highest consistency.

It is also reported that the value of X^2 /df for this analysis is 1.821, where the CFI and TLI value meets the good model fit where both values is .982 and .973, and the RMSEA value is .065. These findings prove that single factor analysis for inspiration achieves a good model fit. No rejected item and all the element and item is acceptable in this construct. All elements are accepted in this construct and the convergent validity (AVE) value indicates a high consistency value when all its elements get a value of more than 0.5.

After going through single-factor analysis through CFA, the mindfulness constructs are three elements and nine measurement items; the details of the elements and items are as follows:

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Table 6.22

The detail of construct, element and measurement item of Mindfulness

Feeling of discovery	It established my sense of finding It was a growing realization It developed my sense of learning	FOD1 FOD2 FOD3
Feeling of insight	It improves my perception It's touched my instinct I felt appreciate	FOI1 FOI2 FOI3
Personal meaningful	It was express my feeling It is evocative I found it significant	PER1 PER2 PER3

6.4.7 Efficiency construct analysis

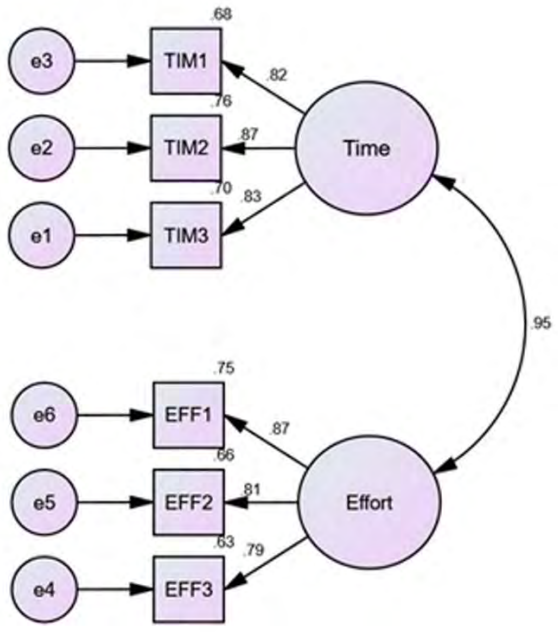


Figure 6.12. CFA single factors for Efficiency

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Table 6.23

Loading factor for efficiency analysis

Element	Item	Loading Factor (λ)	Ranking
Time	TIM1	8.2	3
	TIM2	8.7	1
	TIM3	8.3	2
Effort	EFF1	8.7	1
	EFF2	8.1	3
	EFF3	7.9	2

Table 6.24

X^2, CFI, TLI and RMSEA value for Efficiency

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	19	21.986	8	.005	2.748
Saturated model	27	.000	0		
Independence model	12	832.902	15	.000	55.527

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.974	.951	.983	.968	.983
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.095	.049	.144	.053
Independence model	.533	.502	.564	.000

CONVERGENT VALIDITY (AVE)

Time	0.71
Effort	0.68

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Table 6.24 showed a single factor analysis for efficiency; referring to the drawing factor loading above, all efficiency constructs meet the factor loading with a strong value of factor loading, which means the measurement item creates the highest consistency.

It is also reported that the value of X^2 /df for this analysis is 2.748, where the CFI and TLI value meets the good model fit where both values are .983 and .968 and the RMSEA value is .095. These findings prove that single factor analysis for efficiency achieves a good model fit. No rejected item and all the element and item is acceptable in this construct. All elements are accepted in this construct and the convergent validity (AVE) value indicates a high consistency value when all its elements get a value of more than 0.5.

After going through single-factor analysis through CFA, the efficiency construct are remains two elements and six measurement items, the details of the elements and items are as follows:

Table 6.25

The detail of construct, elemen and measurement item of Efficiency

Time	It has an appropriate duration	TIM1
	The work augmented in suitable speed	TIM2
	The content instantly augments	TIM3
Effort	It strived me	EFF1
	It advances with unflinching determination	EFF2
	It gives it a fly	EFF3

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6.6 Multiple factor analysis

The next process was performing the multiple factors analysis by combining all the factors received together with the item measurement and ensuring that they meet the model's fit requirements for CFA.

For this process, out of seven constructs, only one construct was rejected, namely incentive, and one element was rejected, namely macabre from the storytelling construct because it did not meet the model fit requirements. Six more constructs were received with 20 elements and 48 items compared to 69 items in the single factor analysis process.

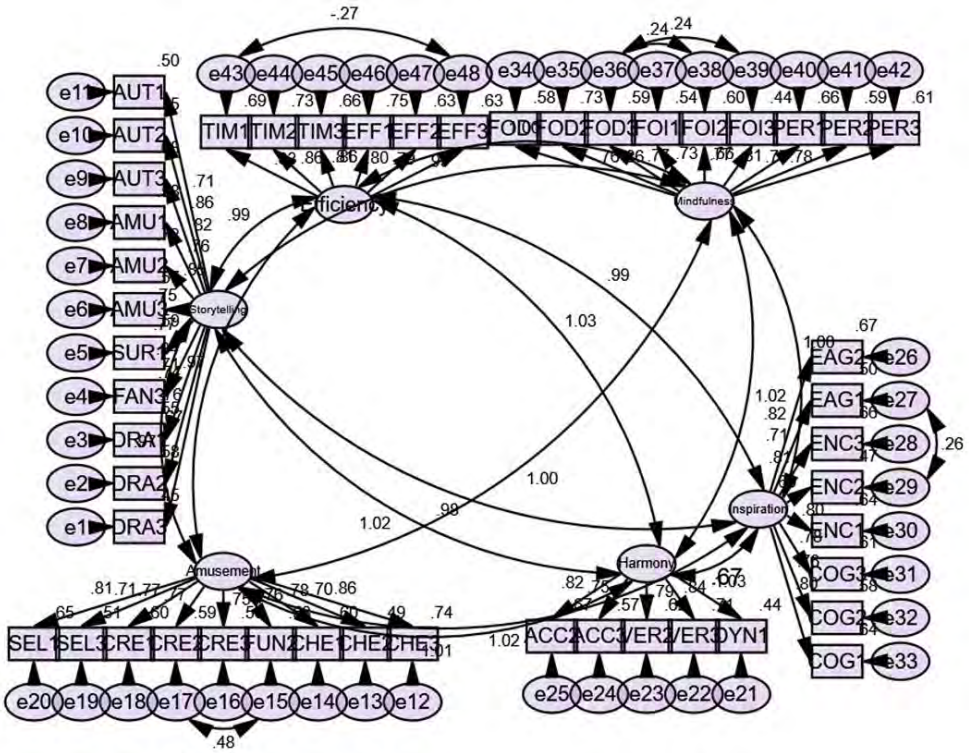


Figure 6.13. CFA multiple factors for AUX model

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Table 6.26

X², CFI, TLI and RMSEA value for multiple factor analysis for AUX model

CMIN/df

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	164	2567.042	1060	.000	2.422
Saturated model	1224	.000	0		
Independence model	96	10705.976	1128	.000	9.491

CFI/TLI

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.760	.745	.844	.833	.843
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

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RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.086	.082	.090	.000
Independence model	.210	.207	.214	.000

Observing the multiple factor analysis CFA for all constructs, elements and items found that all loading factors exceeding 0.7 show the strength of item measurement in testing and measuring each element.

Referring to table 84 above, the value of X^2/df is 2.422 seems to meet the good model fit. In contrast, the CFI value of .843 and TLI .833 is considered as marginal fit but approaching .9, and the CFI and TLI value of each element and item has been tested on single-factor analysis and meet good model fit. On the other hand, the

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RMSEA value for multiple factor analysis meets the good model fit, which is .086. Details of constructs, elements, and items areas in the table below:

Table 6.27

Construct, elements and item after CFA

Construct	Element	Item	Code
1.Storytelling	1) Authencity	This work looks original	AUT1
		I think that was	AUT2
		I felt rightfulness	AUT3
	2)Amusement	It was prestige	AMU1
		It was delighting me	AMU2
		It put me on joviality	AMU3
	3)Surprise	It was so astonishing	SUR1
	4) Fantastic	I felt fascinated	FAN1
	5)Drama	It was dramatic	DRA1
		It was exhilarating	DRA2
		It was thrilling	DRA3
2.Amusement	1) Self-expressive	It stirred my emotion	SEL1
		I felt inspired	SEL3
	2) Creative	It was impressed	CRE1
		I found it artistic	CRE2
		I found it graceful	CRE3
	3) Funny	I found it very entertaining	FUN2
	4) Cheerfulness	It spurred me on	CHE1
		It fires me up	CHE2
		It bright me on	CHE3
3. Harmony	1) Accuracy		
		I found it precision	ACC2
		It was correct	ACC3
	2) Verisimilitude	It is some credible	VER2
		I found it reliable	VER3
	3) Dynamic	This work is powerful	DYN1
4.Inspiration	1) Cognitive	I felt refreshing	COG1
		I felt intellectually	COG2
		challenged	COG3
		I was mentally engaged	

(Continue)

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Table 6.27 *(Continue)*

Construct	Element	Item		Code
4.Inspiration	1) Cognitive		I felt refreshing	COG1
			I felt intellectually challenged	COG2
			I was mentally engaged	COG3
	2) Encourages		It moves me on	ENC1
			It was so promising	ENC2
			I found it very responsive	ENC3
	3) Eager to try		It intent my curiosity	EAG1
			It's sparked my desire	EAG2
5.Mindfulness	1) Feeling of discovery	4.	It established my sense of finding	FOD1
		5.	It was a growing realization	FOD2
		6.	It developed my sense of learning	FOD3
	2) Feeling of insight		It improves my perception	FOI1
			It's touched my instinct	FOI2
			I felt appreciate	FOI3
	3) Personal meaningful		It was express my feeling	PER1
			It is evocative	PER2
			I found it significant	PER3
6. Efficiency	1) Time		It has an appropriate duration	TIM1
			The work augmented in suitable speed	TIM2
				TIM3
		4.	The content instantly augments	
	2) Effort	4.	It strived me	EFF1
		5.	It advances with unflinching determination	EFF2
				EFF3
		6.	It gives it a fly	

6.7 Research question 5: What are the vital construct in the AUX model in designing desirable AR comics.

After going through the FDM analysis process through expert consensus, the initial model obtained consists of seven constructs, namely, storytelling, amusement,

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harmony, inspiration, incentive, mindfulness, and efficiency, which contains 23 elements where the range of the number of elements is between two to six-element for one construct. The researcher has developed the measurement item based on the main theories in this study, with each element containing three items. Next, there are 69 items that will measure the constructs in the analysis of the model validation process in CFA.

Several tests have been performed in the CFA process to further achieve the fit model's requirements to further strengthen the previous model's consistency. In the reliability test, the overall analysis of the item has reached Cronbach's alpha .989, and this proves the whole item has a high consistency to measure the construct. On the other hand, studies for connected item-total correlation show that no negative value also forms a high validity for each item. Similarly, the normality test found that the value of skewness and kurtosis does not exceed three, proves each item in the normal distribution.

Each construct, item and element was tested with CFA analysis using AMOS verion 25. Single-factor analysis and multiple factor analysis were performed by looking at factor loading, X2 / df, CFI, TLI, and RMSEA to determine the AUX model's fit model.

The researcher rejected the incentive construct because it did not reach the model fit value and the item measurement was not sufficient to measure the construct. Simultaneously, the analysis also rejects the macabre element from the storytelling construct because all three items do not meet the loading factor value of 0.7.

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Next, the analysis has also rejected some items from some elements for the same reason as they are not reaching the loading factor value. Details of rejected items are listed in the table below:

Table 6.29

List of rejected item

Construct	Element	Rejected item
Storytelling	Surprise	SUR2 SUR3
	Fantastic	FAN1 FAN2
	Macabre	MAC1 MAC2 MAC3
Amusement	Self-expressive	SEL2
	Funny	FUN1 FUN3
Harmony	Accuracy	ACC1
	Verisimilitude	VER1
	Dynamic	DYN2 DYN3
Inspiration	Eager to try new things	EAG3

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6.8 The Hexagon of Aesthetic User Experience (AUX) Model

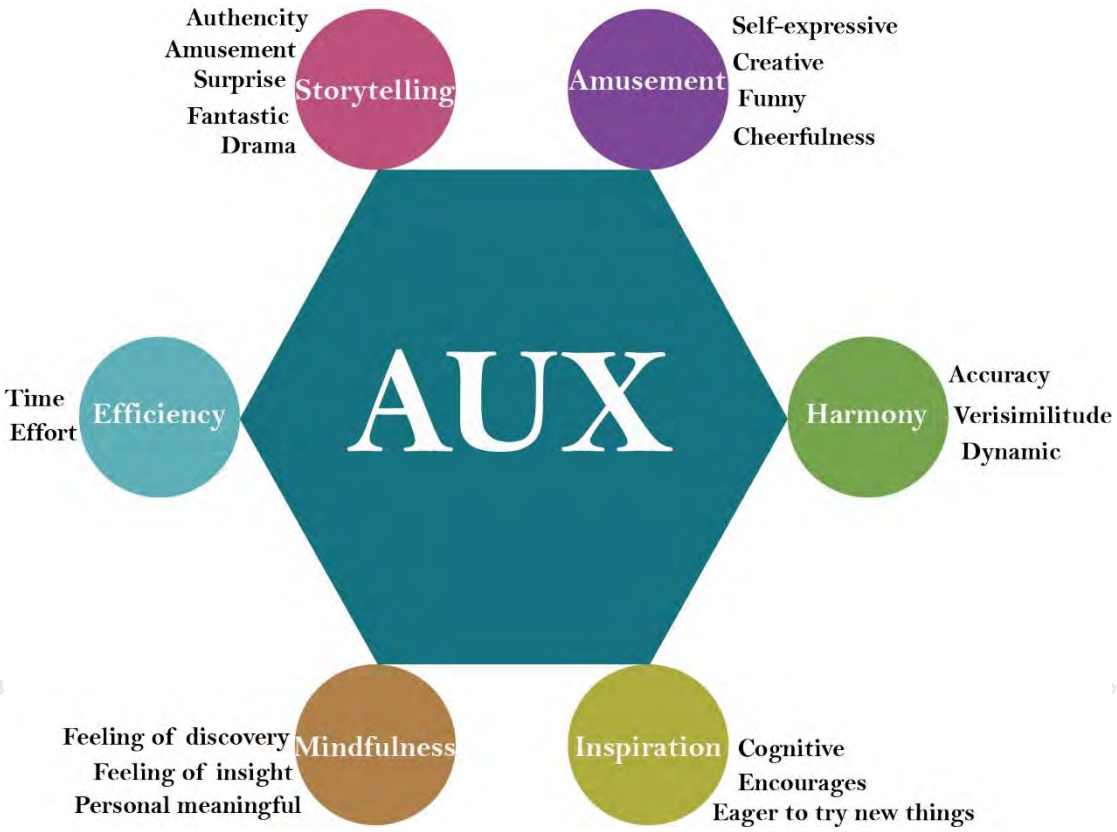


Figure 6.14. The Hexagon of Aesthetic User Experience (AUX) Model

After successfully performed CFA, a new model called the hexagon of the AUX model was purposed. It begins with a storytelling construct as the basis and premise in the beginning of a creative story. The element of authenticity proves the legitimacy of ideas in creating original, genuine and precise stories. Amusement can be described as something prestigious and provide a delightful experience, which in turn situates the user in joviality.

Surprise is an essential element as an impressive factor and the fantastic elements that make the AUX object something that is enchanting. The drama element always gives a dramatic, exhilarating effect and thrilling experience.

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Next, the amusement construct is the mainstay of the AUX object. The essential elements that complete this construct consisted of self-expressive, which is often associated with aesthetic objects, whereas expressive is an emotional expression of a work of art. Creativity becomes a mandatory entity in every aesthetic object; it is a cognitive and expressive manifestation. Creativity is also often associated with problem-solving skills. The element of comedy and cheerfulness may be the effect of the user's observation of the AUX object and provide a new experience for the user.

Revolving to the harmony construct, it can be said it is a balanced construct between technology and visual creativity towards an AUX object. Certainly, the element of accuracy is given stern emphasis to publish something that is precise and in the right condition. The element of verisimilitude is not just a complement to the construct. Still, with this element's presence, it can publish the experience of reality and accuracy. On the other hand, it will provide a credible and reliable experience on AUX objects.

On another occasion, the dynamic is a powerful element in explaining the combination of the two major areas in this study. It has to do with how aesthetic objects and technology are combined to create AUX objects to be something identical.

Inspiration is a construct that is more motivating and inspiring. The most essential elements are cognitive that connect the intellectual and perception of the

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AUX object. The encouragement and eagerness to try new things is the best responsive mechanism to describe inspiration.

Mindfulness in AUX is among the best constructs and acquires high consistency values. The elements are feeling of discovery, feeling of insight, and personal meaningful lead to the sense of finding and learning to improve perception in the process of appreciating.

Last but not least was efficiency. Researcher was directed to the time where technological elements reflect the creative content that can be measured in time. So is effort, which shows fortitude and determination to produce a good AUX object.

In conclusion, through CFA analysis, SEM had successfully validated the purpose of AUX model. The CFA discipline's structural formulas determined the consistency of each construct, element, and item. The final AUX model was created from a test that finally obtained the consistent value of factor loading, X2 / df, CFI, TLI, RMSEA and convergent validity.

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CHAPTER 7

DISCUSSION, SUGGESTION, AND CONCLUSION

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7.1 Introduction

This chapter will discuss the research findings according to the phases of the research conducted. The process of discussion, recommendations, and conclusions on the Aesthetic User Experience (AUX) model is strengthened in this chapter. Further discussion on the study's findings consists of the synergise phase. In this phase, the needs analysis is carried out using the fuzzy Delphi method (FDM) to identify each construct's needs and element to be proposed. The process then continues with the model formulation, augmented reality comic (AR comic) development phase, and model evaluation phase.

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The discussion also stated the potential contributions and recommendations to be conducted in future studies to produce and measure mixed-reality-based studies as the primary study subjects touching on two major areas: aesthetics and Human-Computer Interaction (HCI).

At the end of this chapter, the study's conclusion on the AUX model's overall development is provided. The manual model as the tool is developed to conduct research involving the AUX model.

7.2 Discussion of phase 1 study findings: Synergise

Objective 1: Exploring the possibility of combining AX and UX constructs as a new model for new media art.

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The statement of problems in chapter 1, described the printing industry in general and the comics industry, in particular, have recorded a worrying decline, following the changing reading format from conventional to more interactive online digital platform.

Therefore, the researcher found a new format in the reading method that does not marginalize physical books in conventional form while optimizing digital technology and internet technology. Arising out of this, researchers suggest augmented reality (AR) technology as one solution that can be a bridge between conventional comics with digital and internet technology, where these two media need

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each other in the AR environment (Anjaki et al.,2011; Alvarez & Ternier, 2012; Azuma et al., 2001; Billinghurst et al., 2001)

For this reason, to prove this proposal can be used as one of the solutions, a model of knowledge related to this field should be produced with empirical and scientific research. For this purpose, researchers need to look at related constructs and elements, measurement methods, guidelines, needs analysis, and theory based on this AR comic.

The big idea in this study is how the two different fields of excellent knowledge of theory, method, and implementation are combined and synergised together and able to contribute new knowledge in the environment of aesthetic objects and technology.

AR comic theory and practice are a combination of two major knowledge, namely comics as one of the aesthetic objects and AR in the HCI branch of science. According to their respective fields, both have their measurement methods, concepts, theories, and models.

Basically, aesthetic objects are measured by AX theory where AX reverence to the cognitive elements, perception, and emotions. AX also touches on emotional experiences, aesthetic responses, captivating negative and positive emotions, cognitive levels, perceptions and the art object itself. For AR, the most common measurement method is to use UX models and theories to emphasize human

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interaction with the device based on the content served. Although in UX, there are also emotional and aesthetic elements, it is not a major factor as in UX.

All constructs and elements from the methodological review (MR) are collected and formed into research instruments. The initial model of the AX and UX constructs and elements featured 11 constructs with 24 elements from the UX discipline and five constructs with 15 elements from the AX discipline. The entire construct is 16 with 39 elements.

The study's findings for the synergise phase show the group of experts' consensuses in designing and developing the AUX model carried out using the FDM method. A total of ten experts were directly involved consisting of 5 experts from the field of comics and five experts from AR.

As described in the methodology chapter, the expert consensus's value must meet three conditions: the triangular fuzzy number involving the threshold value (d) where threshold value (d) for each element measured must be less than or equal to $\leq$ 0.2. While the second condition requires that the expert consensus must exceed or equal to $\geq$ 70%, and the third condition is that the fuzzy score value (A) must exceed or equal to the alpha-cut value of $\geq$ 0.5.

In the AX component, five elements have been rejected because they do not meet the 3 FDM requirements. The five elements are love from the amusement, tragic, grotesque, and horrible constructs from the paradox of tragedy constructs

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bizarre from the jolt mental construct. Observing at these results, the researcher mentioned to AX and emotion theory found that these elements are placed in the tertiary of emotions and give similar meanings to primary and secondary emotions (Bundgaard, 2015; Carroll et al., 2012; Costa & Ferro, 2018; Kazanas et al., 2019). Although the love element is in the main emotional in basic emotion, experts consensus rejected because there are other elements that can explain love and it can be measured with item measurement to explain the love element. Experts reject these elements because they contemplate these elements intersection and are not necessary in AR Comic.

As for the UX component, four constructs have been ultimately rejected from the expert consensus because they do not meet the three FDM requirements where all the elements in it have been denied. The constructs are tangibility, intuitiveness, captivation and playfulness, and entertainment. Experts also found that these elements overlap and their presence in the model for AR comic may be less important. This process is a common process in FDM to obtain a consistent model.

There is a process of formulation of elements and elements to obtain the initial model of AX and UX synergies. The formulation process involves rejection, acceptance, equality, meaning, and rebranding based on the key theories and models in this study. This process has led to new constructs and elements' synergy according to the main theories and models in this study, namely AX, UX emotion, comic, and AR.

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7.3 The Heptagon of AUX model

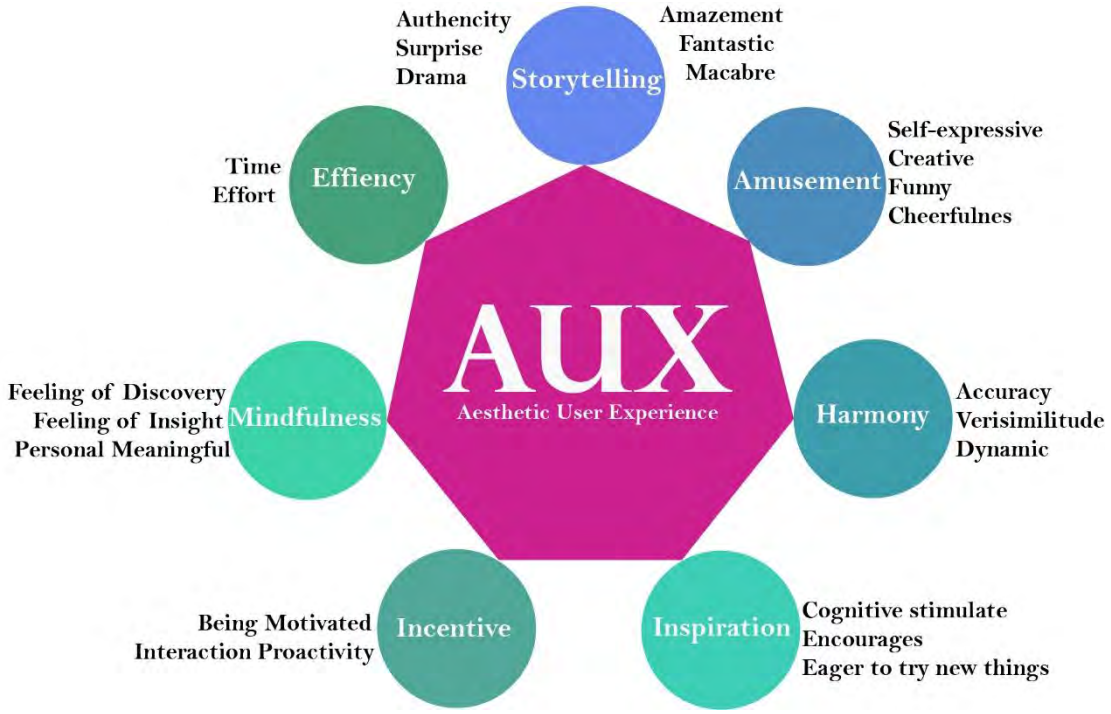


Figure 7. The Heptagon of AUX model

The initial model resulting from this FDM analysis includes seven constructs and 23 elements resulting from a synergistic process consisting of accepting, rejecting, and combining constructs and elements of two components, namely AX and UX.

Constructs containing only one element will be combined with appropriate constructs according to this study's main theories and models. Some construct synergies have undergone a rebranding in terms of the resulting combination's effect name. This rebranding aims to further strengthen the construct as an essential construct in the AUX model.

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In this study, the order of constructs in the AUX model is not emphasized. It is still arranged according to the solid constructs and elements from AX. The integrated construct, after that the rebranding construct, and finally the solid constructs from the UX components.

7.4 Discussion of phase 2 study findings

Objective 2: Designing a desirable AR comic based on the AUX model.

Chapter 5 (AR comic development) described how AR comic development is integrated with comics, animation, and AR principles. It is a new guideline to produce AR comics in future research. The study findings from FDM have successfully published the initial model as the basis for the pipeline to create AR comics. This pipeline starts from selecting the comic panel, animation development, and AR development and publishes into a set of full AR comics.

Selection of comic panel based on emotion theory basics, namely love, joy, surprise, anger, sadness, and fear. This panel selection guide coincides with the storytelling construct by touching on real emotional elements such as amazement, fantastic, macabre, authenticity, surprise, and drama.

The early model of AUX has also outlined two crucial constructs namely, amusement and harmony with self-expressive, creative, funny, cheerful, accuracy, verisimilitude, and dynamic give a clear picture of the comic principles that will be

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transformed into animation. Explaining this construct technically, the principles of comics such as moment to moment, action to action, subject to subject, location to location, aspect to aspect, and non-sequitur need to be integrated with the principle of animation that is acting and line of action through extreme pose.

Visual studies in producing AR comics play a significant role as plot expectations to each panel. Early sketches were created to be more relevant to reach the minds of animators, comic artists, and AR developers. Imagination in anticipating the animated plot to be the main starting point in the two early AUX model constructs, namely inspiration and mindfulness. Expansion from AR comic through expectations and imaginations of the comic plot to the animation shall evoke feelings and emotions in accordance with the elements of the two constructs, namely, cognitive stimulate, encourage, eager to try new things, feeling of discovery, feeling of insight and personal meaningful.

In fact, the technical aspects of AR affect user interaction. The initial AUX model's two constructs touch on the technical aspects, namely incentive and efficiency, with each working on the elements of being motivated, pro-activity interaction, time, and effort. This is about the setup for AR products and how interactivity occurs between humans and devices. The elements of time, effectiveness, and interaction play a significant role in the success of a device-based on a human-based product.

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The initial model from expert consensus through FDM analysis became a pipeline in AR comic production. This initial contribution can be positioned to achieve the formation of products driven to the creative axis.

7.5 Discussion of phase 3 study findings

Objective 3: Validating the AUX model using AR comics as a stimulus.

The purpose of conducting SEM analysis through CFA is to obtain the final fit model to AUX. As described in the chapter, SEM can explain the connection between latent (unobserved) variables and their indicator (observed) variables. SEM can also give good results to the model based on the fit model in structural analysis.

After conducting CFA in two stages, namely single factor analysis and multiple factor analysis, the study found that one construct, namely incentive, was rejected from the initial model of AUX because it could not achieve a good model fit. Three of the six items were denied because they did not reach the required loading factor value, and the RMSEA value approaching poor fit. This incentive contains two elements, namely being motivated and interaction proactivity.

The item rejected was “it aroused me”, “it activated my reaction”, and “it was energetic”. While what is accepted is that “I felt gripped”, “it motivates me to act”, and “I felt connected”.

Theoretically, this incentive construct is closer to the mindfulness construct and inspiration construct, which pragmatically publishes the experiences of finding, learning, intuition, expressive, stimulating, responsive, eagerness and realization.

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Irsyad and Rambli (2016), in Multi-layered Mobile, Augmented Reality (MAR) for positive UX, stressed that it is crucial for an AR product to focus on the UX aspect to invoke specific experience and in the AUX model, mindfulness and inspiration can dominate the incentive construct that has rejected in the AUX model. These three constructs are solid constructs from the UX field.

Hassenzahl (2007) perceives this phenomenon from a hedonic and pragmatic perspective based on a designer perspective and user perspective, which involves emotions, sensations and thought. Parrot (2001) and plutchik (1980) describe more deeply about emotions where the basics of emotions are further developed into primary emotions and tertiary emotions.

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The combination of AX and UX into AUX in this study successfully found a solution to this potential occurrence. The findings of the study empirically explain that this construct should be rejected. The study's findings have also dismissed the “macabre” element from the storytelling construct because all three items did not achieve the desired loading factor. Empirically this element is rejected and makes this construct less than one element out of six elements.

Three items from the macabre element show the effect of negative vibes or suggest negative emotion and the findings find it inappropriate in the AUX product. The item in question was “it scared me”, “I felt grisly”, and “it was not very comforting”.

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Theoretically, in the UX model, the emotions, thoughts and experiences are expected to be positive in feedback on a product. Still, AX is in the opposite situation by accepting any negative emotion reflex to the aesthetic object. Empirically it shows the opposite result that is in the AUX product does not directly require negative feelings, but the macabre element indicates negative emotions that may be excessive. Therefore, it is rejected in the findings of the study.

The findings also found that each of the four items from the storytelling construct that measures the surprise and fantastic elements did not achieve the loading factor. The items is, “it shocks me”, “it sways me”, “it was impressive”, and “it was overwhelmed”. This indicates that this element only needs one item to measure its significant presence in the AUX model.

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Theoretically, this finding is supported by an emotional model that outlines the emotions that are almost the same when a beholder appreciates the artwork and then explains the AX (Parrot, 2001; Mastandrea, 2011; Xenakis & Arnellos, 2015). Out of the 12 items in the amusement construct, three of them did not reach the loading factor, and the three were “it touched me”, “it is hilarious” and “it sparked me on”.

In the harmony construct, the four items did not meet the loading factor; namely “it was exactness”, “it was truth”, “I felt aggressive”, and “it activated my thoughts”. This construct is a combined construct between AX and UX, so users will reflex to creative content and technology mix-reality to explain the elements of accuracy, verisimilitude and dynamic.

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Accuracy and verisimilitude of AX theory emphasize the level of response toward aesthetic objects through emotional and cognitive that recapitulate form and content and then publish meanings combined with dynamic elements that accumulate content in the technology environment.

On the other hand, only one item does not meet the inspiration construct's loading factor that it was desiderated from the element eager to try new things. This construct is from the UX component that explains the concept of experience as something of quality by understanding how users interact with the product, understand the content and how it works. In other words, it postulates the feeling present when they use it and suits the overall context of the product.

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The other two solid constructs of UX are constant mindfulness and efficiency with three elements, each with nine items and two elements with six items. In the AUX model, the mindfulness construct with the full item acts as an interaction between the environment (content) and technology. Theoretically, it suggests cognitive processes to the sensory stimulation that evoke cognitive feelings towards product design, environmental psychology, social psychology and technology.

Efficiency, taking into place with two vital elements of technology, namely time and effort. This element reflects the technical element of the content developed to measure performance in each AUX product. After SEM analysis is agreed, the final AUX model is generated, and the details of the construct and elements are as follows:

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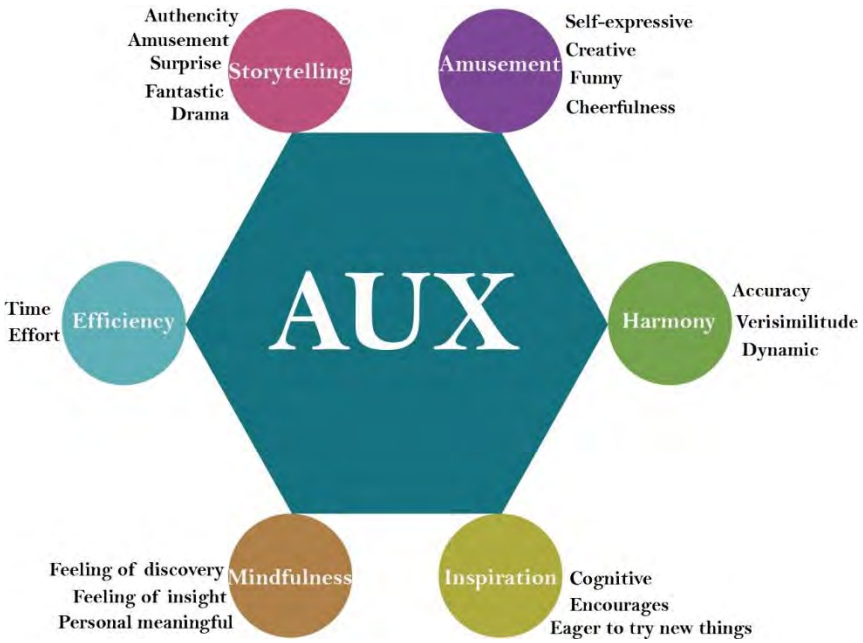


Figure 7.1. The Hexagon of AUX model

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Table 7

Detail of construct, elements and item of AUX model

Bil	Construct	Element	Item
1	Storytelling	1) Authencity	This work looks original I think that was I felt rightfulness
		2)Amusement	It was prestige It was delighting me It put me on joviality
		3)Surprise	It was so astonishing
		4) Fantastic	I felt fascinated
		5)Drama	It was dramatic It was exhilarating It was thrilling
2	Amusement	1) Self-expressive	It stirred my emotion I felt inspired
		2) Creative	It was impressed I found it artistic I found it graceful

(Continue)

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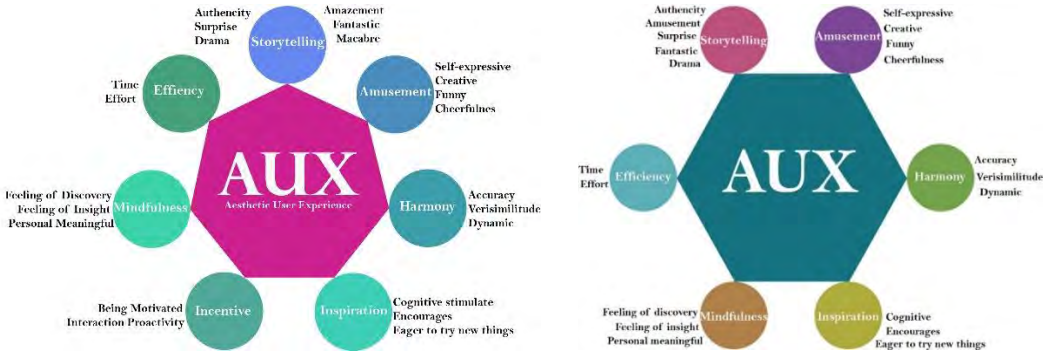
Table 7 *(Continue)*

Bil	Construct	Element	Item
3	Harmony	1) Accuracy	I found it precision It was correct
		2) Verisimilitude	It is some credible I found it reliable
		3) Dynamic	This work is powerful
4	Inspiration	1) Cognitive	I felt refreshing I felt intellectually challenged I was mentally engaged
		2) Encourages	It moves me on It was so promising I found it very responsive
		3) Eager to try	It intent my curiosity It's sparked my desire
5	Mindfulness	1) Feeling of discovery	7. It established my sense of finding 8. It was a growing realization 9. It developed my sense of learning
		2) Feeling of insight	It improves my perception It's touched my instinct I felt appreciate
		3) Personal meaningful	It was express my feeling It is evocative I found it significant
6	Efficiency	1) Time	It has an appropriate duration The work augmented in suitable speed 5. The content instantly augments
		2) Effort	7. It strived me 8. It advances with unflinching determination 9. It gives it a fly

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7.6 Discussion of the comparison between the Heptagon of AUX (Hepta AUX) and the Hexagon of AUX (Hexa AUX) model



The Heptagon of AUX (Hepta AUX) The Hexagon of AUX (Hexa AUX)

Figure 7.2. The Hepta and The Hexa AUX

This section will compare findings between the two models in this study, namely Hepta AUX and Hexa AUX. Theoretically, both models are capable of testing AUX products, whether for use studies, experimental or creative appraisal.

Hepta AUX is an initial model formulated from expert consensus through the Fuzzy Delphi Method (FDM) process. This initial model is a combination of the structural structure and elements of AX and UX theory. There are 16 constructs: five from AX and 11 from UX with 39 elements, each 15 from AX and 24 from UX.

On the other hand, Hexa AUX is a model obtained from confirming the Hepta AUX model foundation using the Structural Equation Model (SEM) through Confirmatory Factor Analysis (CFA). In the FDM process, the model is formulated from an appointed expert, while in the CFA, it requires the respondents to confirm the model.

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Empirically, in the FDM process, there are four constructs of UX that have been completely rejected, namely tangibility, intuitiveness, captivation and playfulness and entertainment. This rejection occurred because it did not meet the FDM requirements. The FDM process has also rejected two elements: horrible from the paradox construc of tragedy and amusement from construct playfulness and entertainment. The initial model was formulated from these FDM findings as grounded to Hepta AUX.

In contrast, SEM analysis through CFA analyzed seven constructs with 23 elements and 69 measurement items built from the Hepta AUX foundation model. The purpose of running a CFA is to obtain a model fit as validation for the Hepta AUX model. Empirically, one construct has been completely rejected; the Incentive constructs when half of the total items do not meet the loading factor and the RMSEA value approaches the poor fit value.

The CFA findings have also rejected seven items from the storytelling construct, three items from the amusement construct, four items from the harmony construct and one item from the Inspiration construct. The model validation finally lists the Hexa AUX model containing six constructs with 20 elements and 48 items.

Describing this phenomenon, in the FDM process, it involves comic experts, AR developers, and academicians, commented on AX theory it involves formalistic elements, content, cognitive, perception and emotion become central arguments in evaluating a comic and AR creative product as a platform. The rejection of four

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constructs by experts in the FDM process is an aesthetics appraisal in appreciating the artwork. AX theory emphasises that the subject will stir emotion when the user is contemplating an art object. This will involve user knowledge and experience on artwork which in AX reflects the stimuli domain of pleasure, subject, expression, metaphor, idea, form, style, and personal meaning.

The pragmatic and hedonic concepts in the FDM process stimulus may not be applicable because, referring to the comics storytelling aspects, it requires the negative and positive emotion to stir the emotion in the AX approach. Instead, pragmatic and hedonic touches on avoid negative UX on the product. However, this AR comics product's technical elements show the potential ingenious to support the achievement in the pragmatics concept and achieve the goal as a reflection on the hedonic concept.

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In the Hepta AUX model's formulation process, two constructs, namely amusement and harmony, are synergy constructs of elements between AX and UX. For amusement element self-expressive and creative from UX while funny and cheerfulness element from AX. On the other hand, harmony is the element of accuracy and verisimilitude from AX and dynamic from UX. This can be explained by several concepts, namely experience in both theories, which in AX centralize cognitive, perceptual and emotion to determine the level of comprehension of the user knowledge and experience of the subject. Therefore, users use knowledge and experience in recapitulate form and meaning.

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In line with that, UX presents experience as a quality, consequences, and process to interact with the environment as a stimulus that evokes significant response such as pleasure, arousal, and dominance. The experience process is a cognitive process that injects the sensory and stimulation method on the evaluative assessment that eventually emerges as an emotion.

AX also describes the concept of cognitive as the level of user feedback on the subject. Nevertheless, AX celebrates both cognitive (creator & user) in giving meaning to an aesthetic object. Carrol et al., (2012) asserted that art expert will decipher at overall and scrutinizing the aspects of formality, context and content. While the user may only contemplate only on the surface of form and content. In this case, cognitive becomes significant because the aesthetic of the object is not produced without knowledge and experience. Otherwise, the AX context does not occur to the user.

Further explanation of cognitive elements in UX is directly related to the user's sense of interacting with a product. Hence, the interaction is action and perception of sensory stimulation between user and technology (Zaphiris, 2013; Alenjung et al.,2017; Dirin & laine, 2018). The significant difference between AX and UX in this cognitive concept is explained by the user interacting does not need to focus on existing knowledge in the creative field. Still, it is concerned with what the user can feel the product and give high impact to UX. Next gives a sense of immersion and positive UX.

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AX and UX's synergy continues with the concept of emotion which in AX emotion is the important and key entity in achieving AX. However, AX is subjective judgment and reflection on the sense of taste that needs to be sensitive to aesthetic object. Users who appreciate artwork will usually associate perception and feelings as a reaction to self, memory, and art objects. In this FDM analysis, experts look at content and context that influence emotional processing in creation and appreciating AR Comics.

Although UX's emotion is more general and always avoids negative UX. The UX product evaluation process still celebrates emotional elements to enhance the experience. Especially in the evaluation of products such as mix-reality, AR and VR that always play with visual, auditory, haptic, kinaesthetic, and sensory modalities will evoke a sense of immersion and sense of presence in emotion facet. It can be said that expert evaluation of stimuli takes into account the concepts and philosophies of AX and UX that have been discussed in FDM analysis.

Next, the researcher brought this Hepta AUX model to undergo the verification process through CFA. This analysis used 193 respondents to test Hepta AUX. In other words, CFA relies solely on the user to appreciate the AR Comics generated by making Hepta AUX a guideline.

In CFA, the relationship between elements and items becomes significant in explaining the theoretical phenomena that occur. Similarly, after the researcher conducted the CFA, there are items that are rejected, then the item respectively

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reduced. The researcher concluded that this CFA analysis successfully validated the Hepta AUX model and discovered a new model, the Hexa AUX.

The cognitive element in CFA findings is very different from FDM findings. Respondents are not gradual creators or experts, only in terms of cognitive; they have existing knowledge that helps them make judgments in appreciating AR comic. An AX theory explains that contemplating an art object appreciates the artwork that involves spiritual sense, environment and social psychological function. Their assessment is different because of their level of comprehension, and the outstanding product is in line with the existing level of thinking and knowledge. However, their judgment is important as a target audience in decision making.

The cognitive level of the user is supported by how good the product is present. Dynamic and vague are measured by the stimulus, appeal and use of the product. In UX, especially to evaluate AUX product user go beyond the functionality and shift to experiential perspective such as cognitive, affective and positive feeling towards the product.

In the concept of experience, the theory is: AX and UX require users and products to interact and in order to create new experiences. Housen (1983) outlined that formative experience as the language of art for classifying theory and decode knowledge is reflective in the concept of experience in AX and UX. It is supported by the fact that UX experience involves interaction, construction and evaluation of a product (Hassenzahl, 2007; Kuniavsky, 2013; Klingbeil et al., 2017). The synergy occurs when the potential of interaction and meaningful relationship with the device

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with existing knowledge helps users appreciate AUX products and enhance anticipation, interaction, and reflection of the experience.

In CFA items, most of them are emotion facets that are reflective of AUX stimuli and synergies. There were rejected items identified as redundant and empirical evidence showed the respondents agreed to measure elements with only selected items. Emotional factors are found in this synergy which through the cognitive facet of AR Comics is translated by form and content into emotion. Reflective between self, memories and AUX product embracing the presence of negative emotion, which is only a reflex to the aesthetic object, but technically the application produced receives a positive notation.

In short, the synergy in Hexa AUX evokes a sense of immersion, invoke specific emotion, reflexes with primary emotion and integrates constructive from both aesthetic and user experience towards the AUX product.

7.7 Implications of the AUX model on theory

Facing the 4.0 revolution industry challenges allows most fields of knowledge to integrate and publish new experience. This knowledge does not stand on one domain only but is supported by various fields, and that is how the nature of the knowledge develops.

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It is explained in this study that two major theories have the potential to be synergised into a new model for measuring AUX-based products. When the AUX model was produced from this study, the researcher managed to define an AUX product. The idea is like this, AUX product is a combination of aesthetic objects and mix-reality technology whose phenomenon is contemporary and currently happens. This is unlike what transpired before when the product assessment judge from two different angles namely, AX and UX.

In the chapter one, there is a sizeable theoretical gap between AX and UX. Today, many mix-reality products produced to combine the aesthetics of objects but are only judged by using AX and vice versa measured by UX. Supposedly the UX is exclusively focused on the product (Utility & usability) and how to handle the product. It is also based on tasks and avoids negative elements such as dislike, frustration, and complexity. Instead, AX is centred on expression, formalities, the content of art form, cognitive, perception, and emotion. AX involves the spiritual sense and celebrates negative elements such as sadness, anger and frustration.

On account of this, AUX is present as a bridge to both theories in two different fields by applying the two elements' potential to be synergized together. AUX is a structural tool for the product based on object aesthetics and mix-reality.

Tangibly, the AUX model explains how users interact with AUX products and has a meaningful relationship with device technology. Next, users combine existing experiences with new experiences and create a conceptual world to give new meaning to the phenomenon. Intangibly, AUX responds cognitively and emotionally towards

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AUX product through stimuli of pleasure, subject, expression, form, style, and personal meaning. It is related to memory, self and AUX products.

In short, the AUX model exists to serve as a guideline for the production, use and assessment of AUX products. It looks holistically about the physical, technical, design, technology, expression, experience, perception and emotion elements of the user in handling AUX products.

7.8 Research contribution

This section describes three major novel contributions from the work of this research. Contribution is limited to academic purposes and for the comics, mix-reality, and animation industries in Malaysia. This research also contributes to the development of new theories in new media.

7.8.1 Academic contribution

This study provides a research that develops a structural relationship model between AX and UX as the main theoretical field of AR Comics. The key contributions of this research in academic are as follows:

1. Using SEM techniques of 7 constructs, 23 elements and 69 items have been developed and verified. After going through rigorous processes and

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procedures, including validity and reliability test, only significant item measures were maintained to create an instrument of latent constructs and measurement item. It then becomes a set of valid and reliable measurement instrument tools to help academicians to implement these tools in other similar research.

2. This study has used FDM techniques to get the initial model, and then the initial model is used as a guideline to produce AR Comics. SEM is also used to test and obtain the consistency of the final AUX model. Basically, this is an innovation to research because it applies a new and evolving research methodology. This technique also describes variations in research methodology.
3. The study results can be used as learning and teaching materials involving creative and mix reality fields. It can be used as a theory and practice in learning activities.

7.8.2 Industry contribution

Furthermore, in this study, the process of producing AR comics is described in stages. In the development of AR Comics, the researcher outlines a step by step pipeline that involves pre-production, production and post-production, as well as AR development as a complement to the development process. This finding greatly contributes to the animation industry that can grow beyond conventional animation, comics that can evolve with technology and enrich the subject in mix-reality because it is still new in

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Malaysia. Ironically it is able to be a link between conventional media and new media.

7.8.3 Theory contribution

One of these main research objectives is to study AX and UX's potential synergy towards AR Comics. The AUX model has the potential to be a new theory in the field of combining object aesthetics with mix-reality technology. These two major areas are referred to as new media, multimedia or intermedia. This study is an initial step towards the formation of new theories that can be studied and developed. Although this contribution is still in the early stages, the impact is significant because this technology is actively growing.

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7.9 Limitation and recommendation for future research

This study focuses on the potential synergy of two theories, namely AX and UX, towards AR Comics. To all researchers, this study is also not permitted from limitations and weaknesses.

Among the main limitations outlined in this study is that the sample used focuses on samples with existing knowledge and experience in the creative field, HCI, and those directly involved in this field. Future research is proposed to expand to samples, not in the creative and HCI field or compare experience between samples in that field with other fields.

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This study also focuses on AR Comics stimulus as a research subject that may be seen in various creative mix-reality products for future research. Among the products proposed are virtual reality (VR) AR games or a combination of both. Furthermore, this study makes comics its main subject where comics are one of the art-forms while many more art-forms can be used as research subjects to obtain a varied outcome potential. Animated content in this study is 2D; for future research, in addition to choosing other art-forms as a subject, it can be suggested that animated content is produced in 3D, special effects, or motion graphics.

After the production of this AUX model, the researchers have high hopes to promote its widespread use in future studies because the potential of this AUX model for this field is still new in Malaysia, whether in the academic or industrial field. The AUX model is provided with product production pipelines, measurement tools, and structured constructs. Among the suggestions for using the AUX model for future research are as follows:

1. The AUX model can be applied in fine arts by enhancing the experience of paintings, drawings, and sculptures. Researchers are proposed to apply mix-reality technology to the works of national artists' collection and study the potential of new experiences to be published.
2. Researchers also suggested to applying the AUX model to the field of advertising by integrating customer experience with the advertised product with a touch of mix-reality.
3. The AUX model can be extended to applications either by synergizing the AUX model with the primary model in game design. Various methods can be

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explored in game design with the integration of mix-reality technology and creative content.

4. Mix-reality content construction can be varied affording to the context with other animation techniques such as 3D, special effects, motion comic, animatics, and motion graphics. Certainly, the effects of comparison and experience will eventually be different.
5. Finally, researchers suggest that the AUX model is integrated with theories and other models in various fields in accordance with the use of mix-reality technology with creative fields or other fields such as social sciences, psychology, computers, and education.

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7.10 Conclusion

In conclusion, after going through the empirical research process with methods that the researcher believes have found some findings that can contribute to the progress of knowledge.

The AUX model is the main objective of this study. It is expected to be celebrated and tested in other studies by other researchers to be marked as a new theory. The combination of FDM method to CFA is also expected to be an innovation in knowledge in the field of creative and mix-reality technology with the increase of strategies and methods commonly used in both fields.

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Next, it is hoped that this AUX model can help the Malaysian comic industry develop comics with a mix-reality combination that does not sideline conventional comics that have long been practiced in the Malaysian comic industry.

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

REFERENCES

Agarwal, V. (2013). Investigating the convergent validity of organizational trust. *Journal of communication management*.

Abdullah, F., & Ishak, M. S. A. (2016). Kesan Perkembangan Teknologi terhadap Industri Penerbitan Buku di Malaysia. *Malaysian Journal of Media Studies*, *18*(2), 71-86.

Adikari, S., McDonald, C., & Campbell, J. (2016). Quantitative Analysis of Desirability in User Experience. *arXiv preprint arXiv:1606.03544*.

Ahsanullah, Sulaiman, S., Mahmood, A.K., Khan, M. (2015). Understanding factors influencing user experience of interactive system: a literature review. *ARPN Journal of Engineering and applied sciences,* vol. 10, no 23.

Ajanki, A., Billinghurst, M., Gamper, H., Järvenpää, T., Kandemir, M., Kaski, S.,& Ruokolainen, T. (2011). An augmented reality interface to contextual information. *Virtual reality*, *15*(2-3), 161-173.

Alenljung, B., Andreasson, R., Billing, E. A., Lindblom, J., & Lowe, R. (2017, August).User experience of conveying emotions by touch. In *2017 26th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)* 1240-1247. IEEE.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun PustakaTBainun ptbupsi

Alivi, M. A., Ghazali, A. H. A., Tamam, E., & Osman, M. N. (2018). A Review of New Media in Malaysia: Issues Affecting Society. *International Journal of Academic Research in Business and Social Sciences*, *8*(2),12-29.

Alvarez, V., & Ternier, S.(2012). Mobile augmented reality for education. *Workshop Proceedings*, 1-5

Al-Azzawi, A. (2013). *Experience with technology: Dynamics of user experience with mobile media devices*. Springer Science & Business Media.

Alumran, A., Hou, X. Y., & Hurst, C. (2012). Validity and reliability of instruments designed to measure factors influencing the overuse of antibiotics. *Journal of Infection and Public Health*, *5*(3), 221-232.

Arroio, A. (2011). Comics as a narrative in natural science education. *Western anatolia journal of education science, special issue*. Dokuz eylul In stitute, Izmir, Turkey.

Arifin, W. N., & Yusoff, M. S. B. (2016). Confirmatory factor analysis of the Universiti Sains Malaysia Emotional Quotient Inventory among medical students in Malaysia. *SAGE Open*, *6*(2), 2158244016650240.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Ayer, M. (2014). Interactive graphic novels: A hybrid advertising technique. *Elon Journal of Undergraduate Research in Communications*, *5*(2)

Adnyani, L. D. S., Mahayanti, N. W. S., & Suprianti, G. A. P. (2020, January). PowToon-Based Video Media for Teaching English for Young Learners: An Example of Design and Development Research. In *3rd International Conference on Innovative Research Across Disciplines (ICIRAD 2019)* (pp. 221-226). Atlantis Press.

Awang, Z., Afthanorhan, A., Mohamad, M., & Asri, M. A. M. (2015). An evaluation of measurement model for medical tourism research: the confirmatory factor analysis approach. *International Journal of Tourism Policy*, *6*(1), 29-45.

Azargoon, M., Shabani, A., CheshmehSohrabi, M., & Asemi, A. (2019). Identification of Effective Factors on the Use of" Query Suggestions" through Fuzzy Delphi Method.*Library philosophy and practice* (e-journal), 2259.

Azuma, R., Baillot, Y., Behringer, R., Feiner, S., Julier, S., & MacIntyre, B. (2001). Recent advances in augmented reality. *IEEE computer graphics and applications*, *21*(6), 34-47.

Baistaman, J., Awang, Z., Afthanorhan, A., & Rahim, M. Z. A. (2020). Developing and validating the measurement model for financial literacy construct using confirmatory factor analysis. *Humanit. Soc. Sci. Rev*, *8*, 413-422.

Basri, N. H., Noor, N. L. M., Adnan, W. A. W., Saman, F. M., & Baharin, A. H. A. (2016). Conceptualizing and understanding user experience. *2016 4th International Conference on User Science and Engineering (i-USEr)* 81-84. IEEE.

Badoy Jr, W., & Teknomo, K. (2016). Q-learning with basic emotions. *7th IEEE International Nanotechnology Communication and Control Environment and Management*. 1609.01468.

Bencsik, A., Horváth-Csikós, G., & Juhász, T. (2016). Y and Z Generations at Workplaces. *Journal of Competitiveness*, *8*(3).

Blevins, S., & Brill, J. (2017). Enabling Systemic Change: Creating an ePortfolio Implementation Framework through Design and Development Research for Use by Higher Education Professionals. *International Journal of Teaching and Learning in Higher Education*, *29*(2), 216-232.

Bundgaard, P. F. (2015). Feeling, meaning, and intentionality—a critique of the neuroaesthetics of beauty. *Phenomenology and the Cognitive Sciences*.

Bednarczyk, M. (2017). The Use of Augmented Reality in Geomatics. In *Environmental Engineering. Proceedings of the International Conference on Environmental Engineering. ICEE* (Vol. 10),1-7

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Bilgihan, A. (2016). Gen Y customer loyalty in online shopping: An integrated model of trust, user experience and branding. *Computers in Human Behavior*, *61*, 103-113

Billinghurst, M., Kato, H., & Poupyrev, I. (2001, March). MagicBook: transitioning between reality and virtuality. In *CHI'01 extended abstracts on Human factors in computing systems* (pp. 25-26). ACM.

Boreczky, J., Girgensohn, A., Golovchinsky, G., & Uchihashi, S. (2000). An interactive comic book presentation for exploring video. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*,185-192 ACM.

Braun, N. (2003). Storytelling in collaborative augmented reality environments. *WSCG Short Papers proceedings.* Science press.

Cabero Almenara, J., & Barroso, J. (2016). The educational possibilities of Augmented Reality. *New Approaches in Education Research*, vol. 5, no.1.

Carmigniani, J., & Furht, B. (2011). Augmented reality: an overview. In *Handbook of augmented reality* 3-46. Springer, New York, NY.

Carroll, N. (2003). Beyond aesthetics. *Cambridge University Press*. New York.

Carroll, N., Moore, M., & Seeley, W. P. (2012). The philosophy of art and aesthetics, psychology, and neuroscience. *Aesthetic science. Connecting minds, brains, and experience*,31-62.

Caudell, T. P., & Mizell, D. W. (1992, January). Augmented reality: An application of heads-up display technology to manual manufacturing processes. In *Proceedings of the twenty-fifth Hawaii international conference on system sciences* (Vol. 2), 659-669. IEEE.

Chen, S., & Desiderio, S. (2018). Factor analysis with a single common factor. *Munich Personal RePEc Archive*, no 90426.

Cherubini, M., & Oliver, N. (2009). A refined experience sampling method to capture mobile user experience. *arXiv preprint arXiv:0906.4125*.

Church, K., & Cherubini, M. (2010). Evaluating mobile user experience in-the-wild: Prototypes, playgrounds and contextual experience sampling. In *Proceedings of the Workshop on Research in the Large: Using App Stores, Markets and other Wide Distribution Channels in Ubiquitous Computing Research* 29-32

Chute, H. (2008). Comics as literature? Reading graphic narrative. *Pmla*, *123*(2), 452-465.

Čisar, P., & Čisar, S. M. (2010). Skewness and kurtosis in function of selection of network traffic distribution. *Acta Polytechnica Hungarica*, *7*(2), 95-106.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Clayton, M.J. (1997). Delphi: a technique to harness expert opinion for critical decision-making tasks in education. *Educational psychology*, vol. 17(4), 373-384.

Costa, H., & Ferro, G. (2018) Olfative aesthetic experience within the servicescape. *In proceeding of invisible design*, vol. 18.

Cohn, N. (2011). A different kind of cultural frame: An analysis of panels in American comics and Japanese manga. *Image & Narrative*, *12*(1),120-134

Cohn, N. (2014). Building a better 'comic theory': Shortcomings of theoretical research on comics and how to overcome them. *Studies in comics*, vol*5*(1),57-75.

Cowling, M., Tanenbaum, J., Birt, J., & Tanenbaum, K. (2017). Retrieved from: https://research.bond.edu.au/en/publications/augmenting-reality-for-augmented-reality.

Cucovic, S., Devedzic, G., Ghionea, I., Fiorentino, M., & Subburaj, K. (2016). Engineering design education for industry 4.o: implementation of augmented reality concept in teaching cad course. *International Conference on Augmented Reality for technical Entrepreneurs*, 11-16

DeCoster, J. (1998). Overview of factor analysis. 1998. Retrieved from*: http://www. stathelp. com/notes.*
05-4506832 Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
Dittmar, J. (2012). Digital comics. *Scandinavian Journal of Comic Art: SJoCA; 2*, *1*.

Dirin, A., & Laine, T. (2018). User experience in mobile augmented reality: emotions, challenges, opportunities and best practices. *Computers*, *MDPI 7*(2), 33.

Diaz, C., Hincapié, M., & Moreno, G. (2015). How the type of content in educative augmented reality application affects the learning experience. *Procedia Computer Science*, *75*, 205-212

Djamasbi, S., & Wilson, V. (2017, January). MUX: development of a holistic mobile user experience instrument. In *Proceedings of the 50th Hawaii International Conference on System Sciences*.

Docherty, T. (2018). Aesthetic education and the demise of experience. In *The new aestheticism*. Manchester University Press.

Eisner, W. 2000. Comics and sequential art*. Poorhouse press, Tamarac Florida*, Nineteenth Printing.

Ellis, T. J., & Levy, Y. (2010, June). A guide for novice researchers: Design and development research methods. In *Proceedings of Informing Science & IT Education Conference (InSITE)* (Vol. 10, pp. 107-118).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Fryer, L. K., & Dinsmore, D. L. (2020). The Promise and Pitfalls of Self-report. *Frontline Learning Research*, *8*(3), 1-9.

Furht, B. (Ed.). (2011). *Handbook of augmented reality*. Springer Science & Business Media.

Freeman, M.H. (2018). The aesthetics of human cognition. *Myrifield Institute for Cognition and the Arts*, http://dx.doi.org/10.2139/ssrn.3259227.

Forlizzi, J., & Battarbee, K. (2004, August). Understanding experience in interactive systems. In *Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques* (pp. 261-268). ACM.

Gagne, R. M., Wager, W. W., Golas, K. C., Keller, J. M., & Russell, J. D. (2005). Principles of instructional design. *Performance Improvement*, *44*(2), 44-46.

Gamberini, L., Orso, V., Beretta, A., Jacucci, G., Spagnolli, A., & Rimondi, R. (2016). Evaluating user experience of augmented reality eyeglasses. *annual review of cybertherapy and telemedicine 2015*, 28.

Gladden, M.E. (2018). A phenomenological "aesthetics of isolation" as environmental aesthetics for an era of ubiquitous art. *The Polish Journal of aesthetics*, vol. 49 (2),11-25

Gjøsæter, T. (2014). Affordances in Mobile Augmented Reality Applications. *Interaction with mobile augmented reality: An exploratory study using design research to investigate mobile and handheld augmented reality*, Vol. 8, issue 4.

Gironacci, I. M., Call, R. M., & Tamisier, T. (2018). Mixed reality collaborative storytelling. In *Proceedings of the 32nd International BCS Human Computer Interaction Conference* (p. 85). BCS Learning & Development Ltd.

Gregor, S., Müller, O., & Seidel, S. (2013). Reflection, abstraction and theorizing in design and development research.

Griffin, M. M., & Steinbrecher, T. D. (2013). Large-scale datasets in special education research. In *International Review of Research in Developmental Disabilities* (Vol. 45, pp. 155-183). Academic Press.

Grubert, J., Langlotz, T., Zollmann, S., & Regenbrecht, H. (2016). Towards pervasive augmented reality: Context-awareness in augmented reality. *IEEE transactions on visualization and computer graphics*, *23*(6), 1706-1724.

Günaydın, S., & Karamete, A. (2016). Material development to raise awareness of using smart boards: An example design and development research.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Han, D. I., tom Dieck, M. C., & Jung, T. (2018). User experience model for augmented reality applications in urban heritage tourism. *Journal of Heritage Tourism*, *13*(1), 46-61.

Handley, S. M., & Benton Jr, W. C. (2009). Unlocking the business outsourcing process model. *Journal of operations management*, *27*(5), 344-361.

Hair Jr, J. F., LDS Gabriel, M., Silva, D. D., & Braga Junior, S. (2019). Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Management Journal*, *54*(4), 490-507.

Harrison, N. R., & Clark, D. P. (2016). The observing facet of trait mindfulness predicts frequency of aesthetic experiences evoked by the arts. *Mindfulness*,vol 7(4), 971-978.

Hague, I. (2012). Beyond the visual–the roles of the senses in contemporary comics. *Scandinavian Journal of Comic Art*, *1*(1), 96-110

Hagman, H. (2005). Aesthetic experience beauty, creativity, and the search for the ideal. *Contemporary psychoanalytic studies*.

Hashim, M. E. A. H. B., & Idris, M. Z. (2016). Theoretical Framework and Development Motion Comic Instrument as Teaching Method for History Subject. *International Journal of Academic Research in Business and Social Sciences*, *6*(11).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Hassenzahl, M. (2008). User experience (UX): towards an experiential perspective on product quality. *IHM* (Vol. 8), 11-15

Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. *Behaviour & information technology*, *25*(2), 91-97.

Hassenzahl, M. (2007). The hedonic/pragmatic model of user experience. *Towards a UX manifesto*, *10*.

Heinrich, F., Joeres, F., Lawonn, K., & Hansen, C. (2019). Comparison of Projective Augmented Reality Concepts to Support Medical Needle Insertion. *IEEE transactions on visualization and computer graphics*, *25*(6), 2157-2167.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55.

Husain, N.M,. Lakulu, M.M.,& Sarkawi, S. (2018). Modelling of PCK competency of programming teachers through fuzzy delphi method. *Asia International Multidisciplinary Conference, the European proceedings of Social & Behavioural Sciences*.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Huang, C. C., & Stolterman, E. (2014). Temporal anchors in user experience research. In *Proceedings of the 2014 conference on Designing interactive systems*, 271-274. ACM.

Housen, A. (1983).The eye of the beholder: Measuring aesthetic development. Unpublished doctoral dissertation, Harvard Graduate School of Education, Boston.

Ingman, B.C. (2018). Adventure education as aesthetic experience. *Journal of Adventure Education and Outdoor Learning*. Taylor and Francis group. https://doi.org/10.1080/14729679.2018.1470015.

Irshad, S., & Awang Rambli, D. R. (2016, April). Multi-layered mobile augmented reality framework for positive user experience. In *Proceedings of the 2nd International Conference in HCI and UX Indonesia 2016*,21-26. ACM.

Irshad, S., & Rambli, D. R. A. (2016). Design implications for quality user experience in mobile augmented reality applications. In *Advanced Computer and Communication Engineering Technology*,1283-1294 Springer, Cham.

Irshad, S., & Rambli, D. R. A. (2017). Advances in mobile augmented reality from user experience perspective: a review of studies. In *International Visual Informatics Conference* (pp. 466-477). Springer, Cham.

Ishii, D., & Watanabe, H. (2010). A study on frame position detection of digitized comics images. In *Workshop on Picture Coding and Image Processing (PCSJ), Nagoya* (Vol. 2010),124-125.

ISO FDIS 9241-210:2009, Ergonomics of human system interaction-part 210 *: Human centered design for interactive systems*. International organization for standarisation, 2009.

Islam, T. U. (2019). Ranking of normality tests: An appraisal through skewed alternative space. *Symmetry*, *11*(7), 872.

Jackson, D. L., Gillaspy Jr, J. A., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: an overview and some recommendations. *Psychological methods*, *14*(1), 6.

Jahn, G., Newnham, C., Berg N.Vd. & Beanland, M. (2018). Making in mixed reality. *Acadia 2018.*

Jamali, S. S., Shiratuddin, M. F., & Wong, K. W. (2013). A review of augmented reality (AR) and mobile-augmented reality (mAR) technology: Learning in tertiary education. *Learning in Higher Education*, *20*(2), 37-54

Jamil, M.R.M., Said, S.,& Azeez, M.I.K. (2014).Kopetemsi guru terhadap pengurusan pengajaran dan pembelajaran: suatu pendekatan kaedah fuzzy Delphi. *Jurnal kepimpinan pendidikan*, vol. 1(3), 77-88

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Jokinen, J. P. (2015). User psychology of emotional user experience. *Jyväskylä studies in computing*, (213).

Jooste, D., Rautenbach, V., & Coetzee, S. (2015). Results Of and Evaluation Of Augmented Reality Mobile Development Frameworks For Addresses in Augmented Reality. In *Free and Open Source Software for Geospatial (FOSS4G) Conference Proceedings* Vol. 15, No. 1, 37

Joreskog, K., & Sorbom, D. (1993). Structural Equation Modelling: Guidelines for Determining Model Fit. *NY: University Press of America*.

Kara, N., & Cagiltay, K. (2020). Smart toys for preschool children: A design and development research. *Electronic Commerce Research and Applications*, *39*, 100909.

Kalkofen, D., Sandor, C., White, S., & Schmalstieg, D. (2011). Visualization techniques for augmented reality. In *Handbook of Augmented Reality*,65-98 Springer, New York, NY.

Kazanas, S. A., McLean, J. S., & Altarriba, J. (2019). Emotion and Emotion Concepts: Processing and Use in Monolingual and Bilingual Speakers. *The Handbook of the Neuroscience of Multilingualism*,313-334

Kelan, E., & Lehnert, M. (2009). The millennial generation: generation y and the opportunities for a globalised, networked educational system. *Beyond Current Horizons*.

Klaehn, J. (2015).The craft of comics: an interview with comic book artists Norm Breyfogle. *Journal of Graphic Novels and Comics*, Vol 6. No 1,108-115 https://dx.doi.org/10.1080/21504857.2014.943414.

Klingbeil, M., Pasewaldt, S., Semmo, A., & Döllner, J. (2017,). Challenges in user experience design of image filtering apps. In *SIGGRAPH Asia 2017 Mobile Graphics & Interactive Applications*, 22. ACM.

Klein, J. D. (2014, April). Design and development research: A rose by another name. In *American Educational Research Association annual meeting, Philadelphia, PA*.

Kim, H. Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative dentistry & endodontics*, *38*(1), 52.

Knowles, S. E., Toms, G., Sanders, C., Bee, P., Lovell, K., Rennick-Egglestone, S.& Gilbody, S. (2014). Qualitative meta-synthesis of user experience of computerised therapy for depression and anxiety. *PLoS one*, *9*(1).

Kowalska, M., & Wróbel, M. (2017). Basic emotions. *Encyclopedia of Personality and Individual Differences*, 1-6.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Kuniavsky, M. (2003). *Observing the user experience: a practitioner's guide to user research*. Elsevier.

Kunzle, D. (1973). *The early comic strip: narrative strips and picture stories in the European broadsheet from c. 1450 to 1825*. Berkeley: University of California Press.

LaNoue, M., Harvey, A., Mautner, D., Ku, B., & Scott, K. (2015). Confirmatory factor analysis and invariance testing between Blacks and Whites of the Multidimensional Health Locus of Control scale. *Health psychology open*, *2*(2), 2055102915615045.

Law, E. L. C., Roto, V., Hassenzahl, M., Vermeeren, A. P., & Kort, J. (2009). Understanding, scoping and defining user experience: a survey approach. In *Proceedings of the SIGCHI conference on human factors in computing systems,* 719-728 ACM.

Law, E., Roto, V., Vermeeren, A. P., Kort, J., & Hassenzahl, M. (2008). Towards a shared definition of user experience. In *CHI'08 extended abstracts on Human factors in computing systems*, 2395-239. ACM.

Lee, S. (2010) *Stan lee's how to draw comics*. Dynamite Entertainment. Watson-Guptill Publications.

Leder, H., Belke, B., Oeberst, O.,& Augustin, D. (2004). A model of aestjetic appreciation and aesthetic judgements. *British Journal of Psychology*, vol. 95, 489-508.

Lei, T., Liu, X., Wu, L., Jin, Z., Wang, Y., & Wei, S. (2016). The Influence of Matching Degree of the User's Inherent Mental Model and the Product's Embedded Mental Model on the Mobile User Experience. In *International Conference on Human-Computer Interaction*, 320-329. Springer, Cham.

Lievens, F., & Anseel, F. (2004). Confirmatory factor analysis and invariance of an organizational citizenship behaviour measure across samples in a Dutch-speaking context. *Journal of Occupational and Organizational Psychology*, *77*(3), 299-306.

Liu, J., Lughofer, E., Zeng, X., & Li, Z. (2018). The Power of Visual Texture in Aesthetic Perception: an exploration of the predictability of perceived aesthetic emotions. *Computational intelligence and neuroscience*, *2018*. https://doi.org/10.1155/2018/1812980

Liu, W., Shen, M., Li, Y., & Wang, R. (2016). The interaction between emotional concept processing and emotional face perception. *Acta Psychologica Sinica*, *48*(2), pp.163-173.

Ma, J. Y., & Choi, J. S. (2007). The Virtuality and Reality of Augmented Reality. *Journal of multimedia*, *2*(1),32-37.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Manakandan, S. K., Rosnah, I., Mohd, J. R., & Priya, R. (2017). Pesticide applicators questionnaire content validation: A fuzzy delphi method. *The Medical journal of Malaysia*, *72*(4), 228-235.

Mahlke, S. (2008). Visual aesthetics and the user experience. In *Dagstuhl Seminar Proceedings*, 08292.

Matcha, W., & Rambli, D. R. A. (2011,). Preliminary investigation on the use of augmented reality in collaborative learning. In *International Conference on Informatics Engineering and Information Science* 189-198. Springer, Berlin, Heidelberg.

Matthes, E. H. (2018). Authenticity and the aesthetic experience of history. *Analysis Journal*, vol. *78*(4),649-657, doi: 10.1093/analys/any028.

Marsh, H. W., Balla, J. R., & Hau, K. T. (1996). An evaluation of incremental fit indices: A clarification of mathematical and empirical properties. *Advanced structural equation modeling: Issues and techniques*, 315-353.

Marianthi, V., Boulodakis, M., & Retalis, S. (2016). From digitised comic books to digital hypermedia comic books: their use in education. *Piraeus: University of Piraeus*, *1*.

Mastandrea, S. (2011). The role of emotion in aesthetic experience. *Rivista di Estetica*. Vol. 48,95-111

Matsumoto, D., & Hwang, H. S. C. (2019). Culture, emotion, and expression. *Cross-Cultural Psychology: Contemporary Themes and Perspectives*,501-515.

Markovic, S. (2012). Components of aesthetic experience: aesthetic fascination, aesthetic appraisal and aesthetic emotion. *i-PERCEPTION,* perceptionweb.com/i-perception, vol. 3,1-17.

Marques, D. (2017). Augmented reality: the new kid kid on the block. *Journal of Natural Science Illustration,* vol. 49, no.3.

Mello, S. C., & Collins, M. (2001). Convergent and discriminant validity of the perceived risk scale in business-to-business context using the multitrait-multimethod approach. *Revista de Administração Contemporânea*, *5*(3), 167-186.

Menninghaus, W., Wagner, V., Wassiliwizky, E., Schindler, I., Hanich, J., Jacobsen, T., & Koelsch, S. (2019). What are aesthetic emotions?. *Psychological review*, vol. *126*(2), 171

Mendoza, A.H-D.., Molina, C., & Fernández-Dols, J. M. (2013). The archeology of emotion concepts: a lexicographic analysis of the concepts shame and vergüenza. *Journal of Language and Social Psychology*, *32*(3), 272-290.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Meskin, A. (2007). Defining comics?. *The Journal of Aesthetics and Art Criticism*, *65*(4), 369-379.

McCloud, S, 2000. Reinventing Comics: How imagination and technology are revolutinizing an art form.*Harpercollins books*, New York.

McCloud, S. (1993). Understanding comics: The invisible art. *Northampton, Mass*.

Michaud, M. (2017). Mixed reality. Lead technology evangelism Microsoft Switzerland. Retrieved from: https://www.theark.ch/media/document/0/e-health-2017-microsoft-manuel-michaud.

Miller, S. (2005). *Developing and promoting graphic novel collections*. Neal Schuman Pub.

Milgram, P., & Kishino, F. (1994). A taxonomy of mixed reality visual displays. *IEICE TRANSACTIONS on Information and Systems*, *77*(12),1321-1329.

Moens, B.G. (2018). Aesthetic experience in virtual museums: a post phenomenological perspective. *Studies in Digital Heritage*, vol. 2:1,

Morreall, J. (2009). Comic relief a comprehensive philosophy of humour. Wiley Blackwell.
05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
Mordka, C. (2016). What are emotions? Structure and Function of Emotions. *Studia Humana*, *5*(3), 29-44.

Morreall, J. (2011). *Comic relief: A comprehensive philosophy of humor* (Vol. 27). John Wiley & Sons.

Mustapha, R.,& Darusalam, G. (2018). Aplikasi kaedah fuzzy Delphi dalam penyelidikan sains social. *Penerbit Universiti Malaya*. Kuala Lumpur.

Muliyadi, M. (2015). *Kartun dan kartunis di Malaysia*. Institut Terjemahan Buku Negara. Kuala Lumpur.

Mundfrom, D. J., Shaw, D. G., & Ke, T. L. (2005). Minimum sample size recommendations for conducting factor analyses. *International Journal of Testing*, *5*(2), 159-168.

Myers, N. D., Ahn, S., & Jin, Y. (2011). Sample size and power estimates for a confirmatory factor analytic model in exercise and sport: A Monte Carlo approach. *Research quarterly for exercise and sport*, *82*(3), 412-423.

Morozumi, A., Nomura, S., Nagamori, M., & Sugimoto, S. (2009). Metadata framework for Manga: A multi-paradigm metadata description framework for digital comics. In *International Conference on Dublin Core and Metadata Applications* 61-70.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Mya, K. S., Zaw, K. K., & Mya, K. M. (2020). Developing and validation of a questionnaire for assessment of individual's perceived risk of four major non-communicable diseases in Myanmar. *bioRxiv*.

Nashir, I. M., Mustapha, R., Maarof, N. N. M. I., & Rui, T. J. (2020). Modified delphi technique: The development of measurement model for innovative instructional leadership in technical and vocational education systems. *Journal of Technical Education and Training*, *12*(1).

Nikov, A., & Gumaia, T. A. (2016). a tool for emotional user experience assessment of web-based medical services. in *cbu International Conference Proceedings* (Vol. 4),840-845.

Nielsen (2018).Media landscape 2017-snapshot. Retrieved From:https://www.nielsen.com/my/en/insights/report/2018/state-of-the-media-malaysian-media-landscape-2017/

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological review*, *97*(3), 315.

Olsson, T. (2013). Concepts and subjective measures for evaluating user experience of mobile augmented reality services. In *Human factors in augmented reality environments,* 203-232. Springer, New York, NY.

Olsson, T., & Mattilla, K.V-V. (2011). Expected user experience augmented reality services. *Personal and ubiquitous computing*, *17*(2), 287-304

Parrot, W. 2001. *Emotions in social psychology*, Philadelphia: Psychology Press.

Parsons, M. (1986). The place of cognitive approach to aesthetic response. *Journal of Aesthetics Education*, vol. 20, 107-111.

Park, T., Zhang, M., & Lee, Y. (2018). When mixed reality meets internet of things: Toward the realization of ubiquitous mixed reality. *GetMobile: Mobile Computing and Communications*, *22*(1), 10-14.

Park, T.,& Lim, C. (2019). Design principles for improving emotional affordances in an online learning environment. *Asia pacific Education review, 20(1)*, pp 53-67.

Partala, T., & Kallinen, A. (2011). Understanding the most satisfying and unsatisfying user experiences: Emotions, psychological needs, and context. *Interacting with computers*, *24*(1),25-34.

Pelowski, M. (2015). Tears and transformation: feeling like crying as an indicator of Insightful or “aesthetic” experience with art. *Frontier in psychology*, vol. 6 :1006, doi: 10.3389/fpsyg.2015.01006

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Pearce, M. T., Zaidel, D. W., Vartanian, O., Skov, M., Leder, H., Chatterjee, A., & Nadal, M. (2016). Neuroaesthetics: The cognitive neuroscience of aesthetic experience. *Perspectives on Psychological Science*, vol. 11(2),265-279.

Perlovsky, L. (2014). Mystery in experimental psychology, how to measure aesthetic emotions?. *Frontier in Psychology*, vol. 5:1006.

Peng, W. T., Huang, W. J., Chu, W. T., Chou, C. N., Chang, W. Y., Chang, C. H., & Hung, Y. P. (2009). A user experience model for home video summarization. *International Conference on Multimedia Modeling*, 484-495. Springer, Berlin, Heidelberg.

Piaw, C.Y (2009). Statistik penyelidikan lanjutan.*McGrawHill Education*. Malaysia.

Plutchik, R. (1980). A general psychoevolutionary theory of emotion. In *Theories of Emotion*, 3-33. Academic press.

Polap, D. (2018). Voice Control in Mixed Reality. In *2018 Federated Conference on Computer Science and Information Systems (FedCSIS)* 497-500. IEEE.

Prudon, P. (2014). Confirmatory factor analysis: a brief introduction and critique. *Qualtrics, P. UT, USA*.

Prudon, P. (2015). Confirmatory factor analysis as a tool in research using questionnaires: a critique. *Comprehensive Psychology*, *4*, 03-CP.

Qu, Q. X., Zhang, L., Chao, W. Y., & Duffy, V. (2017). User experience design based on eye-tracking technology: a case study on smartphone APPs. In *Advances in applied digital human modeling and simulation*, 303-315. Springer, Cham.

Radoslavov, A., & Nikov, A. (2015, June). EMOTIONAL USER EXPERIENCE DESIGN STUDY OF DETERGENT PACKAGES. In *XIII International Scientific Conference" Management and Engineering'15*

Redies, C. (2015). Combining universal beauty and cultural context in a unifying model of visual aesthetic experience. *Frontiers in Human Neuroscience*, vol. 9: 218, doi: 10.3389/fnhum.2015.00218

Richey, R. C., & Klein, J. D. (2007). Design and development research. *Mahwah, NJ*.

Richey, R. C., & Klein, J. D. (2014). Design and development research. In *Handbook of research on educational communications and technology* (pp. 141-150). Springer, New York, NY.

Ritsos, P. D., Ritsos, D. P., & Gougoulis, A. S. (2011). Standards for augmented reality: A user experience perspective. In *International AR standards meeting,* 1-9.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Rigaud, C., Guérin, C., Karatzas, D., Burie, J. C., & Ogier, J. M. (2015). Knowledge-driven understanding of images in comic books. *International Journal on Document Analysis and Recognition (IJDAR)*, *18*(3),199-221.

Roy, T.K., & Garai, A. (2012). Intuitionistic fuzzy delohi method: more realistic and interactive forecasting tool. *Notes on Intuitionistic Fuzzy Sets*, vol. 18, no 2, 37-50.

Sahrir, M. S., Alias, N. A., Ismail, Z., & Osman, N. (2012). Employing Design and Development Research (DDR): Approaches in the Design and Development of Online Arabic Vocabulary Learning Games Prototype. *Turkish Online Journal of Educational Technology-TOJET*, *11*(2), 108-119.

Sarmento, R. P., & Costa, V. (2019). Confirmatory Factor Analysis--A Case study. *arXiv preprint arXiv:1905.05598*.

Schaeffer, J.-M. (2015). Aesthetic relationship, cognition and the pleasure of art. *Investigation into the phenomenology and the ontology of the work of art*, vol. 81, doi: 10.1007/978-3-319-14090-2_9

Schoeller, F.,& Perlovsky, L. (2016). Aesthetic chills: knowledge-acquisition, meaning-making, and aesthetic emotions. *Frontier in Psychology*, vol. 7:1093, doi: 10.3389/fpsyg.201601093.

Shin, T.J., & Jennings, C. (2013). Augmented reality and design process: The new role of augmented reality in design process. *IDSA 2013 Education Symposium*, Chicago.

Saefudin, M. & Wardhani, P. (2013). Penerapan teknologi augmented reality bidang pendidikan untuk menjelaskan materi proses pembuatan chip. *Jurnal Ilmiah Komputasi*, vol. 12(1).

Samanci, O., & Tewari, A. (2012). Expanding the comics canvas: Gps comics. *Proceedings of the 4th International Conference on Fun and Games*, 27-34. ACM.

Santos Silva, D. (2011). The future of digital magazine publishing 1. *Information Services & Use*, *31*(3-4), 301-310.

Sannusi, S. N., & Mustaffa, N. (2015). Akhbar versi digital: Implikasi terhadap trend sirkulasi akhbar bercetak di Malaysia. *Jurnal Komunikasi: Malaysian Journal of Communication*, *31*(2).

Sannusi, S. N., & Adnan, H. M. (2014). kelangsungan penerbitan majalah berbahasa melayu di malaysia-indonesia: kajian terhadap massa dan tempo. *Jurnal Melayu*, *13*.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Saariluoma, P., & Jokinen, J. P. (2014). Emotional dimensions of user experience: A user psychological analysis. *International Journal of Human-Computer Interaction*, *30*(4), 303-320.

Smith, C. (2015). Motion comics: the emergence of a hybrid medium. *Writing Visual*

Samson, S., Granath, K., & Alger, A. (2017). Journey mapping the user experience. *College & Research Libraries*, *78*(4), 459.

Speicher, M., Hall, B. D., & Nebeling, M. (2019). What is Mixed Reality?. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, ACM.

Schindler, I., Hosoya, G., Menninghaus, W., Beermann, U., Wagner, V., Eid, M., & Scherer, K. R. (2017). Measuring aesthetic emotions: A review of the literature and a new assessment tool. *PloS one*, *12*(6), e0178899.

Schneider, R. (2018) Design for mixed reality experiences. Retrieved from: https://www.idsa.org/sites/default/files/FINAL_DesignforMixedRealityExperiences.pdf

Schacht, M., & Schacht, S. (2012). Start the game: Increasing user experience of enterprise systems following a gamification mechanism. In *Software for People* 181-199. Springer, Berlin, Heidelberg.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Shubashini, G., Izran Sarrazin, M., Jawahar, N.L., Abdul hakim, M., & Gunavathy, K. (2015). The Identification of Design Formaintainability Imperatives to achieve cost effective Building Maintenance: A Delphi Studi, *Journal Teknologi, 77(30).* Pp 75-88.

Singh, S., Cheok, A.D., Ng, G.L., & Farbiz, F. (2004). 3D augmented reality comic book and notes for children using mobile phones. *IDC 2004*, pp149-150.

Stefan, P., Wucherer, P., Oyamada, Y., Ma, M., Schoch, A., Kanegae, M.,& Sugimoto, M. (2014). An AR edutainment system supporting bone anatomy learning. In *2014 IEEE Virtual Reality (VR)* , 113-114. IEEE.

Steinert, S. (2017). Technology is a laughing matter: Bergson, the comic and technology. *AI & society*, *32*(2), 201-208.

Sutherland, I. E. (1965). The ultimate display. *Multimedia: From Wagner to virtual reality*, 506-508.

Thielsch, M. T., & Thielsch, C. (2018). Depressive symptoms and web user experience. *PeerJ*, *6*, e4439.

Thomas, S. J. (2009). Aesthetic Emotions and the Ethics of Authenticity. *Philosophy Today*, vol. *53*(3), 231-247.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Thomson, G. (2018). Aesthetic experience and mindfulness. *Human Science Perspectives*, vol. 2 (1).

Tech. Policy Lab (2015). Augmented reality: a technology and policy primer. University of Washington.

Tschaepe, MD. (2013). The creative moment of scientific apprehension: understanding the consummation of scientific explanation through Dewey and Peirce. *European Journal of Pragmatism and American Philosophy*, vol. 1, ISSN 2036-4091.

Tobita, H., & Shibasaki, K. (2009). EnforManga: Interactive Comic Creation Using Drag-and-Drop and Deformation. In *2009 11th IEEE International Symposium on Multimedia* , 269-274. IEEE.

Tobita, H. (2010). DigestManga: interactive movie summarizing through comic visualization. In *CHI'10 Extended Abstracts on Human Factors in Computing Systems*, 3751-3756. ACM.

Tongco, M. D. C. (2007). Purposive sampling as a tool for informant . *Ethnobotany Research and applications*, *5*, 147-158.

Tracey, M. W. (2009). Design and development research: a model validation case. *Educational Technology Research and Development*, *57*(4), 553-571.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun PustakaTBainun ptbupsi

Uribe, M. (2013). Perception and interpretation in the aesthetic experience of art. *Proceedings of the European Society for Aesthetics*, vol. 5, 514-523.

Upson, M., & Hall, C. M. (2013). Comic book guy in the classroom: The educational power and potential of graphic storytelling in library instruction. *Kansas Library Association College and University Libraries Section Proceedings*, *3*(1), 28-38.

Vassiliadi, M. A., & Sylaiou, S. (2018). Literary myths in mixed reality. *Frontiers in Digital Humanities*, *5*, (pp.21).

Van Krevelen, D., & Poelman, R. (2010). Augmented reality: Technologies, applications, and limitations. *The International Journal of Virtual Reality*, 9(2), 1-20.

Verheyen, L. (2015). The Aesthetic Experience of the Literary Artwork: A Matter of Form and Content?. *Aesthetic Investigations*, *1*(1), 23-32.

Wang, X., Hu, J., Hengeveld, B., & Rauterberg, M. (2019). Expressing Segmentation in d-Comics. In *International Conference on Human-Computer Interaction* ,402-409. Springer, Cham.

Wang, L. (2016). An attractive user-experience: mobile augmented reality. Retrieved From http://www.cs.bham.ac.uk/~rjh/courses/ResearchTopicsInHCI/2015-16/Submissions/wanglinyan.pdf.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Wang, K. H., Chen, L. C., Chu, P. Y., & Cheng, Y. M. (2009). A study on the design of Augmented Reality user interfaces for mobile learning systems in heritage temples. In *International Conference on Virtual and Mixed Reality*, 282-290. Springer, Berlin, Heidelberg.

Wang, X., Hu, J., & Rauterberg, B. H. M. (2014). Can time perception be affected by interactive comics? *22nd International Conference on Computers in Education, Japan*, 674-676.

Webel, S., Bockholt, U., Engelke, T., Peveri, M., Olbrich, M., & Preusche, C. (2011). Augmented reality training for assembly and maintenance skills. In *BIO web of conferences*, Vol. 1, EDP Sciences.

Woo, B. (2012). Understanding understandings of comics: Reading and collecting as media-oriented practices. *Participations*, *9*(2), 180-199.

Xenakis, I., & Arnellos, A. (2015). Aesthetics as an emotional activity that facilitates sense-making: towards an enactive approach to aesthetic experience. In *Aesthetics and the embodied mind: Beyond art theory and the Cartesian mind-body dichotomy,* 245-259, Springer, Dordrecht.

Yargin, G.T., Suner, S., & Gunay, A. (2018). Modelling user experience: integrating user experience research into design education. *International Conference Interfaces and Human Computer Interaction*.

Zarour, M., & Alharbi, M. (2017). user experience aspects and dimensions: Systematic literature review. *International Journal of Knowledge Engineering*, *3*(2), 52-59.

Zhang, T., McCarthy, Z., Jow, O., Lee, D., Chen, X., Goldberg, K., & Abbeel, P. (2018, May). Deep imitation learning for complex manipulation tasks from virtual reality teleoperation. In *2018 IEEE International Conference on Robotics and Automation (ICRA)* (pp. 1-8). IEEE.

Zhou, F., & Jiao, R. J. (2013). An improved user experience model with cumulative prospect theory. *Procedia Computer Science*, *16*, 870-877.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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APPENDIX

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1. **Expert review form**

SULTAN IDRIS EDUCATION UNIVERSITY

Expert review

Research title: Synergising Aesthetic Experience (AX) and User Experience (UX) Constructs and Elements for Aesthetic User Experience (AUX) Framework in Augmented Reality Comic (AR Comic)

Name:……

……....

Designation:……

……

Institution:……

……..

This study comprises 39 elements from a combination of 16 constructs representing the aesthetic experience and user experience for augmented reality comic (AR Comic). In summary, these two theories will be synergised into new constructs and elements of aesthetic user experience (AUX) framework. In such case, expert review is the first phase of shortlisting and determining the ranking of these constructs and elements. With reference to this, a new framework will be developed and will be used as a guideline to generate prototypes and for the purpose of validating the framework.

Any questions or consern please contact
Mohd Ekram AlHafis Bin hashim: 012-5597780
Associate Professor Dr Muhammad Zaffwan Bin Idris: 019-6673077

Rating instruction: How often did you feel the emotion and the experience.

Rating scale: From 1 (extremely disagree) to 7 (extremely agree).

The rating scale:

1. Extremely disagree

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2. Strongly disagree
3. Disagree
4. Moderate
5. Agree
6. Strongly agree
7. Extremely agree

For each statement listed below, please mark the response category that best matches your personal experience from your expertise.

No	ELEMENT	1 EXTREMELY DISAGREE	2	3	4	5	6	7 EXTREMELY AGREE
1	Tragic							
2	Cheerful							
3	Captive							
4	Feeling of insights							
5	Dynamic							
6	Concreteness							
7	Eager to try new things							
8	vivid							
No	Statement	1 EXTREMELY DISAGREE	2	3	4	5	6	7 EXTREMELY AGREE
9	Feeling of discovery							
10	Joy							
11	Human likeness							
12	Immersive							
13	Coherence							
14	Being motivated							
15	Bizarre							
16	Self expressive							
17	Time							
18	Fantastic							
19	Authencity							

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20	Grotesque							
21	Relevant							
22	Horrible							
23	Amusement							
24	Effort							
25	Funny							
26	Playfulness							
No	Statement	1 EXTREMELY DISAGREE	2	3	4	5	6	7 EXTREMELY AGREE
27	Surprise							
28	Cognitive stimulated							
29	Macabre							
30	Natural							
31	Accuracy							
32	Personal meaningful							
33	Interaction proactive							
34	Encourages							
35	Creative							
36	Verisimilitude							
37	Drama							
38	Love							
39	Amazment							

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2. CFA item questionnaire (Set 1)

This study is about formulating and testing a model that combine aesthetic experience and user experience on Augmented Reality (AR) Comic. This study contains 69 elements that represent what respondents feel based on the AR Comic given.

Rating instruction: Please rate to what degree this stimuli can trigger your state of emotion.

Rating scale: From 1 (strongly disagree) to 5 (strongly agree).

The rating scale:

1. Strongly disagree
2. Disagree
3. Moderate
4. Agree
5. Strongly agree

Augmented Reality Comic (AR Comic) Instruction:

1. Download Artivive application on App Store, Google Play, Huawei apps store, Apkpure, Apk store etc. for free.
2. Open and scan the comic given
3. The AR Comic will appear when the device scans the comic image trigger.

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Demographic

1. Age
2. Gender
3. In what creative industry field are you involved.
4. Institution (optional)
5. Do you read comic? (If yes,
6. How frequent do you read comic?
7. Genre
8. local

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SET 1

No	Code	Item	Scale				
			1	2	3	4	5
1	F21	It improves my perception (F2.1)					
2	D21	It moves me on (D2.1)					
3	B11	It stirred my emotion (B1.1)					
4	E23	I felt connected (E2.3)					
5	C12	I found it precision (C1.2)					
6	G22	It advances with unflinching determination (G2.2)					
7	E11	I felt Gripped (E1.1)					
8	A11	This work looks original (A1.1)					
9	A52	It was exhilarating (A5.2)					
10	E12	It motivates me to act (E1.2)					
11	F33	I found it significant (F3.3)					
12	C32	I felt aggressive (C3.2)					
13	A31	It was so astonishing (A3.1)					
14	A13	I felt rightfulness(A1.3)					
15	B41	It spurred me on (B4.1)					
16	D41	I felt intellectually challenged (D1.2)					
17	G12	The work augmented in suitable speed (G1.2)					
18	F31	It was express my feeling (F3.1)					
19	A22	It was delighting me (A2.2)					
20	A43	I felt fascinated (A4.3)					
21	A63	It wasn't very comforting (A6.3)					
22	B22	I found it artistic (B2.2)					
23	B32	I found it very entertaining (B3.2)					
24	D32	It's sparked my desire (D3.2)					
25	G21	It strived me (G2.1)					
26	F12	It was a growing realization (F1.2)					

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27	C22	It is credible (C2.2)					
28	A12	I think that was genuine(A1.2)					
29	C23	I found it reliable (C2.3)					
30	G23	It gave it a fly (G2.3)					
31	D13	I was mentally engaged (D1.3)					
32	F32	It is evocative (F3.2)					
33	A32	It sways me (A3.3)					
34	B43	It brightened me on (B4.3)					
35	G13	The content instantly augments (G1.3)					
36	D11	I felt refreshing (D1.1)					
37	A21	It was prestige (A2.1)					
38	B21	It was impressed (B2.1)					
39	G11	It has an appropriate duration (G1.1)					
40	C13	It was correct (C1.3)					
41	F22	It's touched my instinct (F2.2)					
42	A42	It was overwhelmed(A4.2)					
43	B23	I found it graceful (B2.3)					
44	F13	It developed my sense of learning (F1.3)					
45	D23	I found it very responsive (D2.3)					
46	A61	It scared me (Horrific) (A6.1)					
47	A23	It put me on joviality (A2.3					
48	F23	I felt appreciate (F2.3)					
49	A51	It was dramatic (A5.1)					
50	B42	It fires me up (B4.2)					
51	F11	It established my sense of finding (F1.1)					
52	C31	This work is powerful (C3.1)					
53	A32	It shocks me (A3.2)					
54	E21	It activated my reaction (E2.1)					
55	B13	I felt inspired(B1.3)					
56	D22	It was so promising (D2.2)					

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57	A62	I felt grisly(A6.2)					
58	D31	It intent my curiosity (D3.1)					
59	A53	It was thrilling (A5.3)					
60	B31	It is hilarious (B3.1)					
61	E22	It's was energetic (E2.2)					
62	A41	It was impressive (A4.1)					
63	D33	It was desiderated (D3.3)					
64	B33	It sparked me on (B3.3)					
65	E13	It aroused me (E1.3)					
66	C11	It was exactness (C1.1)					
67	C33	It activated my thoughts (C3.3)					
68	B12	It touched me(B1.2)					
69	C21	It was truth (C2.1)					

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FDM results

Average value from fuzzy scale for AX construct (amusement)

Expert	Element 1			Element 2			Element 3		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Pekomik president	0.7	0.9	1	0.7	0.9	1	0.5	0.7	0.9
Comic M CEO	0.5	0.7	0.9	0.5	0.7	0.9	0.9	1	1
Comic Expert 1	0.3	0.5	0.7	0.9	1	1	0.9	1	1
Comic Expert 2	0.3	0.5	0.7	0.7	0.9	1	0.5	0.7	0.9
Comic Expert 3	0.3	0.5	0.7	0.5	0.7	0.9	0.7	0.9	1
Developer AR MTDC 1	0.5	0.7	0.9	0.9	1	1	0.7	0.9	1
Developer AR MTDC 2	0.5	0.7	0.9	0.5	0.7	0.9	0.5	0.7	0.9
Developer Expert 1	0.7	0.9	1	0.5	0.7	0.9	0.5	0.7	0.9
Developer Expert 2	0.5	0.7	0.9	0.3	0.5	0.7	0.5	0.7	0.9
Specialist AR	0.3	0.5	0.7	0.5	0.7	0.9	0.7	0.9	1
Average value from fuzzy scale	0.460	0.660	0.840	0.600	0.780	0.920	0.640	0.820	0.950

Threshold value (d) and percentage consensus for AX construct (amusement)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik president	0.320	0.155	0.153
Comic M CEO	0.076	0.101	0.240
Comic Expert 1	0.232	0.291	0.240
Comic Expert 2	0.232	0.155	0.153
Comic Expert 3	0.232	0.101	0.100
Developer AR MTDC 1	0.076	0.291	0.100
Developer AR MTDC 2	0.076	0.101	0.153

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Developer Expert 1	0.320	0.101	0.153
Developer Expert 2	0.076	0.396	0.153
Specialist AR	0.232	0.101	0.100
Threshold value (d)	**0.187**	**0.179**	**0.155**
Consensus percentage	**40.0%**	**70.0%**	**80.0%**

overall of the *Threshold value (d) and percentage consensus for AX construct (amusement)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Love	0.187	40.0%	0.460	0.660	0.840	0.653	Reject
Funny	0.179	70.0%	0.600	0.780	0.920	0.767	Accept
Cheerfulness	0.155	80.0%	0.640	0.820	0.950	0.803	Accept

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Average value from the fuzzy scale for AX construct (Paradox of tragedy)

Expert	Element 1			Element 2			Element 3			Element 4		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.5	0.7	0.9	0.3	0.5	0.7	0.3	0.5	0.7
Comic M CEO	0.5	0.7	0.9	0.1	0.3	0.5	0.3	0.5	0.7	0.5	0.7	0.9
Comic Expert 1	0.7	0.9	1	0.3	0.5	0.7	0.5	0.7	0.9	0.3	0.5	0.7
Comic Expert 2	0.7	0.9	1	0.5	0.7	0.9	0.5	0.7	0.9	0.5	0.7	0.9
Comic Expert 3	0.3	0.5	0.7	0.5	0.7	0.9	0.7	0.9	1	0.3	0.5	0.7
Developer AR MTDC 1	0.7	0.9	1	0.3	0.5	0.7	0.3	0.5	0.7	0.7	0.9	1
Developer AR MTDC 2	0.3	0.5	0.7	0.3	0.5	0.7	0.3	0.5	0.7	0.3	0.5	0.7

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Developer Expert 1	0.5	0.7	0.9	0.3	0.5	0.7	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 2	0.5	0.7	0.9	0.3	0.5	0.7	0.5	0.7	0.9	0.5	0.7	0.9
Specialist AR	0.5	0.7	0.9	0.1	0.3	0.5	0.3	0.5	0.7	0.1	0.3	0.5
Average value from fuzzy scale	0.520	0.720	0.890	0.320	0.520	0.720	0.420	0.620	0.810	0.420	0.620	0.800

Threshold value (d) and percentage consensus for AX construct (Paradox of tragedy)

Expert	Element			
	Element 1	Element 2	Element 3	Element 4
Pekomik President	0.025	0.275	0.177	0.171
Comic M CEO	0.025	0.336	0.177	0.136
Comic Expert 1	0.235	0.031	0.129	0.171
Comic Expert 2	0.235	0.275	0.129	0.136
Comic Expert 3	0.317	0.275	0.375	0.171
Developer AR MTDC 1	0.235	0.031	0.177	0.380
Developer AR MTDC 2	0.317	0.031	0.177	0.171
Developer Expert 1	0.025	0.031	0.129	0.380
Developer Expert 2	0.025	0.031	0.129	0.136
Specialist AR	0.025	0.336	0.177	0.476
Threshold value (d)	**0.147**	**0.165**	**0.178**	**0.233**
Consensus percentage	**50.0%**	**50.0%**	**90.0%**	**70.0%**

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overall of the *Threshold value (d) and percentage consensus for AX construct (Paradox of tragedy)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Tragic	0.147	50.0%	0.520	0.720	0.890	0.710	Reject
Grotasque	0.165	50.0%	0.320	0.520	0.720	0.520	Reject

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.9	1	1
Comic M CEO	0.7	0.9	1	0.7	0.9	1
Comic Expert 1	0.9	1	1	0.5	0.7	0.9
Comic Expert 2	0.9	1	1	0.7	0.9	1
Comic Expert 3	0.5	0.7	0.9	0.5	0.7	0.9
Developer AR MTDC 1	0.5	0.7	0.9	0.7	0.9	1
Developer AR MTDC 2	0.3	0.5	0.7	0.5	0.7	0.9
Developer Expert 1	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 2	0.5	0.7	0.9	0.9	1	1
Specialist AR	0.9	1	1	0.9	1	1

Expert	Element					
	Element 1					
	E	0.620	0.790	0.920	0.700	0.870	0.970

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Pekomik President	0.115
Comic M CEO	0.144
Comic Expert 1	0.277
Comic Expert 2	0.277
Comic Expert 3	0.115
Developer AR MTDC 1	0.115
Developer AR MTDC 2	0.408
Developer Expert 1	0.115
Developer Expert 2	0.115
Specialist AR	0.277
Threshold value (d)	**0.196**
Consensus percentage	**60.0%**

Average value from fuzzy scale

Average value from the fuzzy scale for AX construct (Mental jolt)

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Threshold value (d) and percentage consensus for AX construct (Mental jolt)

overall of the *Threshold value (d) and percentage consensus for AX construct (Mental jolt)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Bizzare	0.196	60.0%	0.620	0.790	0.920	0.777	Reject
Fantastic	0.135	70.0%	0.700	0.870	0.970	0.847	Accept

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.7	0.9	1
Comic M CEO	0.5	0.7	0.9	0.5	0.7	0.9
Comic Expert 1	0.5	0.7	0.9	0.9	1	1
Comic Expert 2	0.9	1	1	0.9	1	1
Comic Expert 3	0.5	0.7	0.9	0.5	0.7	0.9
Developer AR MTDC 1	0.9	1	1	0.9	1	1
Developer AR MTDC 2	0.7	0.9	1	0.5	0.7	0.9
Developer Expert 1	0.7	0.9	1	0.5	0.7	0.9
Developer Expert 2	0.5	0.7	0.9	0.5	0.7	0.9
Specialist AR	0.7	0.9	1	0.5	0.7	0.9
Average value from fuzzy scale	0.660	0.840	0.960	0.640	0.810	0.940

Average value from the fuzzy scale for AX construct (harmony)

Threshold value (d) and percentage consensus for AX construct (harmony)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.076	0.114
Comic M CEO	0.178	0.142

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Comic Expert 1	0.178	0.249
Comic Expert 2	0.215	0.249
Comic Expert 3	0.178	0.142
Developer AR MTDC 1	0.215	0.249
Developer AR MTDC 2	0.076	0.142
Developer Expert 1	0.076	0.142
Developer Expert 2	0.178	0.142
Specialist AR	0.076	0.142
Threshold value (d)	**0.145**	**0.172**
Consensus percentage	**80.0%**	**70.0%**

overall of the *Threshold value (d) and percentage consensus for AX construct (Harmony)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Verisimilitude	0.145	80.0%	0.660	0.840	0.960	0.820	Accept
Accuracy	0.172	70.0%	0.640	0.810	0.940	0.797	Accept

Average value from the fuzzy scale for AX construct (Storytelling clarity)

Expert	Element 1			Element 2			Element 3			Element 4		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.7	0.9	1	0.9	1	1	0.7	0.9	1
Comic M CEO	0.9	1	1	0.5	0.7	0.9	0.9	1	1	0.9	1	1
Comic Expert 1	0.7	0.9	1	0.5	0.7	0.9	0.7	0.9	1	0.5	0.7	0.9
Comic Expert 2	0.9	1	1	0.7	0.9	1	0.5	0.7	0.9	0.9	1	1

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Comic Expert 3	0.7	0.9	1	0.5	0.7	0.9	0.7	0.9	1	0.5	0.7	0.9
Developer AR MTDC 1	0.9	1	1	0.7	0.9	1	0.5	0.7	0.9	0.9	1	1
Developer AR MTDC 2	0.9	1	1	0.7	0.9	1	0.7	0.9	1	0.5	0.7	0.9
Developer Expert 1	0.9	1	1	0.5	0.7	0.9	0.7	0.9	1	0.7	0.9	1
Developer Expert 2	0.9	1	1	0.7	0.9	1	0.9	1	1	0.7	0.9	1
Specialist AR	0.5	0.7	0.9	0.5	0.7	0.9	0.7	0.9	1	0.9	1	1
Average value from fuzzy scale	0.800	0.940	0.990	0.600	0.800	0.950	0.720	0.890	0.980	0.720	0.880	0.970

Threshold value (d) and percentage consensus for AX construct (Storytelling clarity)

Expert	Element			
	Element 1	Element 2	Element 3	Element 4
Pekomik President	0.071	0.126	0.153	0.038
Comic M CEO	0.084	0.126	0.153	0.162
Comic Expert 1	0.071	0.126	0.025	0.231
Comic Expert 2	0.084	0.126	0.242	0.162
Comic Expert 3	0.071	0.126	0.025	0.231
Developer AR MTDC 1	0.084	0.126	0.242	0.162
Developer AR MTDC 2	0.084	0.126	0.025	0.231
Developer Expert 1	0.084	0.126	0.025	0.038
Developer Expert 2	0.084	0.126	0.153	0.038
Specialist AR	0.309	0.126	0.025	0.162
Threshold value (d)	**0.103**	**0.126**	**0.107**	**0.145**
Consensus percentage	**90.0%**	**100.0%**	**80.0%**	**70.0%**

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overall of the *Threshold value (d) and percentage consensus for AX construct (Storytelling clarity)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Surprise	0.103	90.0%	0.800	0.940	0.990	0.910	Accept
Drama	0.126	100.0%	0.600	0.800	0.950	0.783	Accept
Amazement	0.107	80.0%	0.720	0.890	0.980	0.863	Accept
Authencity	0.145	70.00%	0.720	0.880	0.970	0.857	Accept

Average value from the fuzzy scale for UX construct (Tangibility)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.3	0.5	0.7	0.5	0.7	0.9
Comic M CEO	0.3	0.5	0.7	0.3	0.5	0.7
Comic Expert 1	0.7	0.9	1	0.5	0.7	0.9
Comic Expert 2	0.7	0.9	1	0.9	1	1
Comic Expert 3	0.3	0.5	0.7	0.3	0.5	0.7
Developer AR MTDC 1	0.9	1	1	0.9	1	1
Developer AR MTDC 2	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 1	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 2	0.5	0.7	0.9	0.7	0.9	1
Specialist AR	0.3	0.5	0.7	0.5	0.7	0.9
Average value from fuzzy scale	0.500	0.690	0.850	0.600	0.780	0.910

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Threshold value (d) and percentage consensus for UX construct (Tangibility)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.268	0.099
Comic M CEO	0.268	0.391
Comic Expert 1	0.283	0.099
Comic Expert 2	0.283	0.294
Comic Expert 3	0.268	0.391
Developer AR MTDC 1	0.415	0.294
Developer AR MTDC 2	0.051	0.161
Developer Expert 1	0.051	0.161
Developer Expert 2	0.051	0.161
Specialist AR	0.268	0.099
Threshold value (d)	**0.221**	**0.215**
Consensus percentage	**30.0%**	**60.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Tangibility)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Concreteness	0.221	30.0%	0.500	0.690	0.850	0.680	Reject
Coherence	0.215	60.0%	0.600	0.780	0.910	0.763	Reject

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Average value from the fuzzy scale for UX construct (Intuitiveness)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.1	0.3	0.5
Comic M CEO	0.3	0.5	0.7	0.3	0.5	0.7
Comic Expert 1	0.3	0.5	0.7	0.3	0.5	0.7
Comic Expert 2	0.7	0.9	1	0.9	1	1
Comic Expert 3	0.3	0.5	0.7	0.1	0.3	0.5
Developer AR MTDC 1	0.3	0.5	0.7	0.9	1	1
Developer AR MTDC 2	0.7	0.9	1	0.7	0.9	1
Developer Expert 1	0.5	0.7	0.9	0.3	0.5	0.7
Developer Expert 2	0.7	0.9	1	0.3	0.5	0.7
Specialist AR	0.7	0.9	1	0.3	0.5	0.7
Average value from fuzzy scale	0.500	0.700	0.860	0.420	0.600	0.750

Threshold value (d) and percentage consensus for UX construct (Intuitiveness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.040	0.432
Comic M CEO	0.281	0.132
Comic Expert 1	0.281	0.132
Comic Expert 2	0.270	0.547
Comic Expert 3	0.281	0.432
Developer AR MTDC 1	0.281	0.547
Developer AR MTDC 2	0.270	0.423
Developer Expert 1	0.040	0.132
Developer Expert 2	0.270	0.132

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Specialist AR	0.270	0.132
Threshold value (d)	**0.228**	**0.304**
Consensus percentage	**20.0%**	**50.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Intuitiveness)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Human likeness	0.228	20.0%	0.500	0.700	0.860	0.687	Reject
Natural	0.304	50.0%	0.420	0.600	0.750	0.590	Reject

Average value from the fuzzy scale for UX construct (Captivation)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.9	1	1	0.7	0.9	1
Comic M CEO	0.9	1	1	0.1	0.3	0.5
Comic Expert 1	0.7	0.9	1	0.5	0.7	0.9
Comic Expert 2	0.3	0.5	0.7	0.7	0.9	1
Comic Expert 3	0.7	0.9	1	0.3	0.5	0.7
Developer AR MTDC 1	0.7	0.9	1	0.9	1	1
Developer AR MTDC 2	0.3	0.5	0.7	0.7	0.9	1
Developer Expert 1	0.5	0.7	0.9	0.5	0.7	0.9
Developer Expert 2	0.9	1	1	0.9	1	1
Specialist AR	0.7	0.9	1	0.9	1	1
Average value from fuzzy scale	0.660	0.830	0.930	0.620	0.790	0.900

Threshold value (d) and percentage consensus for UX construct (Captivation)

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Expert	Element	
	Element 1	Element 2
Pekomik President	0.230	0.156
Comic M CEO	0.230	0.700
Comic Expert 1	0.102	0.114
Comic Expert 2	0.453	0.156
Comic Expert 3	0.102	0.398
Developer AR MTDC 1	0.102	0.283
Developer AR MTDC 2	0.453	0.156
Developer Expert 1	0.162	0.114
Developer Expert 2	0.230	0.283
Specialist AR	0.102	0.283
Threshold value (d)	**0.217**	**0.264**
Consensus percentage	**50.0%**	**50.0%**

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overall of the *Threshold value (d) and percentage consensus for UX construct (Captivation)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Captive	0.217	50.0%	0.660	0.830	0.930	0.807	Reject
Immersive	0.264	50.0%	0.620	0.790	0.900	0.770	Reject

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Average value from the fuzzy scale for UX construct (Playfulness & entertainment)

Expert	Element 1			Element 2			Element 3		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.7	0.9	1	0.5	0.7	0.9
Comic M CEO	0.3	0.5	0.7	0.7	0.9	1	0.3	0.5	0.7
Comic Expert 1	0.7	0.9	1	0.3	0.5	0.7	0.9	1	1
Comic Expert 2	0.3	0.5	0.7	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 3	0.7	0.9	1	0.7	0.9	1	0.5	0.7	0.9
Developer AR MTDC 1	0.5	0.7	0.9	0.9	1	1	0.9	1	1
Developer AR MTDC 2	0.9	1	1	0.7	0.9	1	0.7	0.9	1
Developer Expert 1	0.3	0.5	0.7	0.3	0.5	0.7	0.5	0.7	0.9
Developer Expert 2	0.7	0.9	1	0.5	0.7	0.9	0.7	0.9	1
Specialist AR	0.5	0.7	0.9	0.7	0.9	1	0.9	1	1
Average value from fuzzy scale	0.560	0.750	0.890	0.600	0.790	0.920	0.660	0.830	0.940

Threshold value (d) and percentage consensus for UX construct (Playfulness & entertainment)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik President	0.203	0.148	0.164
Comic M CEO	0.348	0.148	0.458
Comic Expert 1	0.203	0.403	0.227
Comic Expert 2	0.348	0.109	0.095
Comic Expert 3	0.203	0.148	0.164
Developer AR MTDC 1	0.062	0.284	0.227
Developer AR MTDC 2	0.336	0.148	0.095
Developer Expert 1	0.348	0.403	0.164
Developer Expert 2	0.203	0.109	0.095
Specialist AR	0.062	0.148	0.227

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Threshold value (d)	**0.232**	**0.205**	**0.192**
Consensus percentage	**20.0%**	**70.0%**	**60.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Playfulness & entertainment)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Joy	0.232	20.0%	0.560	0.750	0.890	0.733	Reject
Amusement	0.205	70.0%	0.600	0.790	0.920	0.770	Accept
Playfulness	0.192	60.0%	0.660	0.830	0.940	0.810	Reject

Average value from the fuzzy scale for UX construct (Meaningfulness)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.9	1	1
Comic M CEO	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 1	0.7	0.9	1	0.3	0.5	0.7
Comic Expert 2	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 3	0.7	0.9	1	0.3	0.5	0.7
Developer AR MTDC 1	0.3	0.5	0.7	0.5	0.7	0.9
Developer AR MTDC 2	0.9	1	1	0.7	0.9	1
Developer Expert 1	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 2	0.7	0.9	1	0.7	0.9	1
Specialist AR	0.5	0.7	0.9	0.9	1	1
Average value from fuzzy scale	0.580	0.770	0.920	0.640	0.820	0.930

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Threshold value (d) and percentage consensus for UX construct (Meaningfulness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.086	0.245
Comic M CEO	0.086	0.112
Comic Expert 1	0.168	0.440
Comic Expert 2	0.086	0.112
Comic Expert 3	0.168	0.440
Developer AR MTDC 1	0.384	0.148
Developer AR MTDC 2	0.306	0.112
Developer Expert 1	0.086	0.112
Developer Expert 2	0.168	0.112
Specialist AR	0.086	0.245
Threshold value (d)	**0.162**	**0.208**
Consensus percentage	**80.0%**	**60.0%**

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overall of the *Threshold value (d) and percentage consensus for UX construct (Meaningfulness)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Personal meaningful	0.162	80.0%	0.580	0.770	0.920	0.757	Accept
Relevant	0.208	60.0%	0.640	0.820	0.930	0.797	Reject

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Average value from the fuzzy scale for UX construct (Liveliness)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.5	0.7	0.9
Comic M CEO	0.5	0.7	0.9	0.9	1	1
Comic Expert 1	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 2	0.5	0.7	0.9	0.9	1	1
Comic Expert 3	0.7	0.9	1	0.7	0.9	1
Developer AR MTDC 1	0.7	0.9	1	0.5	0.7	0.9
Developer AR MTDC 2	0.7	0.9	1	0.5	0.7	0.9
Developer Expert 1	0.1	0.3	0.5	0.5	0.7	0.9
Developer Expert 2	0.5	0.7	0.9	0.7	0.9	1
Specialist AR	0.5	0.7	0.9	0.9	1	1
Average value from fuzzy scale	0.540	0.740	0.900	0.680	0.850	0.960

Threshold value (d) and percentage consensus for UX construct (Liveliness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.210	0.192
Comic M CEO	0.046	0.201
Comic Expert 1	0.046	0.065
Comic Expert 2	0.046	0.201
Comic Expert 3	0.210	0.065
Developer AR MTDC 1	0.210	0.192
Developer AR MTDC 2	0.210	0.192
Developer Expert 1	0.647	0.192
Developer Expert 2	0.046	0.065

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Specialist AR	0.046	0.201
Threshold value (d)	**0.172**	**0.157**
Consensus percentage	**50.0%**	**70.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Liveliness)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Vivid	0.172	50.0%	0.540	0.740	0.900	0.727	Reject
Dynamic	0.157	70.0%	0.680	0.850	0.960	0.830	Accept

Average value from the fuzzy scale for UX construct (Creativity)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.7	0.9	1
Comic M CEO	0.7	0.9	1	0.9	1	1
Comic Expert 1	0.7	0.9	1	0.9	1	1
Comic Expert 2	0.9	1	1	0.9	1	1
Comic Expert 3	0.5	0.7	0.9	0.9	1	1
Developer AR MTDC 1	0.9	1	1	0.9	1	1
Developer AR MTDC 2	0.7	0.9	1	0.9	1	1
Developer Expert 1	0.1	0.3	0.5	0.7	0.9	1
Developer Expert 2	0.7	0.9	1	0.9	1	1
Specialist AR	0.7	0.9	1	0.9	1	1
Average value from fuzzy scale	0.660	0.840	0.940	0.860	0.980	1.000

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Threshold value (d) and percentage consensus for UX construct (Creativity)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.088	0.122
Comic M CEO	0.088	0.031
Comic Expert 1	0.088	0.031
Comic Expert 2	0.220	0.031
Comic Expert 3	0.172	0.031
Developer AR MTDC 1	0.220	0.031
Developer AR MTDC 2	0.088	0.031
Developer Expert 1	0.768	0.122
Developer Expert 2	0.088	0.031
Specialist AR	0.088	0.031
Threshold value (d)	**0.191**	**0.049**
Consensus percentage	**70.0%**	**100.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Creativity)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Self Expressive	0.191	70.0%	0.660	0.840	0.940	0.813	Accept
Creative	0.049	100.0%	0.860	0.980	1.000	0.947	Accept

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Average value from the fuzzy scale for UX construct (Motivation)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.9	1	1	0.7	0.9	1
Comic M CEO	0.9	1	1	0.5	0.7	0.9
Comic Expert 1	0.7	0.9	1	0.7	0.9	1
Comic Expert 2	0.7	0.9	1	0.3	0.5	0.7
Comic Expert 3	0.5	0.7	0.9	0.5	0.7	0.9
Developer AR MTDC 1	0.5	0.7	0.9	0.9	1	1
Developer AR MTDC 2	0.7	0.9	1	0.3	0.5	0.7
Developer Expert 1	0.9	1	1	0.5	0.7	0.9
Developer Expert 2	0.9	1	1	0.5	0.7	0.9
Specialist AR	0.3	0.5	0.7	0.7	0.9	1
Average value from fuzzy scale	0.700	0.860	0.950	0.560	0.750	0.900

Threshold value (d) and percentage consensus for UX construct (Motivation)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.188	0.198
Comic M CEO	0.188	0.061
Comic Expert 1	0.064	0.198
Comic Expert 2	0.064	0.354
Comic Expert 3	0.204	0.061
Developer AR MTDC 1	0.204	0.333
Developer AR MTDC 2	0.064	0.354
Developer Expert 1	0.188	0.061
Developer Expert 2	0.188	0.061
Specialist AR	0.495	0.198

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Threshold value (d)	**0.185**	**0.188**
Consensus percentage	**70.0%**	**70.0%**

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Being Motivated	0.185	70.0%	0.700	0.860	0.950	0.837	Accept
Interaction Proactivity	0.188	70.0%	0.560	0.750	0.900	0.737	Accept

overall of the *Threshold value (d) and percentage consensus for UX construct (Motivation)*

Average value from the fuzzy scale for UX construct (Inspiration)

Expert	Element 1			Element 2			Element 3		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.9	1	1	0.9	1	1
Comic M CEO	0.9	1	1	0.5	0.7	0.9	0.9	1	1
Comic Expert 1	0.7	0.9	1	0.7	0.9	1	0.3	0.5	0.7
Comic Expert 2	0.9	1	1	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 3	0.7	0.9	1	0.5	0.7	0.9	0.5	0.7	0.9
Developer AR MTDC 1	0.5	0.7	0.9	0.9	1	1	0.5	0.7	0.9
Developer AR MTDC 2	0.7	0.9	1	0.5	0.7	0.9	0.9	1	1
Developer Expert 1	0.9	1	1	0.7	0.9	1	0.7	0.9	1
Developer Expert 2	0.7	0.9	1	0.7	0.9	1	0.9	1	1
Specialist AR	0.7	0.9	1	0.5	0.7	0.9	0.9	1	1
Average value from fuzzy scale	0.720	0.890	0.980	0.640	0.820	0.950	0.720	0.870	0.950

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Threshold value (d) and percentage consensus for UX construct (Inspiration)

Expert	Element		
	Element 1	Element 2	Element 3
Pekomik President	0.242	0.240	0.174
Comic M CEO	0.153	0.153	0.174
Comic Expert 1	0.025	0.100	0.508
Comic Expert 2	0.153	0.153	0.059
Comic Expert 3	0.025	0.153	0.218
Developer AR MTDC 1	0.242	0.240	0.218
Developer AR MTDC 2	0.025	0.153	0.174
Developer Expert 1	0.153	0.100	0.059
Developer Expert 2	0.025	0.100	0.174
Specialist AR	0.025	0.153	0.174
Threshold value (d)	**0.107**	**0.155**	**0.193**
Consensus percentage	**80.0%**	**80.0%**	**70.0%**

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overall of the *Threshold value (d) and percentage consensus for UX construct (Inspiration)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Cognitive stimulated	0.107	80.0%	0.720	0.890	0.980	0.863	Accept
Encourages	0.155	80.0%	0.640	0.820	0.950	0.803	Accept
Eager to try new things	0.193	70.0%	0.720	0.870	0.950	0.847	Accept

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Average value from the fuzzy scale for UX construct (Increase awareness)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.5	0.7	0.9	0.3	0.5	0.7
Comic M CEO	0.9	1	1	0.7	0.9	1
Comic Expert 1	0.7	0.9	1	0.7	0.9	1
Comic Expert 2	0.7	0.9	1	0.7	0.9	1
Comic Expert 3	0.7	0.9	1	0.5	0.7	0.9
Developer AR MTDC 1	0.7	0.9	1	0.7	0.9	1
Developer AR MTDC 2	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 1	0.9	1	1	0.7	0.9	1
Developer Expert 2	0.9	1	1	0.9	1	1
Specialist AR	0.5	0.7	0.9	0.5	0.7	0.9
Average value from fuzzy scale	0.700	0.870	0.970	0.640	0.830	0.950

Threshold value (d) and percentage consensus for UX construct (Increase awareness)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.217	0.458
Comic M CEO	0.176	0.093
Comic Expert 1	0.042	0.093
Comic Expert 2	0.042	0.093
Comic Expert 3	0.042	0.161
Developer AR MTDC 1	0.042	0.093
Developer AR MTDC 2	0.217	0.093
Developer Expert 1	0.176	0.093
Developer Expert 2	0.176	0.232

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Specialist AR	0.217	0.161
Threshold value (d)	**0.135**	**0.157**
Consensus percentage	**70.0%**	**80.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Increase awareness)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Feeling of discovery	0.135	70.0%	0.700	0.870	0.970	0.847	Accept
Feeling of insights	0.157	80.0%	0.640	0.830	0.950	0.807	Accept

Average value from the fuzzy scale for UX construct (Efficiency)

Expert	Element 1			Element 2		
	M1	M2	M3	M1	M2	M3
Pekomik President	0.7	0.9	1	0.5	0.7	0.9
Comic M CEO	0.5	0.7	0.9	0.7	0.9	1
Comic Expert 1	0.7	0.9	1	0.5	0.7	0.9
Comic Expert 2	0.9	1	1	0.9	1	1
Comic Expert 3	0.5	0.7	0.9	0.7	0.9	1
Developer AR MTDC 1	0.3	0.5	0.7	0.9	1	1
Developer AR MTDC 2	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 1	0.5	0.7	0.9	0.7	0.9	1
Developer Expert 2	0.5	0.7	0.9	0.5	0.7	0.9
Specialist AR	0.9	1	1	0.7	0.9	1
Average value from fuzzy scale	0.600	0.780	0.920	0.680	0.860	0.970

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Threshold value (d) and percentage consensus for UX construct (Efficiency)

Expert	Element	
	Element 1	Element 2
Pekomik President	0.155	0.203
Comic M CEO	0.101	0.051
Comic Expert 1	0.155	0.203
Comic Expert 2	0.291	0.191
Comic Expert 3	0.101	0.051
Developer AR MTDC 1	0.396	0.191
Developer AR MTDC 2	0.101	0.051
Developer Expert 1	0.101	0.051
Developer Expert 2	0.101	0.203
Specialist AR	0.291	0.051
Threshold value (d)	**0.179**	**0.125**
Consensus percentage	**70.0%**	**70.0%**

overall of the *Threshold value (d) and percentage consensus for UX construct (Efficiency)*

Element	Triangular Fuzzy number condition		Defuzzification process		condition	Fuzzy score	Expert consensus
	Threshold value (d)	Consensus percentage	M1	M2	M3		
Time	0.179	70.0%	0.600	0.780	0.920	0.767	Accept
Effort	0.125	70.0%	0.680	0.860	0.970	0.837	Accept

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AUGMENTED REALITY COMIC VALIDATION FORM

This is a form to validate the Augmented Reality Comic (AR Comic) to conduct a research entitled Synergising Aesthetic Experience (AX) and User Experience (UX) construct for Aesthetic User Experience (AUX) Model in Augmented Reality Comic (AR Comic).

Name	
Designation	
Date	
Signature	

Rating Scale

1 Poor 2 Fair 3 Good 4 Very good 5 Excellent

No	Item	Rating				
		1	**2**	**3**	**4**	**5**
1	**Character and action** The development of the characters and their actions correspond to the selected conventional comics. Appropriateness in terms of line of action and proposed poses.					
2	**Animation Principle** The principle of animation is produced by meeting industry criteria. Meet the requirements of animation production at the animation industry level.					
3	**Comic Transformation into Animation** The transition of comic images to animation is done with a good combination of comic and animation principles.					
4	**Augmented Reality** The development of Augmented Reality (AR) according to the significant concept and technique in accordance with the concept of AR Comic to be conveyed.					
5	**Overall Rating** Suitable for publication as a component of AR Comic and can be used as a stimulus for research.					
6	**Opinion (If any)**					

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AUGMENTED REALITY COMIC VALIDATION FORM

This is a form to validate the Augmented Reality Comic (AR Comic) to conduct a research entitled Synergising Aesthetic Experience (AX) and User Experience (UX) construct for Aesthetic User Experience (AUX) Model in Augmented Reality Comic (AR Comic).

Name	MOHD KHAIRUL ANUAR BIN A. RAHMAN
Designation	PRESIDENT OF PERTUBUHAN DUNIA KARIKATUR MALAYSIA (PEDUKAR)
Date	23 FEB 2021
Signature	PERTUBUHAN DUNIA KARIKATUR MALAYSIA PPM-011-04-301220:19 LOT 920-1, JALAN ALAI, KAMPUNG ALAI, 75460 MELAKA. TEL: 016-6240069

Rating Scale

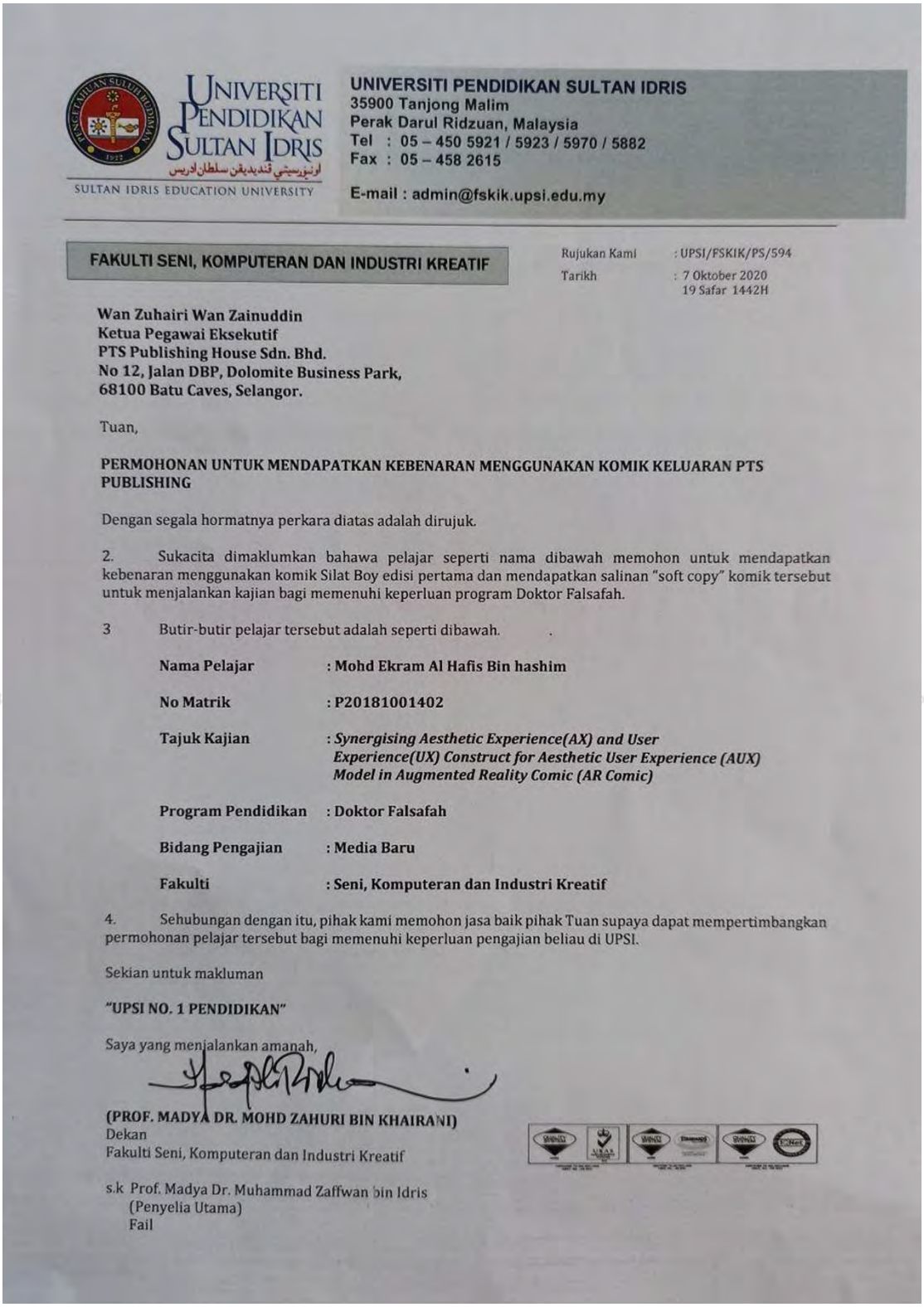
1 Poor **2 Fair** **3 Good** **4 Very good** **5 Excellent**

No	Item	Rating				
		1	**2**	**3**	**4**	**5**
1	**Character and action** The development of the characters and their actions correspond to the selected conventional comics. Appropriateness in terms of line of action and proposed poses.					✓
2	**Animation Principle** The principle of animation is produced by meeting industry criteria. Meet the requirements of animation production at the animation industry level.					✓
3	**Comic Transformation into Animation** The transition of comic images to animation is done with a good combination of comic and animation principles.					✓
4	**Augmented Reality** The development of Augmented Reality (AR) according to the significant concept and technique in accordance with the concept of AR Comic to be conveyed.					✓
5	**Overall Rating** Suitable for publication as a component of AR Comic and can be used as a stimulus for research.					✓
6	**Opinion (If any)**					

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Application for using comics from PTS Publishing



UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

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Tel : 05 – 450 5921 / 5923 / 5970 / 5882
Fax : 05 – 458 2615
E-mail : admin@fskik.upsi.edu.my

FAKULTI SENI, KOMPUTERAN DAN INDUSTRI KREATIF

Rujukan Kami : UPSI/FSKIK/PS/594
Tarikh : 7 Oktober 2020
19 Safar 1442H

Wan Zuhairi Wan Zainuddin
Ketua Pegawai Eksekutif
PTS Publishing House Sdn. Bhd.
No 12, Jalan DBP, Dolomite Business Park,
68100 Batu Caves, Selangor.

Tuan,

PERMOHONAN UNTUK MENDAPATKAN KEBENARAN MENGGUNAKAN KOMIK KELUARAN PTS PUBLISHING

Dengan segala hormatnya perkara diatas adalah dirujuk.

2. Sukacita dimaklumkan bahawa pelajar seperti nama dibawah memohon untuk mendapatkan kebenaran menggunakan komik Silat Boy edisi pertama dan mendapatkan salinan "soft copy" komik tersebut untuk menjalankan kajian bagi memenuhi keperluan program Doktor Falsafah.

3 Butir-butir pelajar tersebut adalah seperti dibawah.

Nama Pelajar	**: Mohd Ekram Al Hafis Bin hashim**
No Matrik	**: P20181001402**
Tajuk Kajian	**: *Synergising Aesthetic Experience(AX) and User Experience(UX) Construct for Aesthetic User Experience (AUX) Model in Augmented Reality Comic (AR Comic)***
Program Pendidikan	**: Doktor Falsafah**
Bidang Pengajian	**: Media Baru**
Fakulti	**: Seni, Komputeran dan Industri Kreatif**

4. Sehubungan dengan itu, pihak kami memohon jasa baik pihak Tuan supaya dapat mempertimbangkan permohonan pelajar tersebut bagi memenuhi keperluan pengajian beliau di UPSI.

Sekian untuk makluman

"UPSI NO. 1 PENDIDIKAN"

Saya yang menjalankan amanah,

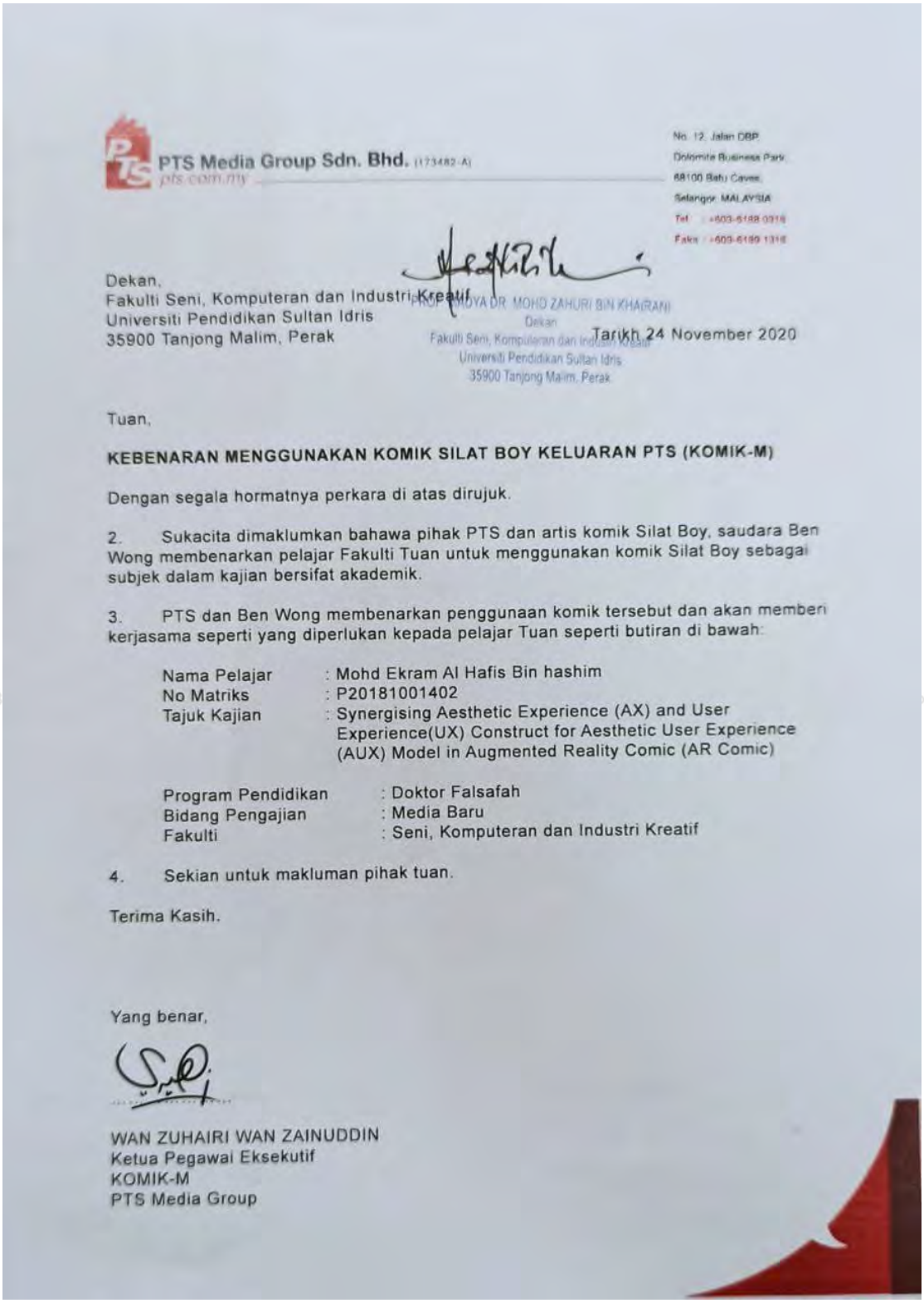
(PROF. MADYA DR. MOHD ZAHURI BIN KHAIRANI)
Dekan
Fakulti Seni, Komputeran dan Industri Kreatif

s.k Prof. Madya Dr. Muhammad Zaffwan bin Idris
(Penyelia Utama)
Fail

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Permission letter to use PTS Publishing comics



PTS Media Group Sdn. Bhd. (173482-A)
pts.com.my

No. 12, Jalan DBP
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68100 Batu Caves
Selangor, MALAYSIA
Tel : +603-6188 0318
Faks : +603-6189 1318

Dekan,
Fakulti Seni, Komputeran dan Industri Kreatif
Universiti Pendidikan Sultan Idris
35900 Tanjong Malim, Perak

PROF MADYA DR. MOHD ZAHURI BIN KHA(RAN)
Dekan
Fakulti Seni, Komputeran dan Industri Kreatif
Universiti Pendidikan Sultan Idris
35900 Tanjong Malim, Perak

Tarikh 24 November 2020

Tuan,

KEBENARAN MENGGUNAKAN KOMIK SILAT BOY KELUARAN PTS (KOMIK-M)

Dengan segala hormatnya perkara di atas dirujuk.

2. Sukacita dimaklumkan bahawa pihak PTS dan artis komik Silat Boy, saudara Ben Wong membenarkan pelajar Fakulti Tuan untuk menggunakan komik Silat Boy sebagai subjek dalam kajian bersifat akademik.

3. PTS dan Ben Wong membenarkan penggunaan komik tersebut dan akan memberi kerjasama seperti yang diperlukan kepada pelajar Tuan seperti butiran di bawah:

Nama Pelajar	: Mohd Ekram Al Hafis Bin hashim
No Matriks	: P20181001402
Tajuk Kajian	: Synergising Aesthetic Experience (AX) and User Experience(UX) Construct for Aesthetic User Experience (AUX) Model in Augmented Reality Comic (AR Comic)
Program Pendidikan	: Doktor Falsafah
Bidang Pengajian	: Media Baru
Fakulti	: Seni, Komputeran dan Industri Kreatif

4. Sekian untuk makluman pihak tuan.

Terima Kasih.

Yang benar,

WAN ZUHAIRI WAN ZAINUDDIN
Ketua Pegawai Eksekutif
KOMIK-M
PTS Media Group

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Human research ethics for data collection



Certificate of Participation

THIS CERTIFICATE IS PROUDLY PRESENTED TO
ENCIK MOHD EKRAM AL HAFIS BIN HASHIM

Has successfully attended the

HUMAN RESEARCH ETHICS ONLINE WORKSHOP (IV)

on

9 OKTOBER 2020

UNIVERSITI PENDIDIKAN SULTAN IDRIS

Professor Dr. Tajul Shuhaizam bin Said
Director Research Management and Innovation Centre
Universiti Pendidikan Sultan Idris

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