To Cite This Article: Yum, M. S. (2024). New Museology Approaches in Cultural Heritage Centers**.** *Journal of Interior Design and Academy*, 4(1), 13-42.

DOI: 10.53463/inda.20240270

Submitted: *16/02/2024* ***Revised:*** *28/03/2024* ***Accepted:*** *16/04/2024*

NEW MUSEOLOGY APPROACHES IN CULTURAL HERITAGE CENTERS

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Abstract

Museums and historical buildings are currently being evaluated for different functions to transfer the social heritage created by the social and cultural values they carry to new generations such as Tofaş Anatolian Cars Museum and Umurbey Bath in Bursa. The museum dedicated to the narration of cultural heritage, presents toy car collections and other periodic toys to visitors in the Carousel exhibition within the historical bath structure as an exhibition space in the new museology concept. The research presents the processes and results of an edutainment project in line with the objectives by examining the exhibition organized by Mido Architecture, Trio Design, and the design studio partnered by the author. To put forth the validity of the study, the research emphasizes the edutainment design process of an architectural user experience concept from an interdisciplinary perspective centered on cultural heritage.

Keywords: Cultural heritage, digital interaction, edutainment design, museology, user experience.

1.INTRODUCTION

Museums are centers that contribute to social awareness by successfully implementing scientific, educational, technical and management services in different fields (Çelik, 2018). 'Edutainment Design' used in public centers such as museums, aquariums and zoos is an approach for providing education through entertainment. Interactive products are designed to make information instructive and increase its retention, transfer content to users through fun. In this method, the design of the content in accordance with the user identities increases the memorability by affecting the communicative and contextual quality of the information presented. Historical structures carry extensive social heritage values on culture. The exhibition project realized by the company partnered by the author, is oriented on edutainment design that not only provides a unique experience to the visitors, but also contributes a value to the historical structure. The edutainment project of the center is used to layout the theme of toys developed independently from the building's theme, unlike other edutainment implementations centers. Therefore, Carousel Toy Exhibition

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project, provides information on the design qualities of edutainment oriented implementations in cultural heritage centers. The main hypothesis of the qualitative study may be explained as 'It may be possible to transfer cultural and social heritage values of historical buildings into contemporary culture with approaches on 'new museology' in order to convey the abovementioned values to new generations'. The fact that museums are institutions that collect, preserve, research, share, exhibit and transfer tangible and intangible cultural heritage, shows the necessity of evaluating the social aspects of informal education in museums. The issue of providing an educational and entertaining exhibition experience in accordance with new museology approaches in social heritage buildings is examined within the study. In this context, it is possible to explain the scope of the study as listed below.

a) Explaining and associating the concepts on museology.
b) Providing information on visitor identities.
c) Determining the features that affect the product, content and spatial perception used in edutainment.
d) Presentating an edutainment project in a cultural heritage center.

The center opened in 2002, is Turkey's first and only museum dedicated to Anatolian Cars. The most valuable asset of the museum is based on discovery of an antique cart and local industrial culture. The main building of the silk factory converted into a museum, presents a time tunnel, beginning from a wheel from thousands of years ago to the the revitalization of carts built by artisan masters and motor vehicles produced by Tofaş. The arrangement and presentation of the non-motorized vehicles exhibited suitable for new museology was realized 25 years ago by Trio Design partnered by the author.

1.1. Method, Hypothesis and Scope of the Study

The study is a qualitative research based on collected data obtained from project development, implementation and service processes. The data used in the study is based on visuals, videos, observations and dialogues in which the compiled data is used wherever deemed necessary. The main purpose of the research is to determine the use of edutainment design in a new museology approach by presenting an up-to-date project realized with the participation of the author.

The main hypothesis of the qualitative study may be explained as 'It may be possible to transfer the cultural and social heritage values of historical buildings into contemporary culture with approaches on 'new museology' to convey the abovementioned values to new generations'. Edutainment design is a design method that includes the use of entertaining and educational content for the purpose of

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INda 2024, 4(1):13-42
e-ISSN: 2791-7436

knowledge formation (Wallden & Soronen, 2004). In this context, it is possible to explain the objectives of the study as listed below.

a) Explaining and associating the concepts of classical museology and new museology.
b) Providing information on museum visitor identities.
c) cMentioning the features that affect the product, content and spatial perception used in edutainment design based on new museology approaches.
d) Presentation and explanation of a unique edutainment project in a public center.

Due to the detailed nature of the subject, the study explains and associates the terms and concepts presented in the title, keywords and the main text. Research questions about the study can be presented as 'What are the interdisciplinary features of edutainment design? Is it possible to convert a historical cultural heritage to a new museology center? Can edutainment applications be designed in accordance with visitor identities? How can technology-oriented theming be implemented in a historical structure in accordance with new museology approaches? What are the educational qualities of knowledge formation provided in edutainment design?'. The main goal of the study is to determine the interdisciplinary features of the edutainment design approach by answering the questions presented above. The methodological structure of the study is handled in 2 different ways. The first approach is related to the processual linking of the research with the sample project presented in the study. The methodological structure of the research is presented below.

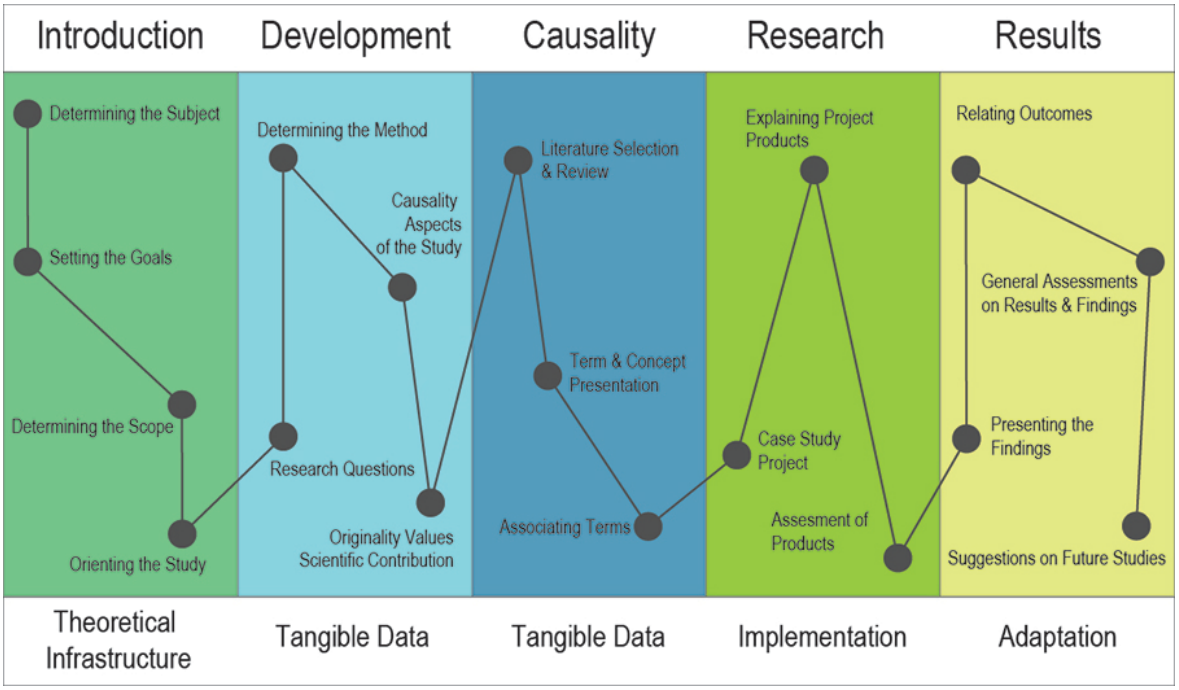

Figure 1. Methodological structure of the study

The introduction section of the study is composed of the theoretical structure that consists of the determination of the subject, setting the goals and the scope regarding the study and an orientation in order to provide an insight on the subject matter.

The development section of the study combines initial tangible data regarding the study such as setting the research questions, defining the research method, explaining the causality aspects, originality and scientific contribution. To expand these statements, the value of the study is based on the interdisciplinary approach related to the concepts presented as well as the goal to create a bond between a professional project through an academic approach that has a social value. The causality section of the study presents main concepts related to the title and keywords aiming to create a literature-centered infrastructure. Therefore, literature review is based on the presentation and association of the main terms and concepts explained. The implementation part of the study presents the case study project that relates to the title about the concepts previously presented. The discussion section presents and assesses the case study project and products through association with the concepts presented. The results section of the study explains the findings based on the case study project as well as general conclusions related to the research. In the final part of the study, suggestions on future studies are made.

2. NEW MUSEOLOGY

In addition to being centers for exhibition, preservation, collection, documentation, education, research and communication, museums offer visual, sensory, aesthetic, social, educational and fascinating experiences to visitors within the scope of heritage preservation and cultural duties (Kotler & Kotler, 2000). The performances held in museums trigger the interest of the visitors increase the awareness and support the financial development of the center by attracting more visitors. Pine & Gilmore (1998) state that the activities in museums are a combination of education, entertainment, imagination and aesthetic factors. As a result of the transformation of museums have undergone over time and the change in social expectations, creates the need to explain the heritages that form the memory of the society more effectively. The inadequacy of classical exhibition, expression and communication styles is one of the main reasons leading to new museology. In addition to this situation, the inadequacy of classical museology in creating financial resources has led to the necessity of addressing museology as a business model. By 1990, studies on cognitive, intuitive and social issues related to education has been carried out in the centers and in 2000, new interactive systems flourished as a result of the technological development with the use of widespread communicative methods (Bandura, 2001). One of the communicative methods used in a new museology approach is a strategy centered on storytelling enabling the use of digital, analog,

visual and audio systems (Soerjoatmodjo, 2011). New museology methods consist of products open to innovations and can communicate with visitors of any identity as an approach that can be updated. The fact that many fixed elements used in classical museology have been transformed into moving and digital elements within the modern understanding of museology enables the exhibitions to be more active, immersive and dynamic.

Classical museums are public centers where historical artifacts, objects and collections are exhibited. The task of preserving and exhibiting the cultural heritage of different societies raises other expectations in an era where communication constantly develops. Most important of these expectations is that museums offer appropriate content not only to experts, but to visitors of all identities and provide educational informative content. While classical museums offer various contents about history, nature and science, shifting towards new museology under the influence of modern technology, changes visitor expectations towards an increasing quality of educational experience. Chinnery (2012) mentions the transformation of centers into an educational tool in service of society centered on new museology understandings. Similarly, Charman (2013) works on the presentation of educational contents that increase the perceptions of visitors in the new understanding of museology. The main reason for recent studies is that new museology combines concepts on technology, communication and learning, following a more original and contemporary educational model compared to classical museums. In terms of an educational role, this situation is the convergence of modern schools and museums. The main difference between schools and museums is that education takes place based on individual preferences. When psychology, sociology, pedagogy and learning styles are considered, children learn and perceive in a different ways than adults, therefore exhibitions and practices should be made in accordance with them (Schiele & Koster, 1998). Adults often visit museums according to their own preferences, but this generalization does not apply to children, as children can be taken to museum visits with their families or school tours without their desires. The main focus of the education provided in centers are the children as some of the school education can take place in museums or education can be provided in schools with interactive technologies (Cromby et al., 1995).

New museology method is an approach that includes ideas and practices towards the formation of new social relations between centers and public. McCall & Gray (2014) have conducted a research to determine the educative differences regarding classical and new museology museums applied in centers in England. Results suggest the overwhelming educative and communicative efficiency of new museology approaches. Peter Vergo (2006) mentions the importance of education that should be offered in cultural centers based on new museology. New museology constantly shifts towards a different direction due to rapidly growing technology. Benefiting from the power of social media,

centers offer enhanced experiences to visitors who do not have the opportunity to visit the center with web-based applications and virtual tours (Durksen, T., Andre, L., Volman, M., 2016). Many international and local museums use digital applications to provide a positive museum visit experience.

2. EDUTAINMENT DESIGN

Edutainment approaches in social culture have been used by Nasrettin Hoca, Kavuklu and Pishekar, Karagöz, and Hacivat for hundreds of years in Turkey. These historical figures represent and convey cultural heritage values through education as well as entertainment followed by artists such as Adile Naşit and Barış Manço. Approaches used, facilitate cultural transfer, and strengthen social ties. The main reason for the widespread use of edutainment in such centers is that physical contact with the content is generally not possible, resulting in a limited interest span of visitors as well as suppressing the qualitative outcomes of the experience. As a solution to the problem, transferring educational content through entertainment creates a unique user experience. The strength of features related to the content of interactive applications, reveals the connection of the edutainment method with social sciences such as psychology, sociology, and pedagogy. Pine & Gilmore (1998: 97-105) state that such experiences (edutainment-centered) consist of a combination of education, entertainment, imaginative, and aesthetic factors. Long-term memory-based preservation of information transmitted to a person, whose imagination is triggered through the interaction created is the true strength of the method. Even though providing entertainment to visitors may sound easy, adding educative values to edutainment implementations that prove to be suitable for all visitor identities requires in-depth expertise. Falk (2006: 151-166) has conducted studies on the classification of different user identities in museums and centers.

a) Explorers, who pursue their curiosity by looking for innovative and exciting features.
b) Helpers, who strive to make the experience of others more enjoyable.
c) Professional hobbyists, who feel connected to the content.
d) Experience seekers, whose primary satisfaction is visiting an important center.
e) Spiritual pilgrims, visitors aiming for a thoughtful and purifying experience.

Factors such as individual interests, group tendencies or personal expectations that contribute to the experience, can affect the overall social experience. Edutainment design is a method that aims to create engagement by using various communicative tools and interactive applications with the goal of conveying contextual information to visitors. The 'engagement' required for the realization of learning is a concept related to psychology and information building, which expresses the balance of cognitive skills of the individual and the difficulty level of the task (Csikszentmihalyi, 1998).

The core value of the method is the development of a design strategy that can communicate educational content while entertaining. Wallden & Soronen (2004) provide a classification related to the instruction of edutainment applications designed in the form of games. This classification encapsules formal, informal, and accidental learning types related to the medium, individual preferences and the source of information. For example, results of learning with the tasks offered by games and acquiring information through the content, increases individual skills in the form of indirect learning. The concept of 'playfulness', which covers most creative fields, is the essence of edutainment design implying to creative cognitive activities such as music composition or poetry rather than playing games (Nam & Kim, 2011). This statement implies to the ability of edutainment tools enhancing creativity on learning and knowledge construction.

3. INTERACTION & USER EXPERIENCE

Cooper et al. (2007) state that interaction design is a transdisciplinary method utilizing different design disciplines. User Experience Design (UXD) is a product oriented developmental approach to establish common design criteria for daily usage products. UXD method includes the design of products and services centered on individual or collective experience by examining the usage patterns of the products. With this perspective, the designer takes the experience of the product in the foreground and addresses the design problem. Hassenzahl (2008: 11-15), makes suggestions on the transformation of concepts related to usability into user experience, which refers to the fulfillment of the functional needs of interactive products for users. The concept of 'usability', which can be considered as the starting point of experience design, has transformed over time by being influenced by technological development converting into 'user experience design' based on new sets of rules and ways of handling. Today, it is possible to track in real-time most digital usage feeds of products.

Free Choice Learning (FCL) refers to the formation of knowledge that occurs because of interaction with one's own choices (Hanshumaker, 2010; Karydis, 2011: 369-384). Interactive systems used in the edutainment design scenarios are applications that support knowledge-building based on individual preferences. The interaction provided by the products developed in edutainment design takes place in different ways as direct, indirect, and accidental interaction. Direct interaction refers to the involvement of the individual in the interaction, indirect interaction usually refers to the individual's participation in the interaction as an observer and accidental interaction refers to involuntary or incidental participation. The individual participating involuntarily (accidental) can turn into an observer (indirect) or be fully involved (direct) under the condition that the content is of interest. This situation points out the importance of the interest, attitude, and curiosity of the person

and reveals the value of psychology and sociology sciences in edutainment design. Pine & Gilmore (1998), classify visitor engagement as an active or passive process depending on the state of mind in an individual. Active participation refers to the use of psychomotor and cognitive skills, while passive participation refers to being an observer or accidentally getting involved in a cognitive activity.

As mentioned by Soerjoatmodjo (2015), live-action or digital storytelling implementations are frequently preferred in edutainment scenarios. In such storytelling cases, visitors can choose to be involved in the activity or stay distant (Springer et al., 2004). Even so, user experience is realized due to direct, indirect, and accidental interaction in all situations involving voluntary, involuntary, or indirect participation. The value of a new visit to a recreational center is the possibility of engaging and experiencing the known as well as the unknown.

3.1. Interactive Technologies

Edutainment design benefits from all forms of technological visualization and storytelling techniques. There are different reasons for the new museology practices used in the narrative educational projects to be based on technology. First, technological systems increase the user experience by providing features such as user performance, usage frequency, content control, and corporate theming (Boskovic, D., Rizvic, S., Okanovic, V., Sljivo, S. & Sinanovic N., 2017). In line with the objectives of edutainment design, the measurement, updating, and control of knowledge formation and educational values can only be achieved through interactive systems. In addition to this, edutainment allows the application of spatial theming in a holistic manner following the brand identity, adding value to the center in terms of financial business models (Pine & Gilmore, 1998). Among the digital media applications that have become widespread in recent years, virtual reality implementations are among the most preferred applications based on their convenience. The main reason why these applications are practical is that they provide convenience in terms of common technology and updatable content. Applications developed for different purposes are designed according to contextual features and communicative preferences set by the center. This fact refers to the customization aspects of interactive edutainment products. Budd & Wakkary (2005, 58-63) state that removing the structural confusion of interaction depends on the association and explanation of technical and human-related qualities. This situation reveals the necessity of designing and organizing the content according to user identities to eliminate the confusion presented by the complexity of interaction. Interactive technologies used encompass Augmented Reality (Sommerauer & Muller, 2014: 59-68), Virtual Reality (Brandejsky & Kilzer, 2006), Touch and Gesture Recognition (Chaudhary, A., Raheja, JL., Das & K, Raheja, S., 2010: 46-55).

4. DISCUSSION

Traditional design approaches that are easy to develop are often inappropriate for design-driven business models that provide services across a broad spectrum. Edutainment does not solely depend on design but is a cross-sectional approach consisting of an educational model and an interdisciplinary design methodology playing a key role in conveying various types of content with interactive products that enhance educational knowledge building. The presented content is an edutainment design project that encapsulates the scenario of the related products and examines the characteristics of the content provided by interactive products related to learning and knowledge formation on culture. The Carousel Exhibition project has been presented but not evaluated in the thesis 'Education Based User Experience and Interaction Design Qualities of Interdisciplinary Edutainment Design Centered in Museums and Cultural Centers'.

4.1. Carousel Toy Exhibition

'Carousel Toy Exhibition' project was carried out by the museum director Naim Arnas Architecture, Trio Design, and the company partnered by the author. The cultural heritage center has been organized according to edutainment design to implement an educational model in the historical site. Digital applications, theming, and storytelling elements contribute to the perception of the experience. Spatial perception and visitor experience have been enhanced allowing the localization of the 'old' and the 'new' representing cultural and social values to preserve structural identity. The exhibition has been realized with more than 12,000 toys from Naim Arnas collection and is available in a book (Toy Exhibition, 2011) and company websites. Storytelling scenes create a reference to childhood for almost everyone. The exhibition has been organized in a certain way to emphasize the 'edutainment' approach regarding the culture of playing with toys by storytelling techniques (Figure 2).

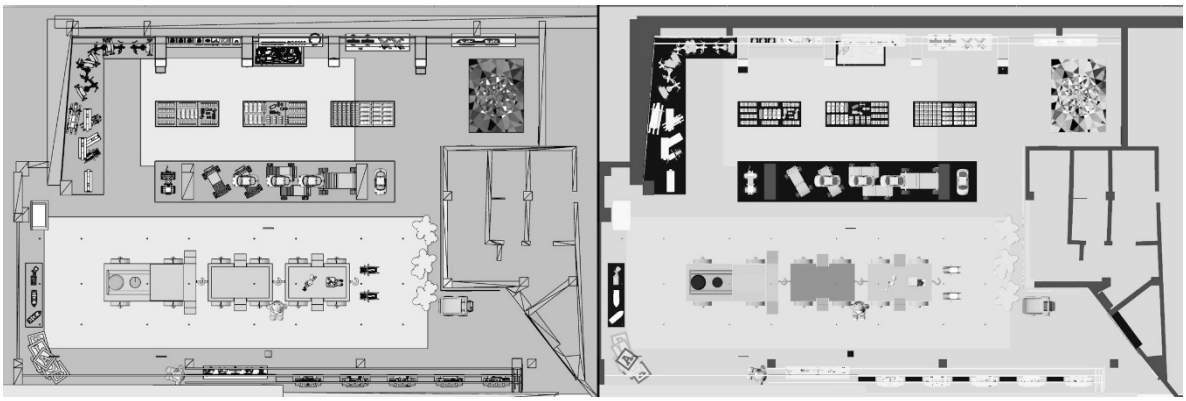

Figure 2. Exhibition area plan

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e-ISSN: 2791-7436

Turkish toy industry has been emphasized with the use of nationally manufactured toys spread throughout the exhibition as a part of a chronological expression. In this context, various scenography was created with thematic toy groupings and with the explanation of street games on the panels placed at the museum garden, a modern and a traditional perspective has been provided for young visitors mostly unable to enjoy playing out on the street.

4.2. Products and Interaction

Products designed are digital interactive implementations while some are non-digital productions with decorative features for storytelling.

4.2.1. Virtual Habitat

The gesture recognition application is the most realistic virtual habitat application visually designed by the company. In addition to the development of underwater and fish details, the overall design is realistic and natural in terms of the movements of fish controlled by an artificial intelligence.

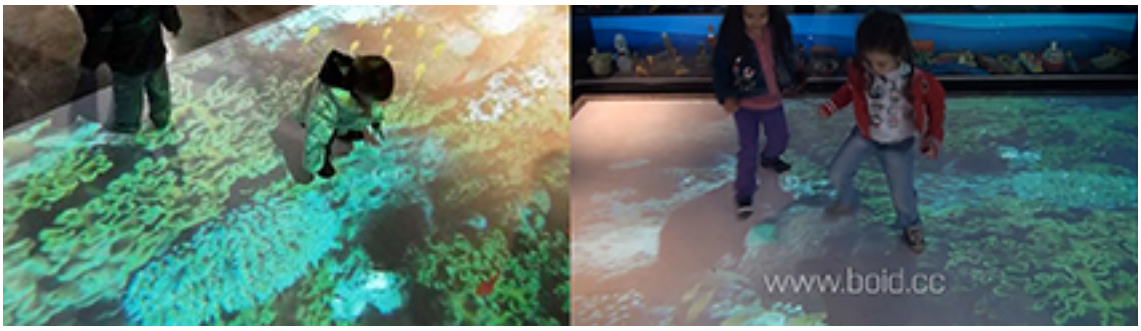

Figure 3. Toy Exhibition virtual habitat application

The application offers a real-world phenomenon rendering the experience uncanny with the realism it provides as an underground aquarium (Figure 3).

4.2.2. Augmented Reality

The application, that includes detailed visualization of antique cars hand-picked from the collection, allows the creation of 3D simulations without physical contact of products that have antiquity values.

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e-ISSN: 2791-7436

Figure 4. Augmented reality

The 3D models of the toy cars protected in the glass section are controlled by the aid of augmented reality images, creating a synchronization between virtual and real as seen in Figure 4.

4.2.3. Virtual Book

The application enables the animated narration of stories that are a part of popular culture for children as seen in Figure 5. The interactive product creates an interaction because of the synchronization of the markers on the edge of the physical book with augmented reality technology.

Figure 5. Virtual book

With the flipping of blank white pages, the software fills the animative content matching the image onto the page through the camera positioned above and projection mounted on the ceiling.

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e-ISSN: 2791-7436

4.2.4. Animation Screens

The screens have been spatially positioned on vantage points and can be seen by everyone passing through the main gallery. Animated screens exhibit motions of special collection pieces where physical contact is not desired due to their antique values, providing visualization on working mechanisms as seen in Figure 6.

Figure 6. Animation screen

Toy animations selected and animated from the collection provide cognitive interaction in the edutainment scenario. The possibility of seeing the toys in a glass display as well as seeing them animated on the screens above presents a unique experience.

4.2.5. Bath Dome

The kite installation implemented on the bath dome without interfering with the historical structure, is an installation that is observed and recorded by everyone.

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e-ISSN: 2791-7436

Figure 7. Bath dome

The experience provided by equipping the depth provided by the dome with kites, adds a unique value to the exhibition as seen in Figure 7.

4.2.6. Train

This implementation attracts children since most exhibited toys are away from physical contact behind displays. The train implementation offers physical interaction with dynamic colors and structural form within the edutainment scenario.

Figure 8. Train

Children are allowed to climb the train consisting of multiple carts of large dimensions as seen in Figure 8.

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e-ISSN: 2791-7436

4.2.7. Carpenter Gepetto

The carpenter shop of Gepetto, the creator of Pinocchio, has been rebuilt within the exhibition inside the bath structure as seen in Figure 9.

Figure 9. Carpenter Gepetto

The shop consists of tools, toys, and the puppet of Gepetto facing outside.

4.2.8. Exhibition Design and Storytelling Implementations

In the exhibition, storytelling elements and collections representing important events belonging to childhood, toy culture and history have been used as seen in Figures 10 to15.

Figure 10. Postcard wall

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e-ISSN: 2791-7436

Figure 11. Umurbey bath, carousel

Figure 12. Classroom storytelling

Figure 13. Outdoor displays

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e-ISSN: 2791-7436

Figure 14. Entrance area

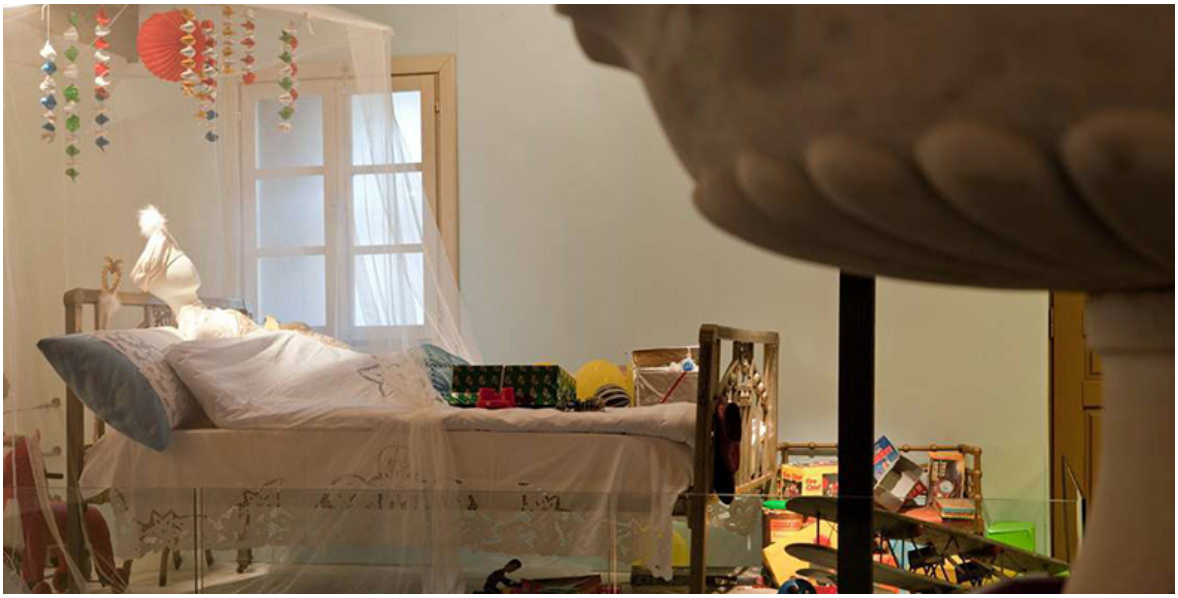

Figure 15. Circumcision bed scene

4.4. Literature Centered Evaluations

Tables presented below demonstrate the evaluation of the eduitanment implementations designed for the exhibition of the literature presented. Tables shown from Table 1 to 7 represent the unique design properties evaluated according to the literature that has been elaborated in the prior sections of the study.

Table 1
Virtual Habitat Literature Evaluation

	Literature	Evaluation
Virtual Habitat	Visitor typology (Falk)	Children, explorers
	Activity (Pine & Gilmore)	Active
	Learning typology (Walldén & Soronen)	Informal, accidental
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Social and collective activity
	Interaction Type	Direct Interaction
	Interaction technology	Gesture recognition system
	Content type	Implementation simulating real world phenomena
	Experiential sociology	Collective social experience
	Design discipline orientation	Digital design
	Spatial product relevance	Private location
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Pc, projector, kinect
	Age oriented content properties (Wallden & Soronen)	Children, appropriate

Table 2
Augmented Reality Cars Literature Evaluation

	Literature	Evaluation
Augmented Reality	Visitor typology (Falk)	Children, youth, adults, explorers, hobbyists
	Activity (Pine & Gilmore)	Active
	Learning typology (Walldén & Soronen)	Informal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Individualistic
	Interaction Type	Direct and indirect interaction
	Interaction technology	Augmented Reality
	Content type	Virtual subjective application
	Experiential sociology	Individualistic experience
	Design discipline orientation	Digital and graphic design
	Spatial product relevance	Common area
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Pc, monitor, kinect
	Age oriented content properties (Wallden & Soronen)	General usage, appropriate content

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INda 2024, 4(1):13-42
e-ISSN: 2791-7436

Table 3
Virtual Book Literature Evaluation

	Literature	Evaluation
Virtual Book	Visitor typology (Falk)	Children, youth, adults, explorers, hobbyists
	Activity (Pine & Gilmore)	Active
	Learning typology (Walldén & Soronen)	Informal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Individualistic
	Interaction Type	Direct and indirect interaction
	Interaction technology	Virtual Reality
	Content type	Subjective data and storytelling
	Experiential sociology	Individualistic experience
	Design discipline orientation	Digital, physical and graphic product
	Spatial product relevance	Private location
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Pc, projector, kinect
	Age oriented content properties (Wallden & Soronen)	General usage, appropriate content

Table 4
Animation Screen Literature Evaluation

	Literature	Evaluation
Animation Screen	Visitor typology (Falk)	Children, youth, adults, explorers, hobbyists
	Activity (Pine & Gilmore)	Passive
	Learning typology (Walldén & Soronen)	Informal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Social activity
	Interaction Type	Indirect interaction
	Interaction technology	Simulation animation
	Content type	Implementation simulating a real world phenomena
	Experiential sociology	Collective and individual experience
	Design discipline orientation	Digital and graphic product
	Spatial product relevance	Common area
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Screen, player
	Age oriented content properties (Wallden & Soronen)	General usage, appropriate content

Table 5
Bath Dome Literature Evaluation

	Literature	Evaluation
Bath Dome	Visitor typology (Falk)	Children, youth, adults, explorers, hobbyists
	Activity (Pine & Gilmore)	Passive
	Learning typology (Walldén & Soronen)	Formal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Social activity
	Interaction Type	Indirect interaction
	Interaction technology	none
	Content type	Implementation simulating a real world phenomena
	Experiential sociology	Collective and individual experience
	Design discipline orientation	Physical product
	Spatial product relevance	Inner dome
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	none
	Age oriented content properties (Wallden & Soronen)	General usage, appropriate content

Table 6
Train Literature Evaluation

	Literature	Evaluation
Train	Visitor typology (Falk)	Children, explorers
	Activity (Pine & Gilmore)	Active
	Learning typology (Walldén & Soronen)	Informal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Individual and social activity
	Interaction Type	Indirect interaction
	Interaction technology	none
	Content type	Subjective simulation of a train
	Experiential sociology	Collective and individual experience
	Design discipline orientation	Product design
	Spatial product relevance	Private location
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Model
	Age oriented content properties (Wallden & Soronen)	Child appropriate content

Table 7
Carpenter Gepetto Literature Evaluation

	Literature	Evaluation
Carpenter Gepetto	Visitor typology (Falk)	Children, youth, adults, explorers, hobbyists
	Activity (Pine & Gilmore)	Passive
	Learning typology (Walldén & Soronen)	Informal
	FCL (Hanshumaker, Karydis)	Present
	Contructivism (Matthews)	Individual and social activity
	Interaction Type	Indirect interaction
	Interaction technology	none
	Content type	Subjective data and storytelling
	Experiential sociology	Collective and individual experience
	Design discipline orientation	Physical product design
	Spatial product relevance	Private location
	Playful learning (Walldén & Soronen)	Indirect learning
	Product spec	Model
	Age oriented content properties (Wallden & Soronen)	General and appropriate for all

4.4.1. Evaluation Findings

The findings related to the literature evaluation results are presented as follows.

4.4.1.1. Virtual habitat literature evaluation results

Most of the visitors showing evident interest in the application are mostly children and explorers who are curious to explore, as classified by Falk. Learning styles are generally informal or accidental as in museums since information is provided because of participation and as a response to a request. The application, which allows passive participants to participate in the communication process through observation, can achieve its edutainment goals because of active participation on interaction qualities. Hanshumaker's free choice theory is present in virtual habitat applications as well as in most interactive applications. As a result of the constructivism features important for the internalization of knowledge, collective experience is an activity that leads to social interaction. The fact that the implementation creates a collective experience in sociological terms, enabling interaction between individuals. The interaction provided with appropriate content to target user audience, enables the development of social behavior between individuals. Interactional efficiency refers to the perceptive quality of the virtual simulation and presenting it to the user in a way that allows enhanced experience. The products of the edutainment scenario should be designed in line

with experience-oriented design goals. Since the hardware and interactive features of the application are determinant, a certain amount of physical space must be allocated to the product. The application provides indirect learning to a certain age group and provides simulative information on the behavior of sea creatures. As the system can be used simultaneously by multiple users, there is no use of audio to prevent the sounds from interfering. The system consists of a projection, hardware, and gesture recognition technology. The artificial intelligence software determines the behavior of fish moving randomly or responding to user movements when disturbed. It is possible to assume that the product has been developed in accordance with essential edutainment-oriented design goals because of the performances monitored at the exhibition.

4.4.1.2. Augmented reality cars literature evaluation results

The application has been designed and positioned to provide information on virtual technologies to visitors of all age groups as classified by Falk. For the system to work, users must be individually active; that is, they must manage virtual three-dimensional models by moving the assigned markers. The application, which is the meeting of the physical and the virtual, compared to the previous application, provides guidance even to visitors with basic technological knowledge. The practice, which enables informal learning as stated by Wallden and Soronen (2004), is suitable for psychomotor and cognitive development as learning mechanisms. The system activates free choice learning, as mentioned by Hanshumaker and Karydis. The experience provided pinpoints individual constructivism due to active single user activation properties. In addition to the direct interaction of a single user, indirect interaction occurs from the process of being observed by other visitors. The product is a technologically augmented reality implementation of a virtual subjective application nature due to its content type. This situation refers to an individual user experience provided because of accessing the content through a non-hierarchical use. These types of applications are subjective designs that provide an individual experience because of personal use. In addition to being a digital product that is perceived as a simulative virtual model, the application provides virtual control simultaneously with the physical, allowing users to work with their cognitive and psychomotor skills. For the system to work, content and system-oriented indirect learning takes place because of the user being open to interaction because of voluntary involvement.

The application that is generally appealing to all age groups, consists of a computer, screen, gesture recognition system and augmented reality markers as hardware. The system is one of the most striking examples of the combined technology-oriented virtual and physical design. The presentation of valuable toys where physical contact is not possible could prove difficult. To resolve

this issue, using an alternative method to create a model visualization from every angle through innovative technologies, increases the power of user experience for the guest.

4.4.1.3. Virtual Book Literature Evaluation Results

The application is a design that provides service to all visitors, in accordance with the classification described by Falk. As stated by Pine and Gilmore, the application allows active use and a product with a strong effect in terms of free choice learning. This feature enables freedom on functional choices providing individual interaction. Virtual book presents a narration of tales of social and cultural value with physical and virtual cooperation and this quality provides an informal learning effect that increases psychomotor skills. Projecting the designed content to a tangible object by markers on each page, enables the users to follow a storyline according to their preferences. As mentioned by Matthews in terms of constructivism, the application provides single-user service, meanwhile supports indirect interaction and experience for observers. The targeted user experience is achieved because of the interaction that is served by virtual reality blended with a narrative content. It is possible mention that the virtual book provides direct interaction to users and indirect interaction to observers. The physical and virtual interface compatibility required in terms of ensuring human-computer interaction is supported with the integrity of the content.

Providing a productive example in terms of storytelling, the application content is presented subjectively due to the source of the content story being anonymous. Compared to other products, this application carries the value of associating a physical object with a virtual content. Turning the pages of the physical book and accessing changing content reveals the experience of interaction created by the virtual and tangible simulation that triggers affective and psychomotor learning typologies. As introduced by Wallden and Soronen (2004), the application provides indirect learning in terms of play-like learning. The physical hardware composing the application consists of a computer, a projection, a tangible model book and gesture recognition system. The virtual book, which has an important place in an edutainment design scenario, generates high user experience by storytelling tales known worldwide attracting visitors with its animative features.

4.4.1.4. Animation screens literature evaluation results

Animation screens have been positioned inside the spatial theme design to create a dynamic movement within the static space. Animative implementations are suitable for all types of visitors as classified by Falk. These screens are designs that create passive interaction since they do not require physical or virtual contact. As well as providing informal learning based on content through animations, the application is also suitable for free choice learning as the experience depends on

individual preference whether to watch the detailed content. The animations can be watched by more than one visitor simultaneously as in accordance with Matthews' classification regarding constructivism. Every person has childhood memories in which they play games and with toys. This situation implies to the fact that everyone, has a certain degree of experience about toys prior to coming to the exhibition. Just as children enjoy playing together, watching animated content collectively provides social activity in terms of constructivism, allowing the information to be formed simultaneously.

Animated graphics in a digital setting are implementations that provide indirect interaction and indirect learning according to the criteria determined by Wallden and Soronen. Screens used for exhibiting animated content encase movie players as hardware. To evaluate the product in general, providing only visual and audio interaction implies to the ability to meet the basic requirement in terms of interaction. The product designed lacks physical or virtual contact with the content material and overcomes this missing quality related to interaction by the compatible content for an edutainment scenario. In this context, the visualization of the mechanical working principles of the selected toys of value through animation, is a functional solution. Simulating the working mechanics of toys, the application provides a memorable user experience in terms of the objectives, where this value touches the cognitive and affective skills on users. Animated content has the capacity to contribute movement to the environment and convey colorful messages for the guest.

4.4.1.5. Bath dome literature evaluation results

Located at the Bursa Anatolian Cars Museum site, the historical bath is integrated with a contemporary building used for special activities and exhibitions. The additional building provides various solutions for the Carousel exhibition enlarging the space and therefor, the overall exhibition area. The fact that architectural interventions could not be made on the structure due to the historical monument status of the bath building, resulted in the arrangement of the additional building in accordance with the exhibition. The kite scenography implementation is located on the dome of the bath and provides a nostalgic feeling rather than technology, making everyone feel the kite nostalgia that they probably have tasted in a period of their life. This installation can be considered as a classic edutainment application and offers visual richness to visitors from all age groups. The application provides a passive activity in accordance with the classification made by Pine and Gilmore, as well as triggering informal learning according to Wallden and Soronen. Experiencing the installation is a cognitive and affective process as an edutainment activity and a social activity in terms of Matthews' constructivism. The application with its subjective quality, is also an affective installation as a product learning typology put forward by Wallden and Soronen.

The kite installation provides indirect learning through factors such as the dome's own acoustic properties and the breeze shaking the kites evoking the kite experience in open air.

Spatial design of the dome area is suitable for all age groups. The pattern created by the kites placed in a certain order cause the overall perception of the exhibition to increase. The installation is valuable in terms of social development related to nostalgia, it shares the same exhibition with technological applications forming unity despite different styles and this quality is a fundamental requirement for the success of edutainment design goals. Many visitors tend to spend time looking at the kite installation and takes photographs as memories. This remark highlights the fact that the installation has experience-oriented qualities that connect with the guests. The installation has been placed on the dome, a symbolic part of such structures, and this preference creates a feeling of freedom taking back the visitors to their childhood with a sky filled with kites. The dome area separates the traditional elements with technological systems and serves as a resting area for the guests. It is a privilege to realize an edutainment design project in such a magnificent structure for designers and experiencing the exhibition for guests.

4.4.1.6. Train literature evaluation results

Physical models of representational value have been used in edutainment design for a very long time. With the developments in technology, many of uses of models are being abandoned even though some prominent examples can still be found in centers. The train is an implementation solely aimed for children even though still attracts curious explorers. This product presents active interaction according to the classification laid out by Pine and Gilmore due to the possibility of physical contact. The train is effective in terms of informal learning style by providing psychomotor and affective learning from an educational perspective. While the train offers social and individual activities related to constructivism, it provides direct collective and individual interaction since it allows physical contact. The implementation offers a cognitive and psychomotor product learning typology, according to the classification put forward by Wallden and Soronen. The size and location of the train model enables children to show interest being a fun educational model that children can climb and play on.

4.4.1.7. Carpenter gepetto literature evaluation results

The Gepetto carpenter workshop creates a nostalgic feeling in almost everyone who sees it as well as providing a high level of memorability due to its high recognition of a great bedtime story. The application has meaningful content for visitors in accordance with Falk's classification, presenting a passive and visual activity. In the absence of digital infrastructure, the interpretation provides

indirect interaction with its storytelling properties. As a storytelling product with simulative features, the application is an impressive example of edutainment design. The carpenter shop, which tells the beginning of Pinocchio's story, is depicted emotionally enough to create a smile on everyone. The shop designed in accordance with edutainment design, enables visitors to meet with Gepetto at least once during the trip. Although there is no physical interaction, the photos taken in the shop, provides a strong emotional interaction, revealing the power of the implementation.

4.5. General Comments on Findings

To connect the literature review with the findings, comments are presented below. As mentioned by Kotler & Kotler, 2000; Pine & Gilmore, 1998, the museum provides a unique multisensory experience centered on educative goals. Interactive systems are products that fits to the description made by Bandura, 2001. Digital and non-digital implementations all support storytelling methods as mentioned by Soerjoatmodjo, 2014. The content presented is an education-oriented tool as discussed by Chinnery, 2012 and enhances visitor perception towards new museology as mentioned by Charman, 2013. Education presented resembles formal education provided at schools as discussed by Cromby & Brown, 1995. that forms new social relations between the center and the public. New museology in the center supports Vergo's claims on education being offered in cultural centers. As mentioned by Durksen et al. 2016, the museum does benefit from web technology to inform the public, however, does not have a virtual tour. The content presented is composed of educative, imaginative, aesthetic, entertaining qualities as referred by Pine & Gilmore, 1998, providing service to all types of visitors as discussed by Falk, 2006, with game-based applications as mentioned by Wallden & Soronen, 2014, activating cognitive skills (Csikszenmihalyi, 1998) with playful and ludic features (Nam & Kim, 2011). Design related qualities demonstrate interaction based interdisciplinary productions (Cooper & Cronin, 2007) supporting free choice learning (Hanshumaker, 2010; Karydis, 2011) with occurring engagement (Pine & Gilmore, 1998). Digital systems allow the monitoring of user data (Boskovic et al. 2007) and user-friendly aspects (Budd & Wakkary, 2005) of the applications provide an inviting experience in terms of heritage remembrance. Digital products have been designed based on all types of interactive technologies as mentioned by Sommerauer & Muller, 2014; Brandejsky & Kilzer, 2006; Chaudhary et al. 2012. To summarize the process, it is possible to confirm various evident facts related to on-site observations. Since children grasped the differences in content and usage of interactive systems, they have generally demonstrated an error-free use. Older children, after controlling simple applications, spent time in more developed, interesting, and suitable systems for single use. Younger children preferred applications in which physical contact was less. Children were excitedly involved in overall

exhibition area while contacting interactive systems without difficulty. Children too young to use touch technologies had a pleasant and highly engaged experience with the habitat application. Since the virtual book application is a virtual reality application and lack of prior experience of many users, it took longer time to grasp the functionality compared to touch applications. On engagement times observed throughout the exhibition, children spent at least twice as much time than adults on interactive devices. Much of the parents' time were spent observing their children having more circulation than adults, referring to the fact that some circled back to their preferred applications. Many the verbal feedback on the presentation techniques used in the exhibition were positive, many questions were asked by both adults and children about the storytelling and interactive products rather than displayed toys. After the tour was completed, especially interactive devices remained in the minds of the children as their parents took their photographs during and after the experience. Non-interacting products have been generally observed as children passed by, preferring often to spend time on interactive devices. To understand the content and usage of the systems, young people who observed it first experienced it later and the young children started the game almost instantly, despite the misuse of the movement. In most of the photos and videos taken by families, children took active poses due to playful content while examining the toy displays. It is possible to make inferences about the quality of the efficiency provided by interactive systems.

a) The integrated interaction between the structure and products reveals that visitors pay close importance to the surrounding and visual perception.
b) The initial experience of interactive systems is provided by the satisfaction and expectations of the users' initial goals. Over time, as the user gains experience within the space, specialization in expectations occurs.
c) During use, visitors should be constantly alerted by providing new information to maintain motivation. Experience should be developed to maintain engagement and the performance of the systems should be constantly monitored through digital feedback reports.
d) It may be possible to state that edutainment scenario attracts more attention than traditional exhibition content as playfulness enhances experience.

The tendency to socialize in a virtually enhanced area is an age-related situation. In general, children over the age of 10 displayed a solipsist behavior, while children under the age of ten preferred to play collectively. This situation provides information about socialization related to demographical values. While unacquainted children in the exhibition mingled in small age groups, older children spent time on their own possibly under social pressure and individual control mechanisms brought about by the awareness of their peers in the environment. Users between the

ages of 5-10 acted on a rapid relocation towards the objects of interest usually in small groups, meanwhile older children generally scanned the space individually and focused only on the objects that attracted their attention. As the author is one of the designers, brief conversations occurred to satisfy the curiosity of some visitors providing valuable feedback.

5. CONCLUSIONS & SUGGESTIONS

Edutainment design is a contemporary design approach with enhanced visual, communicative, and cognitive qualities specifically produced for target groups. The study tries to examine the subject material and data presented making direct inferences on the case study project in line with the objectives of the research. The research serves on the perception, positioning and the interpretation of information and arguments on the values that make up edutainment design approaches related to the presented literature. The initial goals to increase the awareness on a cultural heritage center, have been met by many guests flooding to the exhibition. Due to the detailed and sensitive nature of educative goals, it is a challenge to create an appropriate 'free choice learning' environment that is suitable for social dynamics. Even in cases where the spatial setup is suitable for FCL, visiting family members, far from the social constructivist approach, can pose an obstacle to each other. In such experiences, parents carry both a learner and a teacher identity. Fiction should facilitate individual and social construction, as engagement time is not a guarantee for learning to take place. Even though the study focuses mostly on the edutainment aspects of the exhibition, outdoor products, indoor implementations, and communicative elements all form the edutainment scenario in an integrated manner. By examining the media coverage, published book and on-site observations on the exhibition, it is possible to claim that the event has reached its preset goals on guest attraction by creating a unique engagement experience for all types of visitors. Interdisciplinary edutainment design approach used in centers, creates communicative experiences that act as a bridge between past and future values. Edutainment makes use of technological innovations contributing to social culture with spatial, product and contextual interactions created as well as offering opportunities for individualization, retention, and heritage awareness in centers, that allows highly effective experiences in terms of cultural values and educational features. The creation of original content is a necessity to maintain the continuity of interest in centers. For future studies, it may be possible to research new museology applications between historical and modern structures to obtain a comparison related to social, technical, and scientific aspects.

Acknowledgment and Information Note

This article has been produced from the master's thesis named 'Education Based User Experience and Interaction Design Qualities Of İnterdisciplinary Edutainment Design Centered İn Museums and Cultural Centers' completed in the Institute of Interior Architecture Department Mimar Sinan University. The article complies with national and international research and publication ethics. Ethics Committee permission was not required for the study.

Conflict of Interest Declaration

The author has no conflicts of interest to declare.

Contribution Rate Declaration Summary of Researchers

There is no conflict of interest with any institution or person within the scope of the study. Article has been prepared solely by the Author.

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