We Don't Connect – Negotiations between Usability, User and Art Experience in Online Art Interaction

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Abstract

Art and its conceptualization enable a richer understanding of human computer interaction (HCI). User experience (UX), usability and art experience (AE) have extensive traditions of scholarship. UX and AE especially, have rarely been combined. While systematic approaches to identifying contrasts between the types of experience are lacking, there is also a lag in academic knowledge on how UX and AE relate to one another in the action context of HCI. This paper presents a study in which UX and perceived usability, were investigated in the context of online art experience. The study's participants (N=128) responded to a questionnaire based on an adapted model of interactive art systems while experiencing an online art exhibition. Results revealed three significant correlations: 1) the impact of usability on the sense of immersion; 2) how immersion influenced the art experience; and 3) how the viewer's background (skills and knowledge) affects art experience in digital spaces.

Keywords: Art Experience, User Experience, Usability, Immersion, Culture, Interaction Design

1. Introduction

"Technology makes tools; art makes meaning," stated Caleb Woodbridge [1]. Artistic areas (visual art, design, music, drama etc.) and human-computer interaction (HCI) are intrinsically connected through history and human evolution, via linguistic development and tool making [2]. The study of art experience for instance, has been closely connected with philosophy [3], cultural studies [4], critical theory [5], reception studies, [6] and aesthetics [7]. Understandings of art appreciation support the examination of scholarship in higher order cognitive-affective processes [8]. The Internet with its affordances, has been a space for artistic experimentation and participation since 1994 through what is known as net.art [9]. Art was equally as important during the Internet's development. Ted Nelson's 1960s *Xanadu Project* – a forerunner for the World Wide Web as we know it today – was intended to be a repository for global electronic publishing [10]. Feeding into ideas that lead to the development of hypertext and other Internet innovational logic, Nelson was eager to create a system that facilitated nonsequential writing. In other words, this would be a means of enabling readers to choose their own paths through electronic documents. This was more of an artistic vision than a technical one. Tim Berners-Lee with his technological know-how is more often referred to when considering the foundations of the World Wide Web (WWW) and its hypertextual, and its complex information architecture for the purpose of sharing scientific experiments and data [11].

Goals and motivations behind studying art are notably different to research in HCI, particularly user experience (UX) and usability. Usability focuses on people's ability to use information technology and its interfaces. It centers of the user interface's ability to effectively

mediate the connection between user intention, goal and action to system function. UX research on the other hand, concentrates extensively on the human connection and interactional experience of technology design in regards to broader factors affecting the interaction and its experience (i.e., context, socio-economic factors, psychological etc.) [12]. Thus, while focus is placed on human experience, there are practical relations and implications connected to the field of research and development. Moreover, where usability can be seen to possess a narrower, more task/action-based focus to UX research, it is still an integral part of UX – affecting sentiments obtained from HCI (bad usability often equals bad UX), and being affected by UX (previous learning via experience and perceived attractiveness influencing usability [13]). While art can be systematically used to enhance UX and potentially perceived usability through its aesthetics [13], in the domain of digitality art and its experience in turn, can be interrupted or supported by effective usability and harmonious UX features (i.e., minimalist colors, forms and fonts). In particular, the design of HCI should ensure that the user, or viewer, achieves and maintains direct contact with the art content, enabling immersion into the creative cultural artefact being encountered [14].

While presence (the experience of being there [15]), place, space and flow are connected to immersion and AE, the current study differs to previous ones in that: 1) previous AE studies have primarily occurred at physical art museums; and 2) usability and the UX of art mediating websites have not directly been examined in relation to AE (e.g., see [16]). Through drawing on scholarship in HCI, Information Systems (IS) and art studies, this paper brings about a pertinent perspective on understanding the dimensionalities of experience in the interaction design of cultural spaces. The intermingling of design and creative cultural content is brought to the fore.

The goal of this study was to investigate the relationship between usability and its influence on both UX and art experience (AE) in the context of online art exhibitions. In this study, UX is focused on in respect to both broader factors affecting the experience of the virtual interaction design (participant background and expertise levels, and context) as well as from the psychological perspective of immersion. The authors hypothesized that usability of the digital interactive environment of online art exhibitions positively affects the experience of immersion, and subsequently AE. The study was undertaken via an online questionnaire through which participants were linked to three online art exhibitions. Participants chose one of these and then answered the questions.

2. Related Work

Scholarship on art and the Internet is expansive [9]. Yet, the specific link between usability, UX and AE with focus on the aspect of immersion is lacking. For instance, [17] investigated usability in relation to the design and development of art museum websites. Their study focused on the WWW as a vehicle for art museum marketing and examined the quality of 80 art museum websites via usability and interaction. Their conclusion was that while these websites were mostly coherent, the designs could have been improved through complexity, legibility and mystery (intrigue). From a combined UX and AE perspective this would have meant to incite curiosity towards the contents and to establish genuine connection to the ethos of the institutions. From an art historian perspective, [19] examined the usability of image databases and archives (i.e., ARTstor). Art database studies are also seen in [20] and [21] 23 years later.

Usability of visualization technologies have additionally been studied (see e.g., [22]), particularly from the perspective of art museums. In terms of art production, Photoshop has been the most examined artistic tool regarding usability and metaphor. Yet, none of these studies focus specifically on the impact of usability on AE in itself. One study that comes closest to the current study is that of [23] who looked at the relationship between presence and enjoyment in virtual museums. [23] engaged in a study on the usability of an augmented reality (AR) system designed to present visual overlays of a virtual exhibition inside physical museum spaces. Their results demonstrated that aspect of *perceived presence* positively corresponded with enjoyment of the AR exhibition experience. Their study attempted to counter virtual reality (VR) usability studies in which "interactive systems have a good *look* but a poor *feel*" [24]. The authors proposed an alignment of task performance, presence and enjoyment in order to

enhance the feel of extended reality (XR) in AE. This was studied through combining a short presence questionnaire with the factors of intuitiveness, naturalness or control and interaction.

3. Method

One hundred and twenty-eight participants responded to a questionnaire, probing the dimensions of usability, immersion and AE. Participants were asked to pick and view one of three virtual exhibitions (Jani Leinonen, virtual gallery, https://webar.arilyn.com/janileinonen/; Kalevi Helvetti Gallery, https://webar.arilyn.com/kalevihelvetti/; HALO, Open Atelier, https://elamisentaidetta.fi/halo/ – see Figure 1). All three art exhibitions had a similar design layout creating consistency in the UX. Yet, the artistic content differed. The virtual environments were designed to resemble physical exhibition spaces with rooms and places for artworks on the walls. One space mimicked an actual atelier (studio, workshop) in Finland (Halosenniemi Museum, Tuusula).

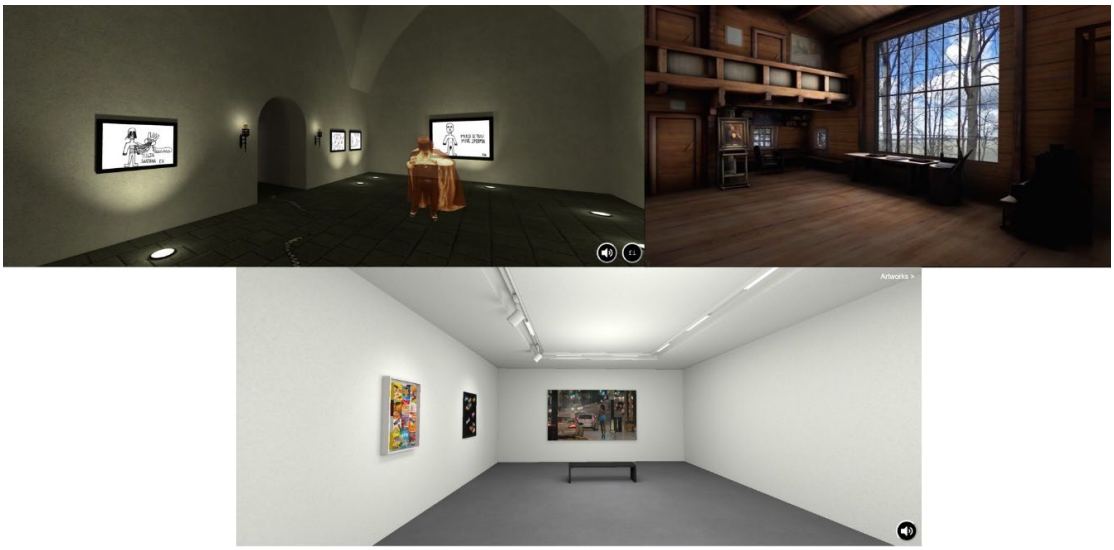

Fig. 1. Kalevi Helvetti Gallery [upper left]; HALO Open Atelier [upper right]; Jani Leinonen Gallery [bottom]. [Screenshots courtesy of Arilyn].

3.1. Data Collection

Due to conditions posed by COVID-19, the study was undertaken via an online questionnaire hosted by Webropol. The survey was publicly distributed via mailing lists and social media channels. Participants had the chance to win one of five gift cards to a local Finnish retail chain. Participants were informed about the research, the purpose of data collection and how the data would be used and stored. The general data protection regulation (GDPR) was adhered to via a data protection information form and informed consent. Overall, 128 participants completed the questionnaire. The questionnaire was designed on the basis of previous studies that focused on dimensions of technical HCI and AE [24]. The questionnaire was adapted to incorporate UX via usability, as well as digital interactive AE. Likert-scale and open-ended fields were included in the survey. Likert-scale questions comprised six categories - enjoyment, visual appeal, usability, experience, thoughts, and emotions. Open-ended questions supported the reporting of thoughts and reactions (emotional, scaling and behavioural).

Before answering the questionnaire, the participants were advised to independently visit one of the listed virtual exhibition sites and remain there for as long as they wished. After visiting the exhibition, the participants were asked to continue to the online questionnaire. Background questions about the participants' skills and interests in using information communication technology (ICT) were regarded as important in order to align each participant's interests, prior experiences and training with the evaluation. [25] argued that there is a strong link between cognitive aesthetic judgements developed via experience and aesthetic emotions. Their study revealed that expertise and art education positively influence AE.

The questionnaire was designed according to six different categories that included factors of usability as well as the experiential factors of the web design and the artwork: enjoyment, visual appeal, usability, experience, thoughts, and emotions. Questions regarding *enjoyment* were informed by previous studies by [23] who investigated museum experience and purchase intention in the field of tourist management, as well as [26] who investigated retail experience in online stores. [26]'s study presented the factor of intrinsic enjoyment as one measure to examine the value of individual experience. *Visual Appeal* was deemed as important when measuring the experience of technical usability [27], a factor taken from HCI research. This is partially due to the fact that visual aesthetics play an important part not only in AE, but in the experience of usability and technology as well. Aesthetic quality can render technological services easier to accept and adopt, and positive aesthetics is a strong determinant of pleasurable experiences by the user during interaction [27].

Usability (based on HCI research) was one of the focus points of the current study. In addition to the practical connection between user and functionality, usability and whether or not a system can be used, is tightly connected to UX [13][28] – aesthetic impression in addition to socio-cultural factors, previous learning and experiences etc. Usability was examined through practical questions: whether or not the platform was easy to use; the ability to move through the exhibition without problems; whether the platform was confusing to use; and whether the website worked without technical problems. *Experience* was measured in conjunction to *immersion* and flow by questions focusing on escapism and feelings of interactivity [29][30]. *Thoughts* as a category was included to probe the ideas generated in response to the exhibition or artworks. This category was previously studied and presented as one of the cognitive-affective aspects of aesthetic processing [30]. Lastly, *emotions* were examined. These were evaluated in regards to feelings of connection with the art works [30], and specific emotions elicited by the exhibition and artworks [31].

3.2. Data Analysis

The data was cleaned and responses checked in terms of completeness. The data analysis was performed in two parts. Quantitative data gathered by questions 1-15 were classified by their mean, median and standard deviation values. Factor and regression analysis were run in SPSS-software to find explanatory factors towards the AE. Qualitative data represented in questions 16-21 were analyzed by thematic analysis [32]. Salient themes were scored in terms of occurrence (question-related context) and frequency within the overall comments. The results of both parts were then re-combined for interpretation.

4. Results

Sixty-one percent of the responses were provided by people born in the 1990s. The gender distribution of participants was 64.1% (female) and 32.8% (male). Almost two (1.6) percent reported their gender as other, or did not prefer to tell. The background information demonstrated that 98% of the participants evaluated their personal skills in using ICT as average or better. Many participants reported to be "moderately interested" or "quite interested" in art, while the rest were only somewhat interested. Most participants did not have any previous art education or professional experience in art. Approximately one third of the participants reported to have participated in short-term art education (single courses or clubs). There was an almost even distribution of responses between the three virtual exhibitions participants engaged in.

Some of the answers contained selections of the "I don't know" option. Therefore, these selections were coded as missing values in order for the values not to disturb the data analysis. Additionally, the responses in the "Using the platform was confusing to me" (Usability 3), were re-defined (inverted) in order to maintain a uniform data outlook on usability. It can be observed from the results that there are no significant differences between mean and median values regarding questions that evaluate AE according to the same theme. One exception pertained to questions focusing on emotional responses. However, this can be considered understandable since some of the questions focused on general emotional responses and some on specific emotions.

4.1. Factor Analysis

The data analysis was followed by a factor analysis run with SPSS software. The analysis was executed using the principal axis factoring and direct oblimin rotation to allow correlated factors. The communalities on each item remained at an acceptable range (over 0.3). Thus, each item was kept in the analysis set. Table 1 presents the pattern matrix created by the factor analysis. The matrix shows four factors that were extracted from the data. The table also displays factor loading values of over 0.3. The pattern matrix and extracted factors differed from the initial study plan, therefore, modifications to the analysis were made. Firstly, the initial number of extracted factors was planned to be based on Eigenvalue (more than 1), but with this setting the calculated pattern matrix was created for five factors. Therefore, the factors were then chosen to be manually set for four. This was since with five factors, three items (Visual Appeal 2 & 3, and Emotions 6) loaded unevenly on the fifth factor that did not support the initial analysis or item structure and was recognised as disturbing the overall analysis.

Secondly, there were some items that did not distinctly distribute on one specific factor. These items were then chosen to be included in the factor that possessed the highest loading. As an example, Enjoyment 1 possessed a fairly even distribution between all four factors, but still presented the highest value in the first factor. This was considered the best option in order to follow a qualified research pattern. Additionally, some of the items did not load on the same factors as their counterparts. For example, Enjoyment 3 (‘I find the activities around the exhibition indulging’) did not load strongly enough with enjoyment, hence it was considered to be included in the fourth factor of immersion.

Table 1: Factor analysis, pattern matrix.

	Art experience	Usability	Negative emotions	Immersion
Enjoyment 1	.417	-.321	-.307	.348
Enjoyment 2	.392			.375
Enjoyment 3				.576
Visual Appeal 1			-.482	.586
Visual Appeal 2			-.353	.501
Visual Appeal 3		-.448		
Usability 1		-.879		
Usability 2		-.784		
Usability 3		-.522		
Usability 4		-.595		
Experience 1				.670
Experience 2				.541
Experience 3	.299			.500
Thoughts 1	.805			
Thoughts 2	.716			
Thoughts 3	.896			
Emotions 1	.733			
Emotions 2	.574			
Emotions 3	.524			
Emotions 4			.494	
Emotions 5			.610	
Emotions 6			.569	
Emotions 7			.831	

Because of the challenges generated in the factor analysis by the data, another major modification was made within the factors. The items Enjoyment 1 (‘The experience was pleasant’) and 2 (‘The way the exhibition displays the artworks is attractive’), were treated as separate variables in the later analysis. This was due to the fact that they seemed to have an uneven distribution in the pattern matrix, and measured AE from angles that differed from the items focusing on thoughts and emotions. Additionally, since Emotions 3 measured the feeling

of joy, it was considered best to represent this item with items Enjoyment 1 and 2. Furthermore, even though visual appeal and experience were initially planned to be separate factors, it was decided that they should be combined as the pattern matrix had calculated them. Instead of separate visual appeal and experience, the combined factor was transformed to represent *immersion*, since all questions in this combined factor were related to themes influencing immersion in virtual environments [33]. Lastly, the items considering negative emotional response were transformed into another new factor, Negative Emotions.

A Cronbach's alpha test was run on each variable to ensure that they were qualified to be used as variables in the later analysis. Table 2 presents the Cronbach's alpha values, and according to these results the chosen factors and variables could be taken to the later analysis.

Table 2. Chosen factors and variables with Cronbach's Alpha value.

Factor/Variable	Items	Cronbach's Alpha
Art experience	Enjoyment 1, Enjoyment 2, Thoughts 1, Thoughts 2, Thoughts 3, Emotions 1, Emotions 2, Emotions 3	.882
Enjoyment	Enjoyment 1, Enjoyment 2, Emotions 3	.751
Thoughts and Emotions	Thoughts 1, Thoughts 2, Thoughts 3, Emotions 1, Emotions 2	.872
Usability	Visual appeal 3, Usability 1, Usability, 2 Usability 3, Usability 4	.796
Negative Emotions	Emotions 4, Emotions 5, Emotions 6, Emotions 7	.724
Immersion	Enjoyment 3, Visual appeal 1, Visual appeal 2, Experience 1, Experience 2, Experience 3	.759

4.2. Regression Analysis

After defining the applicable factors for this study, regression analysis was run to calculate the definite impacts on AE. The effects of the background information, or control variables, on AE was examined. Table 3 presents the effects on enjoyment, thought and emotional response, and the exhibition experience as a whole. When examining the adjusted R-square (0.229) of the model, the control variables explained only a portion of the variance in the overall AE. The control variables did not have much effect on enjoyment or thoughts and emotions per se. However, when combined the overall AE was strongly influenced by the level of interest towards art. Artistic interest was a strong predictor of the responses to thought and emotions, but did not greatly affect enjoyment. Another important finding was that the self-evaluation of ICT skills had quite a strong effect on the overall AE, and more closely in relation to enjoyment, while not that strongly in relation to thought and emotional response. There seemed to be a link between the enjoyment of instant gratification of the interactive experience among those with higher ICT skills than with how pleasant and enjoyable the AE was as a whole. The level of familiarity with virtual art exhibitions seemed to have a significant effect on thought and emotional response (p=0.015), and therefore on the AE. However, the R-square value was less than 0.3, the minimum value for a possible adept explanation. Thus, it can be assumed that these variables do not explain AE in a significant way. Other control variables did not have any significant or recordable effect on AE. In other words, in this model the participant's age, gender, familiarity with virtual exhibitions, previous experience with art, or exhibition choice did not affect the measurements of overall AE.

Table 3. Regression analysis 1 (background information and control variables)

	Art experience		Enjoyment		Thoughts and Emotions	
Control Variable	Std. coefficients	Sig.	Std. coefficients	Sig.	Std. coefficients	Sig.
Year of birth	-.100	.294	-.067	.487	-.068	.479
Gender	-.136	.116	-.100	.256	-.134	.124
ICT skills	-.238	.008**	-.235	.010*	-.192	.033*
Art interest	.392	.000***	.315	.002**	.367	.000***
Familiarity	.192	.035*	.085	.355	.215	.015*
Previous experience	-.043	.630	-.001	.991	-.100	.271
Exhibition	-.092	.284	-.006	.945	-.153	.079
R square	.276		.186		.258	
Adjusted R square	.229		.137		.210	

***p < 0.001, **p < 0.01, *p < 0.05

Table 4 represents AE as a whole. It is divided into enjoyment, thought and emotional response. The analysis was run with the other created variables. Looking at the control variables, the ones that seemed to have a connection with AE were ICT skills, interest towards art and familiarity with virtual exhibitions. Considering the independent variables, immersion was demonstrated to be the strongest factor influencing enjoyment as well as thought and emotional response (std. coefficient=0.494, std. coefficient=0.601, std. coefficient=0.494, p<0.001). When calculating enjoyment separately, negative emotional response seemed to have a slight affect (std. coefficient=-0.141, p=0.046). Thought and emotional response seemed to be affected somewhat negatively by usability (std. coefficient=-0.156, p=0.039) and positively by negative emotions (std. coefficient=0.167, p=0.029). The differences in AE were also compared within each exhibition. This was calculated via using the Kalevi Helvetti and HALO exhibitions as dummy variables in the regression model. According to the model, it seems that AE was significantly less powerful regarding emotional and thought response (std. coefficient=-0.341, std. coefficient=-0.283, p<0.001, p=0.002) and significantly less pleasant (std. coefficient=0.261, std. coefficient=-0,219. p=0.001, p=0.008) in these two exhibitions compared to the Jani Leinonen exhibition.

Table 4. Regression analysis 2 (main model for art experience)

	Art experience		Enjoyment		Thoughts and Emotions	
Control Variable	Std. coefficients	Sig.	Std. coefficients	Sig.	Std. coefficients	Sig.
Year of birth	-.089	.224	-.074	.315	-.045	.568
Gender	-.016	.809	-.004	.955	-.015	.841
ICT skills	-.138	.048*	-.125	.072	-.113	.130
Art interest	.380	.000***	.299	.000**	.360	.000***
Familiarity	.170	.018*	.073	.305	.200	.010*
Previous experience	-.007	.923	.059	.389	-.077	.302
Kalevi Helvetti	-.332	.000***	-.261	.001*	-.341	.000***
HALO	-.275	.001***	-.219	.008**	-.283	.002**
Independent variables						
Usability	-.133	.058	.036	.603	-.156	.039*
Neg. emotions	.042	.549	-.141	.046*	.167	.029*
Immersion	.579	.000***	.601	.000***	.494	.000***
R square	.603		.583		.534	
Adjusted R square	.560		.540		.483	

***p < 0.001, **p < 0.01, *p < 0.05

Considering the independent variables, the most significant variables affecting immersion were usability and the strength of the AE (see Table 5). The Usability (std. coefficient=0.299, p<0.001) and Art Experience (std. coefficient=0.664, p<0.001) values had a positive statistically significant effect on immersion. By dividing AE into enjoyment, thought and emotional response, it seemed that especially enjoyment significantly explained immersion (std. coefficient=0.501, p<0.001).

Table 5. Regression analysis 3 (Immersion as dependent variable)

	Immersion		Immersion	
Control Variable	Std. coefficients	Sig.	Std. coefficients	Sig.
Year of birth	.047	.550	.037	.627
Gender	-.050	.491	-.051	.465
ICT skills	-.022	.768	-.015	.837
Art interest	-.240	.006**	-.229	.006**
Familiarity	-.038	.622	-.017	.820
Previous experience	-.019	.793	-.033	.652
Kalevi Helvetti	.238	.005**	.233	.004**
HALO	.411	.000***	.394	.000***
Independent variables				
Usability	.299	.000***	.218	.003**
Neg. emotions	.042	.579	.093	.227

	Immersion		Immersion	
Control Variable	Std. coefficients	Sig.	Std. coefficients	Sig.
Art experience	.664	.000***	-	-
Enjoyment	-	-	.501	.000***
Thought/Emotion	-	-	.251	.015*
R square	.545		.575	
Adjusted R square	.495		.525	

***p < 0.001, **p < 0.01, *p < 0.05

The difference between each exhibition regarding immersion seemed also significant. This can be seen in relation to Kalevi Helvetti Gallery (std. coefficient=0.238, p=0.005) and HALO Open Atelier (std. coefficient=0.411, p<0.001). Therefore, HALO Open Atelier scored highest on immersion. This is interesting due to the fact that the virtual gallery is actually modelled on a real physical location in Finland. Finally, interest towards art seemed to have an effect on AE. Yet, this negatively corresponded with immersion (std. coefficient=-0.240, p=0.006). That is, the semantic value of the artworks seemed to play a prevailing role in the AE of those already interested in art, while the immersion afforded by the interaction design and technology was important for those who had not indicated prior interest in art.

5. Discussion

Table 6 presents the results of the regression analysis models in comparison to the set hypothesis. The hypothesis was supported since the perceived usability had a positive effect on experienced immersion (std. coefficient=0.299, p<0.001). Figure 2 presents a simplified model of how the results support the initial hypothesis and how the effects of a digital interactive environment and online mediation of art can be interpreted in this scenario.

Table 6. Hypothesis result.

Hypothesis	Std. coefficient	Significance	Supports hypothesis
H1: Usability of the digital interactive environment affects positively on the experienced immersion	.299	.000***	Yes

In this study, the standard (std.) coefficient values of Usability were seen to affect the overall AE. Thus, the hypothesis regarding the positive effects of usability on AE in a digital interactive environment is supported. During the analysis it was observed that in particular, usability was seen to enable immersion in the virtual exhibition spaces. This sense of immersion supported by the lack of interference by usability issues, in turn positively impacts AE. Interestingly, usability did not directly affect the AE per se. Rather, there was a mediated effect between usability, immersion and the subsequent AE. This relationship is demonstrated in Figure 2.

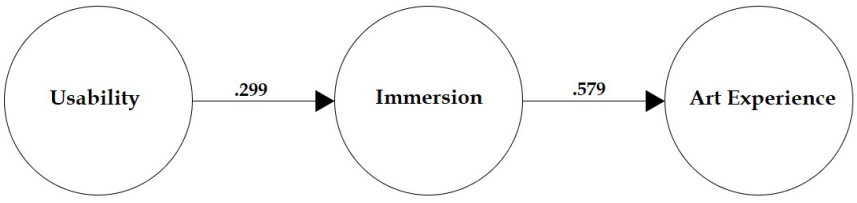

Fig. 2. Model representing the effect of usability and experienced immersion on the overall art experience.

Thus, the usability of the online art exhibition spaces or platforms, positively affects experienced immersion within the spaces, which enhances and mediates the AE. Yet, what was interesting was the relationship between enjoyment of the AE, and the thoughts or associative

reactions that were generated in response to the arts content. Differences were observed between participants who were predominantly tech-savvy (reported higher ICT skills) and those who were interested in art in general. Those who were reported to be more tech-savvy attributed higher scores for enjoyment, while those who were interested in art reported greater levels of thought responses.

These findings support those of prior research that demonstrate differences between novices and experts regarding art appreciation and experience [8]. According to the *psychological approach to art* for instance, art-historical contexts leave causal information within each work of art. This information entails events, actions of the artist, and indeed the mental processes and behavioral traces that can be observed from the artefacts [34]. The more one knows about art, its processes, people and historical contexts in which particular artefacts are created, the more fluent they become in processing this information from the works of art. This entails identifying key actionable, cultural and communicative (symbolic) associations that are portrayed within the expressions of art. This is referred to as processing-fluency [35]. [36] presented a framework for cognitive processing of human *appreciators* (italics by the original authors) that comprised three distinct modes: 1) basic exposure; 2) causal reasoning as a consequence of "artistic design stance"; and 3) artistic understanding of the artefact that arises through more developed art-historical knowledge.

In fact, according to [36], there are three modes of appreciation. The first mode of *basic exposure* entails sensory perception, or perceptual representation and the attentional tracking (where one's attention leads them) of visible features – colors, shapes, size, tones, materials etc. Cognitive processing occurs on basic syntactic (formalistic, expressive) and semantic (immediate or seemingly obvious meanings) levels. Meaning and readings of the artwork are based on general understandings and probabilistic learning. If emotions result from the encounter they are immediate, or basic emotions, triggered via stimuli that induces e.g., joy, fear, disgust, anger etc. The second mode, artistic design stance, similar to [37]'s design stance, describes how causal reasoning begins to occur regarding the observable features in relation to essentialist assumptions. There is identification, genealogy and localization that occurs regarding the work and the factors (artist, conditions, geography, materials etc.) that produced it. There is also a form of 'mindreading' that viewers undertake, that attempts to ascertain mental states of the artists from the perspective of their historical context. The third mode, artistic understanding, relies more on theory-based reasoning that subjective assumptions. Here, a theory-based classification of styles is undertaken while experiencing artwork. Emotions that derive from the experience are the result of higher order cognitive processes that compose an array of associations stemming from the work in a meaningful way. Experiencers, or appreciators, can connect the artwork to other artists and traditions, and can identify appropriation or forgery based on their expert knowledge.

These are the differences that to some extent can be observed in the results of this current study. Those who were interested in art, and potentially have developed knowledge of art and its contexts, are able to process the artworks (and even perhaps their mediated contexts – or how they feed off each other) via higher levels of art-related mental data. Those who were not as educated in art, or at least, had not placed as much attention to art prior to the study, relied on the 'obvious' information derived from the basic exposure to the exhibition. Appreciation for the immersion that the online technological mediation had to offer may well have been developed through the participant's knowledge of interaction design and web technology.

The main tenet of the three-mode human appreciator model is that of context. Whether the art-historical context is that of historical events or processes, geographies and cultures, art institutions, artists' mental states and behavior, or points of commercial value (trading places, markets and galleries), levels of information provide vital references through which viewers, experiencers or appreciators, anchor their associative, or appraisal process [38]. Thus, context has been argued as a definitive factor for framing and attributing information of various sorts to expressions of art no matter how seemingly simplistic (e.g., minimalism) or complex (e.g., postmodernism). Through this knowledge it may be understood that the exhibition and

experience of art via online spaces may face more complex challenges than those of pure usability, or design-based UX.

6. Conclusion

Traditionally, the deliberation, production and encountering of art has been a predominantly embodied experience. These experiences are characterized by information received through the multiple senses, involve the body's interaction and negotiation between altering spaces of varying proportions. And, perhaps more than anything, through placing the body into live physical spaces the experiencer is also prone to moments of randomness, impromptu and serendipity. These are aspects that generate moments of pure excitement, expectation and intrigue – something [18] found was lacking from art museum websites in general. Even in live gallery settings 'usability' per se is not always smooth sailing. Venues for instance, may have accessibility issues, artworks may be damaged, or falling from walls, technical problems may be encountered (from the material to the digital), and museum equipment such as headphones and guides may not be functioning. Yet, the viewer or experiencer (audience), always derives a *complete* experience from their encounter with the artwork, the exhibition and the exhibition's context (museum, gallery, or other space). Thus, there are embodied layers – smell, touch, atmosphere, temperature, sounds etc. - that come forth during the AE that are not strictly hinged upon the artwork itself. In online spaces, symbolic and technical framing occurs through associations made to the organizations and companies facilitating the exhibitions and how these elements relate to the artwork, and indeed artists themselves. This is an aspect that requires further attention in future research.

As the present study has shown, usability is integral for facilitating immersion in relation to AE. Likewise, different viewer groups undergo various types of experiences depending on their fields of interest and indeed, backgrounds of experience. In this study, the authors observed that those with stronger ICT backgrounds derived pleasure or enjoyment in these online art encounters through the immersion afforded by the interaction design and UX. Those who expressed prior interest in art generated more thoughts and associative responses to the artwork itself, based on the semantic value of the artwork – what the artwork was, how it was deliberated, what it was saying and indeed, who had produced it (the artist), their traditions and so forth. Thus, tech-savvy people appreciated the experience of the technology design, while those artistically inclined appreciated the art itself. Understanding experiential differences affords greater openings for development, viewer/consumer segmenting and scientific understandings of art, design and people in computer interaction. The findings from this study open up discussion on the fundamental differences, dynamics and relationships between art, design and technology experience, that combined may offer insight for the development of richer techno-cultural experiences in the future.

Online exhibitions pose challenges for the contextualization of art that serves as the main reference or anchor point for advanced art appreciation. This is important to remember from the perspective of the psychology of art in that context has the power to radically change meaning and the associations it induces, very similarly to the way in which it affects UX – use purpose, context and conditions can change the experience of a design completely [39]. Yet in art, as in UX scholarship, there is a constant search for universal laws. Likewise, similar to UX, scholars search and argue for human universals regarding pleasure, creativity, style, virtuosity, imaginative experience and special focus [40][41][42]. There may be levels such as those existing on the basic exposure level of reactions towards color selection, scale, material and content (e.g., violence) that transcends "time, place and culture", but art, as with UX and design in general, heavily hinges upon in appreciation and semantic value (practical or symbolic) learned information – knowledge.

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