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Exploratory Factor Analysis (EFA) to Examine Learner's Aesthetic Perceptions and Motivation Through their Aesthetic-Emotions in Informal Visual Environments

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Abstract: Concerns have been raised that today formal learning visual environments are designed without accounting for changes in learner's aesthetic perceptions and motivation. They essentially lack in reflecting learners new schemas on digital environments, formed due to massive proliferation of media technologies rich in media aesthetics. This study investigates learner's aesthetic perceptions through their aesthetic-emotions in informal visual environments that become their aesthetic expectations from formal learning visual environments. This empirical study applies media psychology and examines aesthetic-emotion items, treated as adjectives associated with two motivational models as given by Keller and Malone and Lepper, suited for formal and informal visual environments, respectively. Exploratory Factor Analysis (EFA) is performed on aesthetic-emotion items in two studies for developing a scale measuring learner's motivation. The developed motivational scale unveils four dimensions, (1) Usability Perception, (2) Cognitive Engagement, (3) Visual and Aesthetic Appeal and (4) Satisfaction, where learner's experience visual gaps in a formal learning visual environment and have aesthetic expectations due to their prejudiced aesthetic perceptions in informal visual environments. In conclusion, the study essentially equates the four identified motivational dimensions and their respective aesthetic-emotions with aesthetic-designing parameters of formal learning visual environments and discusses from psychological perspective how the lack or absence of identified dimensions can instigate cognitive fatigue in learner's and lower their learning motivation in formal learning visual environments. Findings of this study are imperative considerations for aesthetic designing of today's formal learning visual environments.

Key words: Aesthetic-emotions, human computer interaction, aesthetic perceptions, motivation, visual learning environments, media psychology

INTRODUCTION

Today, formal learning visual environments are facing a central designing problem to instigate positive learning behavior and motivation on part of learner's (Parrish, 2006). A learner is a person who is interacting and is engaged in an active learning process through educational material delivered by the learning environment.

Learning to learn from the learning environment is an important designing concern (Ozel *et al.*, 2007) because e-learning has become a major component in academic world today (Jayanthi *et al.*, 2007). There are also numerous studies that outline specific manners by which learning and learning processes can be enhanced (Zahrani, 2010). Unfortunately, relationship of learning environment to its aesthetic designing and influence upon

learner's learning motivation lacks empirical and theoretical research. Although researchers claim that aesthetic qualities of an online learning environment has a very strong and persuasive role in intensifying learning motivation (Parrish, 2007) due to all interactions occurring through visual and audio presentation (Wroblewski, 2005).

Robins and Holmes (2008) believed that an aesthetic design has an impact beyond decoration and according to Gagne's nine events of instruction (Öztemel and Yavuz, 2009) screen design has the initial role of gaining learner's attention. Research also shows that user-interface of the learning environment has a very strong impact on the learning experience and amount of knowledge to be retained by learners (Deubel, 2003). Likewise, learner's aesthetic perception is considered to be important determinant in designing effective

communication between them and the learning environment (Hoffmann and Krauss, 2004). However, to much our dismay, learner's aesthetic perceptions and motivation in visual environments are not sufficiently covered in existing literature.

This research thus formulates upon learner's aesthetic perception and motivation. It is argued that today proliferation of media technologies has created a new schema (set of aesthetic expectations) on the aesthetics of digital environments. Television, motion-pictures and visual computer or screen displays are no longer considered as means of simple message distribution by media researchers but essential elements for communicating media aesthetics (Zettl, 2008a). Learner's aesthetic perceptions are influenced by the explosion of media technologies, with which they interact in different informal visual environments, resultantly forming a new schema (set of aesthetic-expectations). This has made learner's perceptually selective in judging aesthetics of formal learning visual environment in a contextual frame of reference which leads to prejudiced aesthetic perceptions at times (Zettl, 2008b). Moreover, Graber (Graber, 1988) suggests that impact of prior information is profound in schematic thinking because it can affect kinds of details that will be absorbed by learner's and the perspectives from which the information will be viewed by them.

Formal learning visual environments today are designed by translating traditional learning environments to digital platforms without accounting for these changes in learner's aesthetic perceptions. They do not reflect new schemas of digital environments that are rich in media aesthetics. Due to the difference between what learner's aesthetically expect and what is there or if interaction involves a lot of cognitive work, they get fatigued which is know in some literature as ego depletion. The cognitive fatigue makes learner's unable to absorb new knowledge and if knowledge is not absorbed it means it has not been transmitted by the learning environment (Abdullah *et al.*, 2011). This fatigue leads to cognitive disengagement and lowers learning motivation of learner's in formal learning visual environments.

This study, therefore, examines what learner's aesthetically expect in a formal learning visual environment. It applies media psychology to examine learner's aesthetic perceptions, and motivation through their aesthetic-emotions associated with two motivational models, namely by Keller and Malone and Lepper. By performing exploratory factor analysis on aesthetic-emotion items in informal visual environments, a scale measuring motivation is developed. The key contribution of this study includes classification

of four motivational dimensions in informal visual environments where learner's experience visual gaps between what they aesthetically expect and what they see in a formal learning visual environment.

STUDY OBJECTIVES

- To develop a scale measuring motivation by examining learner's aesthetic perceptions through their aesthetic-emotions in informal visual environments
- To classify motivational dimensions on the basis of aesthetic-emotions of learners' in informal visual environments
- To equate identified motivational dimensions and their respective aesthetic-emotions, with aesthetic-designing parameters of formal learning visual environments
- To discuss from psychological perspective how the lack of identified motivational dimensions can instigate cognitive fatigue in learner's and lower their learning motivation in a formal learning visual environment

BACKGROUND

Here, we will discuss background of media psychology in context of its implications and how it differs from cognitive psychology. Then we will discuss Human Computer Interaction in context of its Usability Perception and Aesthetic Perception and how media psychology equates the two perceptions.

Media psychology: Plentiful research and literature is available to address the cognitive disengagement of learner's in formal learning visual environments, with central focus mostly revolving around cognitive psychology (Riaz *et al.*, 2010b). Cognitive psychology is a discipline within psychology that investigates mental thought processes, such as visual processing, memory, problem solving and language (Riaz *et al.*, 2010c). However, this research applies media psychology which unlike cognitive psychology, studies the interaction of human experience and media technologies.

While cognitive psychology is the study of cognitive processing and perceptual structures (how we process information, make mental models, attention, perception), media psychology draws on many areas of psychological specialization (including cognitive psychology) to apply to interaction with media, such as developmental psychology (different stages of emotional, cognitive and physical development across the lifespan), cultural

psychology (an appreciation of how different people and cultures have different standards and goals and how that is part of the cognitive process) and positive psychology (what makes people function better both behaviorally and emotionally).

Media Psychologist, Rutledge (2010) refers to media psychology as a study of reciprocal relationship of human media interaction that combines understanding of human behavior, cognition and emotions. Media psychology not only examines the content; rather it looks at the functioning of the whole media interaction system in a continual loop. Just as Bandura's social cognitive theory describes the reciprocal action between environment, behavior and cognition, media psychology evaluates the whole interactive process of the system, starting with technology developers, content producers, content perceptions and user response.

Media psychology is relatively a new research field and has not been applied in the field of education (Giles, 2003). As mentioned earlier, media psychology looks at reciprocal relationship of human-media interaction, by examining how humans' interaction of media has influenced upon their *cognition system* which is described as a thought process governed by human experiences, prior knowledge and schemas (Riding and Matthias, 1991) and behavior which is understood as how humans take actions or react in response to external or internal stimuli.

The study objectives of this study are more appropriately met by applying media psychology because the purpose is to investigate what learner's aesthetically expect in formal learning visual environments and cognitive psychology being related to mental thought processes examines 'how learner's perceive aesthetics of a formal learning visual environment?'. This does not indicate what expectations they have. On the contrary, as mentioned earlier, media psychology evaluates the whole human media interaction process; therefore, in addition to examining how learner's perceive aesthetics of a formal learning visual environment, it also looks at the whole interactive process by examining 'how the same is reflected in their aesthetic perceptions and motivation in formal learning visual environments?'.
Human computer interaction: Study of HCI is about human actions that involve operations to be carried out by computers. This is an active process, where humans and computers constantly take turns in their actions and operations, as a result of which, interaction occurs. The interaction of human and computers involves sensory perception and interpretation, thus role of aesthetics is

indispensable in making this interaction, interactive, satisfying and pleasurable (Lee, 2007).

Within HCI, there has been an ongoing battle of perceptions among those who develop user-interfaces, namely usability experts and the graphic designers (Cloninger, 2000). The usability experts insist upon developing interfaces simple and easy so that tasks may be accomplished easily, while the effectiveness and efficiency of the system could be maximized. The stance of graphic designers, however, is to develop aesthetic user-interfaces for getting attention and creating an aesthetic experience for the viewers. Between the two, usability has been of a great concern within the HCI community but making its comparison with aesthetics is unfair and is only possible if aesthetics is destroyed to some sort of measuring instrument. Usability experts consider aesthetics to be non-instrumental when comparing it with more instrumental components such as usability and functionality (Mahlke, 2005). This icing on the cake stance on aesthetics (Bertelsen and Pold, 2004) has been negated by Forlizzi and Battarbee (2004) because for computers, usability acts like a realistic tool that determines effectiveness, efficiency and satisfaction. Quite the opposite, aesthetics is a matter of contemplative reasoning and whole interaction experience of humans with computers is based upon their aesthetic-judgments.

Moreover, studies in HCI have even reported that user aesthetic perceptions for applications subconsciously play a significant role in shaping up their usability perception of the system. For example, a study conducted in this regard showed people reporting higher satisfaction with a system based on how aesthetically appealing and pleasing it looked to them. This aesthetic perception positively enhanced the perceived usability of the system, even when the system was not really usable (Tractinsky *et al.*, 2000). Thus, within human computer interaction, an emerging research area is to investigate how humans perceive aesthetics and how from psychological point of view, their aesthetic perceptions eventually influence upon their usability-perceptions (Zhang and Li, 2005).

Aesthetic perception: Aesthetics is a philosophical branch related to the expression of beauty. The word aesthetic comes from the Greek, *aisthanomai*, meaning to perceive, to sense (Riaz *et al.*, 2010c). The sense or perception of aesthetics is not something that forms passively; rather it is an active process where impressions are embossed on the minds of viewers due to the constant responding of brain to the environment and objects for making meaning, deriving an idea or some kind of satisfaction (Mitias, 1988). Likewise, aesthetics of a

learning environment are recognized as parallel to desire to learn or positive attitude towards content (Parrish, 2006). Use of different multimedia alone can not necessarily enhance the aesthetic appeal of the learning environment. But where those components are placed (Mott, 2006) and how does the aesthetic feel of the learning environment, motivationally affects learners.

Measuring an aesthetic perception can be cumbersome and difficult since it is largely believed to be a subjective judgment that is not rooted in any preconceived notion of purpose. Hume and Krant (Hagman, 2005) are noteworthy researchers in modern aesthetic approach and psychology of art and according to them for an aesthetic perception and experience, formal characteristics of objects are important to the extent that they evoke an inner knowledge or feeling associated with the idea or emotion. Higgins (2008) also argues that there is lack of research on role of emotions in aesthetic experience which extensively requires integration of psychology of emotions so as to do justice to the emotions so prized in aesthetic realm. This has also been the finding of Thuring and Mahike (2007) that aesthetics does have a major effect on users' emotional valence and physiological arousal.

In context of learner's aesthetic perceptions, this research argues that formal learning visual environments today are designed without accounting for changes in learner's aesthetic perceptions that have occurred due to proliferation of media technologies. For example, television, motion-pictures and visual screens or computer displays are no longer considered as means of simple message distribution by researchers but essential elements for communicating media aesthetics (Zettl, 2008a). Likewise, Gurri *et al.* (2010) in their article 'our visual persuasion gaps' observe the influence of visual media by referring to it as literally being everywhere which has spread across the globe in the form of still or moving images. There is hardly any place left where one can escape the exposure of visual media, since today they are in shopping malls, restaurants, gas stations, airports and even at our workplace. Learner's aesthetic perceptions are thus influenced by the aesthetics of visual media technologies, with which they interact in different informal visual environments. This resultantly has formed a new schema (set of aesthetic expectations). Moreover, from psychology we know that human brain stores information with regards to human experiences which is used to filter unnecessary information. This filtration of the brain makes learner's perceptually selective in judging aesthetics of formal learning visual environment which happens in a contextual frame of reference and leads to prejudiced aesthetic perceptions (Zettl, 2008b). And when this filtration creates a big difference between what learner's

aesthetically expect and what actually is there, they get cognitively fatigued or a situation known as ego-depletion which lowers their learning motivation in a formal learning visual environment.

Usability perception: Interaction designers strive to create products and services (such as computers, mobile devices and embedded information technology appliances etc.) for developing their meaningful associations with the users and by examining social complexities of the physical world (Malcom, 2004). Such complexities are addressed within Human Computer Interaction under the discipline of Ergonomics which studies limitations of the human factor when interacting with systems. Ergonomics addresses the human factor limitations for designing of the digital environments in view of those limitations for extending usability and making human computer interaction conducive, efficient and usable (Riaz *et al.*, 2010c).

Human physiology and cognition are central issues to ergonomics and media psychology also looks at the experiential human interaction with objects and environments across the lifespan but with a different perspective (Rutledge, 2008). Media psychology examines usability of media technologies by way of cognitive ergonomics which is based on studying human perceptions, that act as limitations and influence upon usability perception of the system. These perceptual limitations are studied through self-reflection of users under media psychology, when interacting with a system, e.g.,

- Did this experience make me feel competent or incompetent?
- Was I able to make a good decision as a decision-maker?
- Was I engaged at an appropriate level-not too hard or too easy-so that I feel effective and energized?
- Was the lay-out or design aesthetically pleasing contributing to my overall mood?

Media psychology, is thus the bridge between the two perceptions, since it determines aesthetic perception of media technologies by translating visual experience of users into their schematic thinking and at the same time ascertains their usability perception by examining the impact of psychological usability of media technologies on emotional experiences of users.

LITERATURE REVIEW

Emotions associated with our daily life experiences reflect our state-of-mind or feelings. This also indicates our involvement and appreciation from motivational

perspective. But that also does not mean emotion = our aesthetic perceptions or emotion = motivation. Emotions are considered as complex experiences, hard to quantify. They occur in response to certain thoughts or stimuli due to our excited state of mind, reaction or feeling.

In this section we will focus upon use of emotions in IS research and discuss relevant literature to reflect upon aesthetic perceptions and motivation through aesthetic-emotions of learners.

Emotions as aesthetic perception: Swiss Center for Affective Sciences defines aesthetic-emotion as an emotional experience that one goes through during an aesthetic activity or appreciation. This experience can be expressed in variety of emotional states (such as fear, wonder or sympathy) or may be quite specific to aesthetic contexts.

Research on computer interface designing considers aesthetics to be a strong determinant of users' satisfaction and pleasure (Tractinsky, 2004) which are emotional states. These emotional states are based on physiological arousal, expressive behaviors and conscious experience (David, 2004). That is why emotional aesthetic experiences vary as per users' respective mood, temperament, personality and motivation. This is also endorsed by Appraisal Theory which is an advocate of the fact that users appraisal is based upon emotions build due to their personality relevant information (Lazarus, 2001). Use of emotions is extensively done to measure affective perceptions (Lang *et al.*, 1998) and aesthetic critiques establish a very strong relationship between emotion and aesthetic value and refer to beauty appreciation as an emotional state (Prinz, 2007). Therefore, emotions can be used to reflection upon learner's aesthetic perceptions in formal and informal visual environments.

Emotions as motivation: Abraham Maslow, known for Maslow's hierarchy of needs, had refined his famous model to include a new need level need for aesthetics and knowledge between esteem needs and self-actualization. This indicates that humans are naturally motivated by their aesthetic needs as some form of aesthetic appreciation is universal to human nature (Denis, 2002).

Research in aesthetics also shows that people are motivated to resolve inconsistency, vagueness or imbalances that they encounter in their environment. A study conducted by Pavlova *et al.* (2005) examined the role of emotions in the dynamics of different shapes and found that unusual shapes that were obscure or imbalance, strongly correlated with pessimistic or negative feelings like suffering or fear. Motivation hence is also an emotion or a sense of feeling that captivates positive senses in our brain (Weiner, 1990).

Motivation has become a buzz word of today among researchers who are interested in finding critical factors for sustaining learner's involvement in a learning environment. Motivation psychologists classify motivation to be intrinsic and extrinsic in nature. Intrinsic motivation originates from within learner's and directs their behavior or attitude towards learning. While, extrinsic motivation is led by external influences that are not in control of learners, for example, reward, appraisal, grades, promotion etc. A comparative-descriptive study to determine educational adjustment and motivation power between four academic majors showed that students of human sciences and engineering depicted positive attitude or higher intrinsic motivation towards university than medical and paramedical students (Ahmadi *et al.*, 2009). Thus, intrinsic motivation is considered to be more influential because intrinsically motivating activities are those in which learner's choose to participate for no external reward or pressure.

Likewise, our previous study on investigating learning motivation factors in formal and informal visual environments reported higher intrinsic motivation of learner's for informal visual environments (such as video-games, motion-pictures or social networking websites) than for formal learning visual environments (Riaz *et al.*, 2010a). This is because informal visual environments promote informal learning by instigating intrinsic motivation through leisure, fun and entertainment activities (Hayes, 2004). This is supported by researchers who argue (Hanley, 2008) that informal visual environments have motivating consequences that may lead to unintentional discovery learning (Hanley, 2008). By understanding learner's aesthetic perceptions in informal visual environments, instructional designers will be able to motivationally design formal learning visual environments.

Emotions equate aesthetic perceptions and motivation and the objective of this study is to develop a motivation scale on the basis of aesthetic-emotions of learner's in informal visual environments. The scale will study difference between learner's aesthetic perceptions in informal and formal learning visual environments. To achieve study objectives it is essential to integrate two motivational models in this research, one focusing upon characteristics of formal while other on characteristics of informal visual environments.

RELATED STUDIES

Here, we will review the work of other researchers and identify a potential research gap that this study will fulfill.

Mahlke (2005) studied the influence of perceived usability and visual aesthetics on user's emotional reactions and examined the effect of user characteristics and contextual parameters on these relations. Lavie and Tractinsky (2004) conducted a study to determine dimensions of perceived visual aesthetic of websites by developing aesthetic measuring scale, using exploratory and confirmatory factor analyses. Mehrabian and Russell (1975) environmental psychologist measured people's emotional responses in different environments and experimented with hundreds of environments, asking subjects to put their emotional responses on a continuum between two adjectives. Their findings were also based on factor analysis and revealed that much of the variance in descriptions of emotions can be boiled down to 2 dimensions, (1) Pleasure and (2) Arousal.

The studies reviewed in this section examine users' aesthetic perceptions or aesthetic evaluation through their aesthetic-emotions. Similarly, no study was found where aesthetic-emotions in context of motivational variables were investigated. This study therefore addresses a potential research gap identified in literature.

METHODS AND PROCEDURE

After reviewing literature and related studies in IS research, methodology based on performing exploratory factor analysis on aesthetic-emotions was selected. Exploratory Factor Analysis (EFA) was performed in SPSS v.11.

This study treats aesthetic-emotions as adjectives, associated with motivational variables in two motivational models, one essentially meant for formal, while other for informal visual environments. It was done to construct a common foundation of aesthetic-emotions associated with the two motivational models. In order to develop scale, two studies were carried out which were voluntarily supported by undergraduate IT students at Universiti Teknologi PETRONAS (to secure a class participation point).

The study results were used to develop a motivation measuring scale based on learner's aesthetic-emotions in informal visual environments. Since this research also integrated a motivational model meant for formal learning visual environments, therefore, the developed scale highlighted learner's sets of aesthetic expectations from formal learning visual environments through their aesthetic perceptions in informal visual environments. The developed scale was classified into four motivational dimensions that directed towards different aspects of

learner's aesthetic expectations. The study discusses how their absence can instigate cognitive fatigue in learner's and lower their learning motivation.

Selection of motivational models: Learner's intrinsic motivation is an area of interest for instructional designers and critical for the success of both, formal and informal visual environments. In web-based learning environments, formal and informal learning may not be considered as completely distinct entities but rather as being part of a continuum. Therefore, in this study we identified two motivational models given by (1) John Keller and (2) Malone and Lepper.

Keller's model adopts a more formal approach by viewing motivation from behavioristic perspective and is suited for formal learning environments, while Malone and Lepper's model integrates casual dimensions for designing intrinsically motivating environments and is best suited for multimedia based learning environments which are visually informal in nature (Conlon, 2003). The two models share a certain degree of overlap as well in terms of their motivational variables. For example, attention and curiosity are related concepts and motivational critiques, Hardre (2001) suggests that an integration of the two may provide an optimal instructional design model. Also no study was found in the literature that had integrated the two models (Baker, 2003). So integration of the two motivational models is considered important for aesthetic designing of visual learning environments.

Keller's model: Keller's ARCS model is a problem solving approach for designing motivational aspects of learning environments to stimulate and sustain students' learning motivation (Keller, 1983, 1984, 1987). The model is grounded in expectancy-value theory, reinforcement theory, cognitive evaluation theory and explains relationship between effort, performance and satisfaction (Keller, 2006). It is predominately used in formal learning environments since it helps designers identify and solve specific motivational problems related to the appeal of instruction (Keller, 2006). This model (Table 1) has been validated by numerous studies, at different educational levels across different cultures. It has following four categories of motivational variables:

Malone and Lepper's model: Malone and Lepper's (1987) indicated that intrinsic motivation is more successful than extrinsic motivation in terms of reinforcing desired learning behavior. Malone and Lepper proposed a model based on causal motivational variables, exclusively for

Table 1: Keller's motivational model

- **Attention:** Attention is grabbed in a learning environment by using colors, creating novelty, providing interaction, generating participation, wittiness and sound effects
- **Relevance:** By providing realistic scenario, a meaningful contextual interpretation is created between the learner and the learning environment
- **Confidence:** Engagement provided by the learning environment tends to enhance learners' confidence level and proves to be a confidence-building experience for them
- **Satisfaction:** By accepting the benefits of learning environment and expressing aspiration to continue pursuing similar goals through it, indicates satisfaction on part of learners

Table 2: Malone and Lepper's motivational model

1. **Challenging:** The difficulty of the activities to be performed by learners should be kept at an optimal level, otherwise they will get bored or frustrated
2. **Curiosity:** To enhance sensory and cognitive curiosity in activities to be performed by learners, the environment may be designed as such to make learners believe that their current knowledge structure is incomplete, incompatible, or vague
3. **Control:** The learning environment should promote a positive sense of control in learners, so that they are aware of the fact that their learning outcomes are dependent upon their own actions
4. **Fantasy:** Cognitive engagement to be provided by learners by making them experience situations in fantasy contexts that are not actually present, but intrinsically motivating

multimedia based learning environments such as games and other interactive visual environments. Likewise, informal visual environments are tactical, provide flexible learning-space, empower learner's and are casual in nature. This model (Table 2) is, therefore, best suited to meet the requirements of the informal learning visual environments and has the following four intrinsically motivational variables.

Item generation for aesthetic-emotions: As a first step towards merging the two motivational models, adjectives that represented certain form of aesthetic-emotional responses were required. Motivational factors in Keller's Model (Attention, Relevance, Confidence, Satisfaction) and Malone and Lepper's Model (Challenge, Curiosity, Control, Fantasy) were used to determine aesthetic-emotions items for each motivational factor. Three sources were used:

- Reviewing literature on use of emotions to measure aesthetic perception and motivation
- 42 undergraduate business and cyber law students were assigned the task to provide lists of aesthetic-emotions that are adequately inculcated by Keller and Malone and Lepper's motivational factors. The students worked in groups and provided the initial lists
- Expert recommendation of 1 web-designer, 2 HCI researchers and 1 Media Psychologist was also obtained in the initial list of variables

The lists of variables were carefully examined, checked and cleared for duplication or opposite words and a comprehensive list of 54 aesthetic-emotions (items) was compiled (Appendix A).

Study 1

Purpose: The purpose of first study was to assess aesthetic-emotion items (Appendix A) by checking for duplications, discovering confusing items and refining the list after the preliminary visual screening and Exploratory Factor Analysis (EFA). The eigenvalues >1 were scrutinized while un-rotated factor solution and scree plot recommendation was also considered before moving on to the next explorative phase.

Participants: Thirty eight undergraduate business and cyber law students (21 male and 17 female with an average age of 20) participated in the visual screening test to secure a class participation point.

Selection of Website: The selection of website was done by keeping in view primary objective of the research which is to propose an aesthetic perception and motivation evaluation model by examining learner's schematic thinking in formal and informal visual environments. While the sub-objectives of the research, for which this study has been carried out, was to develop a scale measuring motivation on the basis of aesthetic-emotions of learner's in informal visual environments.

The selection of the website was important as it required being the one that adequately involved learner's schematic thinking in informal visual environments. Researchers believe our schemas are reflected in our lifestyle's associations (Graber, 1988). Since this study involved Malaysian students, with an average age of less or equal to 20, therefore, it was important to find out lifestyle associations of teenagers or young Malaysian learners.

According to Education and Research Association for Consumers, Malaysia, 30% Malaysian teenagers watch over eight hours of television a day during holidays and are exposed to over two and half hours of advertisements a day. Television or advertisements run on an informal visual environment and fast food companies in Malaysia generate about US\$ 28 million revenue a year by way of advertising through TV, newspapers and billboards. Therefore, for the first visual screening test, websites of two popular fast food brands in Malaysia were selected.

Procedure: All participants were individually supervised in a computer laboratory and were randomly instructed to

visit one of the two websites under assessment, (1) McDonalds Malaysia <http://www.mcdonalds.com.my/> (2) Burger King Malaysia <http://www.burgerking.com.my/>. They were provided a hardcopy of the questionnaire for indicating their response by evaluating the website on each aesthetic-emotion by using a 7 point scale ranging from (1) strongly disagree to (7) strongly agree. After the rating, the participants were asked to indicate their views on the set of aesthetic-emotions (items) and recommend additional aesthetic-emotions, if they thought were missing from the original list.

Initial solution: Out of 54, thirteen aesthetic-emotion items emerged with eigenvalues greater than 1.00, explaining 66.3% of the total variance. Cattell's Scree Plot (a line graph of eigen values that depicts amount of variance explained by each factor) indicated a cut-off at a 5-factor solution. This was because 6th factor onwards had failed to add appreciably to the cumulative explained variance.

On the basis of initial solution, the list was thoroughly reviewed and modified by keeping in view loadings of items that were less than 0.5, as well as items that depicted either high cross-loadings or did not load high at all 17 additions were also made as per the following qualitative feedback of the respondents on the list of aesthetic-emotions (Appendix B).

Qualitative feedback of the respondents on Burger King's website is reproduced below:

- 1 'sudden appearance of things in the main menu is quite mysterious'
- 2 'have fun with the King' phrase reminds me of my childhood memories'
- 3 'advertisements are striking'
- 4 'Well-informed website'
- 5 'Color-combination of red background with yellow text is in harmony with the logo of BK'
- 6 'Very arousing!!'
- 7 'The website lacks in depicting the true eminence of Burger King'

Qualitative feedback of the respondents on McDonald's website is reproduced below:

- 1 'Reminds me of guilty pleasures that I have had at McDonalds with my friends'
- 2 'The image of joker standing (in the main menu) is very gimmicky'
- 3 'I feel happy to see this website'
- 4 'The website isn't interactive, it is important to intensify user's involvement'

- 5 'The kid's zone section needs a more realistic or a personalized touch'
- 6 'I feel like a resourceful person after reading all these nutritional facts'
- 7 'The website isn't stimulating at all'
- 8 'Extremely colorful website, with good combination of design, pattern and content'

The revised list of 59 aesthetic-emotion items was prepared (Appendix C).

Study 2

Purpose: The second study was conducted to develop a scale by further reducing 59 aesthetic-emotion items and classifying them into motivational dimensions (Appendix C). This time KMO and Bartlett's test of sphericity were computed, eigenvalues>1 were requested, factor loadings<0.2 were suppressed and unrotated factor solution along with Cattell's Scree Plot were also examined.

Participants: Thirty four undergraduate business and cyber law students (16 male and 18 female with an average age of 20) participated in the visual screening and evaluation test, to secure a class participation point.

Selection of the website: For the second screening test, it was decided to select a website that adequately reflected upon aspirations of younger generation and at the same time association of an average Malaysian.

According to a survey done by the Statistic Department for the Economic Planning Unit (Wealth Management, 2007), published in Personal Money Magazine June 2008, a typical family in Malaysia earns only RM 3686/month. This amount is sufficient to pay for a new car because the local automotives such as Proton and Pordua are economical, e.g., around 546,000 cars were sold in 2009 and the forecasted number substantially exceeded 568,000 in 2010 (Bell, 2010). Moreover, this sector is also very competitive as YB Tan Sri Nor Mohamed Yacop, in PVA International Conference held at Kuala Lumpur in 2006 said that Malaysia is the only developing country in the world to have its own full automotive design and engineering capability.

Therefore, for the second visual screening test, Malaysian local automotive sector was selected, since it has significantly contributed towards Malaysian economic growth and progress. Malaysians are generally said to take great pride in their automotive sector's development (Ward, 2001) and their true aspirations are reflected in it.

Procedure: All participants were individually supervised in a computer laboratory and were instructed to visit one of the two websites (1) Perodua Malaysia <http://www.perodua.com.my/> (2) Proton Malaysia <http://www.proton.com/>. The participants were provided a hardcopy of the questionnaire for indicating their response by evaluating the website on each aesthetic-emotion by using a 7 point scale ranging from (1) strongly disagree to (7) strongly agree. 14 students evaluated Perodua Malaysia's website, while 13 students were assigned Proton Malaysia's website for evaluation.

Initial solution: Out of 59, twenty-eight (28) aesthetic-emotion items emerged with eigenvalues greater than 1.00. The cumulative % of variance explained by the first four factors was 74.4%, indicating that about 74% of the common variance, as shared by 28 aesthetic-emotions, can be predicted by 4 factors alone. The recommended four factor solution was preferred because even on the Cattell's Scree Plot eigen values had immensely experienced a leveling off situation after the fourth factor. Moreover, inadequate primary loadings and complexity in deducing the fifth and subsequent factors also supported the four factor suggestion.

Degree of common variance among 28 aesthetic-emotions, as indicated by Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.743. The KMO value is always between 0 and 1 and the closer the value is to 1, better it is considered for factorization while values below 0.6 are considered unacceptable for factorization. In this case the value was above the recommended value of 0.6 and when referred to the interpretation table, it depicted middling adequacy for factorization (Table 3). Likewise, results of Bartlett's test of sphericity was also significant, ($\chi^2(55) = 496.536, p < .05$).

Finally, based on initial solution and Cattell's Scree Plot which indicated a higher likelihood of a 4-factor solution, 4 factors were extracted and rotated using the Oblimin method. This method was chosen because aesthetic-emotion items were not independent and overlapping was very much probable among related aesthetic-emotions.

Factor loading: EFA results depicted similar results for both individual websites, as well as for the combined data set of the websites. Principal Component analysis resulted in 28 interpretable factors explaining 74.4% of the total variance. Many of the factors were intercorrelated significantly. All 28 items had primary loadings of over 0.5 while 9 items had high cross-loadings of >0.5 and were

dropped from the list. Likewise, 22 items did not load high on any of the four factors and so were also dropped.

Classification of motivational dimensions: Aesthetic-emotion items that were significantly correlated appeared together with high loadings (>0.5). This indicated together they were measuring a common motivational dimension.

As a next step, it was important to classify motivational dimensions that were commonly measured by correlated aesthetic-emotion items and had loaded on to the four factor solution (Table 4).

Eight aesthetic-emotion items loaded high on the first factor, out of which 5 were identified as related to usefulness of the website, (easiness 0.835, resourceful 0.913, organized 0.923, informed 0.770, orientation 0.644). While aesthetic-emotions, decisiveness (0.625), personalized (0.926) and realistic (0.846), add aesthetic-motivational value to the usefulness of the website by way of instigating control and creating relevance in the visual experience and influence upon overall usability perception. Therefore, first motivational dimension was classified as usability Perception.

Seven aesthetic-emotion items loaded high on the second factor, out of which 5 aesthetic-emotion items, (elegant 0.825, colorful 0.782, inspirational 0.771, mesmerizing 0.745, imaginative 0.652) directed towards aesthetic appeal of the website and also originated from the same motivational factor fantasy. However, aesthetic-emotion items thoughtful (0.522) and affective (0.548) are sentimental states based on motivational factor attention. Therefore, the second motivational dimension was classified as visual and aesthetic appeal.

Table 3: Interpretation of the KMO as characterized by Kaiser, Meyer and Olkin

KMO value	Degree of common variance
0.90 to 1.00	Marvelous
0.80 to 0.89	Meritorious
0.70 to 0.79	Middling
0.60 to 0.69	Mediocre
0.50 to 0.59	Miserable
0.00 to 0.49	Don't Factor

Table 4: Classification of Motivational Dimensions

Usability perception	Visual and aesthetic appeal	Cognitive engagement	Satisfaction
Easiness	Elegant	Innovative	Ego Gratification
Resourceful	Inspirational	Interesting	Happy
Organized	Imaginative	Interactive	Energized
Decisiveness	Mesmerizing	Stimulating	Eminence
Informed	Thoughtful	Surprising	Reliable
Orientation	Colorful	Proficient	Memorable
Realistic	Affective		Relaxed
Personalized			

Six aesthetic-emotion items loaded high on the third factor, out of which 4 were identified to be representing users' engagement level (stimulating 0.868, interactive 0.811, innovative 0.615, proficient 0.621). While aesthetic-emotions interesting (0.936) and surprising (0.568), rely on cognitive paradigm and add aesthetic-motivational value to the engagement experience by retaining attention and generating curiosity. Therefore, the third motivational dimension was classified as cognitive engagement.

Seven aesthetic-emotion items loaded high on the fourth factor, of which 5 factors directed towards users' satisfaction since they all originated from the same motivational factor satisfaction, (ego-gratification 0.751, happy 0.855, reliable 0.657, relaxed 0.671, memorable 0.705). While aesthetic-emotion energized (0.625) is a reflection of user's confidence level and eminence (0.722) is a high-inclined emotional state based on motivational factor fantasy. These two aesthetic-emotion items significantly add aesthetic-motivational value to users' satisfaction level; therefore, the fourth motivational dimension was classified as satisfaction.

Reliability analysis: The reliability analysis of the four motivational dimensions was computed. Cronbach alpha indicates how well a set of items (or variables) measures a single uni-dimensional latent construct. Cronbach's alpha is usually low, if the data has multidimensional structures. All four motivational dimensions exceeded the acceptable standard of reliability analysis of 0.70 (Nunnally and Bernstein, 1994), indicating that measurement constructs of the four motivational dimensions based on aesthetic-emotions of learner's have met the acceptable standard of reliability (Table 5).

Once the four groups were categorized, their composite scores were also computed on the basis of mean score of aesthetic-emotions, with major loadings on each motivational dimension. High mean score suggests that users experienced a higher level of motivation on that particular motivational dimension.

Out of the four motivational dimensions, visual and Aesthetic Appeal received a notable high mean score of 3.78 as well as the highest α score of 0.77. Followed by motivational dimension Usability Perception (mean score 3.69, α score 0.74), Satisfaction (mean score 3.51, α score 0.71) and Engagement (mean score 3.32, α score 0.72). These findings suggest that learner's learning motivation

is immensely driven by visual and aesthetic appeal and usability perception of the informal visual environment. This is followed by satisfaction and cognitive engagement provided by the visual environment.

How good a fit is this Aesthetic-Emotion Solution?: The Bartlett's test of sphericity (Bartlett, 1950) and the Kaiser-Meyer-Olkin measure of sampling adequacy are acceptable measures to assist users in assessing the adequacy of their correlation matrices for factor analysis. KMO measure of sampling adequacy was 0.743 which as per the interpretation Table 3 falls within the 'middling range', i.e., 0.70-0.79. This indicates if factor analysis is conducted, the factors extracted will account for fair or adequate amount of variance. Also the percentage of variance accounted by both unrotated and rotated solutions was approximately same~75%.

Finally, the factor loading pattern for all four factors also emerged to be fairly clear with little or no ambiguity. As Gorsuch (1983) put it, 'If the simple structure is clear, any of the more popular procedures can be expected to lead to the same interpretations'.

DISCUSSION

This empirical study examines learner's aesthetic-emotions to reflect upon their aesthetic perceptions and motivation. Neurologists suggest that emotion plays an important role in human memory. Emotional responses are a reflection of the situations humans are in, influencing upon their interpretation of the environment and to make it worth remembering and recalling. Thus, emotions are a reflection of our schematic thinking and by scrutinizing aesthetic-emotions of learner's in an informal visual environment, it can be said that learner's new schemas or set of aesthetic expectations for digital environments are examined, that may subsequently be used to measure and compare their aesthetic perception and learning motivation in a formal learning visual environment.

Since no scale measuring aesthetics and motivation could be identified from the literature, therefore, this empirical study was conducted with the four sub-objectives that will now be individually discussed in this section.

The first study objective was to develop a motivation measuring scale. Exploratory factor analysis was conducted to determine number of continuous latent variables, referred as aesthetic-emotion items in this study, that were associated with the two motivational models, given by (1) John Keller and (2) Malone and Lepper. Visual screening tests were carried out on two

Table 5: Descriptive statistics

Motivational dimensions	No. of items	M (SD)	Alpha
Usability Perception	8	3.69 (0.64)	0.74
Visual and Aesthetic Appeal	7	3.78 (0.75)	0.77
Cognitive Engagement	6	3.32 (0.62)	0.72
Satisfaction	7	3.51 (0.88)	0.71

different informal visual environments to determine correlations among a set of observed aesthetic-emotion items. Four-factor solution was extracted using the Oblimin rotation method.

The second study objective was to classify aesthetic-emotion items, since the extracted four-factor solution pointed towards the four motivational dimensions. The motivational dimensions were classified as:

- (1) Usability perception
- (2) Visual and aesthetic appeal
- (3) Cognitive engagement
- (4) Satisfaction

The third study objective was to essentially equate motivational dimensions and their respective aesthetic-emotion items with aesthetic designing parameters of formal learning visual environments.

Aesthetic-designing parameters of each motivational dimension will now be discussed in context of formal learning visual environments:

- Usability perception is the perceived usefulness of the environment. In web-based learning, learner's usability perception is governed by hypermedia applications that provide structural freedom and navigational support to the learning environment. Aesthetic-emotion items related to this motivational dimension measure the suggested aesthetic-designing parameters of the formal learning visual environments as discussed in Table 6
- A learning environment can be as simple as a nice HTML website based on principles of good graphic design or can be an elaborative fully scripted visual experience with high quality production. But if it is not aesthetically appealing to learner's, it will not be registered. Thus, need for aesthetics comes natural to humans and aesthetics of a formal learning visual environment has more to do with its feel and experience which are highly subjective in nature. Aesthetic-emotion items related to second motivational dimension, Visual and Aesthetics appeal, measure the feel of the formal learning visual environments and aesthetic-designing parameters are suggested in Table 7
- An aesthetically designed learning environment not only should present content material in an interesting manner but also engage learner's cognitively. If learner's are able to interpret their interaction experience in a definite way, then the content presented to them was clearly meaningful. Aesthetic-emotions associated with third motivational dimension, Cognitive Engagement,

Table 6: Motivational dimension-usability perception

Aesthetic-emotions	Aesthetic-designing parameters for formal learning emotions visual environments
Easiness	How accessible the information is in the learning environment and how easy it is to use and learn from simulations, modeling, charts, videos, graphics, animations and modern instructional techniques?
Usefulness	How useful the learning environment is in terms of supporting adaptive learning which can be used by anyone, regardless of their learning objectives or digital skills?
Organized	How organized the learning environment is in its navigational structure, visual presentation and providing self-organized learning?
Orientation	Does the learning environment provide concept maps as graphical representation of relationships among concepts for their quick orientation?
Decisiveness	How does the learning environment promote decisiveness and self-determination in learner's through their active participation?
Informed	How does the learning environment fosters meaningful and productive learning in learner's by using complex and contextual situations?
Realistic	How well the virtual aspects of the learning environment are designed to cater for realistic needs of learner's such as self assessment and peer assessment in virtual classrooms?
Personalized	How learner's scaffolding needs are met by (i) linking their prior knowledge to present learning, (ii) guiding learner's through the multifaceted simulation activities and (iii) helping learners in reflecting upon their experiences by linking relevant theoretical frameworks.

Table 7: Motivational dimension-visual and aesthetic appeal

Aesthetic-emotions	Aesthetic-designing parameters for formal learning visual environments
Elegant	How do the visual elements of the learning environment elegantly connect together to inspire learning motivation?
Inspirational	How does the learning environment inspires upon learning motivation by (i) using anecdotes for providing illustration of the concepts, real-world situations and abstract ideas and (ii) providing interactivity to create engaging and motivating content?
Imaginative	How imaginative the learning environment is in terms of designing its learning segments as a story, by including history, prologues, actions, animations, establishing characters and moving story forward towards a climax. Along the way, how does it incorporate the necessary knowledge and skills, challenges and quizzes learner's on relevant matters?
Mesmerizing	How does the learning environment mesmerizes learner's (I) by using visuals that support the message of the content and also represent one or more of its key elements (ii) by enhancing visual interest and retention in animations, graphics, simulations etc. and (iii) by conveying complex information in an entertaining way.
Thoughtful	How thoughtful is the narrative structure of the learning environment?
Colorful	How colorful the learning environment in terms of (i) truly representing its brand identity (ii) expressing emotions (iii) being visually aesthetic and (iv) influencing upon learning motivation.
Affective	How affective is the learning environment in communicating its emotions as an instructional medium and also reflecting upon those of learners?

measure learner's interaction experience in formal learning visual environments and suggested aesthetic-designing parameters are discussed in Table 8

Table 8: Motivational dimension-cognitive engagement

Aesthetic-emotions	Aesthetic-designing parameters for formal learning visual environments
Innovative	How innovative the learning environment is in terms of providing innovative learning situations, based on adaptive systems, intelligent tutoring, conversational and advisory systems?
Interesting	How does the learning environment sustains interest of the learner's by using audio/visual materials, progressive disclosures, games, puzzles and quizzes?
Interactive	How does the learning environment supports (i) ubiquitous learning (i.e., just in time, any time, anywhere), (ii) enables learner's to locate digital information artifacts important to a concept (media files, slide presentations, web pages, etc.) and (iii) uses Interactive video and audio technologies?
Stimulating	How the learning environment stimulates learning through (I) informal knowledge exchange networks, (ii) participation in online discussion and (iii) collaborative learning processes?
Surprising	How does the learning environment surprises by throwing new learning challenges that are neither too difficult nor too easy? Does the difficulty level of the next challenge increases at the right pace, once the learner successfully completes a given task or challenge?
Proficient	How proficient the learning environment is in terms of (i) using appropriate language comprehensible to learner's, (ii) designing of the environment by keeping in view digital skills of the learner's and (iii) coordination of imagery, auditory/verbal processing?

- Learning that occurs without meeting its desired learning objectives is considered futile. And in case of formal learning visual environments, learner's are the best judge to decide this. The aesthetic-emotions related to the fourth motivational dimension, Satisfaction, point towards learner's endorsement from learning perspective and measure the following suggested aesthetic-designing parameters as mentioned in Table 9

Finally, the fourth objective of this study was to discuss from psychological perspective how the lack of identified motivational dimensions can instigate cognitive fatigue in learners and lower their learning motivation in a formal learning visual environment.

In psychology, the term cognitive fatigue or ego-depletion is referred to the idea that self-regulated thinking or behavior is an exhaustible resource that can be used up, in a rational or a linear way (Grinsven and Tillema, 2006). It is an important concept, because in formal learning visual environments, learning immensely depends upon learner's self-regulated behavior which is controlled by intrinsic motivation.

Cognitive fatigue becomes more pronounced when people are provided with vast amount of information related to a topic that they don't have ability or desire to understand, either because it is complex or confusing. This is also true for learner's in a formal learning visual environment, where they are flooded with different

Table 9: Motivational dimension-satisfaction

Aesthetic-Emotions	Aesthetic-designing parameters for formal learning visual environments
Ego-gratification	Did learner's experience a state of ego-gratification at the completion of learning tasks?
Happy	Does the learning environment employs positive psychology to create an environment that fosters happiness as a feeling translated into learning activities, while limiting the feeling of anxiety and stress?
Energized	In order to cater for the ability, different interests and preferred learning styles of the learner's, does the learning environment energizes their learning behavior, by appropriately using worksheets, exercises, games, music, films, documentaries, literature, newspapers, internet resources, text books and revision guides?
Eminence	How the learning environment reflects and maintains its institutional eminence? How is it absorbed by learner's?
Reliable	Do learner's consider content material distributed by the learning environment as being reliable? Moreover, how do learner's sense about their personal privacy being at stake?
Memorable	Do learner's consider their interaction experience with learning environment as memorable?
Relaxed	Do learner's consider their interaction experience with learning environment as relaxed?

information, irrespective of their interest and motivation. In such a situation, learner's relay on their prior or stored information (schemas) to make quick judgments, based on aesthetic layout of the information, colors, texture, visual appeal, narrative style of the content presented etc. These judgments surface due to the information processing by brain at the logical reasoning level which is very limited and enforces decisions to be taken more rationally, such as based on emotions because that requires little cognitive effort. So if learner's judgment depicts higher learning motivation, it means they are experiencing lesser ego or cognitive depletion and vice versa. It is also established in psychology that ego or cognitive depletion leads to impaired performance on tasks requiring higher level of cognitive control or thinking. According to the control theory of self-regulation, human behavior is a result of two directional perspectives (i) how they are doing in meeting their goals and (ii) how they close any gaps that they experience between their actual and desired behavior. This suggests that lesser the gaps in what learner's expect or desire to see and what actually is there in visual environments, higher the likelihood of self-regulated learning behavior and learning motivation.

When learner's report lack of learning motivation, experience stress or pressure in relating or understanding what they are seeing or are unable to pay attention to the content of the visual learning environment, it indicates existence of higher visual gaps in what they are expecting and what they actually there and this study has identified four motivational dimensions where learner's may experience cognitive fatigue due to gaps in what they expect and what they find. To ascertain higher learning motivation in formal learning visual environments,

instructional designers are suggested to design them in view of learner's set of aesthetic expectations from digital environments.

CONCLUSIONS

In this study we have argued that today traditional learning environments do not account for the change in learner's aesthetic perceptions that have occurred due to the massive explosion of media technologies, in nearly every aspect of their lives. Informal visual environments that learner's interact with, such as video-games, motion-pictures and social networking websites are media rich in aesthetics. Their aesthetic perceptions have thus altered and in formal learning visual environments difference between what learner's aesthetically expect due to their altered aesthetic perceptions and what is there, they get cognitively fatigued. This fatigue lowers their learning motivation in a formal learning visual environment.

In order to deduce what learner's aesthetically expect from formal learning visual environments, this study was conducted (i) to develop a scale measuring motivation by examining learner's aesthetic perceptions through their aesthetic-emotions in informal visual environments (ii) to classify motivational dimensions as measured by their respective aesthetic-emotions (iii) equate motivational dimensions in context of aesthetic-designing parameters for formal learning visual environments and (iv) discuss how the lack or absence of identified motivational dimensions can instigate cognitive fatigue and lower learning motivation in formal learning visual environments. The study integrated media psychology to understand human media interaction behavior by essentially combining human behavior, cognition and emotions.

The study results were used to develop a scale measuring aesthetic-emotions of learner's by performing exploratory factor analysis. Two motivational models were examined to study associated aesthetic-emotions i.e., (1) John Keller's ARCS Model and (2) Malone and Lepper's Model. While ARCS adopts a more behavioristic formal approach to designing of environments, Malone and Leppers' model emphasizes upon casual motivational factors and is ideally suited for informal visual environments. The visual screening test was conducted on two different informal visual environments. The motivation measuring scale has been derived from the original list of 54 aesthetic-emotions items (Appendix A). In study 1, the original list was thoroughly checked for duplications, confusing items and exploratory factor analysis was performed where initial solution and

eigenvalues>1 were examined, while unrotated factor solution, Cattell's Scree Plot recommendation and qualitative feedback of the respondents was also considered. This led to the revised list of 59 aesthetic-emotions items (Appendix C).

The study 2 was conducted on the revised list of 59 aesthetic-emotion items. This time, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were also computed. Both showed significant and reliable results. Also the percentage of variance accounted by both unrotated and rotated solutions was approximately~75%. Based on revised initial results and Cattell's scree plot which indicated a higher likelihood of a 4-factor solution, 4 factors was extracted and rotated using the Oblimin method.

The four motivational dimensions derived from this study were classified as (i) Usability perception (ii) Cognitive engagement (iii) Visual and aesthetic appeal and (iv) satisfaction.

This study concludes that it is important to translate learner's set of aesthetic-expectations into aesthetic-designing parameters of formal learning visual environments, so as to fill in learner's visual gaps. These visual gaps make learner's cognitively fatigued and lower their learning motivation in formal learning visual environments.

FUTURE WORK

The motivation scale developed in this study will be used to achieve primary objective of the research which is to propose an aesthetic perception and motivation model based on learner's schematic thinking in formal and informal visual environments.

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APPENDIX

Appendix A

Motivational factor	Aesthetic-Emotion items	Motivational factor	Aesthetic-Emotion items
Fantasy	1. Fancy	Attention	1. Spontaneous
	2. Imaginative		2. Creative
	3. Successful		3. Original
	4. Reputation		4. Thoughtful

Appendix A: Continue

Motivational factor	Aesthetic-Emotion items	Motivational factor	Aesthetic-Emotion items		
Control	5. Inspirational	Relevance	5. Interesting		
	6. Elegant		6. Affective		
	7. Mesmerizing		7. Natural		
	8. Pride		8. Meaningful		
	9. Impressive		9. Knowledgeable		
	10. Organized		10. Familiar		
	11. Structured		11. Conversant		
	12. Contingency		12. Expertise		
	13. Firmness		13. Proficiency		
	14. Supportive		14. Easiness		
	15. Determined		15. Effective		
	16. Decisiveness		16. Efficient		
	Curiosity		17. Excitement	Satisfaction	17. Energized
			18. Surprising		18. Competence
19. Incompleteness		19. Contented			
20. Extraordinary		20. Pleased			
21. Sensitive		21. Ego-Gratification			
22. Secrecy		22. Relaxed			
23. Paradoxes		23. Reliable			
Challenge	24. Bizarre				
	25. Orientation				
	26. Focused				
	27. Alertness				
	28. Vigilant				
	29. Innovative				
	30. Randomness				
	31. Predictability				

Original list of aesthetic-emotions: 54 items

Appendix B

Motivational factor	Aesthetic-Emotion items	Motivational factor	Aesthetic-Emotion Items		
Fantasy	1. Fancy (x)	Attention	1. Spontaneous		
	2. Imaginative		2. Creative		
	3. Successful		3. Original		
	4. Reputation		4. Thoughtful		
	5. Inspirational		5. Interesting		
	6. Elegant		6. Affective		
	7. Mesmerizing		▪ Striking (+)		
	8. Pride (x)		▪ Gimmick (+)		
	9. Impressive (x)		7. Natural (x)		
	▪ Eminence (+)		8. Meaningful		
	▪ Harmonic (+)		9. Knowledgeable		
	▪ Guilty Pleasures (+)		10. Familiar		
	▪ Colorful (+)		11. Conversant (x)		
	10. Organized		12. Expertise		
Control	11. Structured	Confidence	13. Proficiency		
	12. Contingency (x)		▪ Memorable (+)		
	13. Firmness (x)		▪ Realistic (+)		
	14. Supportive		▪ Personalized (+)		
	15. Determined (x)		14. Easiness		
	16. Decisiveness		15. Effective		
	▪ Informed (+)		16. Efficient		
	Curiosity		17. Excitement	Satisfaction	17. Energized
			18. Surprising		18. Competence
			19. Incompleteness		▪ Resourceful (+)
			20. Extraordinary		19. Contented
			21. Sensitive (x)		20. Pleased
			22. Secrecy (x)		21. Ego-Gratification
			23. Paradoxes		22. Relaxed
24. Bizarre		23. Reliable			
▪ Arousal (+)		▪ Happy (+)			
▪ Stimulating (+)					
▪ Mysterious (+)					

Appendix B: Continue

Motivational factor	Aesthetic-Emotion items	Motivational factor	Aesthetic-Emotion Items
Challenge	25. Orientation	Relevance	25. Orientation
	26. Focused		26. Focused
	27. Alertness (x)		27. Alertness (x)
	28. Vigilant		28. Vigilant
	29. Innovative		29. Innovative
	30. Randomness		30. Randomness
	31. Predictability (x)		31. Predictability (x)
	▪ Interactive (+)		▪ Interactive (+)
	▪ Intensified (+)		▪ Intensified (+)

Additions/deletions in the original list of aesthetic-emotions: 54 items (x) aesthetic-emotion item dropped from original list after conducting Study 1 (+) Aesthetic-emotion item added after receiving qualitative feedback of respondents during Study 1

Appendix C

Motivational factor	Aesthetic-Emotion Items	Motivational factor	Aesthetic-Emotions		
Fantasy	1. Imaginative	Attention	1. Spontaneous		
	2. Successful		2. Creative		
	3. Reputation		3. Original		
	4. Inspirational		4. Thoughtful		
	5. Elegant		5. Interesting		
	6. Mesmerizing		6. Affective		
	7. Eminence		7. Striking		
	8. Harmonic		8. Gimmick		
	9. Guilty Pleasures		9. Meaningful		
	10. Colorful		10. Knowledgeable		
	Control		11. Organized	Relevance	11. Familiar
			12. Structured		12. Expertise
			13. Supportive		13. Proficiency
			14. Decisiveness		14. Memorable
			15. Informed		15. Realistic
Curiosity		16. Excitement	Confidence		16. Personalized
		17. Surprising			17. Easiness
		18. Incompleteness			18. Effective
		19. Extraordinary			19. Efficient
		20. Paradoxes			20. Energized
		21. Bizarre			21. Competence
		22. Arousal			22. Resourceful
		23. Stimulating			23. Contented
		24. Mysterious			24. Pleased
		Challenge			25. Orientation
	26. Focused			27. Reliable	
	27. Vigilant			28. Happy	
	28. Innovative				
	29. Randomness				
	30. Interactive				
31. Intensified					

Revised list of aesthetic-emotions: 59 items

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