education sciences

MDPI

Article

Distance Learning through the Grand Egyptian Museum: Leveraging Modern Technology to Teach about Ancient Egypt among Schools and National Museums

Nevine Nizar Zakaria [1,2]

[1] Museology Department, Würzburg University, 97074 Würzburg, Germany; nevine.zakaria@uni-wuerzburg.de or nevinenizar1@mota.gov.eg
[2] Director of Museum Exhibition Affairs, Ministry of Tourism and Antiquities, Cairo 11534, Egypt

Abstract: By considering the increasing emphasis on lifelong learning and the ongoing significant debates over the value and utility of digital technologies in accelerating long-established learning tasks, the paper suggests new approaches for the national museums of Egypt to incorporate distance learning and museum-based online programs as a means to improve their traditional educational programs. This would significantly help school students better understand the ancient history of Egypt, "Pharaonic Egypt", which is an essential part of their formal school curriculum. Moreover, it provides much-needed support to museums with limited or insufficient educational programs to promote more meaningful learning experiences. The proposed approach can be effectively implemented through the Grand Egyptian Museum (GEM), the world's largest archaeological museum complex dedicated to the culture of ancient Egyptian Pharaonic Culture. The study discusses the GEM's educational and digital infrastructure capabilities in creating a robust online learning platform that provides access to rich educational content and digital resources across Egypt's various geographic regions, enhancing museum education concerning pharaonic Egypt in line with the state's cultural policy to strengthen national identity among future generations. By analyzing both qualitative and quantitative data, the study investigates the potential benefits of integrating online digital technologies into the pedagogical and educational practices of Egypt's national museums. It concludes by providing practical recommendations for future research and actions encouraging online learning among Egyptian museums, aligned with recent national efforts toward Egypt's digital transformation.

Keywords: distance learning; online learning; educational technology; lifelong learning; Grand Egyptian Museum (GEM); children museum; teaching ancient Egypt

check for updates

Citation: Zakaria, N.N. Distance Learning through the Grand Egyptian Museum: Leveraging Modern Technology to Teach about Ancient Egypt among Schools and National Museums. *Educ. Sci.* **2024**, *14*, 714. https://doi.org/10.3390/educsci14070714

Academic Editors: George Caridakis, Markos Konstantakis and Alexandros Teneketzis

Received: 6 May 2024
Revised: 13 June 2024
Accepted: 19 June 2024
Published: 30 June 2024

Copyright: © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Over the past century, there has been a growing recognition of museums' educative and pedagogical roles in providing enriching learning experiences to a broad body of visitors. With various models of practice that cater to different learning groups, museums have become legitimate sources of education and essential learning sites [1,2]. Whether through formal, curriculum-based visits or more informal leisure experiences, museums have the necessary resources to facilitate formal, non-formal, and informal learning opportunities for all [1,3]. In the 21st century, the education landscape and school policies have been greatly influenced by technological advancements and digital learning. This has opened up a whole new world of opportunities for museums to transform from mere supplementary providers to an integral component of online learning and curriculum. By adopting new technologies and digital innovations for online teaching, museums have not only made their collections accessible online to the general public but also enabled learners to delve more deeply into the collections, develop a better understanding, and enhance their participation in distance learning experiences.

Although the national museums across Egypt house substantial collections of Ancient Egyptian artifacts that showcase Egypt's rich history and culture, the educational programs offered by these museums are limited and insufficient, making it challenging for students to engage with the collections and learn about ancient Egyptian history as part of their school curriculum. Unlike museums in the Global North, Egyptian museums have yet to adopt the concept of online teaching or e-learning in their educational programs. They have also not integrated digital resources related to their collections and thematic topics to support school curricula and provide richer and more meaningful learning experiences.

The study delves into the advantages of incorporating distance learning methods in national museums of Egypt that encounter challenges such as insufficient resources, funding, and educational materials. By leveraging the latest ICT strategies and digital infrastructure recently introduced by the state 2030 strategic vision, museums can offer enriching educational resources that transcend geographical boundaries and support school curriculums and museums with limited educational content. One effective and practical way to implement this approach is by developing a robust digital learning platform through the Grand Egyptian Museum (GEM), the largest archaeological museum complex in the world dedicated to one culture—Ancient Egyptian Culture, commonly known as "Pharaonic Culture". By utilizing GEM's digital infrastructure and the rich, engaging educational content of its Children's Museum, schools and other national museums can access a rich pool of educational content and resources. Such initiatives have the potential to strengthen national identity among future generations—a policy that is highly encouraged by the government's cultural agenda. A qualitative and quantitative data evaluation was conducted to answer the following research questions: What are the current educational programs and resources used in teaching ancient Egypt among national museums across Egypt? What potential does the GEM and its children's museum hold for embracing distance learning opportunities to benefit schools and museums?

2. Theoretical Framework

2.1. Museums as a Source of Learning: Their Evolving Roles of Online Learning

In the world of recent museums, a new set of relationships has evolved, mainly during the latter part of the 1990s, between objects, learners, and digital technology, in which museums are, above all, places for learning, exploration, and discovery [4,5]. There has been a significant increase in the use of digital technologies for learning in museums and science centers [4,6]. As lifelong learning and access to a broader range of visitors became key targets, museums provided different digital interactives, from on-site audio guides and audio-visual provisions (Table 1) to the creation of increasingly popular websites with encyclopedias and games that encouraged participation and knowledge production [4,7,8]. As far back as 2002, the number of virtual visitors to museums' websites surpassed that of physical visitors on-site [4]. Distance learning is fast becoming an integral part of the learning environment characteristics of museums, whether to encourage diverse learners to visit the museum in person or explore online education resources [9].

Table 1. Summary of the digital technologies used by museums for learning, by the author. (Adapted from glossaries in [4,10].

The World Wide Web (or the Web)	Through the use of internet, the Web provides a plethora of digital resources such as online libraries, journals, databases, and datasets. Some museum exhibitions often implement intranets to offer exclusive and restricted resources that serve the same purpose.
Computer Mediated Conferencing (CMC)	This covers various forms of computer-mediated communication, such as email, discussion boards, bulletin boards, and chat tools. CMC can facilitate diverse collaborative or discursive activities among musuems staff or between musuems and visitors.
Multimedia	Multimedia materials, such as graphics, photographs, animations, films, videos, sounds, and exhibition text writing, are designed to support a variety of learning styles.

Table 1. *Cont.*

Simulations and Models	It allows interaction with and manipulation of real-world environments. This has opened up avenues for experiences like field trips, experiments, and other activities associated with a museum's collection and research that are otherwise impracticable for time, locality, safety, or expense reasons.
Streaming Audio and Video	This includes digital audio and video delivered via the Web as an alternative or supplement to museum texts. It may provide visitors access to real-life situations.
Microworlds and Games	Microworlds are simulations that combine case study scenarios. They allow visitors to learn through experimentation. In online games, visitors participate as avatars to represent interactions within a simulated environment.
Visualisation Tools	Visual tools aim to represent complex data sets graphically, including images, texts, or sounds, to enrich perceptions about the surroundings or offer immersion in a different reality. Examples are Virtual reality (VR) and augmented reality (AR) technologies, which are increasingly used in museum exhibitions to support storytelling and interaction [11]
Presentation Technologies	It comprises different digital projectors and can either be fully interactive or exclusively unidirectional, such as an interactive floor or wall projection, projection mapping that transforms the whole building into 3D displays [12]

2.1.1. Theory and Experience in Museum Education

Education has been understood as a prime function of museums since their inception, alongside their role in preserving and exhibiting artifacts. The world's earliest museum can be traced back to the Ancient Museum of Alexandria, '*mouseion*, *museum*', in Egypt, which was built in the third century [13,14]. It served as the largest center of learning and research, housing rare collections, various treasures, a library, and a temple for the nine "Muses" of art and literature and thus laid the foundation of the museum as an educational place [14,15].

While the roots of museum education can be traced back to the late 19th century, many scholars agree that the modern museum, which allows the public to access collections, began to take shape in the 18th century by opening private collections to a broader audience in Europe [3,16,17]. Displaying artifacts for didactic purposes, installing descriptive texts for acquiring information, inviting the public to physical galleries, and teaching them the history of art were undeniably the central principle and educational mandate of early eighteenth-century museums [17,18]. During the 19th century, there was a shift from private collections to public museums that were seen as scientific and educational institutions. This period witnessed the rise of national museums, which were established to offer public resources to help them become self-educated and provide contexts that allowed them to learn how to self-regulate their behaviors [16].

In the 20th century museum, the new focus on a visitor-centered approach sent museums into new territories of education where museums became powerful educators with the potential to significantly impact the human experience [19,20]. The standard methods of traditional education that rely on teaching and transmitting information to passive receivers, which is similar to the institutionalized formal education of schools and universities, have expanded to a more interactive experience model that offers visitors a high degree of experiential participation, flexibility, interaction, and social engagement [21–25]. Much of the published literature in the museum discourse highlights, therefore, the museums' environments as places of learning, lifelong learning, and experiences that combine physical, social, and personal contexts in the learning processes [23,26].

In the 2000s, museums have moved away from exclusivity and being isolated from the modern world—as it was claimed in 1971 [27,28]—to embrace the constructivist theories of the post-modern, advocating a new approach centered on people and communicating knowledge for educational purposes [24,29]. This shift is viewed by Hooper-Greenhill as a new model of the museum—'*the post-museum*'—which transforms from collecting and storing to entertaining and engaging, and it became more inclusive to maintain relevance to

contemporary society and continue to shape our knowledge [29]. Moreover, incorporating the constructivist theories of Jean Piaget's cognitive development (1896–1980) and Lev Vygotsky's social learning (1896–1934) in the late 20th century revolutionized museum education, mainly by offering active engagement and meaningful social experiences benefiting all [30,31].

In the museum domain, learning is not restricted to the acquisition of factual knowledge. Further, it involves many aspects of free-choice learning that are guided by individual choices, preferences, and knowledge [1,23,32]. In recent times, there has been an increased emphasis on the significance of museums in informal learning outcomes. Additionally, many discussions have emerged highlighting the role of museums in promoting lifelong learning [23,26]. The focus of museum education has gradually shifted towards integrating learning with experience. Museum educators have thereby adopted various learning theories, such as behaviorism, constructivism, cognitive learning theory, developmentalism, humanism, and connectivism, to guide their pedagogical practices [33]. As Immanuel Kant expressed, "*Experience without theory is blind, but theory without experience is mere intellectual play*" [34] (See Table 2). Some of these theories are relevant to the use of digital technologies, which have opened up new possibilities for e-learning, making it easier to support educational activities and unlock the vast resources of museums [4].

Table 2. Examples of evolved museum learning theories (late 20th Century and 21st Century), by the author.

Learning Theories	Theorists	Focus of the Theory
Contextual Model of Learning/ Interactive Experience Model	John. H. Falk and Lynn D. Dierking	A learning framework that considers three key contexts: personal, social, and physical. The personal context refers to what the individual already knows, their motivations, and interests. The social context is determined by the people the individual is with, while the physical context relates to the location where the learning experience occurs [1,2].
Discipline Based Art Education	---	Discipline-based art instruction focuses on integrating art into general education while also placing it within the context of aesthetic education. The instruction is divided into four main disciplines—aesthetics, studio art, art history, and art criticism—and is taught using a formal, continuous, sequential, and written curriculum that is consistent across grade levels [19,35]
Theory of Multiple Intelligences	Howard Gardner	It centered on learning as a crucial part of human development and on understanding the individual's psychology, which can significantly enhance the learning experience [33].
Visual Thinking Strategies VTS	Abigail Housen and Philip Yenawine	The teaching method is based on modeling behaviors that would enable learners to connect with visual art in meaningful, lasting, and pleasurable ways and achieve their full potential [36].
Experience and Education	John Dewey	The concept of "Learning by Doing" is emphasized, which gives a lot of importance to experiential education. This means that learners actively engage with the subject matter instead of just listening to lectures or memorizing facts. Dewey's ideas revolve around the dynamic interaction between the objects of knowledge and the learners, which is central to his philosophy [37].
Theory of Cognitive Development	Jean Piaget	Piaget's theory of cognitive development involves two processes: "assimilation" and "accommodation". It is a cumulative process that builds on existing knowledge and continues to construct larger knowledge structures. This theory of self-regulation divides cognitive development into four stages and called them (1) sensorimotor intelligence, (2) preoperational thinking, (3) concrete operational thinking, and (4) formal operational thinking. Each stage is correlated with an age period of childhood, but only approximately [38].

Table 2. *Cont.*

Learning Theories	Theorists	Focus of the Theory
Socio-Cultural Theory of Learning	Lev Vygotsky	Vygotsky's social construction theory highlights the importance of social activities. His theory can guide museum exhibitions in three ways: (1) Inner dialogue helps children learn, (2) Zone of Proximal Development (ZPD) is the difference between a child's current knowledge and what they can learn, and (3) Scaffolding is the importance of an instructor in the learning process [39].
Constructivist Theory of Learning	George Hein	This model has two types of constructivism: 1. knowledge and 2. learning. These produce four domains: (a) didactic, (b) heuristic, (c) constructivist, and (d) behaviorist, which can apply to real and virtual learning experiences [24,40]
Object-Based Learning	Schlereth and others	This model uses collections/objects as a starting point and basis for learning activities, learning from objects rather than learning about them to explore the many stories and interpretations that they offer [20].
Postmodern Theory	Hooper-Greenhill	It prioritizes experiential learning that can be divided into five stages: 1. Sensory and Exploration, 2. Discussion and Analysis, 3. Memory and Comparison, 4. Deep Thinking from Different Cultural Backgrounds, and 5. Cross-Field Interaction and Application [29].
Learning Styles	Kolb	It comprises four dimensions that define a learning cycle: 1. Immersion in concrete experience, 2. Observations, and Reflections, 3. Logical or Inductive Formation of Abstract Concepts and Generalizations, and 4. Empirical Testing of Concepts' Implications [4]

2.1.2. Museums and Distance Learning

Distance learning is a subset of the broader concept of distance education, which, in turn, can be traced back to the late 19th century when society experienced social democratization and expansion in industrial society, which led to greater access to education [41]. As digital technologies and media evolved in the 20th century, distance education also evolved to incorporate early forms of distance learning. Museums have been involved in distance learning since the early twentieth century as part of their distribution "*of portable museum exhibits, stereographs, slides, films, study prints, charts, and other instructional materials*" [42].

The diversity of the field of distance learning and the variability in its technology and accessibility have made it challenging for scholars and researchers to arrive at a consistent definition of distance learning [43,44]. However, many definitions for distance learning encompass various forms of learning, including online learning, e-learning, technology, mediated learning, online collaborative learning, virtual learning, and web-based learning [44]. Thus, it has been used to describe access to learning for geographically distant individuals [42,44]. Distance/online learning significantly contributes to various fields of education, giving students greater access to various coursework resources from multiple providers, regardless of their level of in-person expertise [42,45]. Over time, online learning technology has become not only more accessible but also more affordable. Practitioners can now create and organize content without requiring specialized programmers, and the cost of hardware devices for learners has decreased [42,44].

This affordability and accessibility have given museums a unique opportunity to transition from being supplementary providers to becoming integral parts of the curriculum and online learning.

Since the 1990s, web-based technology has led to the emergence of two primary forms of distance learning in the museum context–synchronous and asynchronous [41,42,46]. Synchronous distance learning facilitates real-time engagement through virtual trips, video conferences, and live webinars. In contrast, asynchronous distance learning supports online courses and web-based platforms that can be accessed anytime, allowing learners and teachers to correspond at different times [41,46] (see Table 3).

Table 3. Various methods and approaches for implementing distance learning programs in museums, by Author.

Synchronous	Teacher Professional Development	Teacher Professional Development (TPD) refers to programs and informal teaching strategies designed to enhance teachers' pedagogical skills and knowledge, enabling them to incorporate museum-based teaching strategies and collections into their online or blended learning classrooms [8,47]. A well-known example is the Metropolitan Museum of Art, which took advantage of accessible technologies to engage teachers in achieving new common core speaking and listening standards.
	Virtual & Electronic Field Trips	Large-scale electronic field trips are offered by museums to bring students and teachers virtually to their collections and galleries. These trips are similar to traditional field trips, using Skype, videoconferencing platforms, cloud-based applications in classrooms, online registration through their websites, or listing them on centralized interactive learning platforms [46]. Virtual reality field trips and 360-degree tours were also designed to allow the general public and students to walk through the galleries while generating income for distance learning (Refs).
	Videoconferencing	Videoconferencing is a useful tool that allows museum instructors, curators, and learners to connect and interact in real-time educational sessions and discussions using video and audio systems. Popular videoconferencing platforms like Zoom, Microsoft Teams, or Google Meet have unlimited capacity for the number of participants who can join a session and engage with each other in real time (Refs).
	Live Webinars	Webinar is an online event for engaging with large audiences in real-time. The term "webinar" is a combination of "web" and "seminar", and it can be referred to by various other names such as web event, online seminar, web lecture, and virtual event. Webinars can be live, semi-live, or on-demand, making them accessible to participants who may have missed the live event. They are an excellent tool for museums to provide professional development opportunities, share interactive learning experiences, and engage in live sessions with large audiences [8].
	Live Broadcasts	Live broadcasting in museums, or live streaming, is a useful medium for showcasing exhibits, activities, and events to audiences worldwide. By utilizing this technology, museums can reach a much larger and more diverse demographic, enhance the recognition of their offerings, and provide educational sessions for a more enriching learning experience. Some museums have incorporated live streaming as a regular part of their monthly programming [48].
Asynchronous	Institutional Websites	Museum websites, with their unique blend of pedagogical perspectives from curators, educators, and web designers, offer a wealth of online learning resources. These resources, ranging from downloadable materials to digital brochures, curricula packs, fun activities, games, and textbook-style pages, provide a gateway to the museum's collections to deliver enjoyable and meaningful experiences that prioritize the representation of artifacts and active engagement of learners. Some websites offer virtual representations of physical museums, online exhibitions, digitized archives and collections to attract a wider audience, promote exhibits and provide an interactive learning experience (see [4]).
	Massive Open Online Courses (MOOCs)	MOOCs are large-scale, web-based courses that can be taken by anyone with internet access. They are delivered by third-level institutions and professional organizations via MOOC platforms like Futurelearn, EdX, and Coursera [49]. The potential of MOOCs is immense, as they can increase public access to archival content, improve the reusability of digitized resources, and gather valuable information about a museum's impact from learners. In addition, MOOCs can significantly enhance community outreach programs, benefiting learners, lecturers, and curators through teaching practice, engagement and outreach, learner interaction, and access to MOOC learner data [50].
	Online Courses/ Learning Management System (LMS)	Museums are integrating LMSs to offer e-learning services. These systems provide a structured environment to organize and deliver educational content, such as online courses, interactive modules, quizzes, and assignments for teachers and learners alike. The use of an LMS enables museums to offer a more personalized and engaging learning experience tailored to the unique interests and learning needs of each visitor [51]. This allows visitors to freely explore exhibits, dive into topics, and participate in virtual tours and workshops at their own pace, resulting in a more fulfilling and enriching experience for everyone involved [52].

For over three decades, museums have continuously provided distance learning through a variety of digital means to approach learners remotely from kindergarten to lifelong learners [53,54], demonstrating their relevance to contemporary societal changes and their willingness to incorporate new technologies into their educational programs, much like other educational institutions such as schools and universities [55,56]. This became even more evident during the COVID-19 pandemic, as museums ramped up their online resources and joined partnerships with schools to offer online courses that significantly contributed to students' education during these challenging times [46,53,54].

Since the beginning of the 21st century, museum education has kept pace with advances in digital technologies and distance learning. Many museums worldwide actively implement various strategies and programs to provide students from kindergarten to 12th grade with access to museums' staff and collections through distance learning and online pedagogy. These approaches go beyond simply making their collections available online to interactive lessons and live broadcasts, ranging from small classroom-based partnerships [57] to Massive Open Online Courses (MOOCs) that can reach thousands of learners and increase outreach potential for museums [50].

2.2. Current Museums' Distance Learning Programs Used to Teach Ancient Egypt: Global Perspective

Many international museums with Egyptian collections are approaching online learning to teach ancient Egyptian material culture and reach more students and teachers, allowing them to better understand ancient Egyptian culture and history. Distance learning implemented to teach Ancient Egyptian culture is on various scales and covers synchronous and asynchronous delivery programs (see Table 3). An example of synchronous live educational sessions that connect school classes to museums is the British Museum's free interactive workshops incorporating different learning techniques to teach ancient Egyptian history. Students learn about Ancient Egyptian myth, hieroglyphs, and the culture of the afterlife, along with other topics that align with the UK's national curriculum [58].

Museums also provide live online sessions to enhance students' comprehension and knowledge about ancient Egyptian civilization, which in turn enriches classroom content and connects it to Egypt's history. The Ashmolean Museum, for instance, provides online sessions to teach the lives and beliefs of ancient Egyptian people in connection with the national curriculum, which covers the history and geography of ancient Egypt [59]. Some virtual sessions, generate revenue for museums by offering paid live-streaming sessions to experience ancient Egypt [60].

Museums also offer virtual tours, a combination of synchronous and asynchronous virtual experiences, allowing students and teachers to explore the artifacts and galleries related to Egypt's history, preview exhibits, and investigate ancient Egypt's contact with other civilizations [61,62]. School classes participate in online sessions and virtual tours using platforms like Zoom or other live-streaming tools. They engage in inquiry-based learning and critical discussions by exploring the galleries of ancient Egypt, such as those at the Virginia Museum of Fine Arts [63,64].

In addition to the abovementioned, museums provide a wide range of interactive educational resources on ancient Egypt through web-based products and online courses. These resources include curricular materials, downloadable resources, indexed online databases for their collections, puzzles, fun activities, simulations, online exhibitions, and other multimedia content. Students can access these materials at their own pace and convenience, allowing them to engage with the content of ancient Egyptian history and culture asynchronously. Further, some museums, such as the Penn Museum, partner with Coursera and offer a diverse range of Massive Open Online Courses (MOOCs) in ancient Egypt [65]. It is worth noting that specific courses are specifically created for the professional development of educators and teachers [66].

Distance learning programs focusing on ancient Egypt emphasize relevance to national school curricula from kindergarten to 12th grade. They are not just about acquiring

knowledge but also about experiencing it. Led by museum experts, these programs are carefully constructed and well-designed to be interactive using technology, providing a deep understanding of various aspects of ancient Egyptian civilization. The topics covered span more than 5000 years of human history, from Pre-Dynastic Egypt in the 4th millennium BC until the end of the Graeco-Roman Periods. The areas covered include daily life and society, art and architecture, ancient Egyptian language, religion, gods and goddesses, funerary beliefs, royal tombs, etc. These programs serve as an interactive hub for experiencing ancient Egypt and connecting it with modern society. They adopt various learning techniques to enable students to experience historical inquiry skills, artifacts-based critical thinking, creative thinking, and observation skills.

3. The Study Framework

3.1. Egyptian Context: Educational Programs, Digital Technology, and Distance Learning in Museums

Most of the museums in Egypt are operated by the government, with a few being under non-governmental and private structures. The national museums, also known as antiquities museums, are affiliated with the Egyptian Ministry of Tourism and Antiquities (MoTA), previously known as the Ministry of Antiquities, and showcase Egyptian material culture from the ancient Egypt (Pharaonic) era through the Graeco-Roman, Coptic, and Islamic periods up to the modern era. Several other museums focusing on arts, biographies, history, and specialized topics are affiliated with different governmental departments, such as the Ministry of Culture, the Ministry of Agriculture, the Ministry of Transportation, the Ministry of Communication, and other ministries [67–69].

3.1.1. Museum Education: Expansion and Organizational Actions

Over the last three decades, 'Museum Education' has emerged as a recent field in Egyptian museums. In the past, museum functions were limited only to collecting, preserving, researching, and displaying artifacts of excavations for tourists and scholars, but they lacked educational programs that catered to the local community [68]. However, with the substantial growth of regional museums across the country in the last quarter of the twentieth century, there has been a significant increase in locals' awareness of visiting museums and participating in their programs and events [68,70]. The state's cultural policy aims with the regionalization expansion of museums to educate the local community about their region's history and heritage and foster their sense of belonging [67]. Although several educational activities have been initiated, they are still nascent.

In the 1990s, the Egyptian museums made significant progress in realizing their potential as educational institutions, with the support of the national government and UNESCO [71]. This collaboration established two of Egypt's national museums: the Nubian Museum in Aswan and the National Museum of Egyptian Civilization (NMEC) in Cairo [72,73]. Significant improvements have been made in museums' organizational and administrative structures, resulting in a considerable leap in educational programs aimed at local communities and school groups in Cairo and in regional areas [68,71].

Since the late 1990s and throughout the 21st century, Egyptian museums have taken on new roles as educational and social institutions. This positive change has been driven by the government's proactive new cultural agenda, which emphasizes the recognition of museums as informal educational institutions. As a result, more resources have been allocated to establish new museums, including children's museums, to create a new generation of cultural consumers motivated to acquire knowledge from other informal resources alongside schools [71]. In May 1996, the Association of Heliopolis, an NGO, established the first children's museums in Egypt to showcase its rich history through its people, land, and culture. The museum was remodeled and reopened in 2012 as the "Children's Civilization and Creativity Center", offering massive interactive and educational activities that foster creativity and critical thinking among children and youth [68,74]. In 2006, a Children's Museum was founded within the Egyptian Museum of Cairo (EMC) to enhance under-

standing of the EMC's ancient Egyptian collections through playful LEGO activities [75]. The Grand Egyptian Museum has extended this approach with an exceptional children's museum that utilizes cutting-edge interactive exhibits and advanced technological devices to enhance children's understanding of the history of ancient Egypt (see below).

In 2002, the Egyptian Museum of Cairo (EMC) established an educational section for the first time [68]. In the 2010s, all museums sector of MoTA followed suit, incorporating an educational department into their organizational structure to fulfill their growing educational mission [71].

3.1.2. Egyptian Museums' Distance Learning Programs and MoTA's Digital Services

In the 21st century, Egyptian museums have taken commendable initiatives to bring ancient Egyptian history closer to school classrooms. Despite being on a small scale, they have introduced mobile museums and on-site outreach programs to support teaching ancient Egyptian curricula and reinforce the museum's educational role [68]. The concept of distance learning was then limited to sending instructional materials to teachers or outside programs without any online learning activities.

In 2017, the MoTA's museums sector, in collaboration with Microsoft, launched "*My Museum in Your Class*", the first digital distance learning initiative in Egypt's museums [76]. This initiative allowed school classrooms in Egypt and abroad to explore Egyptian museums virtually, breaking down geographic boundaries using the Skype platform. It provided interactive learning opportunities through virtual tours, live Q&A sessions, and interactive discussions, allowing students to delve deeper into displayed artifacts and learn more about Egyptian civilizations through different historical periods [76]. Hundreds of students from Egypt and other countries, including the USA, Sweden, and India, took part in several virtual tours of EMC, the Islamic Art Museum, and other museums. Despite the numerous benefits this initiative had, it was eventually discontinued in the same year or a bit later. In 2021, only two museums, the Sharm El-Sheikh Museum and the Kafr El-Sheikh Museum, offered digital distance learning programs similar to this one but on a smaller scale [77]. They provided virtual tours to classrooms in their regions, using the Teams platform to enhance the learning experience and align it with the school curricula.

However, out of all the museums affiliated with MoTA, only four have independent websites: GEM, NMEC, EMC, and IAM, which were created in recent years. The other museums are listed on the main official MoTA website, *EgyMonuments*, whose first phase was launched as recently as 2019 [78]. *EgyMonuments* is the MoTA's official online platform, which was established in cooperation with the Ministry of Communications and Information Technology. It offers comprehensive information about Egypt's monuments, archaeological sites, and museums, details on current conservation restoration projects, events, and the latest news [78]. The website also offers resources and a library for researchers, Egyptologists, scholars, and tourists interested in learning more about Egypt's ancient civilization and its legacy. Additionally, there are some interactive activities for children, yet small scale, to explore and learn actively about Egypt's rich history [79]. Prior to this, MoTA itself did not have a website except for being a part of the state's governmental portal, which offered essential civil services like other governmental ministries. This suggests that the digitalization of Egypt's museum industry is still in its early stages, and there is much room for growth and development in this area. MoTA is now progressing with Phase Two of its plans, which involves implementing a range of digital services, including new online offerings for the museums section. These services aim to provide the public greater access to museum collections and increase interaction with them. One of the new online services proposed and introduced by the author is the creation of online exhibitions that can be independent or complement physical exhibitions at museums. Additionally, as the website's project manager reported, each museum will have its own sub-portal on the *EgyMonuments* website, which will help enhance its digital presence and attract more audiences.

It should be mentioned here that the Ministry of Tourism and the Ministry of Antiquities merged in 2019 to become a single ministry called the Ministry of Tourism and Antiquities (MoTA). As a result, three affiliated websites now serve as the ministry's official websites. The *Egymonuments* website is exclusively designed for scholars and researchers interested in Egypt's history and heritage. The Ministry of Tourism website, now affiliated with MoTA, serves as a promotional platform for tourists. The third website, launched in August 2022, is the official website of MoTA. It provides comprehensive information about the ministry's scope of work, tasks, competencies, and the components of tourism infrastructure in Egypt. Additionally, it offers digital services and E-ticket reservations for museums and archaeological sites, making it easier for tourists to plan their visits and enjoy their experiences.

Despite the initial slowdown of MoTA's museums' digital services, the COVID-19 pandemic catalyzed them to adopt online activities and enhance their digital transformation on an unprecedented scale. In response to the pandemic, MoTA launched an "*Experience Egypt from Home*" initiative on its websites and social media platforms, offering virtual tours, 360 videos, and other online activities for museums and archaeological sites. Many museums have brought their collections and galleries online for the first time, providing virtual tours, online sessions, virtual educational programs, audio descriptions, storytelling, and comic series via their social media platforms to engage the public remotely in their services [69]. In 2020, the Ministry of Tourism and Antiquities (MoTA) collaborated with the private sector to create informative animated videos to educate schoolchildren about the rich heritage of ancient Egyptian civilization in a simple and easy-to-understand manner as a part of their school curriculum [80]. Notably, these videos have been made available on the MoTA website (*Egymonumats*) and the Ministry of Education website, as well as social media platforms, making them easily accessible to a broader audience.

3.2. The Grand Egyptian Museum (GEM) and Its Children's Museum

The Grand Egyptian Museum (GEM) is one of the most significant museum projects in the world, dedicated to displaying the history of ancient Egypt and its Pharaonic culture. It is the largest museum of its kind globally and is intended to serve as a center for Egyptology and archaeological research, showcasing the diverse and rich manifestations of ancient Egyptian life and culture. The GEM collection comprises 20,000 objects of cultural, historical, and aesthetic significance that span ancient Egypt's history from prehistoric times until the Graeco-Roman periods. It is considered to be one of the most important archaeological collections worldwide, ranging from portable artifacts such as sculptures, reliefs, coffins, papyri, stelae, figurines, coins, and jewelry to colossal statues of pharaohs, tombs, wall paintings, and other architectural elements, including the most famous treasures of King Tutankhamun, making the museum a must-visit for anyone interested in ancient Egypt's history and culture.

3.2.1. GEM Project: Origins and Description

It is located in the Giza Plateau, near the three pyramids, which was inscribed as a World Heritage Site in 1979. Its unique location lies at the intersection between the modernity of Cairo and the fascinating heritage site of the pyramids, making the GEM a remarkable destination away from the bustling downtown Cairo, where the Egyptian Museum of Cairo is situated. Due to its proximity and monumental size, it has earned the nickname of the "fourth pyramid" [81] (Figure 1).



Figure 1. GEM Location and its Surrounding Cultural Landscape [82].

During the 2000s, the Egyptian government was acutely aware of the need to enhance the displays of the Egyptian Museum of Cairo (EMC). EMC was crammed with antiquities, necessitating more space for proper preservation, display, and showcasing [83]. Moreover, a vast number of excavation artifacts are in storage magazines throughout the country that must be conserved, protected from vandalism and theft, and made accessible to the public. In response, the government undertook a series of studies, including the Feasibility Study of Cairo and the Giza New Museum System, with the support of the Italian Ministry of Foreign Affairs [84]. These studies were instrumental in proposing solutions for modern museums, storage, and conservation and research facilities.

In February 2002, the Egyptian government initiated the construction of GEM and announced a public design competition for the GEM complex. The design of the building was chosen through an international competition that received 1557 proposals from architectural firms representing 83 countries. Heneghan Peng Architects from Dublin, Ireland, emerged as the winner [85]. The building's design takes inspiration from the symbolism and geometry of Ancient Egyptian civilization and architecture. It is shaped like a chamfered triangle and approached through a translucent wall structured using fractal geometry to enhance the visual connectivity to the Giza pyramids (Figure 2). The building's north and south walls align directly with the Great Pyramid of Khufu and the Pyramid of Menkaure, creating an organic connection to the adjacent cultural landscape [81].

The GEM project was completed in several phases, from enabling the site in 2005, the construction of a conservation center and an energy center between 2006 and 2010, to the final phase of the museum building, which began in 2012 and is expected to be fully completed and opened by the end of 2024 [69,86]. The total land area of the project is 470,974 square meters, while the museum building covers an area of 92,623 square meters [87]. The Egyptian government has provided funding for the GEM, along with some soft loans from The Japan International Cooperation Agency (JICA), to support the third phase of the museum building's construction [86].

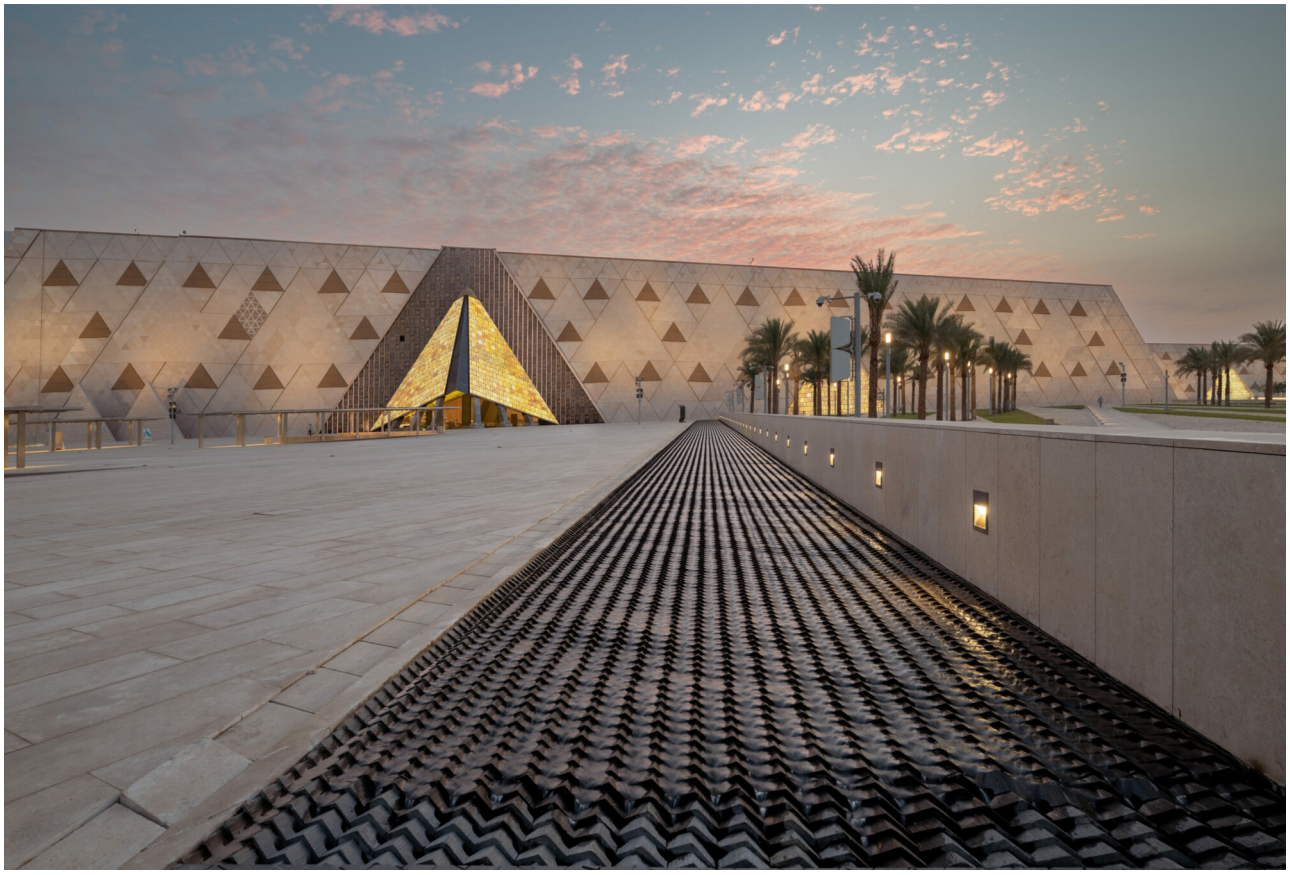


Figure 2. GEM's Entrance Piazza and Geometric Wall [82].

The GEM's exhibition program comprises 15 galleries, of which 12 are arranged chronologically to showcase collections from the prehistoric to the Graeco-Roman periods in 35,000 square meter exhibition space (Figure 3). These are interspersed with thematic topics that delve into the history of ancient Egyptian civilization. The museum's key attractions include the unique King Tutankhamun Gallery, dedicated to showcasing the entire funerary collection of the king for the first time. The Atrium space gallery leads visitors to the Grand Staircase Gallery, which is the main pathway of the museum, allowing access to the exhibition galleries that are nearly 90,000 square meters of exhibit space. Additionally, the museum complex houses the Children's Museum, an arts and crafts center, an Educational Center, a library, HoloLens gallery, King Khufu Boats' Museum, conference and business meeting facilities, and commercial areas containing cafeterias, café, and retail shops. Outdoor activities include the Piazza, the Hanging Obelisk Square, and recreational parks, some of which are inspired by ancient Egypt. Unlike other national museums affiliated with MoTA, GEM incorporates the latest technologies in its galleries and interpretation techniques. The gallery's thematic sections are defined by spatial layouts incorporating digital streams, encouraging visitors to explore ancient Egypt's rich culture and history through interactive displays [81]. Further, visitors can access enclosed spaces called caves from the exhibition galleries, allowing for immersive storytelling with rich interpretation methods and multimedia. This is in addition to implementing accessibility accommodations inherent in the design of GEM's services and facilities to ensure equal access to all individuals, including those with disabilities [69].

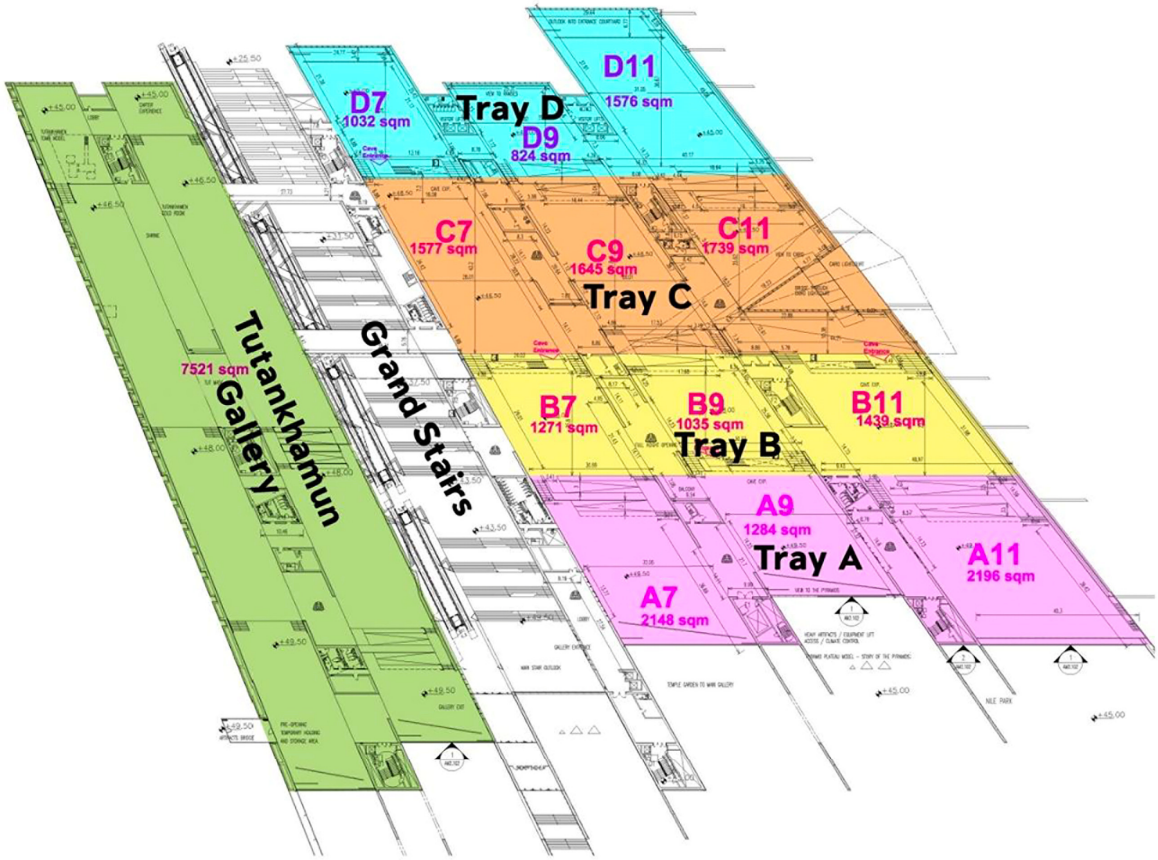


Figure 3. The Permanent Exhibition Galleries of the GEM [87].

The year 2023 marked a significant milestone for the project as the Grand Staircase Gallery was opened to the public. In addition, some other areas, including the children's museum, have been opened before for limited trials. Currently, The GEM hosts significant events, theatrical performances, and concerts featuring renowned Egyptian maestros and composers, showcasing Egypt's rich cultural heritage and contemporary arts. Several temporary exhibitions are open to the public, offering an immersive experience to explore the captivating history of ancient Egypt. "Tutankhamun—The Immersive Exhibition—A Mesmerizing Journey through Ancient Egypt" is one exhibition that utilizes state-of-the-art digital projections to bring the ancient civilization to life [88].

3.2.2. Educational Mission and Children's Museum

GEM's primary mission is to act as an educational institution that promotes and spreads ancient Egyptian culture nationally and globally. The GEM targeted audience, in general, are:

- International tour groups.
- International independent adults.
- International families.
- Domestic and local independent adults.
- Domestic and local Egyptian families.
- Domestic and local Egyptian school groups.

In this regard, GEM offers learning opportunities suitable for the diverse public of varied ages, abilities, and cultural backgrounds. The GEM uses Arabic and English in its written materials, visual components, illustrations, signage, way-finding, and audiovisual content to accommodate the needs of global visitors. Additionally, the Japanese language is utilized in some exhibition labels, selectively featured in certain display areas. The core

educational programs are structured to cater to adults visiting with children, school groups from within Egypt, local school groups, adult learners, and individuals with disabilities.

According to recent data [89], as of 1 January 2023, the total population of Egypt was 104.46 million people, with the majority of the population being over 14 million individuals, falling within the age range of 0–4 years old. Egypt's population is heavily biased towards the younger generations, with the number of individuals in each older age group decreasing relative to the previous one. Specifically, 35.8% of the population falls within the age range of 0–14 years, while 19.03% is between 15–24 years. Furthermore, 72.9% of Egypt's population is under 34 years old, while the number of elderly individuals aged 75 years and above accounted for almost one million people.

The GEM's commitment to education is demonstrated through the GEM Learning Center, which comprises three main sections, each with its own target audience. The Children's Museum is designed for children aged 0–15, while the Educational Section targets above-school-age learners, adults, and marginalized groups, including individuals with disabilities. The Arts and Crafts Section is intended to promote creativity and encourage arts and crafts inspired by ancient Egypt. Together, they provide opportunities for life-long learning experiences for visitors of all ages, including children, youth, families, the general public, adults, scholars, and tourists.

The Children's Museum is the centerpiece of the GEM's multidimensional educational resources. It is an independent section located on the second floor (Figure 4). It covers an area of 3465 square meters and features a wide range of amenities, including a library, theater, arts and crafts area, six classrooms, and multiple exhibition zones. The museum aims to spark children's curiosity and encourage them to explore ancient Egyptian civilization through interactive application games and hands-on exhibits, using their investigative skills in an informal learning environment that is inclusive, interactive, and safe [90].

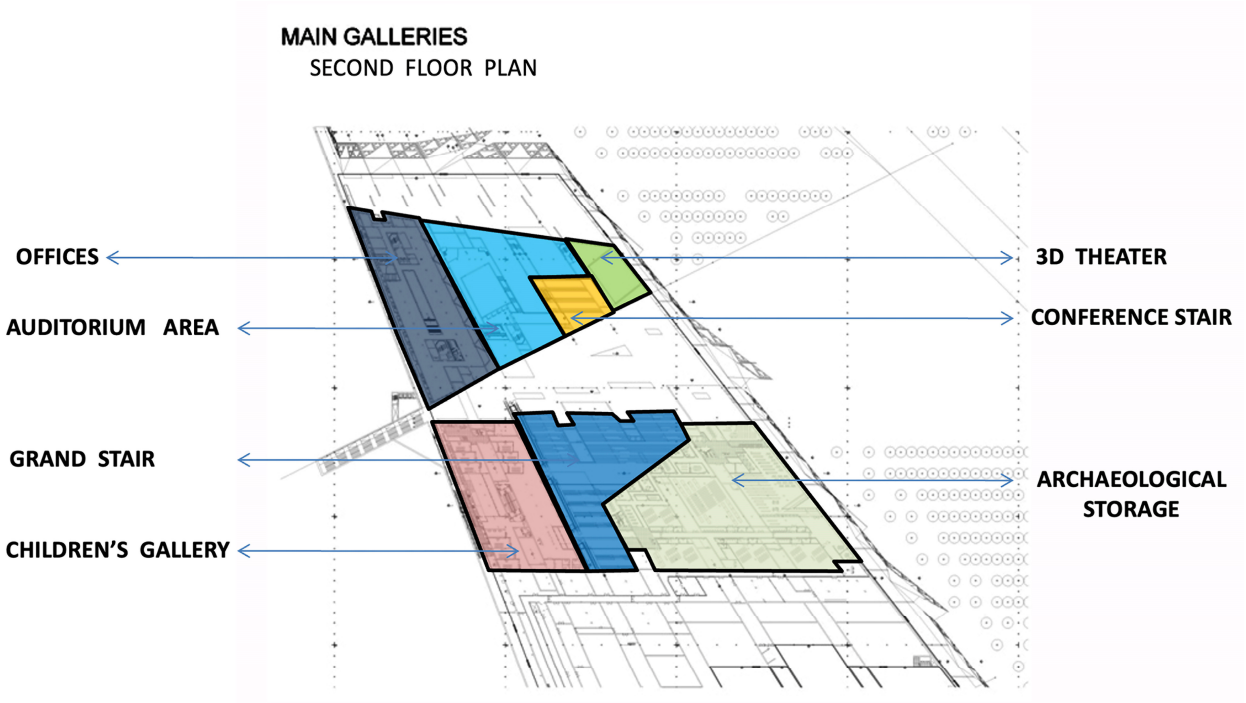


Figure 4. Location of the Children's Museum in the GEM Complex [87].

The museum has adopted innovative methods in displaying its exhibits. It utilizes state-of-the-art communication technologies and interactive environments to convey the same messages as the GEM permanent galleries while featuring relevant themes such as the land of Egypt, Kings, beliefs, sciences, and archaeology. It offers a variety of interdisciplinary experiences in history, arts, culture, literacy, science, and culture designed to pique

children's interests and stimulate their curiosity. The museum targets children aged 0–15, acknowledging early childhood education as humans' most crucial period of intellectual and developmental growth. Currently, programs are only available for children between 6 and 15, as GEM is not yet fully operational. The physical spaces and learning programs have been carefully structured to promote the sensory and developmental exploration of babies, toddlers, and growing children in the presence of their caregivers/parents. The museum incorporated multiple learning styles to enhance children's cognitive, social, behavioral, physical, and developmental skills. Its exhibits provide hands-on interaction and multi-sensory experiences encompassing visual, auditory, tactile, kinesthetic, and self-directed learning.

The museum has successfully implemented a STEM-based education model that is designed to teach essential 21st-century skills to foster curiosity, creativity, and innovative thinking among learners. This non-formal learning environment provides an excellent platform for self-expression and self-motivation, contributing significantly to global literacy in the 21st century [91]. The museum's formal and informal teaching programs are closely aligned with the national Egyptian school curricula, making it an ideal complement to traditional classroom lessons. The GEM website is currently being prepared to provide various educational programs, including games, puzzles, and other interactive media, to increase children's engagement with ancient Egyptian civilization.

The GEM and the children's museum are actively engaging with school children through a variety of educational programs, even though the museum is not yet fully operational [92] (Figures 5 and 6). These programs are not restricted to the museum's premises and are designed to encourage children to learn through interactive games and exploration in the exhibition galleries or outdoor gardens. Additionally, the children learn about conservation in the laboratory, making the experience fun and informative.



Figure 5. Educational programs and hands-on activities at the Children's Museum of the GEM. Photograph by the GEM's Learning Center. Photograph by the GEM's Learning Center. Image reprinted with permission from the Grand Egyptian Museum.



Figure 6. Educational programs and hands-on activities at the Children's Museum of the GEM [93]. Image reprinted with permission from the Grand Egyptian Museum.

4. Study Objective

In recent years, museums have seen a growing trend in offering distance learning programs. This trend not only expands the accessibility of their collections but also enables learners to engage in remote education meaningfully, offering a wealth of potential benefits [43,53]. Many museums worldwide that house Egyptian collections have successfully adopted distance learning on various scales, using synchronous and asynchronous delivery programs to teach ancient Egyptian material culture. Despite this, Egyptian museums have yet to fully embrace the concept of online teaching or e-learning in their educational programs, nor do they integrate digital resources related to their collections and thematic topics to support school curricula and provide more affluent and meaningful learning experiences. This approach is crucial and will not only enhance traditional educational programs offered in national museums of Egypt, specifically in the context of teaching ancient Egypt, but will also serve as a resource for museum educators to overcome their lack of resources and well-structured learning programs. Developing educational websites that provide e-learning to support Ancient Egypt's teaching is necessary to align with the state's cultural policy and strengthen national identity among future generations.

Therefore, the study aims to explore the potential of digital technologies and distance learning in bridging these gaps and enabling students to connect meaningfully with the

museums' collections and engage in a more meaningful interactive learning experience in alignment with the school curricula of ancient Egypt, given that the ancient Egyptian collections are dominating the majority of national museums in the country. The study also examines the current educational programs offered by national museums regarding ancient Egyptian collections and teaching pharaonic Egypt, as well as the potential of the GEM and its children's Museums to embrace this approach and benefit schools and museums.

5. Methodology

5.1. The GEM as a Case Study for Distance Learning Approach

The GEM has been selected as a case study for several reasons for implementing this approach. Not only is it the most ambitious museum project ever attempted in Egypt, but it also plays a significant role in society, even before its completion or full opening. The museum actively participates in various educational tasks, art performances, and social events, further enhancing its influence in society. The GEM is not just a museum with Egyptological collections but also a vital hub for Egyptology and archaeology, contributing significantly to scholarship, research, conservation, and dissemination of knowledge about ancient Egyptian history. It encourages and supports research on the history and civilization of ancient Egypt and provides scholars and researchers with resources and opportunities, whether through its on-site facilities and activities or online library and virtual museum programs. Thus, it has become the most popular educational, academic, and cultural institution that will tremendously impact the country's cultural, educational, and social development.

5.2. Methods

The study utilized both qualitative and quantitative research approaches. The qualitative approach was chosen due to the limited availability of data and studies on educational programs offered by national museums, particularly their adequacy in content, impact, and student participation in learning about ancient Egyptian culture. Additionally, there is a need for data on the programs, resources, and digital infrastructure of the GEM for a web-based learning platform approach [94,95]. Quantitative research was employed to determine the number of national museum housing collections related to ancient Egypt.

The qualitative and quantitative data evaluation was conducted to answer the following research questions that guided the study:

1. What are the current educational programs and resources used in teaching ancient Egypt among national museums across Egypt?
2. What potential does the GEM and its children's museum hold for embracing web-based learning, offering distance learning opportunities for schools and museums, and providing access to meaningful content and resources about ancient Egypt?
3. What are the potential benefits of incorporating distance learning into the National Museum of Egypt?

5.3. Participants

Thirty-three participants were purposely selected from museums and administrative departments affiliated with the MoTA and schools in Egypt. The majority of the participants are from the MoTA, 25 in total, representing 13 national museums known for their extensive collections of ancient Egyptian artifacts and renowned reputation. Their diverse expertise and experience provide valuable insights into current practices, challenges, and opportunities. Additionally, selecting participants also considered geographical locations to ensure diverse regional perspectives. This is in addition to the GEM staff, IT experts, and staff at the MoTA and GEM websites. In addition to museum staff, the study includes 8 schoolteachers responsible for educating students across Egypt's primary, preparatory, and secondary education stages. It is worth noting that some of the museum's educational departments were instrumental in identifying and connecting with the schoolteachers for this study. The interview profile is presented in Table 4.

Table 4. Interview Profile and Questions Guide.

Groups	Participants' No.	Positions	Workplace: Affiliations	Interview Questions
Group one	**16**	A group of sixteen museum professionals from MoTA, including museum leaders and experts from national museums and centralized institutional departments. It comprises the supervisor of the central administration of regional museums; the director of the centralized department for historical museums; museum directors; heads of educational departments; museum educators; and museum curators.	**MoTA's Museums** ■ Cairo Governorate: Egyptian Museum of Cairo-EMC, Gayer—Anderson Museum, National Museum of Egyptian Civilization, Cairo International Airport Museum, and Egypt's Capitals Museum. ■ Giza Governorate: Imhotep Museum. ■ Alexandria Governorate: Graeco-Roman Museum. ■ South Sinai Governorate: Sharm El-Sheikh Museum. ■ Minya Governorate: Malawi Museum. ■ Sohag governorate: Sohag National Museum. ■ Luxor Governorate: Luxor Museum, Karnak Open-Air Museum. ■ Aswan Governorate: Aswan Museum.	1. What type of educational programs, workshops, and activities have you offered for students regarding ancient Egyptian collections? In your view, is it sufficient in terms of content, effectiveness, and student engagement? Is it aligned with the school curriculum? 2. What is the target grade level of schools? How many school visits does the museum receive per month approximately? 3. Who is responsible for designing these programs? What learning and Egyptological resources are used to formulate them? Are schoolteachers, museum experts, or Egyptologists part of developing these programs/activities? 4. Are educators and curators enough for the current programs' content? Are your budget and financial resources sufficient to purchase the necessary equipment required for the educational programs? 5. Do you send materials to schoolteachers before the on-site visits to the museum so that students can better focus on the concepts presented by museum exhibits? 6. Do you conduct a feedback evaluation with teachers and students after on-site visits? 7. What are the current difficulties and limitations students face in learning about the culture of ancient Egypt, in your view? 8. What methods or approaches can be used to encourage appreciation and understanding of Egyptian culture among students as part of their curriculum? 9. Are you offering educational programs online, via social media, email, or website? 10. Have you accessed educational content and programs using a museum's online learning platform? If so, was it beneficial to you? 11. How far can web-based learning platforms with rich educational content and engaging resources support your educational programs and enhance the student's learning experience? To be more precise, on a scale from 1 to 10, how can a web-based learning platform with downloadable educational content and a multi-media menu (video, online collections, interactive games, virtual field trips, virtual tours, online courses relevant to ancient Egypt, and other engaging resources) support your current educational programs? 12. If this web-based learning platform exists, would you recommend students and teachers use its online resources before or after museum visits? 13. Are you willing to attend or contribute to the online courses and interactive modules on ancient Egyptian topics run by this web-based learning platform, contributing to teachers' and educators' professional development? 14. What are the challenges of using distance learning in your museum? 15. Would you happen to have any suggestions or advice to support this approach? 16. (additional question for GEM' staff) Can the educational resources and learning programs that the GEM and its Children Museum holds be reproduced to develop a robust digital learning platform that schools and national museums across Egypt can use? What is needed to accesselrate this approach?
Group two	**4**	It comprises four members from the GEM, namely the director of the GEM learning center, the head of the educational section, a museum curator, and the follow-up and performance development officer for archaeological affairs.	**Grand Egyptian Museum-GEM**	

Table 4. *Cont.*

Groups	Participants' No.	Positions	Workplace: Affiliations	Interview Questions
Group three	**5**	It comprises five digital experts and IT staff at the MoTA and GEM websites. This includes the assistant to MoTA's minister for digital services, the project manager of MoTA's website of Egymonuments, two of GEM's website staff members, and an IT consultant.	**MoTA and GEM**	1. Does GEM have a website? If so, can it be used to host online-based learning programs? 2. Can the Children's Museum's current programs and events be transitioned into engaging online content? What's needed? 3. What digital infrastructure does GEM have for a web-based learning platform similar to international museum websites with web-based online programs? 4. Does the current staff have the skills, budget, resources, or time to effectively convert the programs to online? 5. What technological requirements and resources are needed to develop web-based online programs and educational content and provide access to digital resources? 6. Does GEM have the administrative units and experts, such as a virtual museum educator, digital marketing team, and technical team, to manage this web-based content? 7. Who can serve as the content experts and virtual museum educators? 8. How can the sustainability of GEM-based online programs be ensured? Do you think this approach requires funds or partnerships? 9. What are the challenges and limitations of implementing web-based learning in the context of GEM? Are there any potential technical issues or connectivity problems that could hinder the effectiveness of online learning? 10. What are the potential benefits of incorporating distance learning, particularly web-based distance learning, in improving students' learning about ancient Egypt?
Group four	**8**	It comprises eight teachers who instruct students across three education stages: primary, preparatory, and secondary.	**Five different national and international schools.** They are located in various governorates: Cairo, Giza, Minya, and Ismailia.	1. Have you conducted a museum field trip with your students? If yes, which museums and how many times? Did you participate in any educational programs delivered by the museum? If yes, please describe the type of programs, workshops, and activities you experienced. 2. Did you make arrangements with the museums before your visit? Did the museums provide any resources to support your study trip? If not, did you utilize any educational materials or online resources beforehand? If so, was it beneficial to you? 3. Did you coordinate with the museum regarding the content and design of educational programs? 4. Did the museum programs/activities align with the school curriculum? Do these programs cover the topics of ancient Egypt taught in school classes? 5. Did the museum's educational programs help students understand the pharaonic culture and its related school curriculum or spark their interest in ancient Egypt? 6. On a scale of 1 to 10, how effective were the museum's educational programs in facilitating student's understanding of pharaonic culture? Did they encounter any barriers? 7. Can you share your thoughts on what methods or approaches can be used to foster appreciation and comprehension of Egyptian culture among students as part of their curricula? 8. How far can web-based learning platforms with downloadable educational content about Pharaonic Egypt and related multi-media menus support your teaching about ancient Egypt and enhance the student's learning experience? 9. On a scale from 1 to 10, how can a web-based learning platform be helpful in teaching and learning about ancient Egypt? 10. If this web-based learning platform exists, would you recommend students use its online resources before or after museum visits? 11. Are you willing to attend online courses and interactive modules run by this web-based learning platform that contribute to teacher professional development? 12. Are you willing to cooperate in planning and developing curricular-related materials? 13. What are the challenges of using distance learning in teaching ancient Egypt-related curricula? Internet access, resources, equipment, or institutional barriers. 14. Would you happen to have any suggestions or advice to support this approach?

5.4. Procedures

The study began with an extensive literature review to analyze the evolving role of museums as educational institutions, delve into museum learning theories, and identify the potential of technological advancements in enriching museum distance learning. Additionally, an investigation was conducted into museum education and distance learning practices in Egyptian museums. This was followed by a comprehensive examination of the GEM and its children's museum within the study framework. To gain insights into the present programs teaching ancient Egyptian history, a quantitative survey was created to identify the number of museums affiliated with MoTA that possess archaeological collections focused on ancient Egypt (Table 5). The survey results helped determine the museums with ancient Egyptian collections, investigated their related educational programs, and thus identified areas for improvement. The study then employed semi-structured interviews as a qualitative method to examine the educational programs currently used in MoTA's national museums for teaching ancient Egypt [94]. The interviews aimed to gather insights from museum educators regarding the current challenges in museum education and the potential benefits of integrating web-based learning platforms to enhance student learning experiences [96]. Additionally, the interviews were used to assess the feasibility of implementing distance learning opportunities for schools and national museums through the GEM. The author carefully crafted the interview questions to align with the current study's relevant literature review [94,95] and research objectives. These questions were grouped based on the participants' professional backgrounds, such as museum professionals/educators, teachers, IT experts, and website team members. The specific number of questions for each group is as follows: museum professionals/educators (15 questions with an additional particular question for GEM staff), teachers (14 questions), and IT experts and website team (10 questions). Each participant provided informed consent prior to the commencement of the interview. The interviews were recorded and subsequently transcribed. Each interview lasted 30 to 45 min.

Table 5. Museums affiliated with the Egyptian Ministry of Tourism and Antiquities: a total of 51 museums in 22 governorates (including four open-air museums), by Author.

Egypt's Governorates	Museums	Collections' Historical Periods	Current Status
Cairo	**Egyptian Museum of Cairo**	Ancient Egyptian History.	Opened
	Coptic Museum	Ancient Egyptian History, Late Roman Period (Byzantine Period), Islamic Period.	Opened
	Islamic Art Museum	Islamic Period, Modern Era *.	Opened
	Gayer- Anderson Museum	Ancient Egyptian History, Islamic Period, Modern Era.	Opened
	Royal Carriages Museum	Modern Era.	Opened
	National Police Museum	Ancient Egyptian History till Modern Era.	Opened
	Manial Palace Museum	Islamic Period, Modern Era.	Opened
	Helwan Corner Museum (Farouk Corner)	Ancient Egyptian History, Modern Era.	Opened
	Abdeen Palace Museum	Modern Era.	Opened
	National Military Museum	Ancient Egyptian History till Modern Era	Opened
	Al-Gawhara Palace Museum	Modern Era.	Closed
	Mataria Open-Air Museum	Ancient Egyptian History.	Opened
	National Museum of Egyptian Civilization	Ancient Egyptian History till Present Day.	Opened
	Cairo International Airport Museum- Terminal 2	Ancient Egyptian History till Modern Era.	Opened
	Cairo International Airport Museum-Terminal 3	Ancient Egyptian History till Islamic Period.	Opened
	Egypt's Capitals Museum	Ancient Egyptian History till Modern Era.	Opened soon

Table 5. *Cont.*

Egypt's Governorates	Museums	Collections' Historical Periods	Current Status
Giza	**Imhotep Museum**	Ancient Egyptian History.	Opened
	Mit-Rahina Open-Air Museum	Ancient Egyptian History.	Opened
	Grand Egyptian Museum-GEM	Ancient Egyptian History till Modern Era.	Partly Opened
Alexandria	**Alexandria National Museum**	Ancient Egyptian History till Present Day.	Opened
	Graeco-Roman Museum	Ancient Egyptian History, mainly Graeco-Roman Periods.	Opened
	Royal Jewelry Museum	Modern Era.	Opened
	Maritime Museum	Ancient Egyptian History till Modern Era.	Closed
	Mosaic Museum	Ancient Egyptian History, Islamic Period	Closed
	Antiquities Museum of Alexandria Bibliotheca	Ancient Egyptian History till Islamic Period.	Opened
Matrouh	**Matrouh Archeological Museum**	Ancient Egyptian History till Islamic Period.	Opened
	Rommel Cave Museum	Modern Era (time of WWI-WWII).	Opened
	AL-Alamein Museum	Ancient Egyptian History.	Ongoing Project
El-Beheira	**Rashid National Museum**	Late Roman Period (Byzantine Period), Islamic Period, Modern Era.	Opened
Kafr ElSheikh	**Kafr El-Sheikh Museum**	Ancient Egyptian History till Modern Era.	Opened
Gharbia	**Tanta Antiquities Museum**	Ancient Egyptian History till Modern Era.	Opened
Port Said	**Port-Said National Museum**	Ancient Egyptian History till Modern Era.	Closed
Ismailia	**Ismailia Museum**	Ancient Egyptian History till Modern Era.	Opened
Suez	**National Museum of Suez**	Ancient Egyptian History to Modern Era.	Opened
Sharqia	**Tell- Basta Museum**	Ancient Egyptian History.	Opened
North Sinai	**AL-Arish Museum**	Ancient Egyptian History till Islamic Period, Contemporary Sinai Heritage.	Closed
South Sinai	**Sharm El-Sheikh Museum**	Ancient Egyptian history till Modern Era.	Opened
Fayoum	**Kom-Aushim Museum**	Ancient Egyptian History till Islamic Period.	Opened
Beni Suef	**Beni-Suef National Museum**	Ancient Egyptian History till Modern Era.	Under renovation
Minya	**Akhenaton Museum**	Ancient Egyptian History.	Ongoing Project
	Malawi Museum	Ancient Egyptian History till Islamic Period.	Opened
The New Valley	**El-Wadi El-Gedid Museum**	Ancient Egyptian History till Modern Era.	Opened
The Red Sea	**Hurghada Museum**	Ancient Egyptian History till Modern Era.	Opened
Sohag	**Sohag National Museum**	Ancient Egyptian History till Modern Era.	Opened
Qena	**Dandara Open-Air Museum**	Ancient Egyptian History.	Opened
Luxor	**Luxor Museum**	Ancient Egyptian History till Islamic Period.	Opened
	Mummification Museum	Ancient Egyptian History.	Opened
	Karnak Open-Air Museum	Ancient Egyptian History.	Opened
Aswan	**Aswan Museum**	Museum annex: Ancient Egyptian History till Islamic Period.	Under renovation museum annex is opened
	Nubia Museum	Ancient Egyptian History till Present Day.	Opened
	Crocodile Museum	Ancient Egyptian History.	Opened

Note: Ancient Egypt History spans from prehistoric (c.700,000 BP), Predynastic (c.4000-3200 BC), Early Dynastic Period (c.3200-2686 BC), Old Kingdom (c.2686-2160 BC), 1st Intermediate Period (c.2160-2034 BC), Middle Kingdom (c.2043-1650 BC), 2nd Intermediate Period (c.1650-1550 BC), New Kingdom (c.1550-1069 BC), 3rd Intermediate Period (1069-664 BC), Late Period (c.664-332 BC), Graeco-Roman Periods (332 BC-306 AD). (* Modern Era is for Muhammad Ali Dynasty (1805-1953 AD)) (see [97]).

5.5. Data Analysis

The interviews involved Egyptian participants and were conducted in their native language, Arabic, using the Zoom platform. The author used open-ended interview questions to gain a comprehensive insight into the participant's perspectives and experiences. This method enables a wide range of responses and encourages detailed and personalized answers from the respondents [96]. The conversations were recorded and transcribed verbatim, which were later translated for easier analysis. The analysis process included organizing, sorting, and categorizing the data based on the emergent themes that arose throughout the study, with a focus on addressing the research questions, scope, and aims of the study. The questions utilized during the interviews are presented in Table 4.

6. Results

As informal educational institutions, Egyptian museums can support schoolchildren's education and foster a sense of national identity and appreciation for ancient history. This is part of the state's cultural policy to strengthen national identity among future generations. However, they have yet to fully embrace digital technologies for on-site and online learning experiences to support the teaching of Ancient Egypt.

According to the quantitative survey, ancient Egyptian collections are an essential component of displays in 82% of national museums (Figure 7). Despite that, there is a shortage of educational resources and programs available, making it challenging to engage children with these collections and teach them about the history of ancient Egypt as part of their curriculum. Nonetheless, participant responses have been analyzed and then organized into the following categories: Sections 6.1 and 6.2.

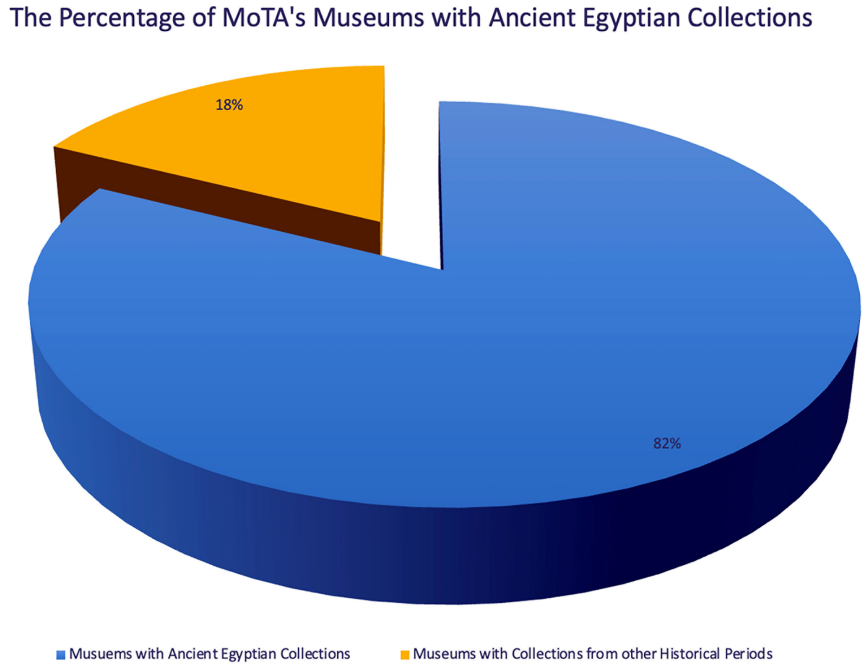


Figure 7. Percentage of MoTA's Museums with Ancient Egyptian Collections, by Author.

6.1. First: The Responses of MoTA's Museum Professionals and School Teachers

In analyzing the responses of MoTA's museum professionals and schoolteachers, several challenges and difficulties emerged regarding the educational programs offered to students concerning ancient Egyptian collections and related topics. These challenges were classified into six categories (see Table 6). The author organized the data by category, emphasizing the key themes within each category and incorporating specific data excerpts to support generalization. The quoted statements in this section are attributed to MoTA's museum professionals and schoolteachers.

Table 6. Challenges and limitations in MoTA's educational programs as identified by interview respondents (museum professionals and schoolteachers).

	Challenges and Limitations	Emerged Key -Themes	Examples of Quoted Statements from Interview Respondents
1	**Challenges in curriculum-based programs**	Lack of robust programs covering school subjects.	MoTA's Staff: the educational content used to teach ancient Egypt is "*limited and lacking in instructions and resources, ultimately affecting the programs' quality*". MoTA's Staff: "*Our museum doesn't have a template with instructions for planning educational programs yet in align with the school curricula*". MoTA's Staff: "*Most educational programs for students only include guided tours and discussions about the displayed artifacts. It would be great to have more well-planned programs that are tailored to the students' ages and curriculum*". Schoolteachers: "*We really appreciate the programs delivered, but they do not cover all the school subjects that are taught in classrooms; we hope there is a possibility of expanding the subjects covered*".
		Severe shortage of instructional materials.	
		Lack of manuals and curriculum guides for lesson plans that align with school curricula.	
2	**Limitations in Coordination and Cooperation with Schools:**	Lack of a formalized coordination with the Ministry of Education.	MoTA's Staff: "*We don't have any collaboration or communication with schoolteachers in designing educational programs, including those related to ancient Egypt*". MoTA's Staff: "*Unfortunately, we don't have any formalized cooperation with schoolteachers to pre-plan museum programs. I believe having regular communication with schoolteachers when planning the program content could improve the quality of educational activities*". Schoolteachers: "*We are not participating in designing educational programs with museums related to ancient Egyptian history or any other historical periods*". Schoolteachers: "*We haven't been invited or involved in any discussions or consultancy with the museum staff regarding the educational activities delivered*".
		lack of established methodologies and instructions.	
		Lack of focused curriculum topics and a defined list of artifacts with articulated lesson plans aligned with school curricula.	
		Lack of consultation with schoolteachers in planning and developing educational programs.	

Table 6. *Cont.*

	Challenges and Limitations	Emerged Key -Themes	Examples of Quoted Statements from Interview Respondents
3	**limitations in the sufficiency of delivered educational programs**	Limitation in educational content and instructional materials	MoTA's Staff: "*This approach limits the museum's ability to explore other topics related to its collections and history, which could be covered more effectively and engagingly to provide a more enriching experience to all children*".
		Lack of need assessments and programs evaluation	MoTA's Staff: "*Currently, there are no measures in place to evaluate the efficacy of the educational programs implemented, nor is there a mechanism to determine the extent to which students have benefited from the educational initiatives focused on teaching ancient Egyptian history, even after they have left the museum*".
		Limitation in the range of topics due to the Museum's Sector centralized policy	MoTA's Staff: "*We appreciate the unified plan of topics we receive quarterly or yearly from the museum sector. However, it limits our opportunities to propose new and innovative ideas*".
		Lack of regular long-term programs. The programs provided are occasional activities and events.	MoTA's Staff: "These programs are better classified as events rather than well-crafted long-term educational programs, as many of these activities and workshops are only offered on special occasions".
			MoTA's Staff: "*These programs are not offered all year-round regularly, they are only available during occasional events which makes them unsustainable*".
4	**Limitations in Financial, Educational, Human Resources**	Financial limitations and lack of budget.	MoTA's Staff: "*We do not have enough budget to implement educational programs effectively*".
		Lack of necessary educational equipment and tools.	MoTA's Staff: "*We have a very limited number of pedagogical tools and resources, which are insufficient to cover all the school visits*".
		Lack of Egyptological resources.	MoTA's Staff: "*It is very difficult to provide an effective educational program without a reasonable budget, which we lack*".
		lacks a standardized methodology and established references.	MoTA's Staff: "*Sometimes we asked the concerned schools to provide museums with the workshop materials*".
		Lack of reviewers and experts.	MoTA's Staff: "*when we receive numerous requests for school visits, it puts a strain on our resources. . ., we have had to rely on the curatorial department to send additional staff to assist us*".
		Lack of human resources and training programs.	Schoolteachers: "*I have provided materials to be used in drawing workshops several times*".
			Schoolteachers: "*I have supplied the museum with Pharaonic-designed tools and clothing for museum activities and performances*".

Table 6. *Cont.*

	Challenges and Limitations	Emerged Key -Themes	Examples of Quoted Statements from Interview Respondents
5	**Technological Challenges**	Lack of technological services.	MoTA's Staff: "We do not have any technological tools or services that can assist us in on-site education programs". MoTA's Staff: "We do not yet have websites or platforms that offer digital resources to support our education programs"
		Lack of digital resources	
		Lack of websites and digital platforms.	Schoolteachers: "*The younger generations are more interested in technology and are likely to engage more deeply with educational content*".
6	**Constraints related to teaching ancient Egypt**	The school curriculum lacks comprehensive coverage of basic information on ancient Egypt.	MoTA's Staff: "*The school curriculum lacks a comprehensive coverage of basic information about ancient Egyptian culture; this is disappointing, given that other countries such as the UK and USA have a wider range of topics on ancient Egypt, accompanied by interactive activities in museums*".
		More theoretical data and less engagement.	
		Surface-level information.	MoTA's Staff: "Students often learn surface-level information; students are intelligent and have many questions about ancient Egyptian civilization. . . and sometimes, teachers are not able to provide these answers".
		Lack of using modern technology.	MoTA's Staff: "*Almost all regional museums lack modern technology in their displays or in explaining exhibitions*".
		Lack of follow-up activities.	MoTA's Staff: "*The focus is only on historical information with a lack of interactive activities. . . it is important to link the programs about ancient Egyptian history with the modern community, which is currently lacking in our programs*".
		Traditional teaching methods.	Schoolteachers: "Students don't feel that this history belongs to it"
		Lack of connecting historical information with student's current modern lives.	

6.1.1. Challenges in Curriculum-Based Programs

All national museums selected for the study have some form of educational program for school students at all levels of pre-university education to teach them about ancient Egyptian culture. These programs primarily target primary and preparatory education students, including tour guides, workshops, hands-on activities like drawing, arts and crafts, storytelling, and puppet shows/theater. High school students can also benefit from tour guides and storytelling, although their range of hands-on activities is limited, as highlighted by many museum professionals' interviewees. Additionally, as stated by the interview respondents, "The museums organize talks and presentations specifically for students studying Egyptology and Archaeology, along with researchers, scholars, and anyone interested in learning more about the history of ancient Egypt".

Museum participants agreed that the educational programs provided are not entirely efficient regarding design, structure, and resources. Although they have stated that these programs are indeed related to the school curricula, they are not well-planned and have no clear goals for effectively integrating the museum's collections with the expected learning outcomes to meet each educational stage.

Several museum professionals have reported that museum exhibitions and collections are highly relevant to various school subjects taught at different levels of schooling, such as social studies, history, Arabic, science, and English, as echoed by one of the interviewees: "Museum collections can tie into a range of subjects, like history, social studies, science, English, and even Arabic, to make the most of this, we must better understand what teachers and students seek. By working closely with schools, we can ensure that the collections are tailored to meet their needs and enhance their learning experience". According to feedback from approximately half of the teachers, the museum programs were reported to need to be more robust in meeting the complete range of needs and content associated with school subjects. As expressed by one of the teachers: "We really appreciate the programs delivered, but they do not cover all the school subjects that are taught in classrooms; we hope there is a possibility of expanding the subjects covered".

However, there is a severe shortage of instructional materials that can be used to create more effective educational programs. One museum educator described the educational content used to teach ancient Egypt as "limited and lacking in instructions and resources, ultimately affecting the programs' quality".

According to the study, most museums have yet to fully embrace the idea of offering educational programs that align constructively with school curricula. This is evident in the lack of written documents, such as detailed manuals that serve as curriculum guides and provide lesson plans that complement the national Egyptian education curriculum. As one of the respondents expressed, "Our museum doesn't have a template with instructions for planning educational programs yet".

Educational programs for school students predominantly revolve around guided tours and create a process of talking that focuses on the artifacts on display. While some museum educators take the initiative of examining school curricula to determine the artifacts incorporated in them, as one of them expressed, "I individually review school curricula to identify the artifacts related to Pharaohs/Egyptian Kings that are included in our museum upon which I plan tour guides". However, this is usually done on an individual basis rather than being institutionalized.

In this regard, the interview responses have made clear that none of the schoolteachers have been consulted or are participating in any prior discussions related to the programs and activities provided by the museums to their students. Additionally, they have expressed that they are not involved in the content preparation process for the school curricula related to ancient Egypt in collaboration with the museum staff. "We haven't been invited or involved in any discussions or consultancy with the museum staff regarding the educational activities delivered", stated one of the schoolteachers.

6.1.2. Limitations in Coordination and Cooperation with Schools

It is important to note that as of yet, there are no established formalized coordination or partnerships between the MoTA and the Ministry of Education to devise a regulatory framework that would enable direct arrangements with schools and formulation of a workable model for curricula-based programs [70]. However, several participants have reported varying degrees of coordination with schools for museum visits. While some have expressed that they coordinate with the school authorities beforehand, others have noted that school visits may occur without prior arrangements. However, certain museums, such as the Karnak Open-Air Museum, have informed that they have established a protocol of cooperation with neighboring schools, which is permitted by the MoTA. Other museums have mentioned that the responsibility of coordinating with schools lies with the museum's Public Relations or Marketing Officers and the administrative officers of the respective schools. According to most schoolteachers, "school visits to the museum are customary to be organized through the administrative office of the school", said one of the teachers. Ultimately, the arrangements for school visits are more administrative logistics rather than arrangements related to the content and type of educational activities offered to support school visits.

As observed from the study, most educational programs related to ancient Egypt lack established methodologies, instructions, focused curriculum topics, and a defined list of artifacts with articulated lesson plans. One primary reason for this is the lack of cooperation between museums and schoolteachers in the planning and designing of curricula-based programs. As a result, the quality of these programs is significantly hindered, and students may not have the best learning experience. As one of the museum professionals highlighted, "We don't have any collaboration or communication with schoolteachers in designing educational programs, including those related to ancient Egypt". Another has commented, "Unfortunately, we don't have any formalized cooperation with schoolteachers to pre-plan museum programs. I believe having regular communication with schoolteachers when planning the program content could improve the quality of educational activities". According to the interview of schoolteachers, the majority reported that they do not have a say in developing curricula pertaining to historical periods such as ancient Egyptian history. None of the teachers were involved in designing programs related to this subject or any other historical period, as one of them expressed, "We are not participating in designing educational programs with museums related to ancient Egyptian history or any other historical periods".

6.1.3. Limitations in the Sufficiency of Delivered Educational Programs

Most of the responses from museum professionals have reported some limitations in the content and effectiveness of the delivered programs. The educational programs follow a centralized approach, which means they adhere to a pre-determined plan set by the museum sector for all museums. This approach only includes topics related to special national or global occasions, such as International Women's Day, Mother's Day, the Holy Month of Ramadan, and National Festivals, among others. However, this approach focuses more on occasional activities than long-term programs. As per one of the respondents, "This approach limits the museum's ability to explore other topics related to its collections and history, which could be covered more effectively and engagingly to provide a more enriching experience to all children". One of the participants commented, "These programs are better classified as events rather than well-crafted long-term educational programs, as many of these activities and workshops are only offered on special occasions". Other participants added, "These programs are not offered all year-round regularly, they are only available during occasional events which makes them unsustainable. This creates many constraints for us to offer more diverse and comprehensive programs associated with Pharaonic culture and other historical periods". Other museum professionals commented,

> "We appreciate the unified plan of topics we receive quarterly or yearly from the museum sector. However, it limits our opportunities to propose new and innova-

tive ideas. We suggest expanding the agenda to cater to each museum's unique needs. This will help us develop more programs that align with school curricula, providing a richer and more diverse array of offerings to school children, families, and the public in general".

Interestingly, according to the viewpoints of teachers, the majority of them are in agreement that the educational programs offered by the museum have been instrumental in enabling students to gain more knowledge of pharaonic culture. The programs have proven to be effective in expanding student knowledge and have been successful in achieving a 70–90% satisfaction rate. "Students felt very happy to capture what they studied in their classrooms before their eyes", commented one of the teachers. Another said, "Every activity offered by the museum adds value to students besides the factual information in their books".

A total of 80% of museum participants raised a valid concern that there is currently no established method to assess the impact and effectiveness of the educational programs and activities offered to school students during their museum visits. They also highlighted the importance of a follow-up process to gauge the effectiveness of these activities in imparting knowledge of ancient Egyptian history to the students. As expressed by some of the museum educators, "Currently, there are no measures in place to evaluate the efficacy of the educational programs implemented, nor is there a mechanism to determine the extent to which students have benefited from the educational initiatives focused on teaching ancient Egyptian history, even after they have left the museum". One of the respondents highlighted the importance of developing methods for evaluating the programs, stating, "This would not only help to measure the success of the programs but also provide valuable insights into their impact on the student's learning outcomes related to their school curricula of pharaonic culture".

The feedback received from 20% of the respondents indicates that the programs are effective, particularly the ones offered by Sharm El-Sheikh Museum, Mallawi Museum, and Imhotep Museum. Some respondents mentioned that "we observed active engagement and participation from some school students in the activities provided". However, it is important to note that this was only based on an observational approach and not through evaluation.

6.1.4. Limitations in Financial, Educational, Human Resources

All museum participants expressed their financial limitations in providing educational programs, as expressed by some, "We do not have enough budget to implement educational programs effectively". Another echoed, "We have a very limited amount of pedagogical tools and resources, which are insufficient to cover all the school visits". One commented, "It is very difficult to provide an effective educational program without a reasonable budget, which we lack". The success of all programs hinges on the availability of adequate materials and tools. Many have emphasized that relying solely on guided tours and storytelling is inefficient. As such, the majority has indicated that they bring the necessary materials and tools at their own expense to ensure the programs are implemented successfully. A participant said, "Sometimes we asked the concerned schools to provide museums with the workshop materials". Some others added, "We have very innovative ideas to enrich the programs with explanatory materials and useful elements that can effectively support the curriculum content, but unfortunately, we lacked the budget and resources to invest in programs". According to many participants' reports, they have been responsible for providing the workshop materials using their own funds, as some stated, "The learning materials used in the workshops are provided by the museum educators themselves since there is not a specific budget yet".

In this context, several schoolteachers stated that they provided some provisions and equipment to facilitate museum activities, as one of the teachers pointed out: "I have provided materials to be used in drawing workshops several times". Another commented, "I have supplied the museum with Pharaonic-designed tools and clothing for museum

activities and performances". Another teacher commented, "One of the major obstacles to the success of museum programs is the lack of necessary equipment and tools". Furthermore, a significant proportion of the teachers have reported that they did not receive any course materials or resources from the museum either before or after their visit. "Having these available would be very helpful", commented one of the teachers. Two out of the total number of teachers reported that they occasionally obtain resources from the museum, "When I needed additional information, I asked the museum staff, and they supported me with resources", said one teacher.

Several museum staff have expressed concerns regarding the resources used in the development of educational programs related to ancient Egypt. They have reported that the programs are not being designed with the use of specific academic resources pertaining to the history and culture of ancient Egypt, and "we a lack of experts to review of the data used to formulate these programs", said one of the interviews. One museum educator commented that the reliance is on basic knowledge of archaeology and Egyptology, as some of the team members have graduated from the faculty of archaeology. Another interviewee mentioned that "while I have studied archaeology and Egyptology, my colleague has a background in applied arts and is not a specialist in ancient Egyptian history. However, we sometimes send the data we collect to the museum director for review". According to their statement, the information gathered on ancient Egypt lacks a standardized methodology or a set of established references. This leads to a situation where the data collected is more individualized in nature rather than being institutionalized. As a result, it might be difficult to compare and verify the information obtained from different sources.

Many museums' participants emphasized the need for adequate human resources to manage and deliver all educational programs effectively. It is, therefore, crucial to refer to the administrative units responsible for providing educational programs at MoTA's museums. These units consist of two central sections—the educational section, which is responsible for designing and implementing education programs for all levels, including adult learners, and the pedagogical section, which is responsible for developing educational and social activities for individuals with disabilities. Several participants drew attention to the fact that their museums are understaffed and that this has been a major obstacle to providing efficient, comprehensive educational programs. One participant mentioned that "when we receive numerous requests for school visits, it puts a strain on our resources; in such instances, we have had to rely on the curatorial department to send additional staff to assist us with delivering the programs". However, they expressed concern that the museum educators are often limited to a team of only 2 to 4 members, which is inadequate for running the programs effectively. Furthermore, some mentioned that some staff members need appropriate training and experience in dealing with children, which further complicates the situation, as echoed by some, "We need specialized programs in museum education and psychological rehabilitation to achieve better results with the school students".

6.1.5. Technological Challenges:

All the respondents, including museum professionals and educators, have confirmed that they do not possess any technological tools or services to facilitate their on-site educational programs or websites. Moreover, they have also conveyed that there is an absence of digital resources that could support their programs. "We do not have any technological tools or services that can assist us in on-site education programs". Additionally, others confirmed that "we do not yet have websites or platforms that offer digital resources to support our education programs".

Several museum participants have reported that they began offering digital programs only after the first wave of COVID-19. They made some of their collections available online for remote viewing and engagement, provided educational sessions through Zoom for students, and created online content such as storytelling audios, quizzes, and Q&As. These activities were primarily hosted on social media platforms, particularly Facebook

pages, as they do not have their own website. Furthermore, MoTA and private companies collaborated to create virtual tours and 360 videos as part of the "Experience Egypt from Home" initiative. These were published on MoTA's websites and social media platforms. However, these digital activities were not continued after the Corona lockdown ended, except for a few events aimed at the general public.

According to schoolteachers, incorporating technology and digital activities, be it on-site or online, can significantly enhance students' understanding of pharaonic culture, thereby providing them with a more comprehensive knowledge of the subject. "The younger generations are more interested in technology and are likely to engage more deeply with educational content", one teacher commented.

6.1.6. Constraints Related to Teaching Ancient Egypt

The lack of comprehensive information about ancient Egyptian culture in the school curriculum was a source of disappointment for the participants, as one of the interviewees said, "The school curriculum lacks a comprehensive coverage of basic information about ancient Egyptian culture; this is disappointing, given that other countries such as the UK and USA have a wider range of topics on ancient Egypt, accompanied by interactive activities in museums". One museum participant stated that "students often learn surface-level information; students are intelligent and have many questions about ancient Egyptian civilization that need thorough answers, and sometimes, teachers are not able to provide these answers; also, due to limited time and resources, museums are unable to respond effectively to the many school visits". Another interviewee stated, "The teaching is too theoretical not to motivate students to engage the five senses to enable them to evoke history and make it a life through hands-on activities". Some highlighted that students need to be more aware of their history and thus require more compelling and attractive programs: "Students need some fun, more catchy programs, adventures, quizzes that help learn about their history in an engaging way, this will not only raise their awareness but also motivate them to learn".

Another participant highlighted the challenge of the lack of utilization of modern technology and interpretation techniques in exhibition galleries. In their observation, this practice falls short of appropriately elucidating the exhibits to students and other museum visitors. "Almost all regional museums lack modern technology in their displays or in explaining exhibitions", one of the participants commented.

Another participant emphasized the necessity of follow-up activities after museum visits, stating that "without these, students tend to forget the information on ancient Egypt they've learned". This underscores the importance of reinforcing the knowledge gained from museum visits.

Some participants have expressed their concerns about the educational content museums and schools provide. They feel that the teaching methods are very traditional: "The focus is only on historical information with a lack of interactive activities such as videos and animations: further, it is important to link the programs about ancient Egyptian history with the modern community, which is currently lacking in our programs". In this context, a few museums have stated that there are some initiatives to link the past with modern society and heritage topics. One has commented, "One of the biggest challenges is the difference and contrast between the ancient Egyptian world and students' modern lives. How their culture and lives are interconnected or intertwined might be tricky for students to understand: this should be melted through the museum's programs".

Since most of the available materials and resources online are not suitable for younger learners and school students, some emphasize the need to develop educational resources that are age-appropriate and engaging, specifically tailored to the needs of young learners and students to learn about Egyptology and history, as noted by some of the study participants, "There is a shortage of educational resources that cater to the needs of young learners when it comes to learning about Egyptological artifacts and history. Most available

materials and resources online are designed for older students or those in high school and college, but not for younger learners".

According to some participants, the biggest obstacle in teaching ancient Egyptian history is that students often feel disconnected from it, "Students don't feel that this history belongs to it, Egyptologists and archaeologists, are in their ivory tower, tend to use complex language and jargon, which can be difficult for the general public and students to understand; as a result, social studies has become a nightmare for the students: it is the role of the museum to bridging this gap and be a mediator".

6.2. Second: Responses of GEM

Based on interviews with GEM staff, the museum has the potential to offer web-based learning resources on ancient Egypt and access to meaningful content and resources about ancient Egypt. One of the participants highlighted that the GEM is designed "to be a platform for dialogue and promoting awareness of Egypt's many contributions to the world." The museum is primarily devoted to ancient Egypt, displaying its rich history from the prehistoric periods through Dynastic Egypt until the Graeco-Roman Period. Given its singular focus on ancient Egypt, it is the preeminent center for Pharaonic Egyptology in the country. "As a top-rated institution for education and culture in Egypt, it has a positive impact on the social, cultural, and educational development of our country", one of the interviewees stated.

Regarding educational infrastructure, The GEM has a variety of educational venues that offer learning programs for different age groups and visitors. The GEM's children's museum is an excellent option for distance learning programs. In addition to its on-site programs that offer high-quality education, the museum incorporates the latest theories in museum education and provides interactive activities for children aged 0 to 15. With all these qualities, the museum's constructive learning setting is an ideal destination for distance learning programs.

The museum offers an extensive collection of educational resources and materials related to archaeology and Egyptology. These resources cover all historical periods of ancient Egypt and have been meticulously researched, compiled, and prepared by renowned Egyptologists, specialists, and scholars "to serve as the fundamental data for the museum's programs and to support the writing of exhibition texts," as one of the participants stated. Another commented, "We found these data really helpful as a reference while preparing our learning programs". Additionally, these data can support teachers, as echoed by one of the participants: "These materials can be really helpful for schoolteachers who are interested in learning more about the ancient Egyptian curriculum. It's packed with useful insights and can really enhance their knowledge in this area".

This is in addition to the GEM library that is currently being developed. It will be available both on-site and online to make it more accessible to researchers and scholars of Egyptology; as one of the participants stated, "We're currently working on building a comprehensive library for Egyptology. We're gathering the most well-known books, journals, and scientific periodicals that will benefit the community and provide a valuable resource for research and study in Egyptology and Archaeology".

Educational and learning programs were expertly developed by knowledgeable experts and joint teams of national and international professionals, including "Museology experts, Egyptology experts, museum education experts, school instructors, as well as national and international researchers and specialists", one participant said. Another participant said, "All educational programs were designed to support and link learners in meaningful ways to GEM's exhibition content while also following the national Egyptian school curriculum".

One of the GEM's critical potentials is a new management mode that sets it apart from other national museums affiliated with the MoTA. The GEM has become an independent economic entity with boards of trustees, allowing for more flexible and efficient performance beyond the constraints of government bureaucracy. This management mode

alleviates the GEM from institutional constraints and complexities that often arise in partnerships with schools and other institutions, which are challenging for other national museums under the MoTA authority. Thus, the GEM, as stated by one of the participants, has "made some practical arrangements with school instructors and teachers to ensure that the programs we offered are linked with school curricula topics", highlighted one of the participants. Also, one of the participants said, "We are collaborating with the Ministry of Education and its affiliated educational systems for English, French, and German schools to assess their needs and tailor our educational programs accordingly".

Children's Museum, with its well-trained staff, presently offers an extensive range of educational programs catering to public schools with no charges and international schools with charges based on their ability to pay. "This ensures that children have equal access to educational opportunities irrespective of their financial background", highlighted one of the participants. This includes evaluation to gather school feedback and ensure that the programs are effective, meet the desired outcomes, and make informed decisions regarding any necessary improvements.

Additionally, "The GEM is planning to establish an Academy that offers short courses and professional diplomas in museum exhibitions, education, and ancient Egyptian civilization, among others", one of the participants stated.

With regard to GEM's digital infrastructure, it has established a robust digital infrastructure to cater to visitors' needs. In addition to the advanced technological tools, multi-media, and digital services available on-site, the GEM is in the process of developing an informative website that will provide comprehensive information about its programs, events, exhibitions, fees, hours, and directions. To enhance visitor experience, the GEM has implemented a Customer Relationship Management (CRM) system to manage and analyze visitor interactions. The system will enable the GEM to provide better experiences and create stronger bonds with its visitors.

7. Discussion

Distance learning has emerged as a prevalent practice in museum education in recent years. Museums have introduced several digital offerings to enhance this approach, ranging from asynchronous alternatives such as online courses and curricula available through museum websites to synchronous options such as virtual field trips and live webinars for the professional development of educators. Despite this progress worldwide, there is a significant gap regarding the field of distance learning in the national museums of Egypt.

On the other hand, the study limited educational content, insufficient resources, and budget constraints in the educational programs of the national museums of MoTA, among other challenges. Distance learning can enhance the student's learning experience by providing additional resources and interactive activities, thus improving their engagement. Also, it would support museum educators and equip them with the much-needed provisions and resources to provide more meaningful learning experiences in teaching ancient Egyptian history.

The GEM presents a viable approach that is supported by a multitude of favorable factors. These include the wide range of curricula-related programs and educational resources offered by its Children's Museum, its ability to adapt and coordinate with various institutions, schools, universities, and even international museums, and the potential of its digital infrastructure, among other factors. By leveraging these strengths, the GEM can offer valuable consultancy services and facilitate the effective teaching of ancient Egypt to promote a learning environment for both school students and teachers' professional development. This initiative, if implemented, has the potential to significantly reshape the education and museum landscape, addressing key challenges and enhancing the learning experience for students.

The approach empowers both museum educators/staff and school students with multiple benefits. Following is the potential impact of the distance learning approach on MoTA's museums and school students.

7.1. Potential Impact for MoTA's National Museums

First, museum educators can greatly benefit from the opportunity to diversify their programs with an array of activities, lessons, exhibits, and interactive games/quizzes centered around ancient Egypt. These enriching additions can be effortlessly integrated into their on-site learning setting. The museum educators will have access to a library stocked with trustworthy information and rich materials that cover all periods of ancient Egypt and related subjects and themes. With these valuable resources and established references at their disposal, they can expand and reinforce their program's content and scope, covering a broader range of topics that align with their collections and school curricula.

Second, it will enable museums to introduce distance learning programs into their educational framework for the first time. Leveraging the GEM website's learning platforms will allow them to integrate online programs for numerous virtual public schools, enhance their teaching methodologies, and offer more engaging and interactive learning experiences to their students. Furthermore, they can create and distribute their custom online resources, such as videos, audio feeds, and virtual field trips, to further enrich the learning process and promote student engagement with ancient Egyptian history and related topics. This presents an excellent opportunity for museums to embrace modern technology and establish an innovative approach to education.

Third, Museum educators will get the much-needed guidance and resources to develop effective educational programs. Based on the findings, there is a lack of a practical model or curriculum guidelines that can serve as a framework for creating educational plans. This has led to difficulties in planning topics for each grade, selecting instructional materials, and choosing assessment methods. However, with the proposed approach, museum educators will have access to a template or manual with clear instructions on developing such programs, which will be a first for them. As they progress through the distance learning programs, museum educators will be equipped with the necessary training and experience to collaborate with schoolteachers in planning and designing educational programs. This will not only enhance their skills and knowledge but also foster a more integrated and comprehensive approach to teaching ancient Egypt, similar to the international examples.

Fourth, one of the major challenges that educational programs face is the lack of sufficient funds, tools, and equipment necessary to carry out these programs effectively. However, a potential solution to this problem is the implementation of integrated distance learning programs. By incorporating such programs, the costs of educational programs conducted at the museum's physical site could be significantly reduced while also providing more opportunities for students and learners to access and communicate with museum programs. This could lead to a more enriching and engaging learning experience for all involved while also making education more accessible and affordable.

7.2. Potential Impact on the School Students

Egypt has one of the largest education systems in the Middle East and North Africa region (MENA). The education structure in the country is centralized and hierarchical, with the Ministry of Education responsible for developing and overseeing education policies, curriculum development, and overall educational plans [68]. In line with Egypt's Vision 2030 and the national government's Information and Communications Technology (ICT) strategy to achieve digital Egypt, the Ministry of Education has established a strategic plan for pre-university education between 2014 and 2030 [68,71,98]. This plan aims to integrate digital learning and education technology, including providing tablets to secondary school students to access digital content through the Egyptian Knowledge Bank—a vast online resource of knowledge and reference materials established in 2016 [99]. The accelerated pace of digital transformation in the national education system presents a significant opportunity to promote distance learning programs in partnership with the national museums of Egypt. These programs can be used to complement school curricula and provide students with a deeper understanding of ancient Egypt.

In this context, all the study's schoolteachers were quite confident that the distance learning programs would greatly improve the learning experience of students studying ancient Egypt. All schoolteachers highlighted that using technology on-site or online would enhance students' knowledge of pharaonic culture. As one of the teachers commented, "Students these days prefer learning using engaging and interactive methods rather than traditional methods like physical texts and lectures. I believe that adopting online learning programs can help spark students' curiosity and passion for in-depth learning about ancient Egyptian topics".

Offering a range of interactive resources aligned to the national curriculum, including audio, text articles, images, and interactives, "Would make learning more interesting and made the students develop a more positive attitude towards learning", one of the teachers expressed. Additionally, "offering these resources can help us create more exciting and engaging les [70–72] son plans. By doing this, we can enable our students better to understand the syllabus of pharaonic civilization and history", another teacher commented.

They rated the online programs 9 and 10 out of 10, emphasizing their numerous benefits in teaching curricula related to ancient Egyptian history. One interviewee stated, "This will give us fresh opportunities to deliver engaging learning experiences; this would motivate us greatly". Another one said, "This resource will be super helpful for students before their museum trip. It'll give them a great orientation on the topic and help them get the most out of the tour guide's presentation".

All of the teachers have expressed satisfaction in participating in online courses offering knowledge and experiences to enhance their professional development. One participant suggested, "It could be really helpful to team up with the Ministry of Education to offer some online courses. I've heard that some efforts are already being made to create online professional learning programs, which would be a great way for us to track our progress and explore new ideas for classroom learning".

In addition to the advantages outlined earlier, museum staff and schoolteachers have noted certain obstacles and limitations associated with integrating distance learning initiatives. These included expenses, time constraints, a shortage of qualified personnel proficient in online platforms, equipment such as printers for printing lesson plans and other resources, and cameras for virtual tours. Nonetheless, a few have proposed some practical solutions to the problem. One of them is to seek financial assistance from international cultural institutions in Egypt and global Organizations like UNESCO, which are already supporting museum development in Egypt, including NMEC or international schools, to offset the expenses. Another solution is establishing partnerships with private sectors, similar to those during the pandemic. Internet access was also highlighted as a challenge. Luckily, the study proposal coincided with a push by the Egyptian Government to improve the country's digital infrastructure.

7.3. Study Limitations

There are a few limitations to consider when interpreting the study's findings. Firstly, it is essential to note that the study only included some of the national museums rather than all of them. Therefore, it should be viewed as a snapshot of educational practices in museums nationwide rather than a comprehensive representation. Additionally, the number of schoolteachers involved in the study was relatively small, which means that the results cannot be generalized to represent a comprehensive view of the perception of schoolteachers towards the impact and effectiveness of delivered educational programs in supporting school curricula related to ancient Egypt or the benefits of distance learning. The data collected are only representative of some schools.

Finally, it is worth noting that the responses obtained from the museum professionals who participated in the study may be influenced and biased by factors such as their museum institutions, their understanding and perception of museum education and distance learning programs, or other variables beyond the research questions. Nevertheless, this

study provides a solid foundation for future research on distance learning programs in Egyptian museums and teaching methods and practices related to ancient Egypt.

8. Recommendations

There is a severe shortage of instructional materials, educational resources, and financial and human resources used in national museum educational programs. Further, their informal environment, which was supposed to encourage free choice exploration and lifelong learning with supportive interpretation tools, still needs improvements to promote constructive learning experiences for all, including school students. Given that the interpretation environment and explanatory elements used in exhibition galleries of the majority of national museums are minimal in providing an interactive and informative learning environment for teaching ancient Egypt [97], it is up to educational programs to bear the responsibility of helping students comprehend topics related to their curricula.

National museums that represent the history and culture of ancient Egypt must embrace technological advancements and introduce distance learning programs on their websites. This approach will address the aforementioned constraints while also bridging the roles of Egyptian museums as both formal and informal educational institutions with the modern societal demands of the 21st century, which have been significantly shaped by technological advancements and digital learning. As emphasized by the majority of research respondents, the implementation of a web-based learning platform would significantly augment students' overall learning experiences and specifically facilitate the teaching of ancient Egypt, with a score ranging from 9 to 10 out of 10 according to one of the interview questions, emphasizing the importance of offering distance learning programs.

The findings of the study concluded that this approach is durable through the GEM's website. While the primary goal of GEM's website is not to offer distance learning programs, the IT experts and website team have ensured that the available resources, educational materials, and lesson plans can be leveraged to create museum-based online programs. As one of the participants stated, "A lot of programs can be adaptable for establishing museum-based online programs". There have been suggestions that the proposed approach would be highly beneficial in supporting GEM's mission to establish itself as a central hub for pharaonic culture and bolster national identity amongst younger generations. Further, it has been suggested that GEM can offer various resources, including live streaming, videos, cartoons, audio, interactive files, and similar materials. Moreover, as part of its future plans, GEM could consider organizing online courses and sessions to educate students, teachers, and the general public about ancient Egypt. This would be especially relevant given GEM's plans for the GEM Academy, and these proposed resources could be linked together to support this initiative.

GEM is well-equipped to support the proposed approach with its competent human resources. The technical teams at GEM can manage web-based content, while the website team and IT experts can provide essential technical support. Additionally, GEM can leverage external consultants to ensure the success of the proposed approach. Despite the concerns raised by some, the necessary funds for this endeavor are likely to be secured through the acquisition of sponsorship and financial support from banks and companies, with the approval of the GEM board. "If the GEM board approves it, we could potentially secure sponsors and financial support from banks, VIPs, and other sources", commented one of the participants, providing reassurance about the financial feasibility of the proposal.

The technical requirements of web-based products will depend on the type and nature of the content, the hosting environment, user traffic, the size of the storage, and the content management system, among other requirements. In addition, companies specializing in the distance learning industry and international museums with good reputations in online provision will need to consult. However, this approach's core content is present, encompassing website digital infrastructure, IT experts, content products, and resources. However, operational work is needed, and it requires more complexity, including well-trained distance learning staff and digital museum educators. It also requires a big budget to

fund the digital provisions and ensure sustainability. Partnerships can be established with companies specializing in technology, virtual tour companies, and scientific organizations.

Moreover, these requirements can be supported by the new Organizational Division for Information Systems and Digital Transformation attached to the GEM administrative structure, which is part of a larger policy that aims to integrate a new division into all the state's administrative structure, as Decree No. 87 of 2019 mandates from The Central Agency for Organization and Administration [100]. This move is in response to the President of the Republic's decision No. 501 of 2017, which pertains to the Supreme Council for the Digital Society. This new division aims to support the state's efforts to transition to a digital economy and achieve the goals outlined in the Sustainable Development Strategy Egypt 2030 [101]. Under the decree, the Ministry of Communications and Information Technology is tasked with providing the necessary technical support for the division's responsibilities, which include overseeing digital transformation and regulating information systems.

9. Conclusions

In recent years, museums across the globe have leveraged digital technologies to create interactive online learning experiences for their audiences. The ease, flexibility, and affordability of engaging with diverse and geographically distant audiences, as allowed by digital technologies, have impacted the learning experiences positively, increased interactions with students, enabled them to have useful supplementary experiences built on their classroom learning and encouraged students to delve deeper into the curricular topics, including those related to ancient Egyptian culture while developing new skills.

Surprisingly, before COVID-19, the MoTA and its affiliated museums implemented a policy against offering online offerings, exhibitions, or virtual tours. This decision was made due to concerns that such offerings could negatively impact the number of physical visits to museums and archaeological sites and potentially decrease their overall significance. Even though the MoTA's policy has gradually evolved and changed in the wake of the COVID-19 pandemic, allowing more venues for museums to establish an online presence and develop digital content through their social media platforms and MoTA's website, there is still a noticeable gap in distance learning opportunities, online teaching integration in educational programs, and using digital resources to enhance school curricula. However, this gap can be largely attributed to the early stage of digitalization in MoTA's museum industry.

Nevertheless, the potential for growth and advancement in this area is substantial, offering a promising future for MoTA's digital initiatives. GEM infrastructure provides a feasible approach backed by several advantageous factors, enabling the potential to establish a distance learning platform through its website. This approach can effectively support the teaching and learning of Ancient Egypt in alignment with the national curriculum. Such endeavors have the potential to bolster the sense of national identity among forthcoming generations, which is highly valued and actively encouraged by the government's cultural policies, while also providing museum educators with the necessary guidance and resources to create effective educational programs and compensate for lack of financial and educational resources.

Egypt's digital transformation strategy, in alignment with Egypt Visio 2030, will significantly support this distance learning initiatives, opening doors to a new world of learning in which students will become lifelong learners. Furthermore, It will help teachers through online professional learning programs that allow them to track their growth. By leveraging these resources, museum educators can create effective learning programs that align with school curriculums and can be used in distance learning scenarios. Ultimately, teaching about ancient Egypt could become ubiquitous and accessible to learners everywhere and at any time.

Funding: The research was funded by the British Museum -International Training Programme (ITP) Research Support Grant of 2024. The article processing charge (APC) was funded by the ITP research grant and the Open Access Publication Fund of the University of Wuerzburg.

Institutional Review Board Statement: Ethical review and approval were waived for this study as local legislation and institutional requirements do not mandate such procedures.

Informed Consent Statement: Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. Permissions for design diagrams (Figures 1–4) included do not need to be obtained per national institutional requirements.

Data Availability Statement: The original contributions presented in the study are included within the article, further inquiries can be directed to the corresponding author.

Acknowledgments: The author sincerely acknowledges the continuous support of the British Museum International Training Programme (ITP) for its alumni and the funds it has received to support the publication of this study. The author expresses sincere gratitude to all research participants for generously dedicating their time to share their experiences during the interviews. The following individuals are acknowledged for their active participation and support. MoTA's Staff: Ahmed Hamida, Supervisor of the Central Administration of Regional Museums; Sherif Said, Director of The Centralized Department for Historical Museums; Mona Rafaat, Supervisor of Egypt's Capital Museum-ECM; Sayedah Safwot, Head of the Educational Section at the Egyptian Museum of Cairo (EMC); Azza Razk, Head of the Educational Department at the National Museum of Egyptian Civilization (NMEC); Mamdouh Farouk, Director of Imhotep Museum; Mervet Ezzat, Director of the Gayer-Anderson Museum; Mohamed Ali, Head of the Educational Department, Malawi Museum; Gehad Shwaky, Educator Officer, Archaeological Awareness Department, Karnak Open-Air Museum; Heba El-Daresay, Museum Educator, Aswan Museum; Alaa Hassan, Director of Luxor Museum; Mohamed Hassanien, Director of Sharem El-Sheikh Museum; Diana Wadie, Museum Educator, Sohag National Museum; Mona Mamdouh, Museum Educator, Sohag National Museum; Rasha Hussein, Museum Educator/Curator, Cairo International Airport Museum; Riham El-Rifaay, Museum Curator, Graeco-Roman Museum. GEM's Staff: Gehan Nabil Zaki, Director of the GEM Learning Center; Enas Kareem, Head of the Educational Section; Amal Hamdy, Follow-up and Performance Development Officer for Archaeological Affairs at the GEM; Said Nassar, Museum Curator at the GEM. MoTA's Digital Experts and MoTA/GEM Websites Team: Mohamed Shabaan, assistant to MoTA's minister for digital services; Marwa El-Sheemy, the project manager of MoTA's Egymonuments website; Heba Moemen, Staff Member of the GEM Website; Allyia Raffat, Staff Member of the GEM Website; Bahaa el-Din Megahed, IT Consultant.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Falk, J.H.; Dierking, L.D. Learning from Museums: Visitor Experiences and the Making of Meaning. In *American Association for State and Local History Book Series*; AltaMira Press: Walnut Creek, CA, USA, 2000; ISBN 978-0-7425-0294-9.
2. Hooper-Greenhill, E. *Museums and Education: Purpose, Pedagogy, Performance*; Museum Meanings; Routledge: London, UK; New York, NY, USA, 2007; ISBN 978-0-415-37935-9.
3. Hein, G.E. *Progressive Museum Practice*; Routledge: London, UK, 2016; ISBN 978-1-315-42184-1.
4. Hawkey, R. *Learning with Digital Technologies in Museums, Science Centres and Galleries*; Hal Open Science: London, UK, 2004; p. 00190496.
5. Knell, S.J. The Shape of Things to Come: Museums in the Technological Landscape Simon J. Knell*. *Mus. Soc.* **2003**, *1*, 132–146.
6. NEMO. *Digital Learning and Education in Museums: Innovative Approaches and Insights*; Network of European Museum Organisations: Berlin, Germany, 2023; ISBN 978-3-9822232-6-1.
7. Marty, P.F. Museum Websites and Museum Visitors: Digital Museum Resources and Their Use. *Mus. Manag. Curatorship* **2008**, *23*, 81–99. [CrossRef]
8. Moore, C. Embracing Change: Museum Educators in the Digital Age. *J. Mus. Educ.* **2015**, *40*, 141–146. [CrossRef]
9. Din, H. Pedagogy and Practice in Museum Online Learning. *J. Mus. Educ.* **2015**, *40*, 102–109. [CrossRef]
10. Littlejohn, A.; Higgison, C. *A Guide for Teachers. LTSN Generic Centre e-Learning Series No. 3*; Learning and Teaching Support Network: London, UK, 2003.
11. Spadoni, E.; Porro, S.; Bordegoni, M.; Arosio, I.; Barbalini, L.; Carulli, M. Augmented Reality to Engage Visitors of Science Museums through Interactive Experiences. *Heritage* **2022**, *5*, 1370–1394. [CrossRef]
12. Hawkins, M. Light at the Museum: How Canon's XEED Laser Projectors Bring the Past to Life in Immersive Exhibitions. Available online: https://www.canon-europe.com/pro/stories/projectors-in-museums/ (accessed on 25 February 2024).
13. Bagnall, R.S. Alexandria: Library of Dreams. *Proc. Am. Philos. Soc.* **2002**, *146*, 348–362.

14. Lee, P.Y. The Musaeum of Alexandria and the Formation of the Muséum in Eighteenth-Century France. *Art Bull.* **1997**, *79*, 385–412. [CrossRef]
15. Hein, H.S. *The Museum in Transition: A Philosophical Perspective*; Smithsonian Institution Press: Washington, DC, USA, 2000; ISBN 978-1-56098-371-2.
16. Bennett, T. *The Birth of the Museum: History, Theory, Politics*; Culture: Policies and Politics; Routledge: London, UK; New York, NY, USA, 1995; ISBN 978-0-415-05387-7.
17. Prottas, N. Where Does the History of Museum Education Begin? *J. Mus. Educ.* **2019**, *44*, 337–341. [CrossRef]
18. Paul, C. *The First Modern Museums of Art: The Birth of Art Institutions in 18th- and Early-19th-Century Europe*; Getty Publications: Los Angeles, CA, USA, 2012.
19. Anderson, D.; Lucas, K.B.; Ginns, I.S. Theoretical Perspectives on Learning in an Informal Setting. *J. Res. Sci. Teach.* **2003**, *40*, 177–199. [CrossRef]
20. Gorman, A.K. Museum Education Assessment: Survey of Practitioners in Florida Art Museums. Ph.D Thesis, Florida State Univeristy, Department of Art Education, Tallahassee, FL, USA, 2008.
21. Baldino, S.D. Museums and Autism. Creating an Inclusive Community for Learning. In *Museums, Equality and Social Justice*; Sandell, R., Nightingale, E., Eds.; Museum Meanings; Routledge Taylor & Francis Group: London, UK; New York, NY, USA, 2012; pp. 169–180.
22. Black, G. *Transforming Museums in the Twenty-First Century*; Routledge: Abingdon, UK; New York, NY, USA, 2012; ISBN 978-0-415-61572-3.
23. Falk, J.H.; Dierking, L.D. *The Museum Experience*; Whalesback Books: Washington, DC, USA, 2002; ISBN 978-1-315-41789-9.
24. Hein, G.E. *Learning in the Museum*; Routledge: London, UK, 1998; ISBN 978-1-134-86048-7.
25. Hooper-Greenhill, E. *The Educational Role of the Museum*; Routledge: London, UK; New York, NY, USA, 1994.
26. Falk, J.H. Museums as Institutions for Personal Learning. *Daedalus* **1999**, *128*, 259–275.
27. Brown, K.; Mairesse, F. The Definition of the Museum through Its Social Role. *Curator* **2018**, *61*, 525–539. [CrossRef]
28. Hudson, K. *Museums for the 1980s: A Survey of World Trends*; Unesco Pr: Paris, France, 1977; ISBN 978-92-3-101435-2.
29. Hooper-Greenhill, E. *Museums and the Interpretation of Visual Culture*, 1st ed.; Routledge: London, UK, 2000; ISBN 978-1-00-312445-0.
30. Piaget, J. *Play, Dreams, and Imitation in Childhood*; Norton: New York, NY, USA, 1962; ISBN 978-1-136-31803-0.
31. Vygotsky, L.S. *Mind in Society: Development of Higher Psychological Processes*; Cole, M., Jolm-Steiner, V., Scribner, S., Souberman, E., Eds.; Harvard University Press: Cambridge, MA, USA, 1980; ISBN 978-0-674-07668-6.
32. Falk, J.H.; Dierking, L.D. *The Museum Experience Revisited*; Routledge: London, UK, 2016; ISBN 978-1-315-41784-4.
33. Ebitz, D. Sufficient Foundatiom: Theory in the Practice of Art Musuem. *Vis. Arts Res.* **2008**, *34*, 14–24. [CrossRef]
34. The Thomas, B. *Fordham Institute. Advancing Educational Excellence Theory without Experience Is Intellectual Play*; The Thomas B. Fordham Institute: Washington, DC, USA, 2015.
35. Greer, D. Discipline-Based Art Education:Approaching Art as a Subject of Study. *Stud. Art Education. A J. Issues Res.* **1984**, *25*, 212–218. [CrossRef]
36. Yenawine, P. *Theory into Practice: The Visual Thinking Strategies*; Visual Thinking Strategies: Lisbon, Portugal, 1999; pp. 2–11.
37. Dewey, J. *Experience and Education (Original Work Published 1938)*; Simon and Schuster: New York, NY, USA, 1997.
38. Piaget, J.; Inhelder, B. *The Psychology of the Child*; Basic Books: New York, NY, USA, 2000; ISBN 978-0-465-06735-0.
39. Yasnitsky, A. *Questioning Vygotsky's Legacy: Scientific Psychology or Heroic Cult*, 1st ed.; Routledge: New York, NY, USA, 2019; ISBN 978-1-351-06063-9.
40. Hein, G.E. The Constructivist Museum. *J. Educ. Mus.* **1995**, *16*, 21–23.
41. Welch, G.W.; Hawley, L.R.; McCormick, C. *Bridging the Gap: Expanding Access to the Visual Arts through Distance Technology*; Crystal Bridges Museum of American Art: Bentonville, AR, USA, 2013.
42. Kraybill, A. Going the Distance: Online Learning and the Museum. *J. Mus. Educ.* **2015**, *40*, 97–101. [CrossRef]
43. Ennes, M.; Lee, I. Distance Learning in Museums: A Review of the Literature. *Int. Rev. Res. Open Distrib. Learn.* **2021**, *22*, 162–187. [CrossRef]
44. Moore, J.L.; Dickson-Deane, C.; Galyen, K. E-Learning, Online Learning, and Distance Learning Environments: Are They the Same? *Internet High. Educ.* **2011**, *14*, 129–135. [CrossRef]
45. Carliner, S. *An Overview of Online Learning*, 2nd ed.; HRD Press: Amherst, MA, USA, 2004; ISBN 978-0-87425-740-3.
46. Gaylord-Opalewski, K.; O'Leary, L. Defining Interactive Virtual Learning in Museum Education: A Shared Perspective. *J. Mus. Educ.* **2019**, *44*, 229–241. [CrossRef]
47. Steiner, R.V.; Applewhite, A.; Aquino, A.E.; Gugenheim, L.J.; Janelli, M. Online Teacher Professional Development from the American Museum of Natural History. In *Teacher Learning in the Digital Age: Online Professional Development in STEM Education*; Dede, C., Eisenkraft, A., Frumin, K., Hartley, A., Eds.; Harvard Education Press: Cambridge, MA, USA, 2016; ISBN 978-1-61250-897-9.
48. Carlsson, R. Livestreaming and Museums: Making Museums Truly Accessible. Available online: https://www.museumnext.com/article/livestreaming-and-museums-making-museums-truly-accessible/ (accessed on 13 March 2024).
49. Gallagher, S.; Moss, R.; College, T. Harnessing Massive Online Open Courses for Innovations in Museum Education and Beyond. In *Proceedings of the 28th ICDE World Conference on Online Learning, Dublin, Ireland, 3–7 November 2019*; Dublin City University: Dublin, Ireland, 2020; Volume 1, pp. 282–292.
50. Mazzola, L. MOOCs and Museums: Not Such Strange Bedfellows. *J. Mus. Educ.* **2015**, *40*, 159–170. [CrossRef]

51. E-Learning Platform for Museum Industry. 2023. How Museums Can Use E-Learning to Improve Their Visitor Experience? Available online: https://www.thelearning-lab.com/blog-elearning-platform/elearning-platform-museum (accessed on 13 March 2024).
52. Smith, J. LMS for Museums and Cultural Institutions Industry. Available online: https://learnexus.com/blog/lms-for-museums-and-cultural-institutions-industry/ (accessed on 18 March 2024).
53. Ennes, M. Museum-Based Distance Learning Programs: Current Practices and Future Research Opportunities. *Int. Rev. Res. Open Distrib. Learn.* **2021**, *22*, 242–260. [CrossRef]
54. Mitchell, A.; Moehring, T.; Zanetis, J. *Museums and Interactive Virtual Learning*; Routledge: Abingdon, UK, 2022; ISBN 978-1-00-322481-5.
55. McCall, V.; Gray, C. Museums and the 'New Museology': Theory, Practice and Organisational Change. *Mus. Manag. Curatorship* **2014**, *29*, 19–35. [CrossRef]
56. United Nations Educational, Scientific and Cultural Organization-UNESCO. Startling Digital Divides in Distance Learning Emerge. Available online: https://www.unesco.org/en/articles/startling-digital-divides-distance-learning-emerge#:~:text=Half%20of%20the%20total%20number,continuity%20in%20the%20vast%20majority (accessed on 1 May 2024).
57. Sanger, E.; Silverman, S.; Kraybill, A. Developing a Model for Technology-Based Museum School Partnerships. *J. Mus. Educ.* **2015**, *40*, 147–158. [CrossRef]
58. The British Museum. Virtual Visit Myth-Busting Ancient Egypt. Available online: https://www.britishmuseum.org/learn/schools/ages-7-11/ancient-egypt/virtual-visit-myth-busting-ancient-egypt (accessed on 13 March 2024).
59. Ashmolean Museum Oxford. Ancient Egypt Online. Available online: https://www.ashmolean.org/article/ancient-egypt-online (accessed on 13 March 2024).
60. Leicester Museums and Galleries Online Egyptian Session: Looking at Artefacts. Available online: https://www.leicestermuseums.org/learning-engagement/learn-with-leicester-museums/curriculum-enrichment-activities/online-egyptian-session-looking-at-artefacts/ (accessed on 18 June 2024).
61. National Museums Liverpool. Ancient Egypt Virtual Tour. Available online: https://www.liverpoolmuseums.org.uk/virtual-tours/ancient-egypt-virtual-tour (accessed on 13 March 2024).
62. The British Museum. Virtual Visits. Available online: https://www.britishmuseum.org/learn/schools/samsung-digital-discovery-centre/virtual-visits (accessed on 13 March 2024).
63. Virginia Museum of Fine Arts. Distance Learning. Available online: https://vmfa.museum/learn/distance-learning/ (accessed on 13 March 2024).
64. Virginia Museum of Fine Arts. Galley Preview: Ancient: Egyptian. Available online: https://vmfa.museum/learn/resources/egyptian-art-gallery-preview/ (accessed on 13 March 2024).
65. DiSanto, J. Wonders of the Ancient Egypt, New Free Online Course. Available online: https://www.penn.museum/about/press-room/press-releases/wonders-of-the-ancient-egypt-new-free-online-course (accessed on 13 March 2024).
66. Penn Museum. Professional Development. Available online: https://www.penn.museum/learn/k12 (accessed on 13 March 2024).
67. Hawass, Z. New Era for Museums in Egypt. *Mus. International. Herit. Landsc. Egypt* **2005**, *57*, 7–23. [CrossRef]
68. Zakaria, N.N. Assessing the Working Practices and the Inclusive Programs to Students with Disabilities in the Egyptian Museums: Challenges and Possibilities for Facilitating Learning and Promoting Inclusion. *Front. Educ.* **2023**, *8*, 1111695. [CrossRef]
69. Zakaria, N.N. Museums for Equality: Combating Prejudice, Promoting Human Rights and Practices of Social Inclusion in Egypt's Museums. In *The Accessibility Spectrum: Moving from Access to Inclusion within Museums*; Eardley, A.F., Jones, V.E., Eds.; Routledge, Taylor & Francis Group: London, UK; New York, NY, USA, 2024; in press.
70. Doyon, W. The Poetics of Egyptian Museum Practice. *Br. Mus. Stud. Anc. Egypt Sudan* **2008**, *10*, 1–37.
71. Zakaria, N.N. Policies and Practices of Museum Education and Social Inclusion—The Case of Egyptian Museums. In *Routledge Handbook of Museum and Heritage Education*; Routledge, Taylor & Francis Group: London, UK; New York, NY, USA, 2024; in press.
72. Abdel Moniem, A. The National Museum of Egyptian Civilization. *Mus. Int. Herit. Landsc. Egypt* **2005**, *57*, 24–30.
73. Paolini, A. Successes and Outcomes of the Nubia Campaign. *Mus. Int.* **2005**, *57*, 55–60. [CrossRef]
74. El-Saddik, W. *Children Museums for Egypt. A Study for Establishing Children's Museums in Egypt and Specific Departments for Museum Education*; Dar El-Shrouk-Cairo: Cairo, Egypt, 1993. (In Arabic)
75. The Egyptian Museum. 2024. Children's Museum, History and Collection. Available online: https://egyptianmuseumcairo.eg/childrens-museum/ (accessed on 22 April 2024).
76. Al-Ahram Portal Antiquities' Ministry Launches the "My Museum in Your Classroom" Project in Cooperation with Microsoft. Available online: https://gate.ahram.org.eg/News/1645839.aspx (accessed on 22 March 2024).
77. Hashem, R. Multiple Virtual Tours in Egyptian Museums within the Initiative of "My Museum in Your Class". Available online: https://www.elwatannews.com/news/details/5443567#goog_rewarded (accessed on 22 March 2024).
78. Ministry of Tourism and Antiquities. Discover Egypt's Monuments. Available online: https://egymonuments.gov.eg/en (accessed on 23 March 2024).
79. Ministry of Tourism and Antiquities. Children's World. Available online: https://egymonuments.gov.eg/en/child-world/child-media-hub (accessed on 22 March 2024).

80. Egyptian Ministry of Education Teaching Pharaonic History for Children. Available online: https://www.facebook.com/watch/?mibextid=xfxF2i&v=360582591574091&rdid=DEwsu584CK7Y8BmP (accessed on 20 February 2024).
81. Mansour, Y. The Grand Museum of Egypt Project: Architecture and Museography. *Mus. Int. Herit. Landsc. Egypt* **2005**, *57*, 36–41. [CrossRef]
82. Hassan Allam Holding Grand Egyptian Museum. Available online: https://www.hassanallam.com/projects/grand-egyptian-museum (accessed on 28 March 2024).
83. El-Saddik, W. The Egyptian Museum. Museum International. *Herit. Landsc. Egypt* **2005**, *57*, 31–35.
84. Bonifica, S.P.A. *Feasibility Study of Cairo and Giza New Museum System*; Italian Ministry of Foreign Affairs D.G.C.S: Cairo, Egypt; Rome, Italy, 1999.
85. Mansour, Y.; Shafik, Z.; Attia, A.; Abdel Moniem, W. *The Grand Egyptian Museum: International Architecture Competition*; Ministry of Culture: Cairo, Egypt, 2003.
86. Bassir, H. The Grand Egyptian Museum: A Home for Interconnections. *J. Anc. Egypt. Interconnect.* **2013**, *5*, 6–8. [CrossRef]
87. Operation and Management Consultancy (OMC). *Grand Egyptian Museum Phase III. GEM Permanent Exhibition Design and Build*; Ministry of State for Antiquity/Supreme Council of Antiquities, Hill International: Cairo, Egypt.
88. Grand Egyptian Museum. Tutankhamun—The Immersive Exhibition: A Mesmerizing Journey through Ancient Egypt. Available online: https://visit-gem.com/en/tut (accessed on 3 March 2024).
89. Statista Total Population of Egypt as of 2023, by Age Group. Available online: https://www.statista.com/statistics/1230371/total-population-of-egypt-by-age-group/ (accessed on 20 March 2024).
90. Acciona Grand Egyptian Musuem. Available online: https://www.acciona.com/projects/grand-egyptian-museum/?_adin=02021864894 (accessed on 28 February 2023).
91. Kanari, C.; Souliotou, A.Z. Education of Children with Disabilities in Nonformal Learning Environments: A Cross-Disciplinary Approach of Steam Education in a Technological Museum in Greece. *EJAE* **2020**, *5*, 1–34. [CrossRef]
92. Grand Egyptian Museum. GEM Children's Museum Tour. Available online: https://visit-gem.com/en/children (accessed on 30 March 2024).
93. Grand Egyptian Museum. The Official Page of the Grand Egyptian Museum. Available online: https://www.facebook.com/GrandEgyptianMuseum (accessed on 5 December 2023).
94. Creswell, J.W.; Guetterman, T.C. *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*, 6th ed.; Pearson: New York, NY, USA, 2019; ISBN 978-0-13-451939-5.
95. Cohen, L.; Manion, L.; Morrison, K. *Research Methods in Education*, 6th ed.; Routledge: London, UK; New York, NY, USA, 2007; ISBN 978-0-415-37410-1.
96. Kvale, S. *InterViews: An Introduction to Qualitative Research Interviewing*; Sage Publications: London, UK, 1996.
97. Zakaria, N.N. *House Style for the Ministry of Tourism and Antiquities. Establishing a Chronology for Egypt's Historical Periods*, 1st ed.; Ministry of Tourism and Antiquities Press: Cairo, Egypt, 2021; ISBN 978-977-6420-49-6.
98. UNESCO Egypt Technology. Available online: https://education-profiles.org/northern-africa-and-western-asia/egypt/~technology (accessed on 22 March 2024).
99. Lewis, H. EdTech in Egypt: Preparing Students for Success in the Global Economy. Available online: https://et-mag.com/edtech-in-egypt-preparing-students-for-success-in-the-global-economy/ (accessed on 22 March 2024).
100. Central Agency for Organization and Administration. A Decision Is Issued to Create an Organizational Division for Information Systems and Digital Transformation. Available online: https://www.caoa.gov.eg/WebForms/Default.aspx (accessed on 15 April 2024). (In Arabic)
101. Ministry of Communications and Information Technology Egypt ICT 2030 Strategy-Digital Egypt. Available online: https://mcit.gov.eg/en/ICT_Strategy (accessed on 20 March 2024).

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.