



## Promoting Children Tourism Through Applying Virtual Reality to the Egyptian Child Museum

Randa Alaa El-Din Fouad, Haidy Elsaid\*

*Faculty of Tourism and Hotels, Helwan University, Egypt*

### KEYWORDS

VR technology  
Egyptian Child Museum  
Cultural heritage  
Tourist experience

### ABSTRACT

Children's Museums are one of the rapidly developing fields of museology. Over the past few years, there has been a noticeable increase in the use of Virtual Reality (VR) in the museums' sector to embrace technological innovations and adapt to the challenges of the digital era. Meanwhile, children play a significant role in their families' travel decision-making process, nevertheless, this segment lacks sufficient attention. Therefore, this paper aims at applying VR technology to the Egyptian Child Museum as one of the key interpretation tools that may help in the promotion of children's tourism. It also focuses on children and the use of VR technology in entertainment and education. Furthermore, it sheds the light on the benefits and challenges resulting from the application of VR technology to the children's museums sector. The mixed-method was used in this paper including the qualitative method which was applied by conducting in-depth interviews with five museum professionals at the Egyptian Child Museum. Moreover, a quantitative method was followed by distributing a survey to a sample of the children visiting the Egyptian Child Museum and their parents to obtain their perspectives on the museum's implementation of VR technology. The results indicate that children are fascinated with technology, and they have a great impact on travel-related decisions. At the same time, children's museums can be the cornerstone for an entire vacation. Thus, this study contributes to the promotion of the children's tourism traffic through the adoption of VR technology in the Egyptian Child Museum

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### 1. Introduction

The United Nations International Children's Emergency Fund (UNICEF) considers anyone under the age of 18 as children (UNICEF, 2021). Meanwhile, Shuxia (2018) mentions that the word 'children' refers to those in preschool or elementary school, implying the age of 0-14 years old. When families decide to travel, one of the

hardest challenges facing parents is keeping their kids entertained and finding appropriate attractions for a variety of ages. For that, children's museums can be a genuine lifesaver as being the best tourist attractions for children to visit during their vacations (Abd El-Rahman, 2014).

Children's museums operate as venues for children to have fun and be entertained through a

\* Contact Haidy Elsaid at: [haidy.arafa@gmail.com](mailto:haidy.arafa@gmail.com)

variety of activities that help them to develop their skills and creativity. Moreover, they simultaneously serve as alternative and innovative spaces for school education, allowing active children's engagement in learning using interactive and digital technology such as Virtual Reality (VR), which has become increasingly incorporated into the visiting experience (Shehade and Stylianou-Lambert, 2020).

Children have a significant impact on their families' consumption behaviour. This involves the travel decision-making process, particularly when choosing tourist attractions (Shuxia, 2018; Wang et al., 2004). Furthermore, their influence on tourism purchasing power has been steadily developing and is expected to keep growing in the future. Thus, destinations increasingly integrate child-friendly services, affirming the importance of children as a segment in the tourism market (Dallari and Mariotti, 2016; Poria and Timothy, 2014). However, research focusing on children's consumption has only addressed tangible products, including toys and clothes, while their travel experience has received insufficient attention in tourism literature. Besides, for quite a long time, it was assumed that children behaved similarly to adult consumers. However, in terms of market behaviour, their consumption conduct differs from those of adults (Yewei and Xiaohong, 2020).

In this context, Tomić et al. (2018) state that the children's market segment encompasses three subsegments as follows:

1. Primary market: where children use their own money to buy the products and services they need.
2. Influence market: where children have the power to affect and change the consumption behaviour of their families.
3. Future market: where children are considered as promising future purchasers.

Consequently, the fundamental role of children in affecting their families' consumption behaviour and the travel decision-making process leads to the expansion and evolution of the child consumer influence market.

## **2. Literature Review**

### *2.1 Children Tourism*

The progressively vital role that children play in affecting the travel decision-making process of their families has resulted in the emergence of children's tourism (XiaoHong and MiMi, 2016).

According to Shuxia (2018), children's tourism comprises two types; child-only tourism, where the child spends overnight at another place without his family, such as summer camps, and family tourism. Yet, children's tourism is very difficult to be defined as the best ones to explain it are the children themselves. Thus, it has no specific definition till now. However, children tourism is expected to mature and develop dramatically soon (Song et al., 2020; Shuxia, 2018).

#### *2.1.1 Characteristics of Children as Tourists*

Travelling children need to have their necessities secured including food, safety, comfort and hygiene. The availability of child-friendly amenities and services is also of great importance. Besides, children favour fun, dynamic, and energetic experiences and activities. In addition, designing specialized programs for children is exceedingly preferred, such as providing playground programs in public parks or organizing excursions to child museums for children and their families (Song et al., 2020).

#### *2.1.2 The Importance of Children Tourism*

Children tourism is significant and promising for the following reasons:

1. It has an integral contribution to children's education.
2. The crucial influence that children have on their family's travel decision-making.
3. The increasingly expensive money and effort by parents to travel with their kids.
4. Parents' satisfaction is majorly influenced by their children's contentment.
5. The travel experience gained by children has a radical impact on their future consumption behaviour as adult travellers (Song *et al.*, 2020; Yewei and Xiaohong, 2020).

#### *2.1.3 Problems of Children Tourism*

There is a lack of literature and research on children's tourism due to the false belief that children follow their parents' travel decisions and do not contribute to the travel decision-making process. Besides, the difficulty of collecting data from children makes studying their consuming behaviour complicated (Aydin et al., 2021; Dale and Ritchie, 2020). Moreover, travelling with children makes the parents more concerned about their convenience, the time and distance of travel, the cleanness and hygiene of the destination, and the availability of suitable facilities for them (Song

et al., 2020). However, the interest in children's tourism and studying their travel behaviour is notably growing (XiaoHong and MiMi, 2016).

## 2.2. The Virtual Reality (VR) Technology

The use of immersive VR technology is a relatively recent tendency adopted by almost several industries around the world. The history of VR technology is not as recent as it might be perceived. In fact, "Sensorama", a simulator device that provided viewers with an interactive experience, is considered one of the earliest VR systems created in 1957 by the cinematographer Morton Heilig. However, the term "Virtual Reality" was developed in 1987 by the researcher Jaron Lanier during a period of intense research activity into this form of technology (Anderson, 2019).

Virtual reality technology nowadays refers to computer-generated 3D environments that enable the users to interact with and immerse themselves in it via a simulation of complex data or some form of reality. These environments are perceived through a device known as a head-mounted display (HMD), a virtual reality headset, or a helmet. Another significant type of VR is called the CAVE (Computer Assisted Virtual Environment), which was invented in 1992 and uses the walls, floor, and ceiling in a cubed-shaped VR room as projection screens. The users of CAVE wear stereoscopic glasses to convey 3D images. Accessories such as wands, joysticks, and other virtual objects can be employed for a more immersive experience (Miller, 2014). As for the 360° videos, it lacks the freedom of movement and exploration seen in VR experiences, which seem to be more immersive. Nonetheless, all VR devices are a hybrid of VR and 360° video (Dredge, 2016).

In the last ten years, VR technology has become a futuristic trend due to noticeable progress in artificial intelligence. The world of virtual reality has witnessed significant improvements that brought a progressive evolution to new industries from marketing and entertainment to education and communication. Moreover, people, companies, and institutions effectively incorporate VR technology into their daily life routines and quotidian operations (Arnhem *et al.*, 2018). Additionally, VR technology is distinguished with its accessibility for those with physical, sensorial and cognitive disabilities as it already relies on all human senses. Undeniably, many VR applications and gadgets are developing and proved to be useful

in the real world as assistive technologies (Kamieth, 2011).

### 2.2.1 Children and the Implementation of VR in Entertainment and Education

According to the WHO, 42% of children under the age of 8 have access to their own tablet devices and spend an average of 2 hours and 19 minutes a day on them. Children aged 5-8 spend almost 3 hours each day using screen-based technologies (Timberg and Siegel, 2019).

Regarding the education and entertainment industries, the first experiment with VR as a learning tool dates to 1991-1992, in Seattle, where the pupils of a summer school, aged between 10 and 15, experienced the world with an immersive VR system from their labs. The term "Virtual Reality" was associated with games in 1993 when Jonathan Waldern, the founder and director of the first company to manufacture immersive VR games, announced that 3 million people used his company's games (Schroeder, 1993).

The development of digital games for children promotes the technology to act as an active part of their surrounding world while considering their needs and desires. Gaming technologies, including virtual and Augmented Reality (AR), engage children physically and contextually in relevant narratives (Madej, 2016).

Virtual reality technology has verified its beneficial impacts on many sectors including tourism, culture, heritage, and museums. Consequently, this technology has been significantly implemented in several museums and educational institutions, affecting the way people experience and perceive heritage and providing an innovative and strong tool for easy learning (Shehade and Stylianou-Lambert, 2020). From this perspective, the British Museum is considered one of the earliest museums to employ effective VR applications, in 2015, to enhance the visitors' experience. This event was achieved in collaboration with Samsung, allowing the museum's visitors to explore a VR Bronze Age site while using Samsung Gear VR headsets (Auffret, 2017). Moreover, the use of VR technology has been widely adopted in the heritage sector as a means of providing virtual tours experiences, notably during the global outbreak of the COVID-19 pandemic. This outbreak allowed digital cultural heritage to be available online in order to raise people's awareness concerning the outstanding universal value of the world cultural

heritage remotely and during lockdown (Chirisa et al., 2020).

The application of VR technology enables children to explore worldwide cultures differently through experiencing festivals, events, religious and political perspectives, therefore creating a smaller world where more opportunities exist. In addition, it enables prospective learning and teaching applications involving children, particularly in distant areas and during humanitarian disasters. Furthermore, VR technology is being utilized to produce immersive storytelling for children, providing them with new interactive methods to experience the narrative, since the primary goal of museums is to entertain, enlighten, educate, tell stories, train, and construct arguments. Meanwhile, the employment of technological tools facilitates its mission (Shehade and Stylianou-Lambert, 2020).

### 2.3 Children Museums

Museums are indisputably cultural and educational institutions that play a significant role in comprehending the sustainability of cultural heritage, preserving the country's past and present cultural identity, and presenting it to future generations through the display of a wide range of materials and artefacts. Museums, like any other cultural heritage attraction, are considered experiential products and effective tools for global learning as they promote and provide training, education, and engagement for both staff and visitors (Nilson and Thorell, 2018).

According to the International Council of Museum (ICOM) Statutes, adopted by the 22<sup>nd</sup> General Assembly in Vienna, Austria, on August 24, 2007, the museum is defined as: "*A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment*" (ICOM, 2007). As a consequence, the Association of Children's Museums (ACM), based in Washington, D.C. and founded in 1962, has defined a children museum as "*a non-profit educational and cultural institution committed to serving the needs and interests of children by providing exhibits and programs that stimulate curiosity and motivate learning*". The core concept behind these exhibits is that playing is the

children's context for learning since it fosters their creativity and imagination, provides a sense of adventure, allows them to practice different skills, process emotional events, and explore their world. It is also essential for the healthy social, emotional, and cognitive development of children who have the right to enjoy developmentally appropriate and high-quality learning experiences (ACM, 2016).

Another example of other international professional organizations for children's museums is the Hands On! Europe Association of Children's Museum. It started as an informal network established in 1994 and eventually became a recognized non-profit organization in Portugal for the first time in 1998. Hands on! mainly focuses on the circularization of children's museums on an international level. Moreover, it was determined that the organization would be open to all qualitatively valuable programs for children in children's museums or other museums (Hands On! Europe, 2013).

#### 2.3.1 History of Children Museums

Children (under the age of 18) constitute almost 30% of the world's population (Patterson, 2020). The earliest children's museum movement began with the Brooklyn Children Museum (BCM), founded in 1899 in New York City. It underwent several expansion and renovation stages before becoming the first green museum in New York City in 2008 (BCM, 2016). Brooklyn Children Museum was open to the public, free of charge, and its collection represented devotion to the study of natural sciences that supported the majority of public schools' curricula comprising zoology, botany, U.S. history, mineralogy, geography, and art (Swigger, 2019).

Over the next several decades, other cities across the United States have been inspired by the BCM and established the next seven in order children's museums including Boston Children's Museum (1913), The Detroit Children's Museum (1917), the Children's Museum of Indianapolis (1925), the world's largest children museum as of the ACM, the Children's Museum, West Hartford (1927), Duluth Children's Museum (1930), Jacksonville Children's Museum (1935) and Charlotte Children's Museum (1947). All the above-listed museums shared a similar philosophy, which is primarily centred on collecting and displaying objects and artefacts as teaching resources while maintaining its traditional priority which is the

preservation of cultural heritage and natural environment (Schofield-Bodt, 1987).

Subsequently, the notion of children's museums has extended internationally outside the United States, appearing mostly in Canada, England, Wales, Belgium, Scotland, New Zealand, Korea, and Australia (Wood, 2018). Today, there are more than 300 children's museums across the world serving and supporting millions of families through the implementation of their four fundamental dimensions, regardless of their size, as being local destinations, educational laboratories, community resources, and advocates for children (ACM, 2016). Despite this noticeable global presence of children's museums, the vast majority of this type of museum still exists in the United States with over 200 museums on its mainland, receiving more than 40 million visitors annually (ACM, 2017).

### 2.3.2 Children Museums and VR Technology

The majority of children's museums depend principally on digital technology in their exhibitions and galleries, and they are looking for the best practices and techniques for its integration constructively (Brister, 2017). In this context, various museums offer both on-site interactives and online virtual tours for their visitors to provide them with better learning experiences and maximize their entertainment (Sfintes, 2013). Undoubtedly, the outbreak of the COVID-19 pandemic in 2019 has suspended the worldwide tourism industry. According to the third UNWTO report on travel restriction, 100% of destinations worldwide had implemented COVID-19-related travel restrictions, and 165 of 217 destinations (72%) had completely stopped international tourism based on the data collected as of April 2020 (UNWTO, 2020).

In response, the museums' sector tended to take advantage of the COVID-19 crisis and be more dependent on the use of technology, e.g., robotic applications, mobility tracking technologies, virtual reality applications and virtual tours (360° virtual videos) (El-Said and Aziz, 2021). Several museums have displayed their collections online or created online virtual tours in order to alleviate the children's boredom during the lockdown. The best examples of worldwide museums that provided free appealing home virtual tours for children are the Boston Children's Museum, The Louvre Museum, The British Museum, The Metropolitan Museum of Art, Van Gogh Museum, Smithsonian

National Museum for Natural History, and others (Zemler, 2020).

### 2.3.3. Best Examples of Worldwide Children Museums Using On-site VR Technology

In 2021, the Children's Museum of Indianapolis has been chosen as the best museum for families in the US that offers significant interactive experiences for children and adults alike (Cimini *et al.*, 2021). The Indianapolis Children's Museum is the world's best, largest, and fourth-oldest museum of its kind (fig. 1). It was founded in 1925 by Mary Stewart Carey after being inspired by a visit to the Brooklyn Children's Museum in 1924. It is located in 3000 North Meridian Street, Indianapolis, IN, USA, encompassing almost 500,000 square feet of fun-filled experiences, and receiving more than one million visitors annually (The Indianapolis Children's Museum, 2019a). The museum has been accredited by the American Alliance of Museums (AAM) and its stated mission is to "create extraordinary learning experiences across the arts, sciences, and humanities that have the power to transform the lives of children and families" (The Indianapolis Children's Museum, 2021)

Fig. 1

The Indianapolis Children's Museum



Hamaker, 2017.

It consists of five floors: the lower floor, the ground/main floor, the second floor, the third floor and the fourth floor that house nearly 130,000 artefacts and specimens. Among the museum's distinctive exhibitions are the 3D simulated Cretaceous dinosaur habitat, which is closed through March 2022 and is only available for online virtual tours in the meantime, a carousel, a steam locomotive and the famous fireworks of glass sculpture which rises five stories high. In 2017, a virtual-reality tightrope, using 3D Google Camera, has been introduced to the circus exhibition, allowing visitors who are afraid or

physically unable to experience it in reality (fig. 2). For instance, someone who is afraid of heights can easily try high wire balancing without fearing a fatal fall. Moreover, a wheelchair user can enjoy the feeling of being high above the ground (Hamaker, 2017)

**Fig. 2**

The virtual reality tightrope in Indianapolis Children's Museum.



Hamaker, 2017.

The Indianapolis Children's Museum focuses primarily on the implementation of technology and interactive exhibits since such exhibits are principally designed to nurture the children's creativity, help in the development of their cognitive and learning process, inspire their imaginations and connect generations for decades (The Indianapolis Children's Museum, 2019b).

As a result of the COVID-19 outbreak in 2020, the museum has gone digital with the "Museum at Home" experience which includes virtual tours for the museum's exhibits, educational activities, fun videos, blogs, live chats and storytelling to keep children entertained during the lockdown. Moreover, the museum continues to provide virtual summer programs for its visitors on a variety of topics including sculpture, art, drawing, animation, mini-masterpieces, puppets and games, and toys (The Indianapolis Children's Museum, 2020).

The museum is suitable for both adults and children aged 0 to 13+, and it is open daily from 10 a.m. to 5 p.m., except on Mondays and Tuesdays. The admission fees are 17\$ for adults, 16\$ for seniors (60 years and above), 12\$ for youth (ages 3 to 17), 15\$ for Indianapolis college or university students and free for children under the age of 3. Tickets can be purchased online for \$1 less than the published cost (Indiana State Museum and Historic Sites, 2021). On Martin Luther King Jr. Day, Presidents Day, Fiesta de la Familia, and Christmas Eve, the museum offers free admission to everyone, in

addition to selected galleries and exhibits that are free all year (Mann, 2021).

#### 2.3.4. Benefits of Applying VR Technology to Children Museums

Since VR technology has become more accessible, it has undoubtedly provided huge prospects for children's museums on a variety of levels. It is frequently applied to create interactive, engaging, and immersive experiences in museums' environments (Shehade and Stylianou-Lambert, 2020). It has also been widely used for reconstructing historical environments, allowing children to be fully immersed in the experience and explore history and art. Heritage sites and cultural exhibitions from all over the world can also be viewed, providing its users with a time-travel experience and the feeling of actually being there (Economou, 2016). It should be mentioned that the discovery of a cultural heritage environment is typically based on storytelling via audio description that provides information about specific buildings. In addition, children can actively participate and determine their experience and behaviour as the VR content is instantly generated. For instance, if children are exploring an ancient city, they may use the pointer to pick which path to follow and what to do, much as on a real tour, without the use of motor interfaces as joysticks (Debailleux et al., 2018).

Moreover, the use of VR technology in children's museums has been regarded as an effective educational tool that allows access to a wide range of information. It also offers learning opportunities that enhance children's interests in knowledge and facilitate their learning experiences. Additionally, the VR environment may have a strong motivational impact on children's learning due to the immersive nature and sense of presence ingrained in VR applications. The sensation of presence and immersion are frequently connected with higher levels of involvement and more intense emotions and aspects that are associated with improved learning outcomes. Hence, the higher the sense of presence and emotional involvement during the experience, the easier the children will recall the content presented to them (Araiza-Alba et al., 2020).

In terms of children with special needs, as well as those who are visually impaired, autistic, have social anxieties or have mental health issues, VR brings possibilities for socializing, exploration,

adventure, and experiences that they would not have in the actual world. Hence, it allows them to broaden their knowledge, abilities, and attitudes in ways that were previously unattainable. Furthermore, it enables them to engage in safe learning activities and experiences through simulated environments away from the constraints imposed by their physical or mental disorders (Shehade and Stylianou-Lambert, 2020).

### 2.3.5 Challenges of Applying VR Technology to Children Museums

Despite the advantages of applying VR technology to museums, it has some drawbacks represented in the isolation of the visitors from the surrounding atmosphere which may hinder social interaction. Besides, the staff needs to be trained on dealing with VR technology and assist visitors who are unfamiliar with it. Additionally, some museum professionals lack expertise in VR projects and settings (Mealy, 2021). In contrast, VR technology is not suitable for blind and deaf visitors. Moreover, others argue that the proper age to use VR equipment is above 12 years old, and children below 12 are not recommended to use it due to mental and physical health concerns. In addition, regular cleansing of VR devices is required as being utilized by a large number of visitors on daily basis. Over and above The Child Museum is located in 34 Abu Bakr El-Seddiq St. in Heliopolis neighbourhood in Cairo, covering an area of 4000 square meters. The main entrance path to the museum represents an integration of two colourful and vibrant models (fig. 3). The first model is the planetary orbit, which refers to the future sciences, while the second model is the pyramid, which alludes to Egypt's great history and the overwhelming strengths of its rulers. The two models are intersected to highlight the Egyptian Child Museum's theme, which connects the pyramids to the stars. In other words, it interrelates the past (ancestor's civilization), the present (today's sciences and innovation) and the future (planetary orbit) in order to develop a conscious and intellectual child (The Egyptian Child Museum, 2021), VR requires tremendously high-quality graphics in order to provide a convincing experience that immerses and engages the visitor (Shehade and Stylianou-Lambert, 2020; Mealy, 2021). The huge funding required to implement VR technology projects regarding equipment and staff training can be considered a critical challenge.

Additionally, using VR devices for an extended time can cause medical side effects such as dizziness and nausea (Baniasadi et al., 2020; Mealy, 2018).

### 2.4 The Egyptian Child Museum

The Egyptian Child Museum is considered the first of its kind that serves as a public cultural source, designed mainly for children, for creative education, inventive work and participatory learning methods.

#### 2.4.1 History of the Egyptian Child Museum

The Egyptian Child Museum, also known as "The Children's Center for Civilization and Creativity" and formerly as "Suzan Mubarak Child Museum", is one of the Heliopolis Association's major projects. It is an informal education institution that strives to raise awareness of the importance of the Egyptian heritage and how to preserve it, through a set of exhibits and educational and interactive programs and activities that target all segments of society (Heliopolis Association, 2021). It was established in 1985 as a part of the joint project with the British Museum. The museum was designed by experts from all over the world and Egypt, and it was officially opened on the 30<sup>th</sup> of May 1996, as the first children-oriented museum in the MENA region. The museum was renovated twice throughout its history, in 1996 and in 2012, to keep pace with the contemporary technological development (Osama, 2017). The Egyptian Child Museum is a Non-Governmental Organization (NGO) and a member of the international nonprofit organization, the Association of the Children's Museums (ACM). Furthermore, it received the UK's Museum and Heritage International Award in 2012, followed by the UNESCO Best Prize in Heritage in 2013 (ICOM, 2013).

The Egyptian Child Museum is an interactive edutainment intellectual entity that brings all the family members together in a tour through time and place to discover Egypt's past, present and aspire to the future. It is considered the best and the most significant museum for children in the MENA region. Its declared mission is to provide fun interactive learning for children and families, empower them and give them a new perspective on their future (The Egyptian Child Museum, 2020).

#### 2.4.2 The Layout of the Egyptian Child Museum

The Child Museum is located in 34 Abu Bakr El-Seddiq St. in Heliopolis neighbourhood in Cairo,

covering an area of 4000 square meters. The main entrance path to the museum represents an integration of two colourful and vibrant models (fig. 3). The first model is the planetary orbit, which refers to the future sciences, while the second model is the pyramid, which alludes to Egypt's great history and the overwhelming strengths of its rulers. The two models are intersected to highlight the Egyptian Child Museum's theme, which connects the pyramids to the stars. In other words, it interrelates the past (ancestor's civilization), the present (today's sciences and innovation) and the future (planetary orbit) in order to develop a conscious and intellectual child (The Egyptian Child Museum, 2021

**Fig. 3)**

The entrance path to the Egyptian Child Museum.



*Children's Center for Creativity and Civilization, 2021:4.*

#### 2.4.2.1 The Garden

The main entrance path leads to an extensive park, approximately 14 feddans plot (fig. 4). It encompasses a variety of plants and trees with labels indicating their names and species, allowing children to learn about nature while exploring (SIS, 2016).

**Fig. 4**

Map of the Egyptian Child Museum's Garden



*Children's Center for Creativity and Civilization, 2021:5.*

The garden has a representation of the Nile river, starting with Ethiopia and ending with the Red Sea and the Delta. The Nile is surrounded by the scenery of the African rainforests, which features 3D representations of wildlife that used to live in and around the Nile, such as crocodiles, flamingos, antelopes, elephants, giraffes, hippopotami deer, donkeys, foxes, and lions. On the two banks of the Nile, children can enjoy a live exhibition zone of butterflies, birds and fish. They can also examine replicas of Bedouin and countryside houses and enjoy playing in the outdoor excavation area. Moreover, the garden embraces a theatre for concerts and puppet shows, a cinema with 3D projection facilities, a library stocked with educational literature, outdoor classrooms for creative and musical activities, a playground, a gift shop and a cafeteria (Children's Center for Creativity and Civilization, 2021). Artwork, painting, and ceramics are among the various activities and crafts that may be practiced in the garden. In addition, technical activities courses and summer camps are also available. Aside from that, separate sections are allocated for birthdays and gatherings.

To enter the museum's main building, visitors must follow a historical path that begins in the garden with the Nile River and proceeds to the first floor, which is the basement. The museum is divided into four floors: the basement (secret treasures of the Pharaonic culture), the ground floor (seasons of the Nile), the first floor (Egyptian panorama), and the second floor (Egyptian stars). Moreover, the museum's design takes the shape of different clocks, and it epitomizes the three measures of Egyptian time, which are the sun (Shadow clock stairs), the water (Water clock drum) and the stars (Celestial Clock Dome) through which its people controlled their environment for seven thousand years (Children's Center for Creativity and Civilization, 2021).

#### 2.4.2.2 The Basement (Hidden Treasures)

The basement is designed to resemble the interior of a pyramid, where children can explore the pyramids' mysteries, how they were built, and why they were constructed (fig. 5). They can also learn more about the Sphinx and other pyramids in Upper and Lower Egypt. In the 2D art section, children can trace an ancient picture, color it in, add parts to the picture to create a figure for a king or a nobleman, and finally insert some hieroglyphic

texts. Moving to the 3D art area, children can examine 2D images that tell stories about the ancient Egyptian kings, their names, why they built temples and other monuments, how they made offerings to their deities and how they celebrated festivals. For further illustration, 3D models for the most prominent ancient Egyptian temples and statues are provided

The remaining sections of the basement promote Egypt's hidden treasures including monuments that were found in the tombs and valleys. Children can learn more about archaeological excavations and dig up hidden treasures using various equipment such as the brush. In the underwater archaeology zone, children can reveal the secrets of the underwater monuments and learn more about UNESCO's significant role in rescuing the Nubian monuments (Children's Center for Creativity and Civilization, 2021).

Besides, they can acquire knowledge about the mummification process and the internal organs of the human body. Moreover, they have the chance to discover how medicine was developed thousands of years ago and how the ancient Egyptian remedies were effective in healing several illnesses (El-Akkad, 2015)

#### 2.4.2.3 The Ground Floor (Seasons of the Nile)

The ground floor portrays the three seasons of the Nile (fig. 6): the flood (*šḥt*), the sowing/growth (*pṛt*) and the harvest (*šmw*), where children learn about the Nile River flood, how water was measured and how the ancient Egyptians discovered agriculture. In the sowing theatre, they play the farming game to find out how the ancient farmers worked, what crops they planted and what equipment they used. They subsequently enter the harvest theatre, where a movie depicting the harvest work is projected on the wall.

Fig. 6

Map of the Egyptian Child Museum's ground floor.



Children's Center for Creativity and Civilization, 2021:28.

In the Egyptian market area, children learn how the ancient Egyptians traded, where everything was measured in units of bread and the Deben weight in copper was used to calculate the value of other goods for exchange. Moreover, they can gain knowledge about how the ancient Egyptians learned to count, read, and write.

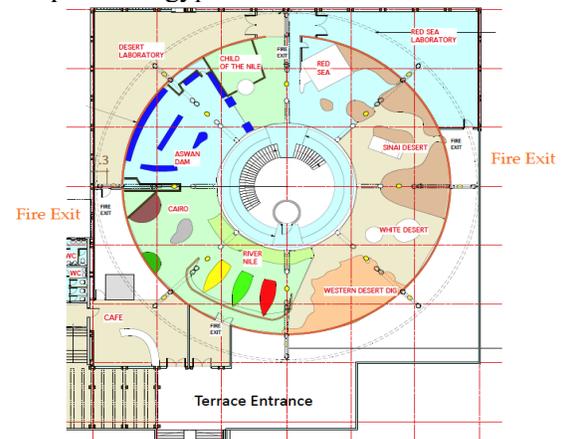
Moving to the Egyptian house section, children can identify the materials used for construction, the house's division and the furniture used. In addition, a film on manufacturing baskets and bedframes is displayed in the workshop section. A storytelling hall is attached to the Egyptian house section, where children can listen to the tales of the Shipwrecked Sailor and the Eloquent Peasant. On this floor, children can also explore the ancient Egyptians' daily life tasks such as building ships, temples, and houses, as well as playing musical instruments and dressing up for celebrations (Children's Center for Creativity and Civilization, 2021).

#### 2.4.2.3 The First Floor (Egyptian Panorama)

On the first floor (fig. 7), the Children of the Nile movie is unveiled allowing the visitors to know how children live along the Great Nile River (at least 100 million children live along the Nile, nearly 20 million lives in Egypt). They also gain knowledge about the causes of Nile pollution, how to eliminate it and how to generate and save energy (Children's Center for Creativity and Civilization, 2021).

Fig. 7

Map of the Egyptian Child Museum's first floor



Children's Center for Creativity and Civilization, 2021:39

Moreover, they can distinguish the different species and creatures that used to reside in the Western Desert, the White Desert and Sinai. A video of the ancient whale *Basilosaurus* is shown in the area of Wadi El-Hitan (Whales Valley), the world's only intact fossil dating about 40 million years ago that has been uncovered during a new excavation at Wadi Al-Hitan (IUCN, 2015).

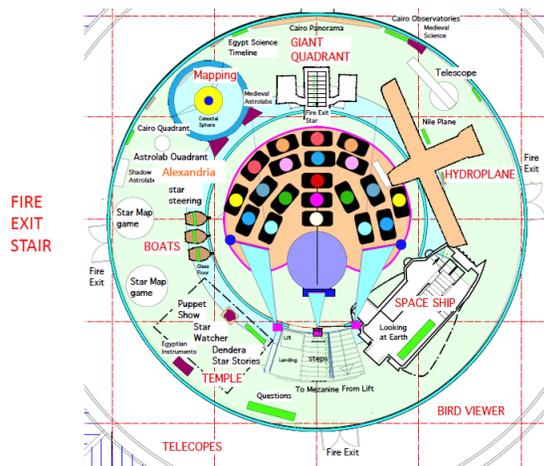
A room is dedicated to revealing the incredible wealth of natural beauty, coral, fish and sharks that dwell along the Red Sea's shore. Inside this room, children can enjoy exploring the Red Sea treasures and miracles with their images reflected on the wall through a hanging camera, as if they are diving in it.

### 5.2.5 The Second Floor (Egyptian Stars)

The second floor is where the journey of the children to past and present ends, and the adventure to Egypt's future begins (fig. 8). On the second floor, children learn about Egypt's contribution to the birth and development of sciences. From this perspective, the rooftop of the temple of Dandara is depicted on the floor with its most renowned stars: the Priest (star watcher in ancient Egypt, telling the time) and the Rising Sothis (named after goddess Isis and marked the new year). Through a series of interactive games, children can discover the Cairo observatory and Helwan telescope to explore the space and watch different constellations of stars (El-Akkad, 2015).

Fig. 8

Map of the Egyptian Child Museum's second floor.



Children's Center for Creativity and Civilization, 2021:48.

Children can also review some of the ancient maps, e.g., the Dandara zodiac map, the Ptolemy world

map and the Arab maps, modern sciences and different Egyptian scientists such as Ibn El-Nafis and El-Haytham, the first Egyptian journey to space and the first plane that ever flew from Cairo to Alexandria by Lotfia El-Nadi in 1933 (Children's Center for Creativity and Civilization, 2021).

Finally, children can visit the spaceship exhibit where they can engage in a variety of activities and experience the adventure to space. Besides, a movie about the space is displayed on the main dome.

### 3. Research Method

The research aims at determining how VR technology would be applied to the Egyptian Child Museum to promote children's tourism traffic and the challenges of its implementation. It also focuses on identifying the museum professionals' and children's perceptions towards VR technology and its application to the Egyptian Child Museum. In this context, a visit was conducted to the Egyptian Child Museum in May 2021 to explore whether VR technology is available at the museum and define how it could be employed.

In addition, a qualitative method was followed through proceeding face-to-face in-depth interviews with five museum professionals, with managerial and technical positions, at the Egyptian Child Museum in June 2021 to get clear discernment of the museum's role in promoting children tourism, the current condition of the museum, and the challenges of applying VR technology to the museum. Nine open-ended questions were carried out to allow an open conversation with the interviewees so that more details would be provided. The questionnaire was based on the survey of Shehade and Stylianou-Lambert (2020), which was designed to examine and assess the challenges and advantages of the use of VR in the museum sector.

Moreover, a quantitative method was used by distributing a survey to a random sample of the children with their parents who visit the museum's garden to get insights from both the VR technology and its application to the museum. The validity of the survey was explored by four experts who belonged to tourism and museology fields. Furthermore, it was developed in reference to that of Aubrey *et al.* (2018), which aimed at investigating the perceptions about the children's engagement with VR technology.

The survey was distributed in the museum's garden, and each one was answered by one child and one parent. It was divided into two sections, one for the child and the other for one parent and included 19 multiple-choice questions (15 for the child and 4 for one parent) to make it faster and easier for the children to answer. According to Aubrey et al. (2018), VR technology is not suitable for children under 7 years old. As a result, the survey was disseminated to children aged 7 to 18 years old. Since accurate statistical data about the number of visitors of the museum were not available, the survey was distributed to 100 children with their parents from July to August 2021, with 96 surveys eligible for analysis, with a response rate of 96%.

#### 4. Research Findings

##### 4.1 Visit to the Egyptian Child Museum

A field visit was conducted to the Egyptian Child Museum in March 2021 to learn about the museum's current status, and to explore the availability of VR technology in the museum's exhibitions and galleries. Prior to the visit, an inspection was carried out to determine whether the museum has an official website or not. It was detected that the museum does not have an official website, but it does have an updated Facebook page. During the visit, it was noted that there is a small area in the museum's garden, rented by an external company, allotted to a VR and AR dinosaur exhibition. The VR show, which seemed to be rudimentary, was experienced using the company's smartphone, which was placed inside a primitive VR headset.

In addition, the museum's main building was accessed with the assistance of one of the museum's responsible professionals, however, it has been closed for visitors as a result of the COVID-19 outbreak since March 2020. The museum's four floors have been investigated and the tour indicated a lack of application for the VR technology. Several rooms and areas, principally dedicated to the projection of movies with varied themes and contents, have been identified and deemed appropriate for applying the VR technology as follows (Table 1):

**Table 1**

The appropriate suggested rooms and areas for applying the VR at the Egyptian Child Museum.



##### 4.2 In-depth Interviews with the Museum Professionals

The results of the in-depth interviews conducted with the five museum professionals at the Egyptian Child Museum revealed the following:

###### 4.2.1 Children's Influence on Travel Decision-making

Asking the museum professionals about their opinion regarding whether children influence the travel decision-making process, they stated that children play an important role in the travel decision-making process either directly by choosing destinations and tourist attractions, or passively as parents constantly seek their children's needs, satisfaction, and methods of entertainment when making travel choices.

###### 4.2.2. The Role of Children Museums in Promoting Children Tourism

Museums are significant tourist attractions and play a critical role in promoting tourism (Adeniji and Ekanem, 2013; Museums Association, 2013). Thus, the museum professionals were asked about the role of children's museums in promoting children's tourism. They affirmed that children's museums play a vital role in promoting children's tourism traffic since they provide physical and intellectual advantages for children. Besides, children's museums are a great leisure alternative considering the playful and active nature of kids. For this reason, they attract a huge number of children and family visits.

###### 4.2.3 The Egyptian Child Museum's Current Condition

The museum professionals were asked about the current condition of the Egyptian Child Museum, and they mentioned that as a consequence of COVID-19 precautionary measures, the museum's

main building has been closed to the public since March 2020 and will remain thus until further notice. Today, the garden and its surrounding areas are open to the public daily from 9 a.m. to 9 p.m. The garden ticket is 25 EGP, while the planetarium show, which is only held on Fridays and Saturdays, is 50 EGP. The museum is appropriate for children aged 4 to 10+. Prior to the outbreak of COVID-19 in 2020, the museum's building was open to the public from 9 am to 2 pm, while the garden and the playground area were open till 9 pm. Its entrance fees ranged from 15 to 35 EGP, depending on touring the garden or visiting any of the four floors (the visit-time range in each floor varies between one hour and an hour and 15 minutes).

Currently, the museum is going under a comprehensive development plan that will be accomplished by next year, 2022, and involves extensive maintenance for the museum's game equipment as well as the transformation of the museum's first-floor labs into a science centre.

#### *4.2.4 The Availability of the VR Technology at the Egyptian Child Museum*

The museum professionals were requested to clarify the availability of the VR technology at the museum and its activities. They responded that the VR technology is not applied to the Egyptian Child Museum, however, there is a small area in the garden, next to the main entrance, rented by an external company and dedicated to a basic VR and AR dinosaur exhibition experience. Children may participate in the VR and AR programs by scanning the QR code with their smartphones and sometimes using a simple VR headset. The VR and AR dinosaur display are open from 9 am to 3 pm, costs 50 EGP, and is suitable for children above 5 years old.

#### *4.2.5 Applying VR to the Egyptian Child Museum*

The museum professionals were asked about their opinion regarding applying VR technology to the Egyptian Child Museum, and whether it would promote children's tourism. They stated that the more the child museum offers interactive and pleasurable features, the more it becomes appealing and attracts more visits. The participants also mentioned that incorporating VR to the Egyptian Child Museum would add a competitive advantage to the museum, improve the children's experience and make the museum more interactive. Consequently, this would attract more children and promote children tourism traffic, especially since

today's children nowadays are fascinated with technology.

#### *4.2.6 Possible Challenges of the Implementation of VR Technology to the Egyptian Child Museum*

According to the responses of the museum professionals, one of the key challenges that may face the implementation of the VR technology to the Egyptian Child Museum is the high cost of the initial VR products: the hardware and particularly the software, which requires specialized knowledge and expertise VR development companies. Also, the staffing needs for developing and handling VR and the cost of its repair and maintenance are among the stressful challenges that might face the implementation of the VR technology to the museum. From a financial perspective, the Egyptian Child Museum is a Non-Governmental Organization (NGO) and a member of the international nonprofit organization, the Association of the Children's Museums (ACM) that depends on self-funding rather than the governmental substantial support which seems to be more stable. Nevertheless, the museum endeavours to allocate other resources for capital, maintenance, building rehabilitation, and activities fundraising. In this context, several activities and events take place in the museum's garden as part of the museum's fundraising plan. The Heliopolis Association, for example, arranged several events and workshops to commemorate the value of friendship and human ties between humans and animals on World Friendship Day, July 30, 2021 (Taher, 2021). Furthermore, the museum generates revenue through investments in its outlet and outdoor areas, such as photo session arrangements, space rentals, planned birthday parties and events, pet exhibitions (held three times a year), organized trips, activities workshops, summer camps, and technical courses.

#### *4.2.7 The Availability of Technical Support and Staff Training*

The museum professionals were questioned if the museum can handle the application of VR technology in terms of the availability of a technical support department and training program for the museum staff. The participants stated that there is a department at the museum in charge of the general technical assistance and regular maintenance for the museum's technological and interactive activities. Moreover, they confirmed that the museum staff is provided with frequent

training programs to enable them to be updated with the latest technology required for the children's activities. However, the staff still lacks the skills and knowledge to adopt and manage VR technology and its associated equipment.

#### 4.2.8 The Egyptian Child Museum's Activities and Facilities for Children with Special Needs

Asking about the Egyptian Child Museum's activities and facilities for children with special needs, the museum professionals mentioned that as part of the museum's commitment to inclusivity, it accommodates families with special needs children since specific programs, events and workshops are frequently held in the museum's garden. Additionally, selected areas in the museum's building are designated for children with special needs and particular activities are specifically designed to engage and entertain them. Furthermore, ramps are constructed in the garden and its adjacent areas, as well as in the museum's building, to facilitate the children's mobility with their companions.

#### 4.2.9 The Egyptian Child Museum's Role and the Community Engagement

The museum professionals indicated that the Egyptian Child Museum is concerned with the local community and the most effective ways to address their demands. The museum has a Facebook page where they share information about their summer camps, trips, events, activities, and workshops. Within the framework of the museum's social responsibility, its board of trustees allotted 15% of the total profit for families with children in need. It also encourages the youth to participate in the voluntary work represented in organizing free tours and guiding children who visit the museum. Moreover, the museum offers free training to university students whose studies are relevant to the museums and heritage sector.

### 4.3 Children's Survey

The results of the survey distributed to the children and their parents at the Egyptian Child Museum revealed the following:

The first three questions of the survey were about the demographic information of the respondents.

#### 4.3.1. Age of the children

As shown in table 2, 41.6% of the children aged from 7 to 10 years old and 33.4% were 15 to 18

years old. Meanwhile, 25% of them were between the ages of 11 and 14.

#### 4.3.2 Gender of the children

The highest percentage of the children 58.4% were males, while 41.6% of them were females.

#### 4.3.3. Nationality of the children

The majority of the children 94.8% were Egyptians while only 5.2% (5 children) were non-Egyptians, 2 of whom were Americans, and 3 were Syrians (Table. 2).

**Table 2**

Demographic information of the surveyed children at the Egyptian Child Museum

	<i>n</i>	Percent
<b>Age</b>		
7 to 10 years old	40	41.6
11 to 14 years old	24	25
15 to 18 years old	32	33.4
<b>Total</b>	<b>96</b>	<b>100</b>
<b>Gender</b>		
Female	40	41.6
Male	56	58.4
<b>Total</b>	<b>96</b>	<b>100</b>
<b>Nationality</b>		
Egyptian	91	94.8
Non-Egyptian	5	5.2
<b>Total</b>	<b>96</b>	<b>100</b>

#### 4.3.4 The Frequency of the Museum's Visits

The majority of the children 80.2% (77 children) have visited the museum several times, while 19.8% of them (19 children) visited the museum once.

#### 4.3.5 Reasons for Visiting the Egyptian Child Museum

The children were asked why they visit the museum, and some of them chose more than one answer. The majority of the children 75% (72 children) stated that visiting the Egyptian Child Museum was their own choice, while only 12.5% (12 children) said that it was their parents' preference. Meanwhile, 45.1% of the children (52 children) chose the museum's reputation as the reason for their visit, 33.3% (32 children) selected special occasions and events, and 29.1% (28 children) indicated having unique experiences. However, only 8.3% (8 children) stated that convenience was the key reason for visiting the museum.

#### 4.3.6 Activities during the Visit

The children were asked about the activities they enjoy during the visit, and they were allowed to pick more than one activity. Playing scored the highest percentage 54.1% (52 children), followed by socializing with others that was chosen by half of the children 50%. Meanwhile, 45.8% of the children (44 children) adopted exploring and wandering, and 41.6% (40 children) preferred participating in activities and exhibits held there. However, 20.8% (20 children) chose hands-on opportunities and 16.6% (16 children) selected summer camps.

#### 4.3.7 Knowledge of VR Technology

The majority of the children 92.7% (89 children) acknowledged that they understand what VR is, whereas just 7.3 percent (7 children) did not.

#### 4.3.8 Experiencing VR Technology

The majority of the children 85.4% (82 children) claimed that they have experienced VR technology, while 14.6% (14 children) have never experienced it.

#### 4.3.9 Places of Experiencing VR Technology

The 82 children who experienced VR technology were further asked where they experienced it, and they were allowed to select more than one answer. The majority of children 90.2% (74 children) said that they experienced VR at malls, while 67% (55 children) experienced it in museums. However, 34.1% (28 children) stated that they tried VR at home using affordable VR headsets as well as 360° videos and websites. Meanwhile, only 4.8% (4 children) experienced VR in other places such as the Immersive VR gaming centre in New Cairo, VR cafe in El-Mokattam and The Virtual room Egypt on the North Coast.

#### 4.3.10 Fields of Experiencing VR Technology

The children who experienced VR technology (82 children) were also asked about the fields in which they tried it, and they were allowed to choose more than one answer. Most of the children 82.9% (68 children) experienced VR in entertainment shows and movies, and 63.4% (52 children) tried it in games. Meanwhile, only 29.2% (24 children) experienced it in education.

#### 4.3.11 Trial of VR Dinosaur Show in the Egyptian Child Museum

More than half of the children 54.2% (52 children) indicated that they have tried the VR dinosaur exhibition in the museum's garden, while 45.8% (44 children) stated that they haven't.

#### 4.3.12 Description/Experiencing the VR Dinosaur Show in the Egyptian Child Museum

Some of the answers of the 52 children who responded that they had tried the VR dinosaur exhibition described their experience as being primitive and boring. Other children indicated that they did not enjoy it and it is not worthy at all in terms of ticket fees (50 EGP) since the show's duration is less than 5 minutes. Moreover, a few children complained about the show's administration, stating that all children stand in a queue, with no chairs or waiting area, and each child sees the display and passes the VR kit to the next child.

The majority of the 44 children who haven't tried the VR dinosaur exhibition in the museum's garden specified that they have no clue that the museum provides a VR dinosaur exhibition among its activities. Other children reported their dissatisfaction for standing in long queues, wasting their playtime, and waiting for their turn to try the show.

#### 4.3.13 Applying the VR Technology to the Egyptian Child Museum's Activities

Of the 96 surveyed children, 92 (95.8%) were excited about the application of VR technology to the museum's activities, while only 4.2% (4 children) were reluctant and did not show any interest in applying such technology to the Egyptian Child Museum.

#### 7.3.14 Reasons for Applying the VR Technology to the Egyptian Child Museum's Activities

The 92 children who favoured applying the VR technology to the museum's activities were further required to clarify their reasons, and they were allowed to choose more than one answer. The majority of the children 95.6% (88 children) replied that having fun is one of the most significant reasons for applying the VR technology to the museum's activities, 39.1% (36 children) stated that applying the VR to the museum's activities would be an educational, enriching and creative experience, while 30.4% (28 children) denoted that applying the VR technology to the museum's activities would enable them to be fully immersed, engaged and interacted with a

comprehensive virtual world. In addition, applying VR to the museum's activities can effectively promote socialization and improve the children's daily life skills.

#### *4.3.15 Reasons for NOT Applying the VR Technology to the Egyptian Child Museum's Activities*

The 4 children who stated that they are against applying the VR technology to the museum's activities were further asked to explain their reasons, and they were permitted to select more than one answer. Out of the 4 children, 75% (3 children) claimed that young children don't know how to deal with it and it is hard to engage with, while 25% (1 child) said that applying the VR to the museum activities would increase the excessive screen time.

#### *4.3.16 Children's Influence on their Parents Vacation/Travel-Decision Making Process*

The majority of the parents 96.9% (93 parents) indicated that their children have a significant influence on their travel-decision making process, while the minority 3.1% (3 parents) stated that their children do not have any impact on their travel-decision making process specifically if they are young (aged between 0 to 4 years).

#### *4.3.17 Parents Willingness to Pay Extra Money for the VR Activities Provided by the Egyptian Child Museum*

The highest percentage of the surveyed parents 95.8% (92 parents) showed their willingness to pay extra money for the VR activities provided by the Egyptian Child Museum, while the lowest percentage 4.2% (4 parents) were reluctant to pay extra money for the VR activities in the museum referring that their children already spend excessive time on screens, particularly during the pandemic and the online learning, and they want screen time to be minimized.

#### *4.3.18 Parents' Preferences of the Frequency of their Children's Participation in the VR Activities Provided by the Egyptian Child Museum*

A large number of parents (40 parents) 41.7% expressed a strong preference for allowing their children to engage in the museum's VR activities once a month. Also, 37.5% (36 parents) preferred every other week for their children to try the museum's VR activities, while 20.8% (25 parents) denoted that allowing their children to experience

the VR activities provided by the museum once a week is preferable.

#### *4.3.19 Appropriate Length of Time for the VR Activities Provided by the Egyptian Child Museum*

The majority of parents 62.5% (60 parents) reported that 5-10 minutes is the appropriate length of time for the VR activities geared towards their children. Meanwhile, 33.3% (32 parents) indicated that 10-20 minutes is the adequate length of time for their children to experience the museum's VR activities, and 4.2% (4 parents) that 20-30 minutes is the suitable length of time for the VR activities in the Egyptian Child Museum.

### **5. Conclusions**

Children have a significant impact on the travel decision-making process of their families whether directly or indirectly. Moreover, children's tourism offers educational value for children and influences their future consumption behaviour as adult travellers, nevertheless, it has not been sufficiently explored in tourism literature. Meanwhile, children's museums play a fundamental role in promoting the children's tourism traffic and, in some cases, can be the cornerstone for an entire vacation. With the rapid growth of science and technology, museums tend more to the digital and intelligent technology of VR through its application in cultural contexts. From this perspective, children's museums can be considered as assorted institutions whose twin function is entertainment and education.

The Egyptian Child Museum is the best and first children-oriented museum in the MENA region and visiting it was a personal preference and not parents' preference for the majority of the surveyed children. For the time being, children are fascinated with technology and the majority of the surveyed children verified their understanding of VR and its experience in entertainment shows and games. Despite the fact that applying VR technology to the Egyptian Child Museum would enhance children's experience and eventually draw more children's tourism traffic, the exciting VR technology is not applied to its diverse galleries and exhibitions, except for the simple VR dinosaur exhibition in the museum's garden. Moreover, the high cost of the VR projects and the dependence of the museum on self-funding rather than the stable governmental substantial support, as well as the lack of expertise on VR projects are some of the main challenges

facing the application of VR technology in the Egyptian Child Museum are.

The application of VR to the Egyptian Child Museum has positive potential, and the majority of the surveyed children were very excited about it, stating that it would allow their experience to be more fun, educational and enriched. Besides, most of the surveyed parents expressed their willingness to pay extra money for the VR activities provided by the Egyptian Child Museum and reported that 5-10 minutes is the appropriate length of time for the VR activities.

The Egyptian Child Museum is committed to children with special needs by offering a wide range of facilities and activities held frequently. In addition, selected areas are properly equipped to receive and host them. In addition, it has a clear mission regarding its role with community engagement through the allocation of the 15% of the overall profit for families with children in need. It also encourages the youth to the voluntary work. Furthermore, it offers training and job vacancies for university students with the speciality of heritage and museum studies.

## **6. Recommendations**

Conducting more research on children's tourism and its promotion, and the consumption behaviour of children as travellers as well.

Adopting the implementation of VR technology at children's tourist attractions in Egypt such as museums and parks, would attract more children, and therefore increase the children's tourism traffic.

Allocating the previously installed rooms and areas at the Egyptian Child Museum's main building, dedicated to the movies display, for the implementation of the VR technology and its exhibitions including the sowing theatre, the harvest theatre, the storytelling area and the workshop area in the ground floor, the Whales Valley area and the Red Sea room in the first floor, and the space dome in the second floor.

Implementing customized VR exhibitions designed specifically for children with special needs to meet their demands and enable them to engage safely in learning and entertainment activities relatively free from the limitations imposed by their disabilities. In addition, it would allow them to communicate and interact with other children with similar disabilities or diseases and help them to expand their skills, knowledge, and experiences. This initiative would praise the

Egyptian Child Museum as the first museum in Egypt to use VR technology to break the barriers of the children's disability and provide them with feasible access to educational and entertainment programs.

Applying certain topics from the children's educational curricula to the proposed VR content inside the museum in order to facilitate and enhance the children's comprehensive immersion and engagement with their study. The application of VR technology in education would help the children to interact with concepts and objects, experience realistic objects and feel immersed by using headsets, tactile gloves, and motion sensors. It will also enable them to experience game-based education, boost their cognitive development and improve memory power through connecting feelings with education.

Applying VR technology to the museum's activities with a time length from 5 to 10 minutes to allow children to enjoy the experience without getting bored or experiencing any health effects such as dizziness, headache and eye strain.

Collaborating with a variety of technology companies and developers that seek to examine their VR equipment in a museum environment, in order to provide the museum with the initial high-cost equipment and hardware required for the VR temporary and permanent exhibitions. The museum can also overcome the high-cost challenge by installing VR mid-range systems, which mostly consist of desktop VR systems that employ a standard high-resolution or stereo monitor and in some cases shutter glasses in conjunction with trackballs, joysticks or 3D input devices. In addition, the museum may provide its visitors with VR lower-end systems that can be accessed through the internet and a low-cost PC.

Charging additional ticket fees for the VR exhibitions and rooms within the museum to help finance the huge funding necessary for VR equipment and the regular maintenance it requires, particularly that the majority of the surveyed parents expressed their willingness to pay extra money for VR activities at the museum.

Providing VR technology training programs for the Egyptian Child Museum staff to be able to deal with VR technology equipment and handle its maintenance.

Developing an interactive website for the Egyptian Child Museum with 360° videos for a museum

tour, as museums' websites provide worldwide connectedness.

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