

Influence of Natural - Artificial Light & Ventilation on Spatial Design in Fashion Design Institute

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Abstract:- This research investigates the impact of natural and artificial lighting, as well as ventilation, on spatial design within a Fashion Design Institute context. Through a combination of observational analysis and qualitative assessment, this study aims to explore how lighting and ventilation systems contribute to the overall functionality, aesthetics, and user experience of educational spaces within a fashion design institution. The methodology involves a comprehensive examination of lighting technologies, and ventilation strategies relevant to educational environments. Additionally, site visits and interviews with stakeholders such as students, faculty, and design professionals will provide valuable insights into their perceptions and experiences regarding spatial design factors. Preliminary findings suggest that effective integration of natural light sources, supplemented by well-designed artificial lighting systems, can enhance creativity, productivity, and comfort within fashion design studios and classrooms. Moreover, optimal ventilation solutions play a crucial role in maintaining a conducive learning environment by regulating temperature, humidity levels, and air quality. Through this research, practical recommendations will be proposed for architects, designers, and educational institutions to optimize spatial design through the strategic incorporation of lighting and ventilation elements. By acknowledging the significance of these factors in shaping the learning environment, fashion design institutes can create inspiring spaces that foster innovation, collaboration, and student well-being.

Keywords:- Natural & Artificial Light; Ventilation; Spatial Designs; Functionality –Aesthetics.

I. INTRODUCTION

The influence of natural and artificial light, as well as ventilation, on spatial design in a fashion design institute is significant. These elements play a crucial role in creating an environment conducive to creativity, productivity, and well-being for both students and faculty. Here's how each aspect impacts spatial design.

A. Natural Light:

- **Enhanced Creativity:** Natural light has been shown to enhance creativity and mood. Integrating ample natural light into design studios and workspaces can stimulate

the imagination and foster innovation among students.

- **Visual Accuracy:** Natural light provides the most accurate representation of colors and textures, crucial for fashion design. It allows designers to accurately assess how fabrics and colors will appear in different lighting conditions.
- **Connection to Nature:** Exposure to natural light creates a connection to the outdoors, promoting a sense of well-being and reducing stress levels. Incorporating views of nature or outdoor spaces into the design can further enhance this effect.

B. Artificial Light:

- **Task Lighting:** Proper task lighting is essential for detailed work involved in fashion design, such as sketching, sewing, and pattern-making. Adjustable lighting fixtures allow students to customize the lighting according to their needs.
- **Ambiance:** Artificial lighting sets the ambiance of the space. Warm, soft lighting in common areas can create a welcoming atmosphere, while brighter lighting may be necessary in areas where precision work is performed.
- **Accent Lighting:** Accent lighting can be used to highlight displays of student work, creating focal points within the space and enhancing the overall aesthetic.

C. Ventilation

- **Comfort:** Adequate ventilation is essential for maintaining a comfortable environment, especially in design studios where students may spend long hours. Proper airflow helps regulate temperature and humidity levels, preventing discomfort and fatigue.
- **Air Quality:** Good ventilation improves indoor air quality by removing pollutants, odors, and excess moisture. This promotes a healthier learning environment and reduces the risk of respiratory issues among occupants.
- **Productivity:** Fresh air and proper ventilation have been linked to increased cognitive function and productivity. Students are likely to perform better in well-ventilated spaces, leading to improved learning outcomes.

Incorporating these elements into the spatial design of a fashion design institute requires careful planning and consideration of factors such as building orientation, window placement, lighting fixtures, natural ventilation. By prioritizing natural light, implementing appropriate artificial lighting solutions, and ensuring effective ventilation, designers can create inspiring environments that support the creative process and contribute to the overall success of the institution.

➤ *Aim*

To study and formulate the necessary spatial design for Natural - Artificial light & Ventilation in Fashion Design institute.

To create an inspiring, healthy, and learning environment that fosters creativity, supports learning outcomes, and promotes the well-being of all occupants.

➤ *Objective*

- *Optimize Learning Environment :*

To Optimize learning environment that enhances concentration, promotes focus, and among students and faculty by strategically locating windows and skylights to provide ample daylighting.

- *Stimulate Creativity and Innovation*

To foster a creative atmosphere that inspires students to think innovatively by maximize exposure to natural light in Design studios.

- *Enhance Aesthetic Appeal and Identity*

To create visually appealing spaces that reflect the institute's values . Integrate lighting design elements that highlight architectural features.

Incorporate dynamic lighting elements to create ambiance and visual interest. Provide ventilation systems that promote fresh air circulation .

➤ *Scope*

The scope for integrating natural-artificial light & ventilation on spatial design in **Fashion design institute** to encompasses various aspects related to the physical environment, functionality, aesthetics, and user experience. The scope includes .

- Architectural design consideration
- Lighting Considerations
- Ventilation Considerations
- Spatial Planning and Functionality

➤ *Limitations*

The spaces which will include in this particular research regarding natural-artificial light & Ventilation in spatial design in Fashion Design institute are specific to spaces viz., the academic building, runway show area.

II. METHODOLOGY

A. *Needs Assessment*

Conduct interviews, surveys, or workshops with students, faculty, administrators, and to understand their preferences, requirements, and expectations regarding lighting, ventilation, and spatial design.

Identify key performance criteria, such as visual comfort, energy efficiency, indoor air quality, and flexibility, to guide the design process and prioritize design objectives.

B. *Site Analysis and Environmental Assessment*

Evaluate the site context, including orientation, solar exposure, prevailing winds, and climatic conditions, to inform daylighting and ventilation strategies that are responsive to local environmental factors.

Conduct environmental assessments, such as daylight modeling, solar path analysis, and computational fluid dynamics (CFD) simulations, to predict the potential impact of natural light and airflow patterns on the building interior.

C. *Concept Development and Design Ideation:*

Generate design concepts that integrate natural and artificial lighting elements, ventilation strategies, and spatial arrangements to enhance user experience, promote creativity, and support learning outcomes.

Explore innovative design solutions, such as daylight harvesting systems, passive ventilation techniques, and adaptive lighting controls, to maximize energy efficiency and occupant comfort.

D. *Integrated Design Collaboration*

Foster interdisciplinary collaboration among architects, lighting designers, mechanical engineers, interior designers, to develop integrated design solutions that optimize lighting, ventilation, and spatial qualities.

Utilize Building Information Modeling (BIM) or other collaborative design tools to coordinate the integration of lighting and ventilation systems with architectural and interior elements throughout the design process.

➤ *The Above Mentioned Scopes are Discussed Below:*

- **Architectural Design Consideration :** Determining optimal building orientation, placement of windows, and layout of interior spaces to maximize access to natural light while ensuring adequate ventilation.

➤ *There are Different Types of **Natural Light** that Come into a Building, here are some of them:*

- **Diffuse and uniform light** coming from larger and more regular openings, for example: strip windows around a room; **Direct light** from the direct sunlight at the desired location on the floor or other surface;

- **Zenith light** from the ceiling like a skylight;
- **Reflected light** from any surface and redirected into space.

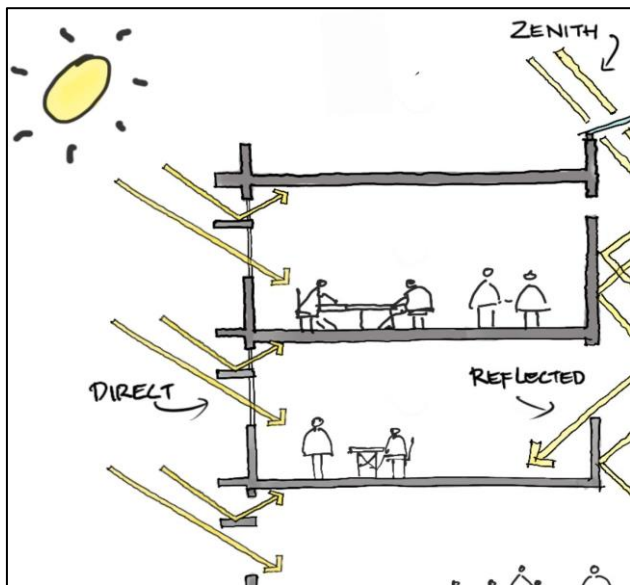


Fig 1: Image Showing, Proper Openings in Building to Gain Natural Light

Technique that efficiently brings natural light into interior space using exterior glazing (windows, skylights, etc.), thereby reducing artificial lighting requirements and saving energy.



Fig 2: Image Showing, to Gain Natural Light Via Direct and Indirect Glare by 'Day Light Factor Method'

- Blue Arrow: sunlight reflected from outside to inside. Green arrows: direct light entering the interior, the amount of openings allows uniform light in the design space.

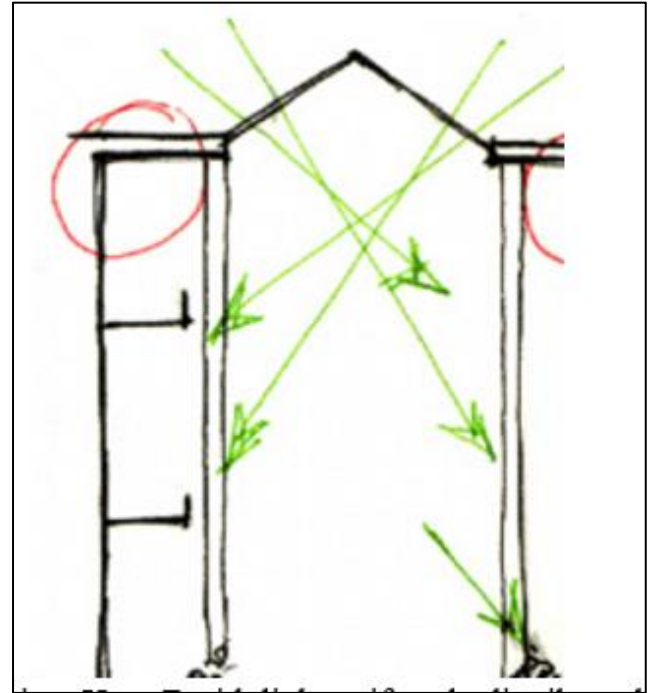


Fig 3: Image Showing, How Zenith Light Uniformly Distribute Daylight in Spaces

- Zenith Light: roof opening allowing uniform light with both sunny and cloudy skies in Lobbies , Atrium , Academic building .
- Lighting Considerations: In terms of artificial lighting , Selecting Proper Acoustical material to enhance the space in runway shows.

Selecting appropriate artificial lighting fixtures, including ambient, task, and accent lighting, to complement natural light and provide sufficient illumination for various activities within the institute.

“A Fashion Show Is Completely Visually Driven!
 Lighting Will Make All the Difference.”

➤ *The Runway Stage:*

- The stage is placed in the middle of the audience, rather than in front.
- The lighting fixtures do not move, but the subjects do.



Fig 4: Image Showing, Proper Lighting Fixtures to Subjective Area

➤ *The Lighting:*

- The lights must be placed in an extensive way so that the models are always well lit no matter where they are on stage.

- The lighting must be precise and cannot bleed off of the stage and into the audience.

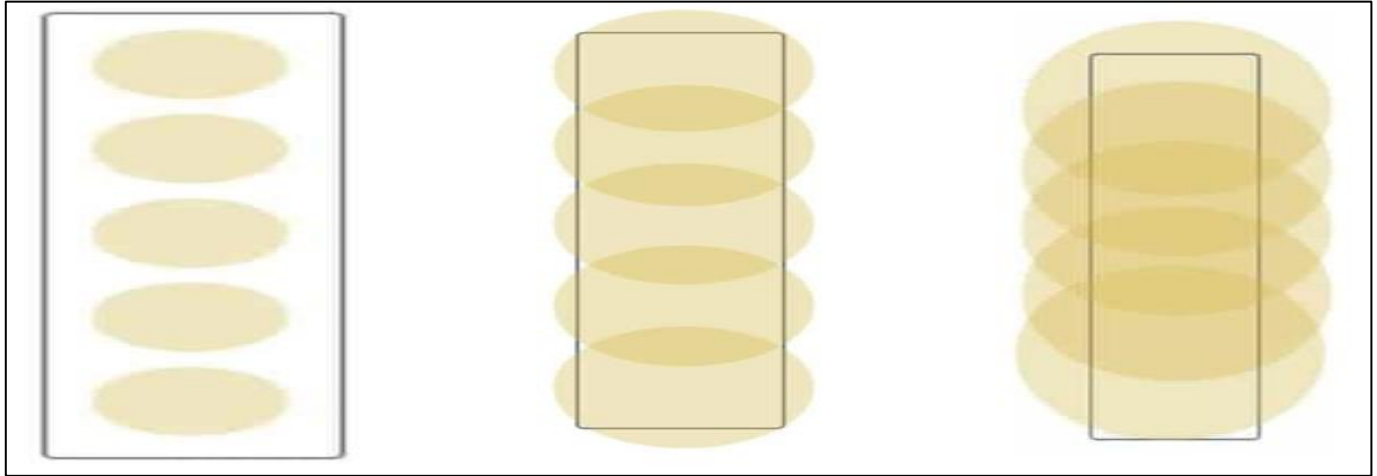


Fig 5: Too little lighting. This lighting won't bleed into the audience, but won't fully illuminate the models.

Fig 6: Too much light, This lighting will illuminate the models, but will also illuminate the first row of the audience.

Fig 7: This is the ideal lighting, The entire stage is illuminated and only a small amount of light runs off the sides, but will not reach the audience.



Fig 8: Ellipsoidal Fixtures

Ellipsoidal fixtures are powerful spotlights commonly used for theater and stage. The beam is powerful and can be adjusted in size to match whatever subject you want to light. For a fashion show, a warm white light is needed to show the natural colors of the outfits.

➤ *Lighting Front & Back:*

- Because of the design of the stage, the audience will see the front and back of the models as they walk by.
- We cannot use a spotlight that points directly down unless we want to create harsh, unflattering shadows.
- Therefore: Lighting must come down at an angle so that it hits the models' entire front and back. This also properly showcases the designer's clothes.

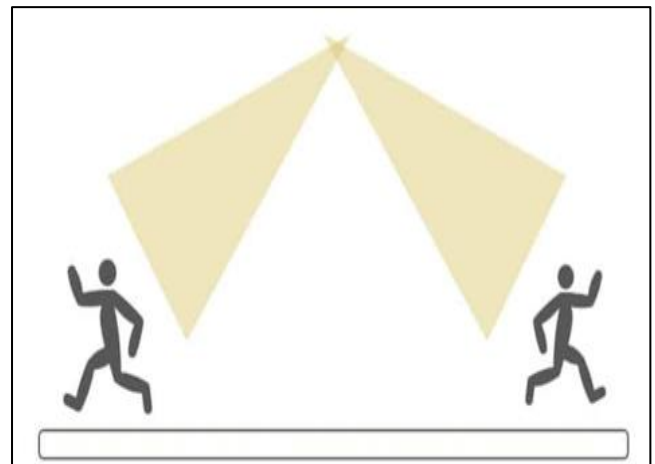


Fig 9: Image Showing, Appropriate Angle for Lighting to Showcase the Subjective Area (Runway Stage to Highlight Models)

➤ *Cross Your Beams*

- Hang your ellipsoidal lights so that the two beams create an upside-down 'V' shape.
- Placing the lights up and down the length of the catwalk so that light will hit the models and they travel back and forth.

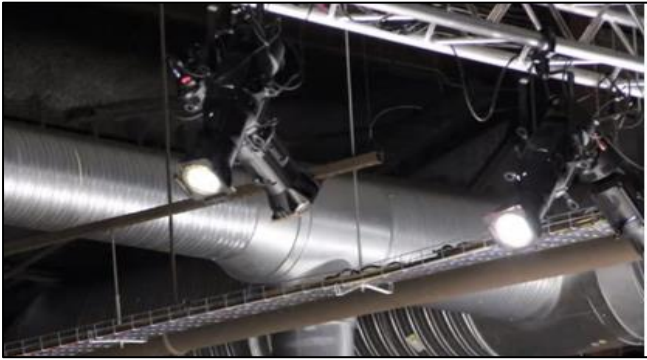


Fig 10: Front Lights



Fig 11: Back Lights

➤ *At the end of the Rampwalk: Perfecting the Light for Photographers*

- At the end of the ramp walk, the model will pause for a

moment to pose. This is where the professional photographers will snap their perfect shot.

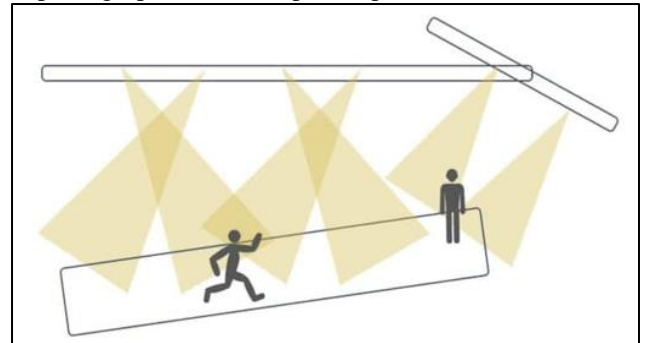


Fig 12: Image Showing, Imbalance Beam of Light and Angle Put Bad Impact in Space

- *Ventilation Considerations:* Designing natural ventilation systems, such as operable windows, skylights to facilitate airflow and maintain indoor air quality. Implementing mechanical ventilation systems, including HVAC systems, to ensure adequate fresh air circulation, temperature control, and humidity regulation throughout the institute.

By understanding natural wind flows and diverted wind flows, design inlets of appropriate sizes and design outlets to escape warm air at higher locations compared to inlets. It can cut down the consumption of electrical devices indoors.

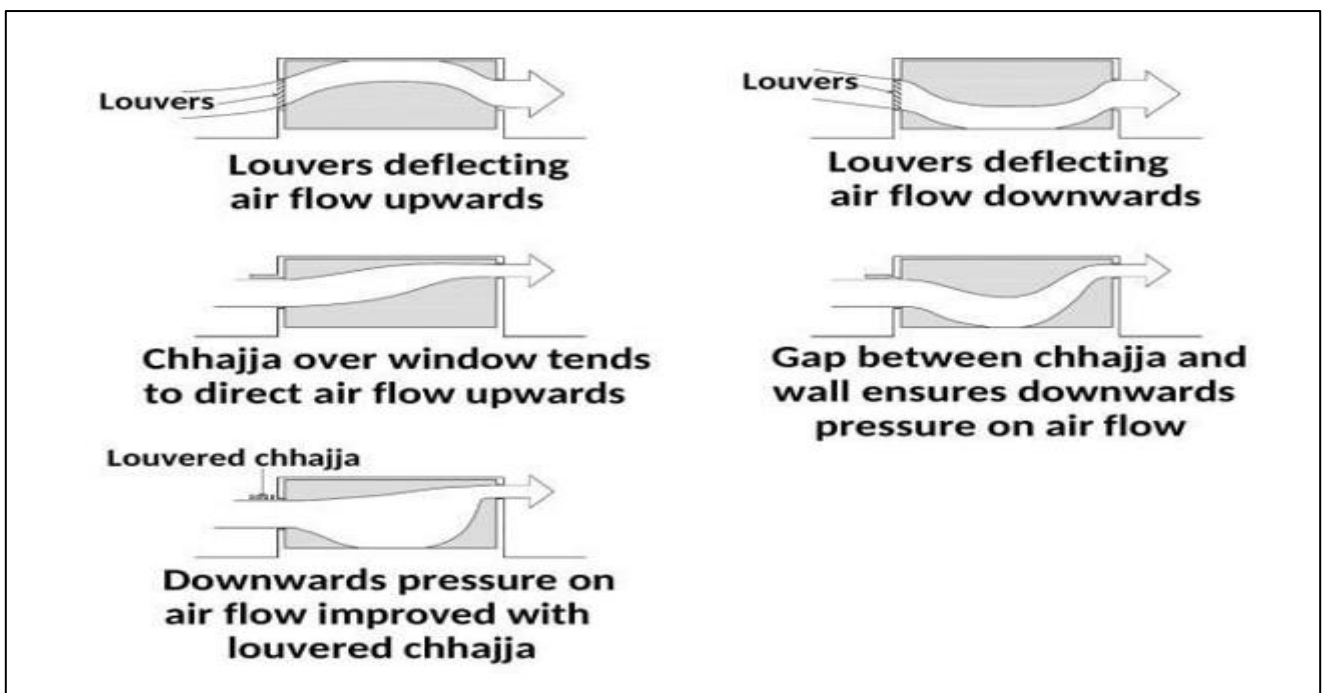


Fig 13: Proper Ventilation Opening with the Help of Louvers

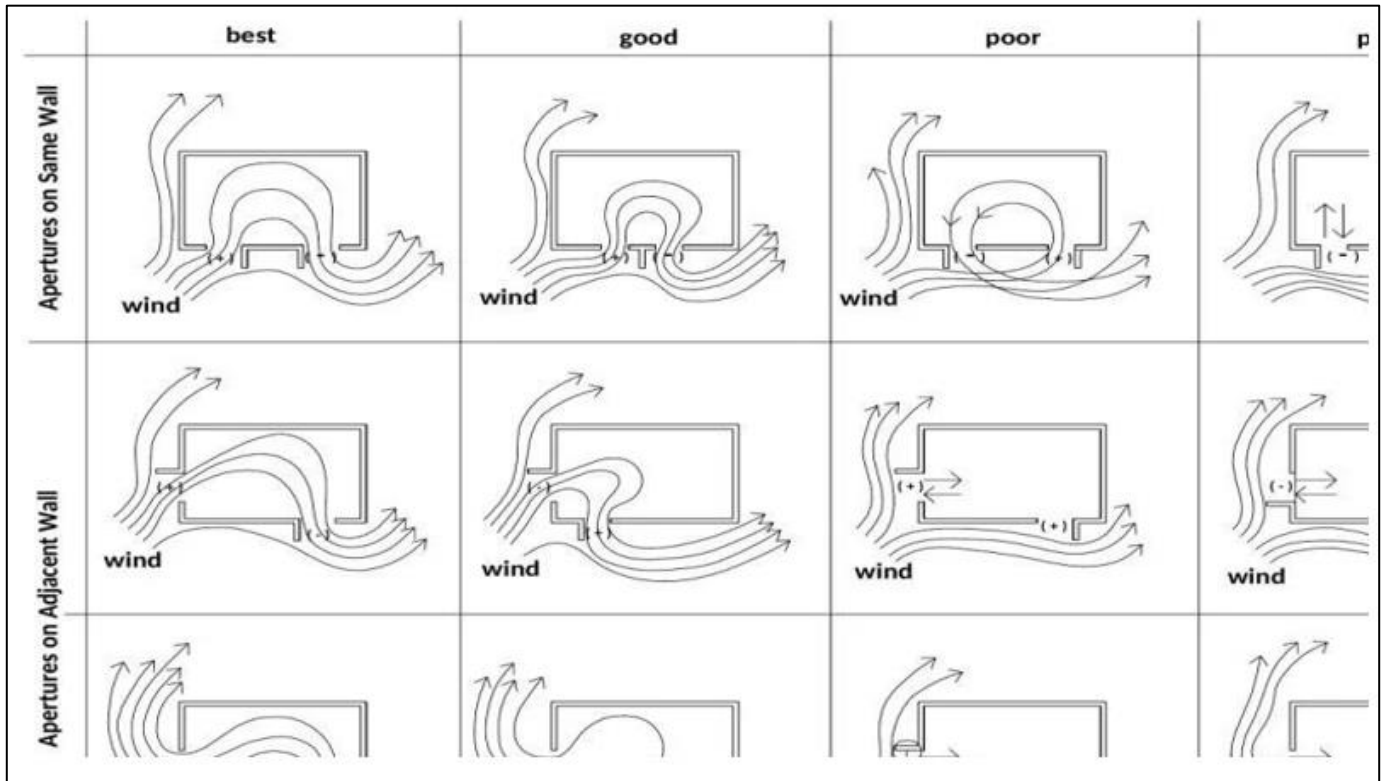


Fig 14: Proper Wind Flow Plays Vital Role to Achieve Natural Ventilation

- *Spatial Planning and Functionality:* Configuring interior spaces, such as design studios, classrooms, and collaborative zones, to optimize natural light exposure, visual connectivity, and user comfort.
- *Interpret Requirements* – build the brief
 - ✓ With these factors in mind we can start to develop a plan of requirements, extract from the data we have collected the necessary functions these spaces will be fulfilling.
 - ✓ In some cases it is suitable to develop a matrix that demonstrates the requirements of each room, in terms of privacy, daylight, access, equipment and so forth.

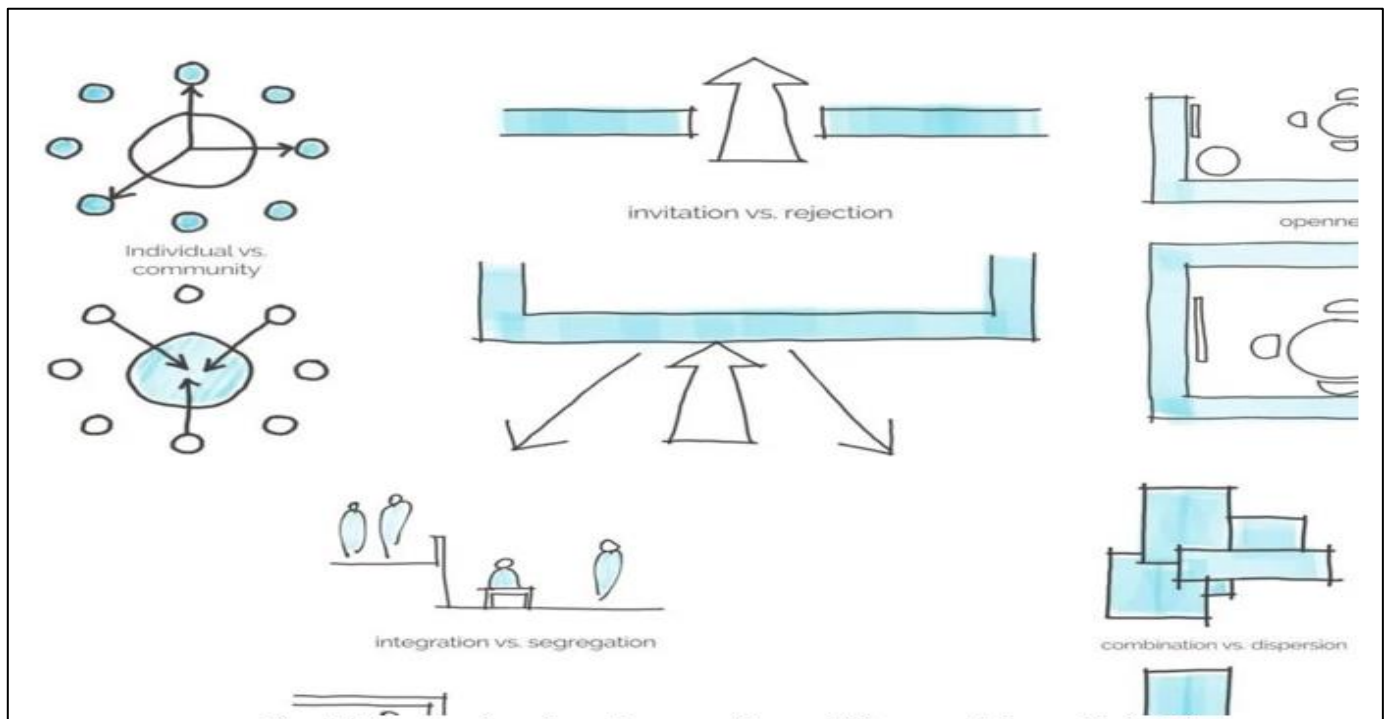


Fig 15: Image Showing, Impact of Two Different Subject Which Influence Spatial Design Spaces

➤ *Developing Circulation*

- How people move around the building from room to room is just as important as the destination.
- When developing a circulation structure we can look at

a few basic principles.

- What is the fluidity of the circulation? Is there a smooth flowing route or a more direct route?
- Does the circulation route clash with furnishing requirements

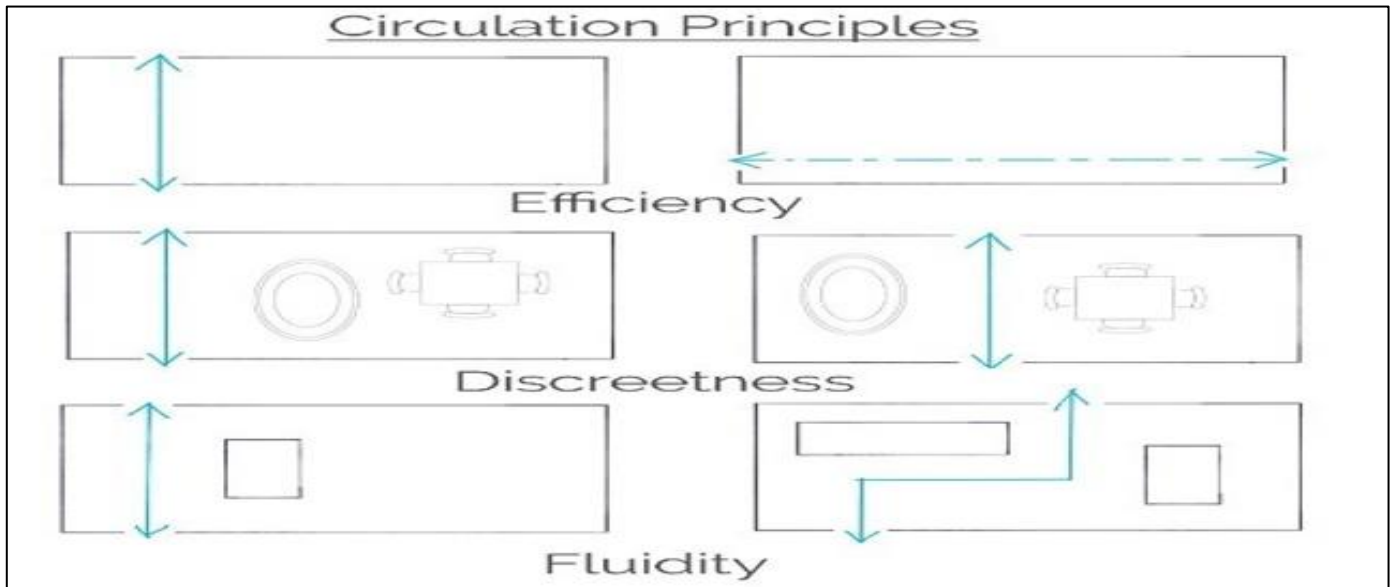


Fig 16: Image Showing, Ideas for Developing Circulation and their Impact

By following this methodology, fashion design institutes can develop innovative, and user-centric spatial designs that prioritize Natural-Artificial lighting, Ventilation, indoor environmental quality to support creativity, learning, and well-being within the built environment.

III. CONCLUSION

This study has shed light on the significant influence of natural and artificial light, along with ventilation, on the spatial design of fashion design institutes. Through a comprehensive analysis of lighting and ventilation systems in various educational settings, several key findings have emerged.

Firstly, the integration of daylighting strategies, such as maximizing natural light through the use of large windows, skylights, and light wells, has been shown to positively impact the overall ambiance, visual comfort, and energy efficiency of fashion design spaces.

Secondly, the role of artificial lighting cannot be underestimated, particularly in spaces where natural light may be limited or insufficient. Well-designed artificial lighting systems, incorporating elements such as adjustable fixtures, task lighting, contribute to the flexibility and adaptability of fashion design studios, enabling users to customize lighting conditions based on their specific needs and preferences.

Additionally, effective ventilation solutions play a vital role in maintaining a comfortable and healthy indoor environment conducive to learning and creativity. Proper airflow rates, combined with temperature control

mechanisms and air purification technologies, help mitigate indoor air quality issues and ensure optimal thermal comfort throughout the year.

By prioritizing the integration of these elements, fashion design institutes can cultivate spaces conducive to creativity, learning, and well-being. This study underscores the importance of holistic design approaches in optimizing educational environment, paving the way for future research and innovation in spatial design practices.

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