Application of Interactive Technology in Library Design in Surabaya

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Abstract

The relatively rapid development in West Surabaya is not yet fully balanced by the availability of adequate and easily accessible educational facilities. Libraries, as centers of literacy and knowledge dissemination, are currently required to transform and keep pace with technological and societal developments, as well as the needs of modern society. This discussion aims to explore a library design that utilizes an interactive technology approach by combining educational, recreational, and interactive functions, making it a more engaging, participatory, and relevant learning space for the current generation. The method used is descriptive qualitative thru the analysis of primary and secondary data, as well as visual documentation. The design results show the application of interactive technology on the facade and library facilities with a contemporary architecture theme, such as the use of Transparent Light Emitting Diode Screens and glass walls that support natural lighting as well as informative functions. In addition, facilities such as the Light Sensory Room, Virtual Reality, Hologram Light Emitting Diode Board, Wall Touch Screen, and Humanoid Robotics are designed to create an immersive, innovative, and collaborative learning experience. Thus, this library not only serves as a repository of information but also as a modern educational tool that is interactive and aligned with current technological developments.

Keywords: *Educational; Interactive Technology; Library*

1. Introduction

West Surabaya is known as one of the areas with quite rapid development, but it is felt to be incomplete due to the lack of easily accessible educational facilities in the area. An important role in creating good education is, among other things, the equitable distribution of adequate educational facilities in every region. This distribution aims to achieve good and targeted education, supported by a millennial generation that is tech-savvy, making it a good opportunity to create good educational facilities. [1]

Libraries are one of the places or means of education, literacy, and the dissemination of knowledge for the community. Generally, a library is a space or building that houses a collection of books, articles, journals, and various other reading materials used for reading, borrowing, or accessing information. However, with the development of information and communication technology and the changing times, the needs of society or users for library services have also changed. Libraries are beginning to transform into multifunctional spaces and places that can be used for discussion, completing assignments, conducting research, and even as community activity centers. This transformation is supported by technological advancements that can make it easier for users to find information and experiences, as well as interactive facilities that can be used for a more enjoyable learning experience.

Interactive technology is becoming one way to design and manage libraries so that they can provide more interesting and enjoyable knowledge or information thru the application of devices such as Virtual Reality, 3D Light Sensory, Humanoid Robotics, and Touch Screen Boards, making users more immersed and participatory in using the technology. This technology can be used to visualize a more realistic learning environment, present material visually and interactively, and provide quick access to evolving information. Thus, libraries are not only places to store information, but also places or means for users to interact with their surroundings and developing technologies.

1.1. Library

A library is one of the units within an institution whose mission is to support learning, research, publishing, and recreational activities by providing various types of information that meet the needs of its users, [2] meaning that a library is an important unit within an institution that has the task of supporting the processes of learning, research, publishing, and recreation. This role is realized thru the provision of various information sources, including both print information such as books and digital information that meets the needs of its users. However, libraries don't just serve as places to read and borrow books; they also function as centers for scientific guidance, a means of supporting the writing and publication of works, and an educational recreational space accessible to the entire community.

1.2. Interactive Technology

The word "interactive" generally means two-way or multi-way communication between the components of communication. Simply put, "interactive" is active communication between the communicator and the recipient. No one is passive. Interactive media generally refers to multimedia products and digital services on Information Technology systems that respond to user actions by presenting audio, visual, or audiovisual content [3]. In other words, interactive technology is the use of digital technology with the aim of making it easier for users to interact and find information anywhere, as well as providing a more enjoyable learning experience. This technology opens up opportunities for people to interact both directly and indirectly with learning materials, making the learning process more engaging and dynamic. Thru interactive features such as quizzes, simulations, and learning videos, the public can engage more actively, which in turn can improve their understanding and skills [4]. Some examples of interactive technology are the application of devices such as Virtual Reality, 3D Light Sensory, Humanoid Robotics, and Touch Screen Boards to make users more immersive and participatory in their use of technology.

Virtual Reality technology consists of two types: Head-Mounted Display and Mobile Virtual Reality. A Virtual Reality head-mounted display is a Virtual Reality tool connected to a Personal Computer, such as Oculus Rift, Samsung Gear Virtual Reality, and others. Mobile Virtual Reality, on the other hand, is a simple headset like Google Cardboard that can be used on Android devices, iPhone Operating Systems, and tablets without needing to be connected to a Personal Computer [5]. Virtual Reality will be very effective if virtual elements are added in real-time. Therefore, augmented reality generally adds 2D or 3D objects to a digital video in real-time. Virtual objects added to a scene are known as Augmented Reality Visuals. By definition, Augmented Reality elements are not visible to the naked eye, so Augmented Reality Visuals rely on some kind of screen, such as a canvas in HyperText Markup Language version 5 (Cawood & Mark, 2008). [6]



Figure 1. Light Sensory Room
Source: Pinterest



Figure 2. Light Sensory Room
Source: Pinterest



Figure 3. Wall Touch Screen
Source: Pinterest



Figure 4. Humanoid Robotic
Source: Pinterest

2. Method

The type of method used is a qualitative descriptive method. This method has an approach that aims to describe or depict an object, phenomenon, or event in depth based on the facts available in the field. Descriptive qualitative research is conducted to explain existing research without manipulating the data of the variables being studied, by conducting direct interviews (Bahri, 2017: 73) [7]. In the implementation process, this research utilizes photographic media as supporting visual documentation, as well as both primary and secondary data, which serve as analysis material to strengthen the findings.

3. Results and Discussion

The facade design of this interactive technology library adopts a contemporary architectural theme. Contemporary architecture was chosen because it is closely linked to the utilization of technology, both in terms of materials, construction systems, and esthetic elements. In this library's facade, the application of interactive technology can be seen in the use of innovative materials and technologies, such as Transparent Light Emitting Diode Screens and the use of glass walls.

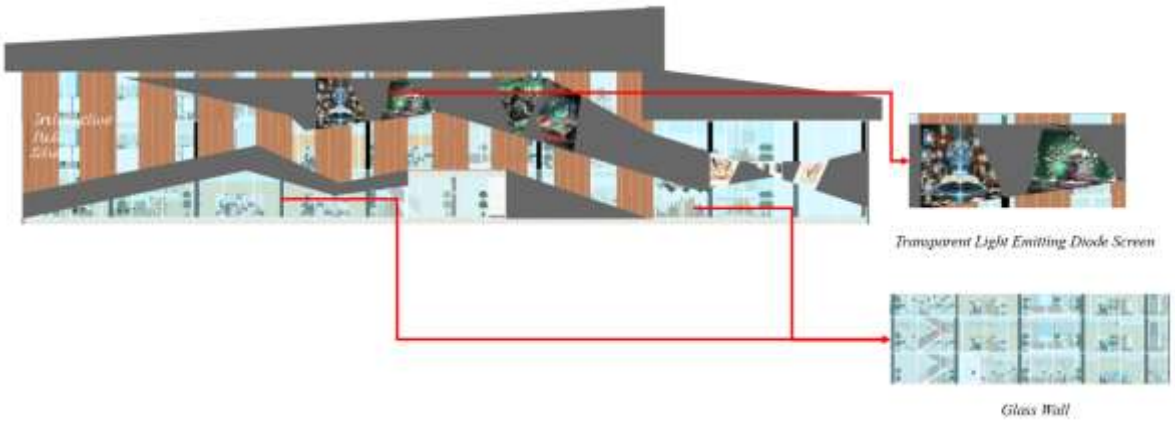

Figure 5. Transparent Light Emitting Diode Screen and Glass Wall
Source: Personal Data

A Transparent Light Emitting Diode Screen that serves as a medium for providing visual information to the public, whether information about the library or other information, by installing Light Emitting Diode Micro lamp beads on a transparent substrate. A Transparent Light Emitting Diode Screen is a type of digital display that is thin and transparent, allowing natural light to still enter the building space. This technology is designed to be installed directly on the interior of building facades that use glasswall material, by placing a Transparent Light Emitting Diode screen on the back surface of the glass using special brackets so that the exterior architectural appearance remains attractive.

The material glass wall is also used on the facade of this library as a substitute for brick walls, and it also supports the Transparent Light Emitting Diode Screen material and serves as an interactive material. The function of the glass wall on the library facade is as follows: a) Natural lighting, making the space inside the library naturally brighter. This can reduce the use of artificial lighting during the day and support the concept of environmentally friendly architecture. b) Visual Connectivity, Glass walls provide transparency so that activities both inside and outside the library can be seen, creating an open, inclusive impression and inviting visitors to enter. c) Visual Interactivity with the Environment, the glass wall on the facade is not only a physical boundary between the indoor and outdoor environments but also an interactive medium that displays lighting, reflections, and can be combined with digital elements such as a Transparent Light Emitting Diode Screen to display dynamic information or visuals.

In addition to the application of interactive technology on the library facade, the facilities available in this library also incorporate interactive technology designed to enrich the learning experience and enhance user engagement. These facilities include: a) A Light Sensory Room that provides stimulating lighting effects for the visual senses. b) Virtual Reality that allows users to explore learning content in three-dimensional simulations. c) A Light Emitting Diode board hologram for dynamic and interactive material presentation. d) A wall touch screen that serves as an information search and digital navigation medium. e) Humanoid robots that act as guides or information assistants. All these facilities are designed to create an innovative, collaborative learning environment that is in line with current technological developments.

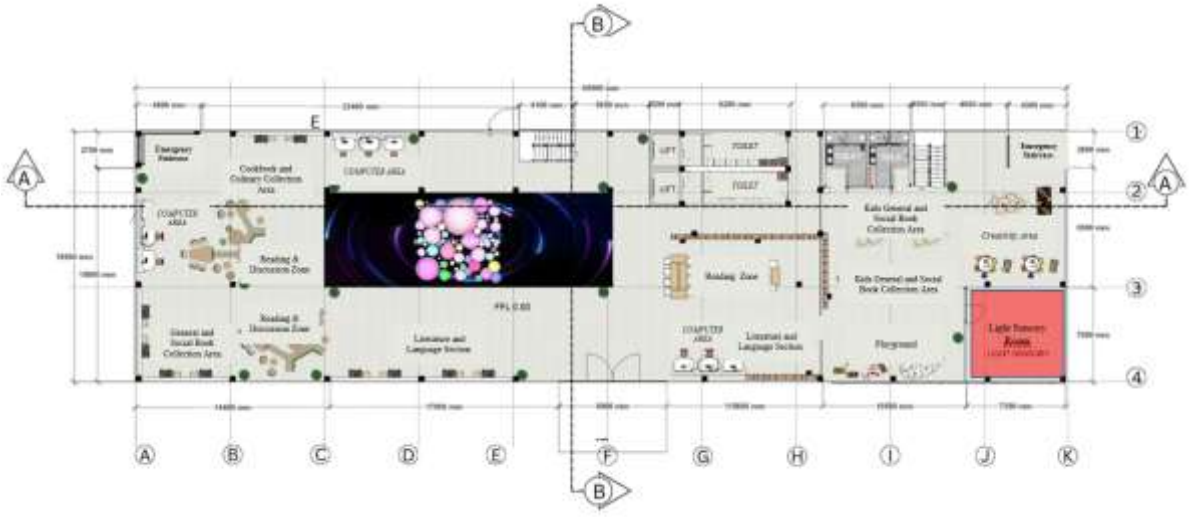

Figure 6. Light Sensory Room
Source: Personal Data

The first facility is the light sensory room located on the 1st floor of the children's library. This room utilizes interactive technology. The interactive technology in this room can be seen in the use of dynamic lighting technology that combines colors, intensity, and light patterns that can change according to the desired content or atmosphere, or thru touch interaction from the user. This space aims to create a visual experience to support the learning process, enhance concentration, or create a pleasant atmosphere. In education, light sensory can also be used to simulate specific themes, such as natural phenomena or the atmosphere of outer space.

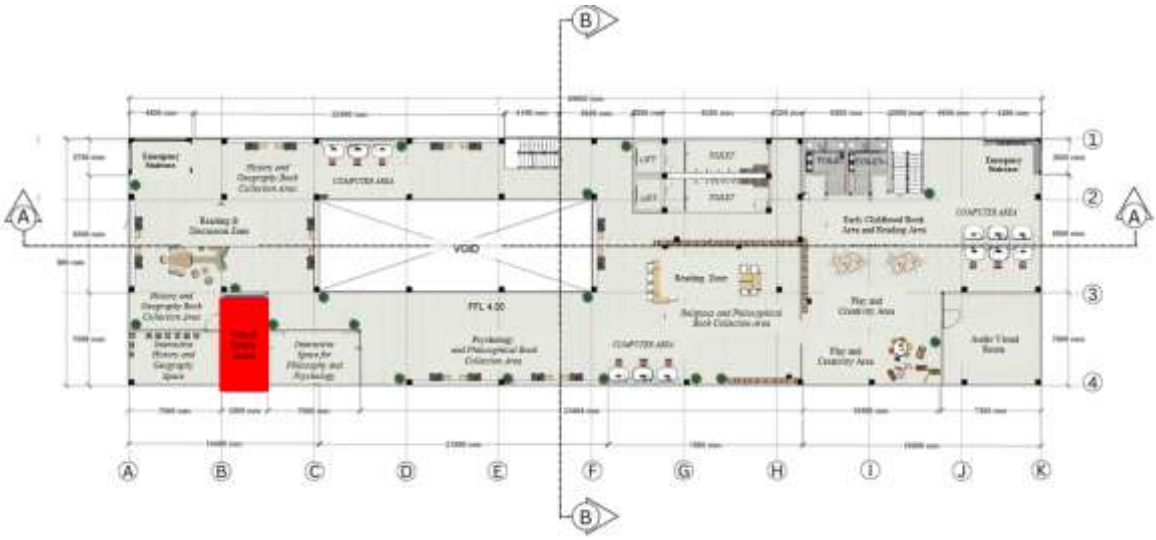

Figure 7. Virtual Reality Room
Source: Personal Data

The second facility in this library is Virtual Reality, located in the young adult library on the 2nd and 3rd floors. This room utilizes interactive technology and is provided so that users can enter a realistic three-dimensional simulation world. This technology supports interactive learning, such as taking virtual tours or observing directly at museums, exploring historical sites, simulating science experiments, or visualizing data in 3D form. The use of Virtual Reality in libraries can provide experiences that are difficult or impossible to present directly in the real world. The development of

Virtual Reality has resulted in a variety of technologies that can support the effectiveness of the teaching and learning process in educational institutions.

This Virtual Reality facility uses the Mobile Virtual Reality model, which means it can be used with simple headsets like Google Cardboard that can run on Android devices, iPhone Operating Systems, and tablets without having to be connected to a Personal Computer, making it more practical and easier to use.



Figure 8. Hologram Light Emitting Diode Board
Source: Personal Data

The third facility is a Hologram Light Emitting Diode Board, which also utilizes interactive technology. The Hologram Light Emitting Diode Board displays three-dimensional objects without the need for special glasses, allowing visitors to see the shape and details of the objects directly with a more realistic impression. This facility is placed in the center of the library as the main focal point, so that every visitor can easily find and utilize it. Placement in the central area also allows for more open interaction, where visitors can seek information thru experiencing, playing, and interacting with holograms that respond to movement or touch. The holographic content presented includes architectural models, anatomy, interactive data, or creative visualizations designed to facilitate understanding of specific concepts. Additionally, this facility is also used for exhibitions, public presentations, and educational programs held in the library, making it not only an element of technological entertainment but also supporting innovative and engaging learning processes.

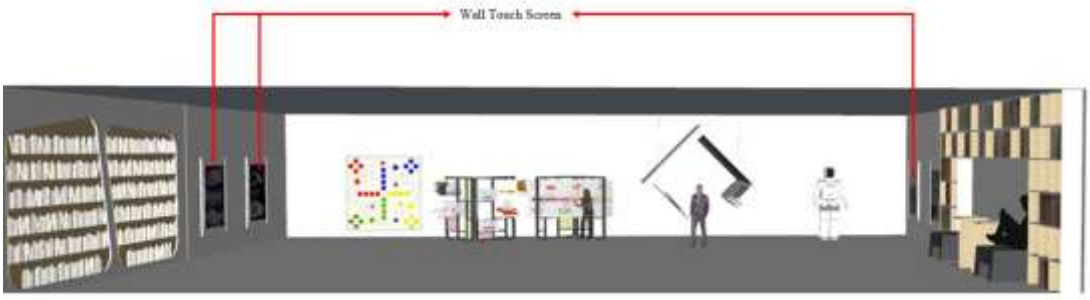

Figure 9. Wall Touch Screen
Source: Personal Data

The fourth facility that utilizes technology in this library is the Wall Touch Screen installed on the library wall. This Wall Touch Screen serves as an interactive information center. Users can search for information related to the library or other things, read book summaries, play games, or interact with digital educational content. Additionally, the wall touch screen can be used to collaboratively display event agendas, the latest news, or learning materials. A touchscreen is a device that replaces the function of a keyboard and mouse as an interface between the user and electronic devices, where communication occurs between the user and the electronic device. [7]



Figure10. Humanoid Robotic
Source: Personal Data

The final facility in this library that utilizes interactive technology is a Humanoid Robot, which is a robot shaped to resemble a human. This robot serves as an information guide and service assistant for visitors. It is equipped with voice recognition and natural language technology, allowing it to answer visitors' questions, provide location directions, and assist with navigating the library's facilities. Its presence is not only functional but can also make it easier for visitors and library services.

4. Conclussion

Designing a library with the implementation of interactive technology in Surabaya is proof that the transformation of the library's function is not limited to being a place for storing information, but also serves as a modern educational tool that is more participatory, recreational, and relevant to community needs as time goes on. The application of contemporary architecture thru the use of materials such as transparent Light Emitting Diode screens and glass walls supports visual connectivity, natural lighting, and informative functions. Additionally, the available facilities utilize interactive technologies such as a Light Sensory Room, Virtual Reality, a Hologram Light Emitting Diode Board, a Wall Touch Screen, and Humanoid Robotics, which are capable of creating an immersive, collaborative, and innovative learning experience and atmosphere. Therefore, this library design can serve as a model for developing educational facilities that can keep pace with technological advancements, while also supporting the creation of inclusive and highly attractive public literacy spaces for the community.

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