Kinetic Environmental Graphic Design and Its Impact on the Interactive Interior Space of University Educational Environments

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Abstract
The interior design of spaces requires the presence of many standards and design and functional requirements without compromising aesthetic values. Environmental graphic design is an important aspect in the design of interior spaces, as it depends on the interaction of the brand with the design of the interior space and the identity of the place. When environmental graphic design is associated with the interior spaces and the element of movement, it is converted into an interactive environment, leading to the creation of dynamic spaces capable of performing sustainable interactive human functions. Since the design of internal spaces for educational environments requires an interactive environment between students and their spaces, the kinetic environmental graphic design was the link between educational spaces and individuals, it plays an important role in directing within educational spaces along with other architectural elements. The research problem appears due to the lack of clarity of the design and functional requirements and standards for educational internal spaces, as well as the weakness of guidance, counseling, and interaction systems within the spaces. The study followed the descriptive analytical approach in analyzing the impact of kinetic environmental graphic design on the interactive internal space of the university educational environment as a model, and the result of the research was to develop principles for designing the internal space derived from the university educational environment, which achieved the aesthetic, functional and interactive dimension.

Keywords: Kinetic Environmental Graphic Design, Interactive Design, Interactive Interior Space, University Educational Space

1. Introduction

In the ever-evolving landscape of education, the design and ambiance of university environments play a pivotal role in shaping the learning experience. Beyond traditional pedagogical methods, today's educational institutions are increasingly focused on creating immersive and engaging spaces that foster creativity, collaboration, and knowledge acquisition. This shift has spurred innovations in the field of environmental design, and one such innovation is Kinetic Environmental Graphic Design (KEGD). This introduction sets the stage for a comprehensive exploration of how KEGD influences the interactive interior spaces of university educational environments.

Kinetic Environmental Graphic Design, a relatively novel concept in the realm of environmental design, introduces motion, interactivity, and technology as integral components of the design language. It has already found applications in various sectors, from corporate settings to public spaces, and is now increasingly permeating university campuses. Its potential to transform static spaces into dynamic and interactive environments presents an exciting opportunity to enhance the educational experience.

This research aims to explore the concept of KEGD and its integration within the university educational environment. The primary objectives are as follows:

1. To examine the principles and elements of kinetic environmental graphic design.
2. To offer practical insights and recommendations for designing interactive interior spaces in higher education institutions.

In sum, this research endeavors to shed light on the potential of kinetic environmental graphic design to transform the static interiors of universities into dynamic, interactive spaces that can significantly enhance the educational experience. As the educational landscape continues to evolve, it is imperative to explore innovative approaches that foster creativity, engagement, and effective learning, and KEGD emerges as a promising avenue in this pursuit.

2. Material and Methods

The study deals with two basic aspects: first, kinetic environmental graphic design, and second, interactive interior design for the educational environment. The foundations that have been addressed are divided into several elements, namely:

2.1. Environmental Graphic Design (EGD)

Information conveyed graphically in the built environment It is a cross-disciplinary specialization area that incorporates elements of the fields of industrial, interior, and graphic design. The convergence of graphic design, architecture, industrial design, interior design, landscape architecture, city planning, and urban design makes it the pinnacle of multidisciplinary design. The design process, often known as design thinking, is a feature shared by all of these design disciplines, including EGD.

2.2. Applications of Environmental Graphic Design (EGD) in Educational Spaces

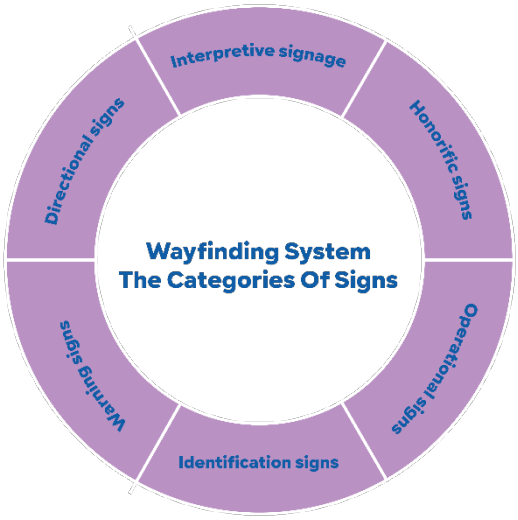

Figure 1: wayfinding System the Categories of Signs

2.2.1. Wayfinding System

The idea or structure that directs the creation of a signage program. A strategy could help define the categories into which signs are divided in addition to the lines of a public transportation system, the wings of a building, the neighbourhoods of a city, or the precincts of an academic institution.

- **Identification signs:** Identification signs are the cornerstones of wayfinding and frequently provide travellers their first impression of a location. These signs serve as visual cues that identify a location or space, whether it be a room, a specific building, or a campus entrance, by displaying its name and purpose. They mark the entrances and exits to both primary and secondary destinations and are visible at the beginning and conclusion of routes. Although identifying markers clearly indicate the change from one type of area to another, they serve more than just utilitarian purposes. They convey a place's individuality, character, and even its historical context when styled properly. These signs can expressly convey a location's identity by displaying a real logo or, more generically, by conjuring an image.

Figure 2: Identification signs

- **Directional signs:** To guide individuals to the numerous destinations within a given area, directional signs are placed far from destinations. Because they assist people in finding their way to destinations, directional signs are also frequently referred to as wayfinding signs. Arrows are generally always shown on directional signs to indicate specific routes to destinations, such as left, right, and straight ahead.

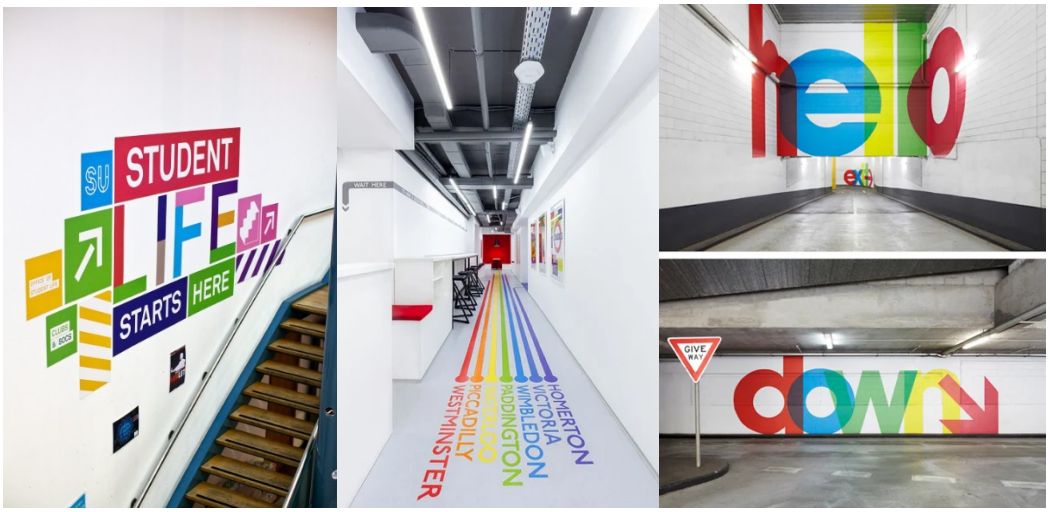

Figure 3: Directional signs

- **Warning signs:** Signs that warn of dangers or safety precautions in the surroundings. In an environment, regulatory and prohibitor signs are used to control how people behave or forbid specific behaviours.

Figure 4: Warning signs

- **Orientation signs:** (also known as operation signs) explain how an area is used and operated, hence they are frequently complex and take some time to read and comprehend. One illustration is directory signs, sometimes known as directories, which indicate tenants' locations within a setting and frequently come with a locator map. Other examples include the All Visitors Must Be Announced signs, which are common in Manhattan apartment buildings, and signs showing days and hours of operation, such as for a retail business.

Figure 5: Orientation signs

- **Honorific signs:** Symbols of honour bestow honour on those connected to an environment. Donor signage, which lists the donors who have provided money to a location or building, is a good example. Another illustration is a cornerstone on a building, which usually lists the date of construction as well as the names of the building's creators, architects, and other notables. Most honorific signage is seen in public and institutional locations.

Figure 6: Honorific signs

- **Interpretive signage**: By offering details about a location's history, geography, people who once lived there, artifacts, and other information, interpretive signage aids in the interpretation of an environment or specific locations within it. Examples are signs that convey information about the animals at a zoo or aquarium and plaques that honour the occasion(s) that occurred at a historical location, such a battlefield. Research—often quite academic.

Figure 7: Interpretive signage

2.2.2. Interactive Experience

Take advantage of modern interactive systems and methods in interactive wall technology that allows the user to distance education:
Where there is a difference between the large traditional screens and the interactive walls, the interactive walls represent a very special case of screens equipped with special sensors and capacity for energy that would recognize the user and interact with him and respond with programmed reactions to them because of his actions, some walls allow people to play at the wall and others interact educational or functional.

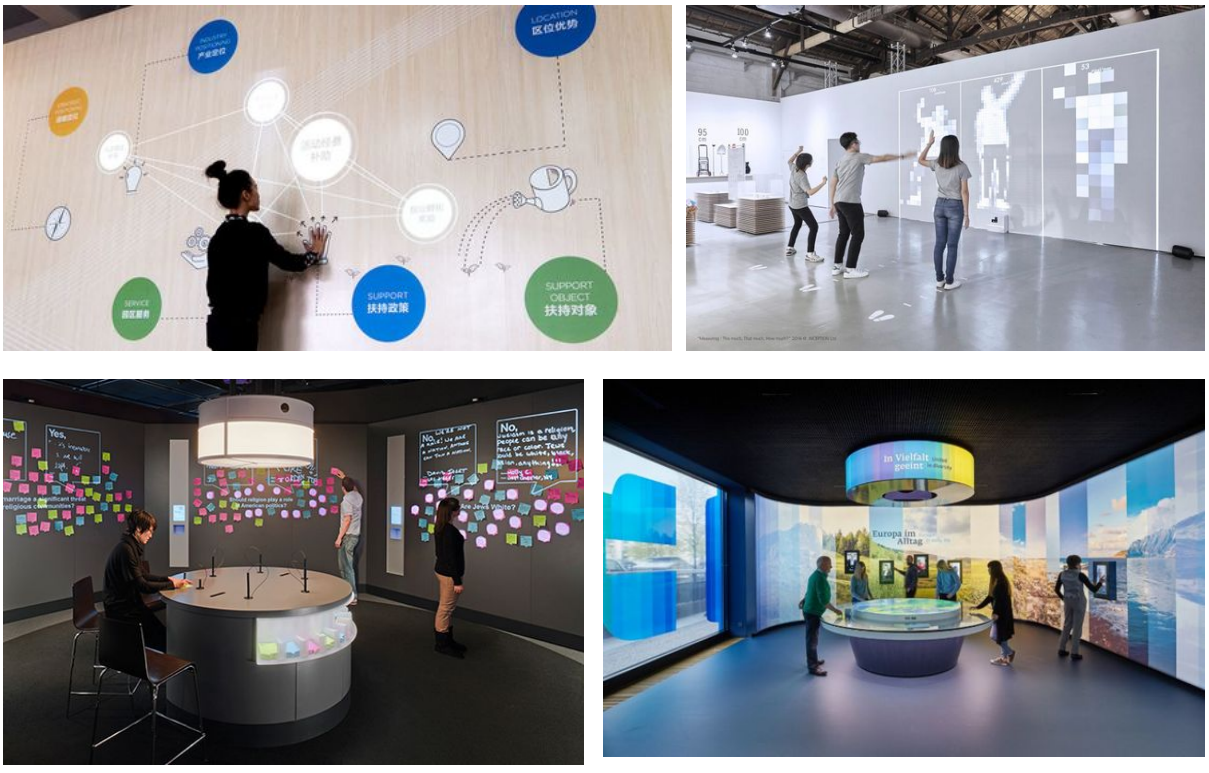

Figure 8: Interactive Experience

2.2.3. Floor Graphics

This technology provides light shows, which provide a fun interactive experience and effective interactive participation, as it is considered one of the technologies.

Modern technological means, as this technology consists of external cameras installed and attached to infrared connected to a computer and connected to a projected display that interacts with the images expected of a person The cameras capture the individual's movement path through position trackers.

Then the illusion of remote presence is created (or telepresence), or its presence is affected through position tracking devices. Position trackers (which contain motion sensors) are based on capturing the user's movements.

He accurately adjusts his vision through the screen and then transfers it to the computer, which in turn adjusts and adjusts the images to make them look like a reaction to the person's movement in real time, that is, when the same thing happens and at the same speed as the real responses.

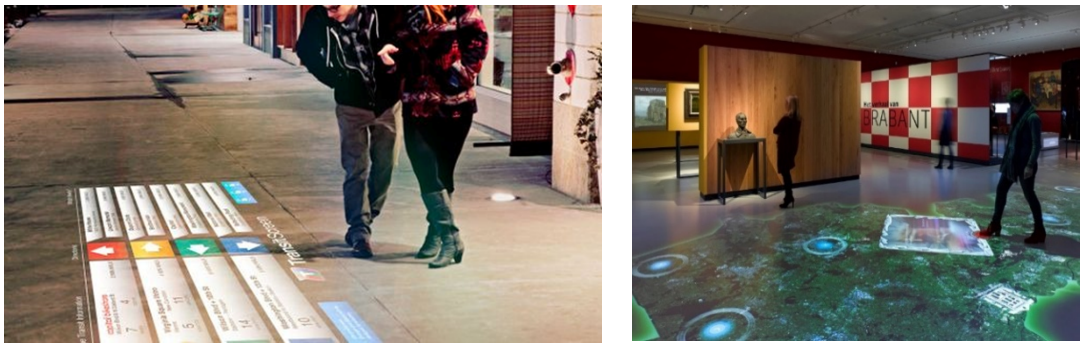

Figure 9: Floor graphics

2.2.4. Window Graphics

Allows the user to control the interfaces Smart via Interactive buildings via mobile applications.

Figure 10: Window graphics

2.3. Kinetic Graphic Design (Motion Graphic)

Motion design is a discipline that combines movement with other media. These other media include animation, film, sound, typographic texts, graphic design, photography, and illustration. Since it is the change that takes place to the medium over time, we can think of motion design as time-based media.

Modern designers and producers refer to a broad range of design and production as motion graphics, which includes many different industries like cinematic video, digital media, animation, visual effects, movie intros, television breaks, commercials, multimedia presentations, more recently architecture, and increasingly digital gaming.

2.4. Immersive Environments

By bringing structure, ambiance, comfort, and understanding to a real-world or virtual setting, immersive environments help people develop a feeling of place. They are a singular synthesis of interior and exterior design, pictures, motion graphics, sound, and architecture that function together to foster social interaction and offer beautiful, meaningful experiences. By fusing tangible and physical spatial experiences with interactive digital technologies, they are also utilized to convey messages, products, or services. Immersive environments are those created today that combine real and imagined realms that allow moving pictures, text, and audio to interact with users. Animation's artistic and expressive features are increasingly seen in hotel lobbies, trade exhibitions, retail locations, and museums, as well as in challenging public venues like amusement parks and airports.

2.5. Motion Graphic in Interior Design

Motion graphics are increasingly being incorporated into interior design as a key element in creating atmosphere and mood. They can be utilized, for instance, in corporate lobbies or waiting areas to maintain the design integrity of the space while reinforcing a brand, changing content to promote different messages, and defining an atmosphere that may not be possible with other mediums. Motion graphics in retail and event spaces can give the area a special depth, provide drama and suspense in entranceways, draw passing people by displaying the content in storefront windows, and complement a brand or product theme. Motion graphics have also been employed by casinos, eateries, and hotels to produce captivating immersive experiences for customers, offer conversation starters to encourage guest involvement, and deliver original material.

2.6. Educational Installations

In recent years, motion graphics have played a significant role in interactive educational installations. For example, in Goldman Sachs' new Learning Center in New York City, multidimensional forms and patterns move and change in size and color in response to people's traffic patterns. Unified Field created a dynamic media installation that simulates the patterns and fluctuations of twenty-first-century market environments using an advanced 4D visualization program and Intelligent Recognition Inference System (I.R.I.S.)., like Goldman Sachs, operate. Data on the history of the stocks in the world’s capital markets is layered with information, such as days of the week and historical events, giving visitors a visceral experience and inviting them to extrapolate their own conclusions on the markets. Goldman Sachs, a global investment banking leader, wanted to create an inspiring learning

environment while communicating their commitment to developing skills, changing attitudes, and encouraging new thought and behavioral patterns. This complex installation used Unified Field's 4D visualization software on an SGI supercomputer and Windows NT server. Four curved, frosted panels and a 42" plasma screen are mounted on four wing-shaped aluminum poles. Ten feet in front of the panels and embedded in the ceiling is a tracking video camera that monitors the motion of viewers and interfaces with a high-speed image processing board containing gesture recognition software.

2.7. Educational Environmental Graphic Design

Environmental graphic design depends mainly on the cooperation of graphic design with interior design in determining the directions of human movement within the space, and therefore this is determined in a basic element, which is wayfinding design.

And Successful wayfinding design depends on understanding three variables:

- the nature of the client organization.
- the people with whom the organization communicates.
- the type of environment in which the system will be installed.

It is critical to thoroughly research and define all three of these variables at the start of a project. The designer must create a family of sign types that not only addresses primary information and wayfinding needs but also recognizes secondary issues and audiences with an appropriate information hierarchy and sign-messaging protocols when developing the wayfinding strategy and designing the sign system.

At the top of the places that need informative design are educational and cultural institutions, hospitals, sports and entertainment institutions, airports, and commercial and government institutions.

The Wayfinding Handbook: Information Design for Public Places

By identifying the three elements, we can reach the identification of educational environmental graphic design, as it is from this direction the design that concerns the educational institution as a structural structure, considering the target group of students and teachers, in addition to the surrounding environment in which the design is implemented.

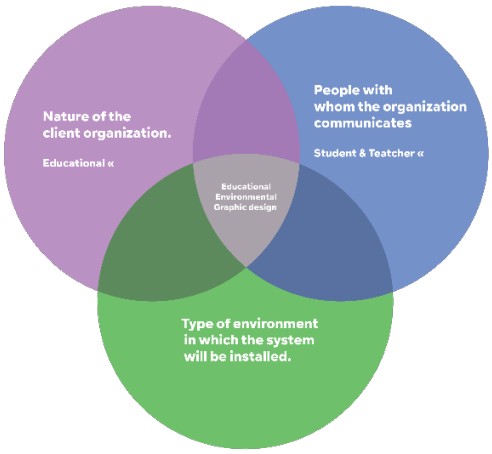

Figure 11: Educational environmental graphic design

2.8. The Learning Environment

Learning environment is the space allocated for learning and teaching and it is an important aspect that needs to be addressed to ensure effectiveness and to improve learning outcomes. Quality learning environment may promote intellectual activities, interaction, generation of ideas, friendship, cooperation and encourage learning, growth, and personal development of students. In the learning environment, there are various aspects that interact and affect the students. Many studies conducted show the learning environment can affect learning outcomes and student development. As a result, the classroom learning environment should be well designed and carefully planned to allow students to learn comfortably, actively collect learning information, gain appropriate experiences, assess their own learning, and respond to personal experiences in a variety of contexts.

2.9. The Structure of the Interactive Interior Space

To understand the dimension of interactivity in interior design, a hypothesis must be established that it is possible to reach a space in which the physical dimensions of the space and the electronic dimensions are integrated without one cancelling out the other.

Many of these mutual interactions and influences between the physical and electronic dimensions can be limited, embodied in a new virtual dimension with two complementary and overlapping aspects. They are the physical and electronic destination.

We can call this new model of internal space the interactive model, which is merely a nominal metaphor in which the new complementary results are gathered resulting from the mutual interaction between the dimensions of the space structure, which is divided into:
The physical structure of the space: It includes the walls, ceilings, and floors, including the furnishing units for each activity separately.

The electronic structure: of the space, which is divided into: Physical components: which are the wires, equipment, and communication units responsible for the transfer of information, and electronic components: which are a set of laws and “Software and Protocols” that complete the interaction process, the movement process, and receiving orders.

2.10. Interactive Interior Design

This concept arose as a result of the intimate relationship between man and computer, which is developing day after day, where the basic idea of interaction between man and space depends on creating scenarios for the various activities practiced by man within the internal spaces and programming them inside the computer through advanced programs where the sensors that operate through rays Infrared is to recognize a person when he enters the space, and these spaces and internal devices are controlled to interact with him and meet his requirements.

2.10.1 Interactive Design Can Be Divided Into Three Main Parts

1. Design Information: It is the starting point in designing any interactive space, and it relies on knowing the needs and goals of users through the functions and objectives behind the internal space and organizing those contents within a diagram or curve to illustrate the functions of the different groups through a hierarchy of commands.

2. Design Interactive: It aims primarily to make the internal space capable of following the user's activities and trends. Therefore, it transforms an information diagram or graphic design curve into a scenario or design of events, describing or clarifying the user's movement within the space and the way he uses it. Thus, the process of moving from information design to interaction design is complete. It means transforming information into user experience.

3. Design Sensorial: for the user depends on creating multiple means of input and output that are compatible with human feelings. To create a good interactive experience, the designer must try to understand more the feelings and observe the goals of the users. He must also think about how to design the feelings of the different functions of the interior spaces and the extent of the relationship of these feelings to each other and how to design them.

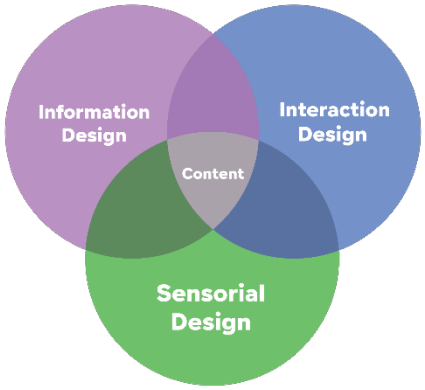

Figure 12: Interactive design

2.10.2 Interactive Educational Interior Design

Interactive architecture is about creating new types of interactive relationships between people and the educational built environment.

Interactive spaces allow building bridges between the physical and digital world. Integrating interactive spaces in learning environments combines the benefits of computer aided learning and tangible interaction; they combine the richness of multimedia content with the concreteness and natural user experience of tangible interaction.

2.10.3. Design Requirements in Interactive Spaces

1- Providing an experience that ensures attraction and engagement.
2- Dealing with a diverse audience in size.
3- Dealing with a different audience in the way of learning.
4- Stimulating social communication among participants and providing a participatory leisure experience.
5- Obtaining opinions and comments from users and responding to them.
6- Security and safety issues.

2.11. Visual Perception

Visual perception is the main means for understanding the characteristics of the visual formation of the architectural form, the elements of the internal space, and the plastic artworks within the architecture. A person's realization of these characteristics is his ability to imagine the work he saw as a visual impression to turn into a complete and stable image in his mind. The vision process aims to identify the elements of space. the interior, realizing its identity, and completing the visual image of the space by recognizing its constituent features such as its shape, color, surface properties, and its own level of illumination.

Space, distance, tactile gradation, lighting quality, color, shape, and the degree of tactile gradation variation all influence visual perception.

2.12. Interactivity as an Element of Integration Between Environmental Graphic Design and Interior Spaces

The integration of interactivity within Environmental Graphic Design represents a paradigm shift in designing interactive interior spaces. By fostering engagement, personalization, and adaptability, interactivity transforms environments into dynamic, participatory experiences. As technology continues to advance, the potential for interactivity to redefine the boundaries of EGD and interior spaces is boundless, offering new avenues for creative expression and user-centric design.

This is where interactive design is one of the most important mechanisms for self-learning, in which the learner practices self-experience in forming educational experience through touching, understanding, and convincing, as it is important that the learner learns how to learn, and it is not important to give the information and test its ability to retrieve it, but positive education must be emphasized. Change the stereotypes that rely on comprehension and persuasion by experimenting and observing, encouraging thought, self-learning, deduction, and conclusion, until the student arrives at the information himself and has his educational experiences through positive participation rather than negative reception.

To analyse the impact of interactive design as a source for developing educational interior design elements and furniture by setting.

A design strategy to analyze interactive design elements includes:

1. General vision stage: "Achieving the visual identity of the interactive design" It depends on achieving visual vision through Forming a mental image with innovation and a specific concept through interactive elements
2. Interactive scenario stage: It includes the interactive idea in terms of choosing the appropriate interactive elements for the design.
3. Interactive task stage: The plan responsible for carrying out interactive tasks designed in the interactive scenario
4. The effect of interactive design as a source for developing interior design and furniture elements It includes:
    a) Impact on the recipient:
    Did the interactive design take this into account?
    Did the interactive design help raise the recipient's awareness?
    b) Impact on developing interior design elements and furniture.

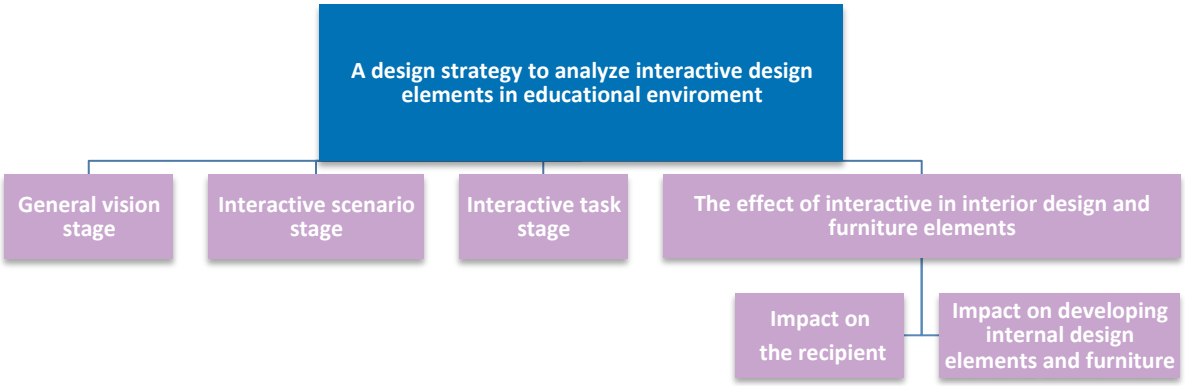

Figure 13: Interactivity as an element of integration between environmental graphic design and interior spaces

Discussion

Through the previous study, it was concluded that through the integration between the principles of kinetic environmental graphic design and the principles of interactive interior design of educational buildings, a Kinetic, interactive educational environment is obtained:

First: Fundamental Principles of Environmental Graphic Design

1. Organization for designs:
   Information should be organized in a logical and transparent manner, with visual hierarchy directing the viewer's attention to the most relevant aspects.
2. User-Centered Design:
   Designs should be adapted to the target audience's or users' needs, preferences, and behaviors.
3. Accessibility and Inclusivity:
   Designs must be on hand to all individuals, together with people with disabilities, making sure that data is to be handed to everyone.
4. Adaptability and Flexibility:
   Designs should have the capacity to adapt to changes in the environment or user needs over time.
5. Wayfinding:
   EGD plays an important role in guiding people through space, providing clear guidance and navigational aids.
6. Emotional Impact and Engagement:
   Designs should evoke emotions, create a sense of place, and engage the viewer on an experiential level.

Second: Principles of Interactive Interior Design for Educational Building

1. User-Centralized Design:
   Design with consideration for the wants, tastes, and actions of faculty, staff, and students. Think about various age groups, learning preferences, and skill levels.
2. Flexibility and Adaptability:

Create areas that are flexible enough to accommodate a range of activities, group sizes, and instructional techniques. Modular components, movable walls, and adaptable furniture are necessary.

3. Merging physical dimensions and electronic dimensions
4. The various active scenarios that space users share and programming.
5. Technology Integration:
   Utilize current and appropriate technologies to improve the learning process. This includes virtual reality, digital whiteboards, interactive displays, and collaborative tools.
6. Sensory Engagement: Consider all your senses, including smell, touch, sound, and vision. Create a welcoming and stimulating environment by using the right materials, lighting, and acoustics.

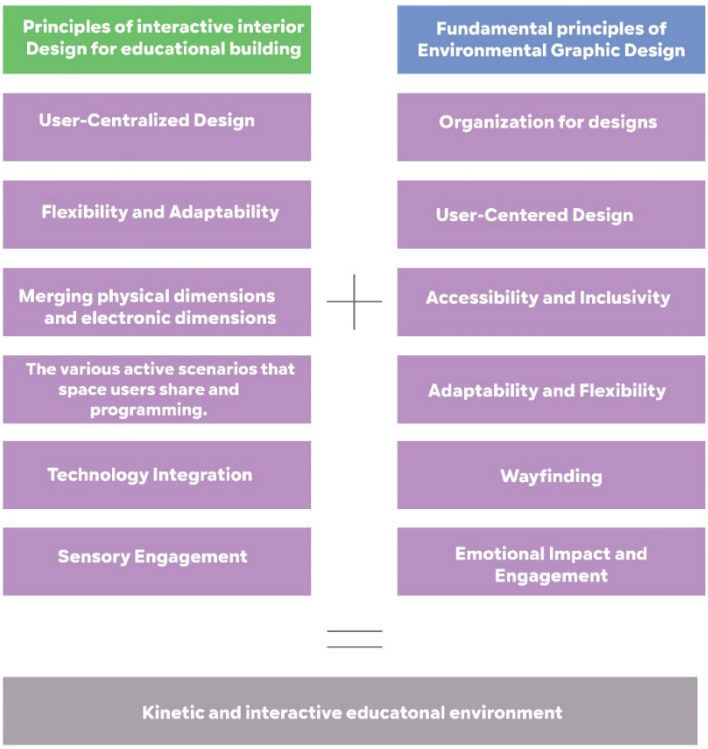

Figure 14: Kinetic and interactive educational environment

Conclusions of the Research

- Develop principles for designing the interior space derived from the university educational environment, which achieved the aesthetic, functional, and interactive dimensions.

- Kinetic environmental graphic design ("KEGD") uses dynamic visual elements that adapt to the interaction and response of students, which leads to a dynamic educational environment, and thus students are encouraged to explore, interact, and learn in a more practical and practical way due to this dynamic.

- This study will not only highlight the learning experience, but it will also prepare students for a more interactive and leadership-oriented future. It emphasizes the importance of interior and graphic design in forming the educational trip.

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