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Actual Material Virtual Materiality: Multiplicity of Locality-based Exhibition

Abstract

This study aims to demonstrate actual-virtual multiplication in the context of spatial operations in locality-based architectural exhibitions. Exhibitions are curatorial activities that provoke discourse. Architectural exhibition also means operating actual-virtual objects through relational multiplication. Multiplication is to perceive objects not as singular but as multiple various entities. The multiplication operation in exhibitions must be further explored, especially in exhibitions involving objects with various layer depths. As one of the local materials in Indonesian architectural practice, soil has various profoundness in the locality context. The 'Tanahku Indonesia' exhibition is the case study, a national-scale exhibition of local material-based exhibitions. The breakdown of the case study focuses on its actual-virtual elements, operations, and relations. Terms actual in an exhibition can indicate the direct artifact element. In contrast, virtual can suggest artificial, indirect, and multiplicative representation methods. The study offers three concepts. First, actual material can be a portal to virtual materiality. Second, multiplications of objects and materials reveal various spatial operations in an exhibition. Third, the connection between exhibitions is a multistage multiplication process of spatial design. Exhibition spatial construction has various interrelated actual-virtual multiplication operations that become a potential for future design basis.

Keywords

Exhibition, Multiplication, Actual-Virtual, Material, Materiality

1. Introduction

This paper aims to demonstrate the idea of multiplication concerning actual-virtual relations in the context of spatial practices of local material-based exhibitions. "Among the leads I will then follow is the idea that materiality, like almost every feature of our environment, is to a large extent a cultural construction" (Picon, 2003b, p. 115). The idea of materiality of a material can be understood as an access to reveal the cultural extension and various contextual knowledge, including spatial design. The strength of locality-based spatial practices relies on the material itself, which is often considered less potent than forms and concepts (Thomas, 2006). Materials are not just ready-to-use items; various complex contexts and entities always accompany them (Paramita et al., 2022; Thomas, 2010). On the other side, materiality can reveal multiple things, such as material processes, actors, locations, characters, as knowledge resource. In this context, materiality is related to cultural diversity, where materials are positioned as one of the product. Actors or subjects of production, production locations, production processes, and the character of the material produced in each region can be shown as access to the materiality knowledge beyond the material itself.

Materials as actual, especially locality-based materials will always coexist and be accompanied by their virtual unique local values. Virtuality is not just a technology-related discussion. According to Kalaga (2003), virtuality is permanently attached to each object, accessed through the memory and perception of the subject. Each object can become an access or portal to virtuality in perception and information that the viewer or user can extract. The discussion of materiality is not only limited to its form and type but also a more profound discourse related to various processes, contexts (Author, 2020) and knowledge based on specific daily practices (Wigglesworth, 2005; Wigglesworth & Till, 1998). The idea of local materials lies at the notion of local value defense against universality, and a form of response to diverse contexts (Frampton, 1993).

Material as an actual object, has various virtual materialities related to the many invisible aspects that accompany it. Materiality becomes more than the material itself and is not always tangible, physical, and visible (Ingold, 2007; Picon, 2021; Tilley, 2007). For example, soil and bricks are no longer just tangible things; because of their diversity, these products can tell intangible narratives about the production process. The community, cultural, and social values of the production process of these materials have the potential to be explored in greater

deepness. The unique relationship between actual material and virtual materiality provides an exciting basis for discussing the various spatial knowledge that emerges from it.

The local material as an actual object is always side by side and contains a variety of profound virtual materialities. The position of actual-virtual relations has an interesting character in a discussion of practice. The actual-virtual connection is binomial and complementary, such as material to element and model to image (Braga, 2019). The understanding of the virtual can also be conceived as an element that is more than the limitations of the actual material (Kalaga, 2003). Virtual can be conceived as the non-matter proposition, but is nonetheless an attribute of that proposition (Deleuze, 1994). The issue of virtuality is always related to the boundaries of visible and invisible (Jecu, 2015). The actual can potentially uncover various virtualities as separate entities. Materiality can be interpreted as a form of relation (Picon, 2020). Materiality can't be directly noticed from a material object. However, materiality has a more critical position than physical material to unveil the knowledge associated with it. The relationship between material and materiality is like the connection between actual objects and their various virtual properties. This relation becomes the basis of a design operation to construct a material-based architectural exhibition.

As a form of spatial practice, exhibitions can emphasize a material's various materialities. Exhibitions are a form of critical curative spatial practice that provokes discussion, allowing for multiple forms of knowledge (Gadanho, 2010; Rendell, 2007). Representation is a spatial operation dominant in an exhibition because of its capability to illustrate more than an actual artifact. Virtuality itself is present in exhibition practice as a set of operations to re-articulate or multiply various elements of the object's actuality (Gay, 2001; Till, 2006). Studying an exhibition can also mean discovering various elements, object design operations, and complex actual-virtual relations in their spatial practice (Battista, 2021; Brown & Szacka, 2019). Exhibitions become a strategic medium for discussing actual materials and virtual materiality.

Exhibitions related to local materials have a potential to reveal various knowledge in a relational framework, between actual and virtual in multiplicative design operations. The process of creating and developing an exhibition encompasses research, discovery, and reflection in understanding architectural practice. This complexity of exhibition practice exposes exhibitions as a potential for knowledge construction (Cai et al., 2022; Nathania & Wahid, 2022). However, only a few studies have attempted to uncover exhibitions in the

context of materiality and materiality within a multiplicative relational framework between actual-virtual. The main idea of this study is that actual object-based materials contain knowledge in their virtual materiality (actors, processes, tools, locations, etc.), multiplied in various forms in actual-virtual-based spatial exhibition design practices. Studying exhibition spatial practices indicates discovering the diverse elements, design operations, and actual-virtual relations within them.

This study attempts to position a local material-based exhibition as an object of study to be explored and reflected upon in relation to its spatial knowledge. 'Tanahku Indonesia' (which means the diverse character of soil as earth-based material in Indonesia's multiple regions) is an idea, exhibition, and discourse on material collectivity, materiality, and *materialscape* that is representative on a national scale (Author, 2020; Johanes & Wahid, 2018; Wahid et al., 2020). The exhibition went through an in-depth curatorial process involving a diverse sample of local collective material data (especially 'soil' from across the country) and covering the macro-scale of Indonesian material geography. Soil is one of the material bases in Indonesian local architecture. Its processing into various processed materials, such as bricks, panels, roof tiles, and so on, makes soil no longer limited to just a material. It represents multiple manufacturing cultures, processing-making cultures, and material creation cultures from all regions in Indonesia. Soil, as an actual material, is not only capable of telling its own story. Instead, various other virtual materialities are associated with it, including material processing stories, various processing tools, the subject (actor), and the culture of each location with their specificity of soil character.

This study strives to investigate the 'Tanahku Indonesia' exhibition, which was generated in two time periods as a form of spatial practice multiplication in 2017 and 2021. Each exhibition will closely relate to its spatial location (exhibition venue). The construction of the spatiality of the exhibition will depend on its architectural and object design operations. The actual and virtual objects, in the diverse local context of Indonesia, have the potential to be positioned as a complex multiplicative design operation. The 'Tanahku Indonesia' exhibition does more than merely display soil in its actual condition as something diverse. Instead, the exhibition is challenged to display various indirect (virtual) things related to the soil as material. Material processing actors, material-related culture, material processing tools, local community are various exhibition entities represented virtually with various design operations. The main

objective of this study is to illustrate and demonstrate the idea of multiplication in architecture within an actual-virtual relational framework on local materials.

2. Literature

2.1 Material, materiality and locality

The potential of actual material and virtual materiality discourse goes beyond discussing objects and their substance, to a deeper level of design knowledge. Material collections can also be understood as contextualized discoveries, especially in materiality and context-based design knowledge (Paramita et al., 2022). The material itself is more than a final object, but rather a process that is never finished, flowing, mixing and even mutating and transforming (Ingold, 2007). Material also means a complex data set with a deep variety of specific information (Hosoya et al., 1997; Howes et al., 2018; Miltiadis, 2020; Mitchell, 2005). Materials will always be about images, objects, and practices (Rose & Tolia-Kelly, 2016). Materials have the potential to be compelling as a fundamental discussion when discussing design practice and its embodiment.

An understanding of the terms local and locality provides a strong basis for the specific knowledge that may emerge from its material practices. Soil, as an earth-based material, has a wide range of potential variants. Each local area or region in Indonesia will have a specific material character, as well as a variety of specific society's material actors and their practices. Understanding materiality includes aspects of individual and social production and inscription (Grosz, 2001; Ingold, 2007; Renfrew et al., 2005; Tilley, 2007). The reality of local materials is not limited to the physical reality of the object but various thoughts on its culture and social practices (Johanes & Wahid, 2018; Loschke, 2016). Investigating the locality becomes an opportunity to reveal new knowledge specific to its context to defend it against various challenges from universal modernity (Author, 2021). Materials are not only used in constructing the architecture, but the discussion of materiality, especially in the local context, can also build a particular knowledge.

The materiality of a material means that it is a multiple entity that encompasses many diverse things related to the material itself. Materiality virtually detaches itself from the actual material (Kalaga, 2003). This virtuality of the material will alter a variety of related knowledge, without

changing the condition of the material itself (Kraus et al., 2015; Nash et al., 2021). Material virtuality is also often discussed as materiality in a digital virtual medium (Picon, 2003b). Yet, in essence, physical materials and their materiality, contain various things that are virtual, or cannot be perceived directly by observing the material object alone (Deleuze, 2002; Kalaga, 2003). However, the material as an actual object has the opportunity to open up a variety of information and knowledge related to its materiality in a broad locality context.

2.2 Exhibition, Representation and Multiplication of Actual-Virtual

Exhibitions, as a specific spatial design practice, have the potential to display a variety of actual materials and their complex virtual materiality. Exhibitions, as discourse of knowledge, have a crucial position, because of their curatorial nature and provoke various discussions. The curation of an exhibition is not only about the actual objects, but also about the various virtual relations that occur within it (Busch, 2016). Curation in an exhibition is a production activity of its spatiality (O'Neill, 2007). In a local context, exhibitions are even an effort to maintain the cultural values associated with them (Moural & Hassan, 2021). Exhibitions as possible new contexts and systems (Brown & Szacka, 2019), model reality with virtuality together in the articulation of space (Lee, 2015). The actual and the virtual always collaborate in the realization of culture (Kalaga, 2003; Mccabe, 2019). The exhibition of actual material and its virtual materiality is a model in redefining and contextualizing the actual-virtual connection itself.

Actual-virtual is not only limited to the relationship between material and its materiality. More than that, in the context of the exhibitions themselves, actual-virtual can be understood as a form of multiplicative spatial operation. According to Gay (2001), exhibitions combine the actual and the virtual. Objects that appear in real time, without the process of reinterpretation, are actual. In addition, various forms of efforts to create objects without the presence of the original object are a form of virtuality practice. In this understanding, virtual can be conceived as an effort to duplicate or multiply actual objects in a variety of varied operations (Deutsch, 2005; Grosz, 1998, 2001; Author, 2023). Multiplication itself is a notion that always implies actual and virtual elements as a unified whole (Deleuze, 1994; Deleuze & Parnet, 2007). Multiplication can also be understood as a representation operation that breaks away from the understanding of architecture as a fixed and single entity (Paramita, 2022; Spiller, 2020). Through the operation of multiplication, various new understandings and forms of an object

become more open (Stanek & Kaminer, 2007). Multiplication means operating architecture in a dynamic domain of transformation.

Understanding actual-virtual as a connection has a similar concept to an understanding of materials and their materiality. In the spatial practice of the exhibition, the effort to present actual materials and all forms of virtual multiplication in representing materiality is also a specific form of actual-virtual connection (Brown & Szacka, 2019; Gay, 2001; Author, 2023). Knowledge can be built through reflected design practice (Schon & DeSanctis, 1986). This study aims to investigate, observe, and reflect on all forms of understanding the relations of material and materiality in the actual-virtual framework. The exhibition becomes an opportunity as a medium of spatial design practice, where the multiplication and representation operations can be positioned as a design mechanism.

Exhibitions are crucial in presenting a combination of actual objects and virtual representations, especially in presenting the diversity and depth of local contexts associated with them. Exhibitions presenting locality only in actual objects will be limited in presenting such diversity. The combination of actual-virtual objects or artifacts in the exhibition and various virtual representations will have potential to display the diversity of the Indonesian locality. Photos, videos, models, graphics, drawings, and other multiplicative representations become a creative medium.

The exhibition represents various things through a complex design operation. Visitors can also experience and understand the arguments and statements of the exhibition through a diversity of creative representations. In a temporary exhibition, objects play an essential role, as their configuration with another objects shape the exhibition's spatiality. Finally, this study also aims to reveal the multiplicative actual-virtual operations in the exhibition as a reflection to expand design knowledge related to future exhibition practice. Localities have both (actual) products and (virtual) processes, cultures and actors that can be showcased as part of an effort to expand design knowledge.

3. Research method

3.1 Research data & framework

This study was conducted using a qualitative approach (Creswell, 2018; Groat & Wang, 2013), as a form of reflection-in-action study on a single case study of design practice (Schon & DeSanctis, 1986; Till, 2012). Single case study research unlike quantitative experiments that generalized to theoretical propositions. Instead, single case studies in qualitative studies aim to extend theory through analytical generalization (De Souza, 2019). The writing of the exploration study is conducted in a narrative approach, which has the potential to articulate the case study into a more in-depth design process (Bolton, 2006; Norberg-Schulz & Borsano, 1980). This study reflects exhibition design practice on theoretical ideas based on multiplication in architecture.

One form of design-related research is to position design practice as an integral part of the research process itself (Frayling, 1993; Verbeke, 2013). The design process has the same complexity as the research process itself. Spatial practices, especially exhibitions, elaborate a variety of activities, including research, search, curation, discovery and reflection as a complex process (Wells, 2007). The 'Tanahku Indonesia' multiple exhibitions, as a specific case study related to spatial practice-based materials and materiality, was chosen because it is a fairly representative case study in terms of the richness of the data it accommodates (national scale country). The exhibition is a single case study, but considering the multiple exhibition models and their possibility for transformation in the future, it is a representative single case study for research.

The actual-virtual framework is used to conceive of material and materiality as a relation, and actual objects and actual-virtual representations in exhibitions as a multiplicative design operation. Spatial design operations are transformative actions, interventions, and systematic approaches in the design of a spatial model (Alexander, 1977). In exhibitions, design operations are the collective result of assembling and constructing strategies and aesthetic efforts in making interactive experiences to consume presented information. Actual-virtual in the discourse of material and materiality addresses the issue of visibility and invisibility of a material object (Jecu, 2015). Virtual is more than just an understanding of computational digital approaches, it is about materiality (Jecu, 2015). Virtual also means removing the

limitations of traditional readings of an actual physical condition (Mitchell, 1996). In the context of exhibition operations, the virtual itself is more than just representation, but rather the transformation of a limited source to a multiplicative process that connects to various possibilities (Abdelhameed, 2013; Grosz, 2001; Papasarantou, 2020). Every process of multiplication will be closely related to actual and virtual elements.

In observing, deconstructing, and reflecting on the 'Tanahku Indonesia' exhibition, the actual-virtual relation framework is the central perspective of this study. Actual-virtual can be positioned as an operational relation in the exhibition; actual is something that already exists and can be represented directly, while virtual is an idea of indirect or artificial representation (Battista, 2021; Gay, 2001; Author, 2023). The research goal is to contemplate the exhibition as an operation of actual-virtual relations, which multiplies actual material (directly visible) and virtual materiality (a material aspect that is not directly visible). The design operation demonstrates the presentation of actual material fragments and the multiplication of various virtual representation methods (non-actual representation).

3.2 Research context & analysis

'Tanahku Indonesia' is an in-depth exploration of the material (earth) and its various materialities (*materialscape*, act of collecting, tracing the imprints, selecting the imprints). This idea is manifested by showcasing local earth-based materials to reveal their potential as an integral part of Indonesia's creative economy development. This idea was realized in two exhibition periods, namely at *dia.lo.gue artspace* in the 2017 period, as well as in the *arch:id ice bsd* public exhibition in 2021. This study positions these two exhibition periods as specific case studies that will be identified in three main aspects, exhibition elements, object design operations and object-spatial relations between them. Figure 01 shows the composition of the 'Tanahku Indonesia' 2017 & 2021 exhibition.

FIGURE1

Figure 1. *Materiality-based exhibition realization of local materiality, 'Tanahku Indonesia' in two periods of time, 2017 and 2021*

The exhibition as a whole consists of 13 main sections. 'Indonesian *Materialscape'* and 'The Colors of Indonesia' showcase the diversity of the soil in an actual catalog and a virtual wooden map of Indonesia as a whole. 'Value in Materials' and 'From Raw to Value' are actual virtual visual presentations in the form of diagrams of the material processing of each community and culture. 'Tools in the Making Process' presents a variety of soil processing tools, both actual tools and through virtual representations. 'Actors Behind the Material' is a collection of virtual portraits of various tribes and cultures as processors of earth materials. 'Looking into the Kitchen' is a virtual three dimensional model presentation that depicts a journey of exploration throughout Indonesia. 'Earth+ Project' is an actual depiction of each process of soil processing, from raw to processed materials. 'When Architecture meets the Earth' is a virtual drawing presentation as a sketch of the connection between an architectural column and the earth/land/soil as its base.

Other sections include 'Journey of Finding Indonesian Earth-Based Material,' presented through various processed actual materials. 'Materiality in Practice' is a series of works by architectural and interior designers in processing soil into actual products or building elements. 'Geometry of the Material' displays the arrangement of actual bricks as processed soil in molding, drying, and firing. The last section, 'Make and Share,' is a collective creation of visitors through direct interaction with the actual clay material. The first exhibition is the full version, while the second is presented in a more limited format due to venue limitations. All exhibition parts are designed and constructed spatially through a series and arrangement of collaborative objects between actual artifacts and their virtual representations. Figure 02 shows the exhibition elements.

FIGURE2

Figure 2. *Parts and sections of an exhibition with actual-virtual element collaboration in various spatial configurations*

Observation and deconstruction were conducted using digital documentation in the form of photos, videos, and text articles. Primary data in the form of direct discussions with the exhibition creators supported secondary data. The analysis process was carried out by identifying various elements related to the exhibition, and classifying them into actual-virtual

mappings. The analysis continued with an investigation through the redrawing of the key settings of the spatial exhibition, particular spatial scene, to obtain a deeper understanding of its spatial qualities (Carpo & Lemerle, 2013; Cook, 2013). In this exhibition, objects play an essential role, not only as content but also as their position and arrangement in space, which become the basis for shaping the spatial experience of the exhibition. Research-based on visual imagery is related to reflection activities through copying operations (interrogation and composition), collaboration (dialogue), image attention (understanding phenomena), and orthographic projection (materiality and form) (Lucas, 2016). Virtual is a projected form of the present condition (Lucas, 2019). Virtual is a projected creative form of the existing condition. Identification is conducted to find various actual-virtual elements in the exhibition. Exhibition archive concept and includes a shape grammar transformation (Liapi & Liosi, 2021). he operation of various elements was analyzed and then found to be a form of actual-virtual multiplicative operation (Chaturvedi et al., 2011). In the final stage, the discussion was directed towards the three main aspects of exhibition practice, related to elements, operations and relations, as well as other findings. The discussion built from there will be reflected back on the discussion of local materials and materiality.

4 Result

This study found actual-virtual-related issues, which are divided into three main classifications. The findings of this study cover exhibitions in both time periods of their realization, 2017 and 2021.

4.1 Multiplication elements: Actual-virtual identification

The actual-virtual identification in the context of the exhibition is divided into two things. The first is the actual-virtual identification related to the exhibition content, which is the material and its materiality. The second is the actual-virtual identification related to the various multiplication of representation objects that exist in both exhibition periods. Materiality is more than material; materiality is not always tangible, physical, and visible (Ingold, 2007; Picon, 2021; Tilley, 2007). These arguments became the basis for investigating and mapping the elements of the exhibition, based on the actual-virtual framework. Based on the substances and contents, actual covers the actual objects, namely raw soil materials ('earth'), material processing tools, and processed materials derived from them. While virtual means other non-

physical materiality, in the form of data, information, processes related to the material. Based on the process of representation multiplication, actual means that the exhibition content uses actual objects, without changing the form to other objects as part of the representation. While virtual, from the process of multiplication, includes all forms of attempts to re-present various material substances and materiality into other forms of representation. Included in this category are two-dimensional graphic content, both fixed and animated, as well as three-dimensional physical models.

According to its content, this exhibition presents material as something that is actual, as well as materiality that is virtual. The actual materials displayed are raw materials in the form of soil, processed materials from the soil, and various tools for the production of processed materials. Regarding virtual materiality, the aspects displayed cannot be noticed directly but are linked to actual materials. This exhibition displays materiality that includes the production process, the location of the source material, the actors involved in making the material, the narrative of the material, and various joints that can be applied to assemble the materials. These five aspects are virtual in nature, closely related to actual materials, but cannot be displayed directly by the original object, as they are mostly data, narration and information.

Based on the object of the exhibition, the exhibition features a variety of multiplicative representational objects, both of actual material and virtual materiality. In an exhibition representation, the original artifact can be read as actual, while other forms of indirect creative representation multiplication are interpreted as virtual (Betsky, 2005; Garrido Castellano, 2014; Gay, 2001). The creativity of design in exhibitions is various operations that accompany the complex process of curative representation. Exhibitions do not simply display objects as they are, but various creative representations that can expand the knowledge brought by the exhibition itself. Figure 03 shows the overall mapping of content and objects in the exhibition related to materials and materiality.

FIGURE3

Figure 3. *Identification and mapping of actual-virtual elements in exhibition content*

The multiplication of material representation and materiality, specifically present in this exhibition, into specific forms and shapes. Multiplication can be conceived as an act of making,

which detaches architecture and its objects from a fixed and unchanging condition (Grosz, 1998, 2001; Paramita, 2022). Multiplication does not mean raw duplication, but instead emphasizes transformation that allows for new architecture, as a unity with the preceding aspects (Deleuze & Parnet, 2007; Stanek & Kaminer, 2007). Direct presentation (original materials, processed materials, and material tools) collaborates with indirect artificial and virtual representations of materials. Two hundred forty varieties of raw soil were collected from all over Indonesia, accompanied by virtual representations of photos and videos related to the material. Processed soil material is presented as actual object, including bricks, tiles, panels, powder, and clay. In addition to the actual processed and raw materials, photos and videos demonstrate a multiplication of representations in the form of multimedia content. Material processing equipment, such as molds and cutting tools, are displayed as actual components in the exhibition. The virtuality aspect of these materials is multiplied by photographs, videos, and graphic re-drawings on unique panels.

In general, because materiality is data and information that cannot be directly represented through actual objects, all aspects of it were represented in the exhibition in the form of virtual artificiality. The material production process, which goes through a series of sequences and complexities, is re-represented in three-dimensional models and intensive two-dimensional diagrams. The physical scale model of the Indonesian geography map demonstrates the mapping of each source of raw earth soil materials location. In addition to the virtual multiplication representation in the form of a map, the location of the origin of each material is also exhibited in the form of videos and physical models. The process of raw materials becoming processed materials involves practices carried out by specific local communities of society. The subjects and actors of these materials are represented virtually, through photographs and videos, which are exhibited in customized panels. Materials dialogue with other materials, through tectonic joins that are specific representations of locality. The exhibition features material joints and tectonics that are multiplied in a graphic representation of images on a special surface in the exhibition space. The overall complexity of the material and materiality is constructed through the multiplication of text, which is presented both in physical form and in digital form on the screen. Figure 04 identifies actual-virtual elements in specific contextual scenes from both exhibition periods.

FIGURE4

Figure 4. *Identification of actual-virtual elements in exhibition spatiality*

4.2 Multiplication operation: In-between actual-virtual

According to the results of previous observations and investigations, the multiplication in this exhibition is a process of re-representing aspects of the material context and its materiality. This exhibition occurs through the change and multiplication of substance from the field where material practice actually occurs, into the simulation of material mapping and curation in the form of a spatial model. This process is interesting, especially when mapping the entire flow of transformation from the field source, to its change through the process of multiplication in the object of representation in the exhibition. The aspects of the material and materiality emerge in the actual multiplication, using the material itself directly. Other aspects are transformed in their multiplication into creative virtual representations.

In general, the operation of multiplicative representation is limited to three main categories: raw materials, processed materials, and tools supporting the material processing process. Meanwhile, virtual multiplication representation operations appear in at least seven main categories. Artificial representation, or can be understood as virtual multiplication, includes maps, miniature scale models, photos, videos, diagrams, graphic and textual images. When the connections between them are explored and drawn, the multiplication process occurs in a certain complexity, as aspects of the material and materiality are multiplied into more than one type of representation. Figure 05 shows the relational operations, especially the multiplication of actual-virtual representations in this exhibition.

FIGURE5

Figure 5. *Actual-virtual multiplication operation in exhibition content*

The complex operation of multiplication can be simplified into specific types. Changes in the form of objects occur in the multiplication of aspects in the field into the spatial space of the exhibition. Aspects in the field can generally be categorized into three things: object, subject, and process. Objects include earth materials, processed materials, and supporting tools.

Subjects are the actors in the processing and treatment of various materials. On the other hand, processes include the complex processing of materials, including the production process and joint material tectonics. These three categories become the source of multiplication in the exhibition space.

The exhibition showcases four main categories of multiplication form. These include objects, media, thoughts and models. Objects include land, processed materials and processing tools. The media category includes the forms of exhibition objects documented in photographs and videos. The thought category includes diagrams, drawings and texts, where these multiplicative representations do not simply re-present, but attempt to explain something deeper. The last category is the physical model, where this multiplicative representation emphasizes the demonstration of a particular form of order.

The relationship between the source and the representation in exhibition is a multiplicative operation. The emphasis is on the ability of the exhibition to re-present things in different, variably duplicated forms. Four kinds of multiplication design operations happen in the exhibition, considering the type of connection between them. The first is the operation of representation. Representation means not completely, or appearing partially (Arya, 2019; Whyte, 2007), especially in crucial parts or fragments (Beckmann, 1998; Grosz, 2001). This operation emphasizes the representation of specific fragments to highlight the whole of what it represents. The second operation is visualization. This operation positions the multiplication, on the output in the form of visual media, be it in the form of photos or videos. The third operation is explanation, which emphasizes the dismantling of something to clarify something deeper. The last operation is the simulation operation. This operation not only emphasizes imitative multiplication, but also means dematerialization, and undergoes certain modifications (Baudrillard, 1994; Jecu, 2010). Simulation also means shaping an experience, by enriching existing representations (Eloy, 2022; Miltiadis, 2020). These four operations are illustrated relationally in Figure 06.

FIGURE6

Figure 6. *Variety of relational actual-virtual multiplication operations in exhibition*

4.3 Multiplication relation: Multilevel actual-virtual

The ‘Tanahku Indonesia’ exhibition was organized in two different time periods. The main exhibition was held in 2017, whereupon in 2021, the opportunity emerged to re-exhibit the material substance of this materiality, but in a narrower time and space limitation. Thus, in the process, there was a modification of the various elements and operations that had been observed previously. If the whole process is mapped out, from the beginning of the curation of various materials from the field, especially from almost all regions in Indonesia, an interesting linear relationship is discovered.

Multiplication, as the main basis of the exhibition's deconstruction, has an interesting relationship when reflected on the entire exhibition construction process. Multiplication as an effort of continuous change (Grosz, 1998, 2001; Paramita, 2022), as well as emphasizing transformation that eventually becomes a unity (Deleuze & Parnet, 2007; Stanek & Kaminer, 2007), becomes an interesting basis for interpretation. The relationship between the source collection of the exhibition, and the first, as well as the second, exhibition becomes a series of multilevel / multistage multiplications. This has the potential to be consistently continued on various occasions in the future with the assistance of varied technologies of multiplicative representation.

If the exhibition is positioned as a form of multiplicative operation, then subsequent exhibitions with different and evolving spatial contexts, time contexts, content contexts, become a form of multilevel multiplication. The opportunity to be able to present spatiality with objects and experiences that continue to evolve, but remain strongly related to the original source, makes actual-virtual understanding increasingly complex. This can be understood as a potential reflective reading of the idea of multilevel actual-virtual multiplication. Figure 07 illustrates the interesting relationship between the various exhibitions, as well as the exhibition and its source collection.

FIGURE7

Figure 7. *Multistage actual-virtual multiplication process in exhibition construction*

A unique relationship emerged between the field conditions, the first and second iterations of the exhibition, and the future possibilities. The first relationship was created by an attempt to

map and categorize various elements of earth materials from across Indonesia in the 2017 exhibition. The main multiplicative operation was to present multiple materials and materiality through actual (original) and virtual (artificial) exhibition elements. However, the relationship has evolved in line with the iteration of the second exhibition in 2021. Not all aspects of the 2017 exhibition can be displayed in the 2021 exhibition. The 2021 exhibition is a compressed version due to the limited space and the fact that it is not the main exhibition but a feature and part of a particular event. The elements on display are not the complete collection but only a representative part or fragment. Relation between the two becomes an act of compressing things and presenting them in a different spatial form and order from the previous exhibition, making the multiplication at this stage distinctive. The action to re-present elements in another form of space is illustrated in Figure 08 below. This multiplication has the potential to be continued in future exhibitions, with different contexts, which makes the multiplication strategy of spatial design constantly shifting.

FIGURE8

Figure 8. *Various multiplication processes and iteration process in each exhibition system*

As illustrated above, the exhibition has the opportunity to become a varied multiplication medium. As the exhibition material, the soil is represented in the medium of clear jars to display a variety of textures, colors, and compositions. In the first exhibition, the jars had the opportunity to be displayed on a vertical wall. However, this iterated differently in the second exhibition, where the jars were placed on a low shelf. The visitor's interaction also changes from looking directly at the object to looking at the object below the visual level. The form of visualization is also part of the exhibition. The photos are placed on the wall in the first exhibition, while in the second exhibition, the available medium is on the floor plane to represent a ground concept. Both bring different forms of interaction. Multiplication in the form of an explanation is presented as a diagram of the material processing process. The difference between the two exhibitions is the placement on the wall versus the floor, which varies the interaction of the visitors. The last form of multiplication is simulation, demonstrated through a physical map that simulates the location of each material. There was little difference between the two exhibitions, mainly in the attached and freestanding systems, with similar

visitor interactions. This variety of multiplication presents diverse opportunities for spatial redefinition of design.

Based on the identification, investigation, mapping, and analyses above, three things related to the 'Tanahku Indonesia' exhibition can be synthesized. It relates to the actual-virtual framework in understanding spatial operations based on architectural multiplication. First, in relation to the elements, materials are positioned not only as a single entity, but also as an assemblage of various other invisible entities that are more profound. Material can be positioned not only as a final product but also as the complexity of processes, actors, production, narratives, etc. Secondly, in relation to operations, material as something actual (physical) and materiality as something virtual (non-physical), have the opportunity to be elaborated in depth in the exhibition spatial practice. The operation of multiplying various material contents and materiality, through many creative representation opportunities. Objects that are re-presented as they are can be conceived as actual operations (original artifacts), and various other indirect representations can be conceived as virtual operations (artificial elements). Various multiplicative creativity is demonstrated in the exhibition, such as drawings, graphics, diagrams, scale models, maps and so on. The third is related to the relationship between them, where the design operation of multiplication is multi-level. Temporary exhibitions have the potential to be reappeared on other occasions, even in line with various technological developments in representation. Augmented and virtual reality, for example, can provide a wide range of variants for the multiplication of exhibitions in the future. Thus, understanding exhibition design as an operation of multiplication, in line with the transformation and alteration of the temporary exhibition, into various other forms that may lead to something more novel.

This study positions the virtual not as a technology but as a character of representation strategy. Technology and digital technology are tools but not the main virtual elements. The virtual is not a condition because of technology, but it helps access virtuality better (Jecu, 2015; Kalaga, 2003). However, by the idea of exhibition multiplication as something transformative and multistage beforehand, virtual technology (augmented reality, virtual reality, or mixed reality) may become part of the evolution of this exhibition. Virtual and digital space will present a distinct design operation and a multiplication construction at a future stage. An

entirely virtual exhibition linked to digital representation technology will potentially present localities and materials with a unique and different character.

5 Discussion

In addition to the various identifications of elements, operations and relations of material substance and materiality related to the previous exhibition, interesting discussions emerged that could potentially extend design knowledge. These discussions will be positioned within the understanding of materials and materiality in the context of multiplicative actual-virtual readings within them.

5.1 Material: from actual artifact multiplicated to virtual portal

As a result of the exhibition's deconstruction demonstration above, a new positioning of the material itself can be discussed. However, deeper than that, material itself has the potential to be positioned as a virtual portal (Kalaga, 2003). The portal referred to here is that an actual object opens up various other invisible virtual entities, in the form of data and information (Hosoya et al., 1997; Howes et al., 2018; Miltiadis, 2020; Mitchell, 2005) that can be presented in its disassembly. Reading a material not only on its physical limitations, but more deeply on various other non-physical aspects (Jecu, 2015; Mitchell, 1996), as a reflection of a complex and contextual practice (Rose & Tolia-Kelly, 2016). Material is transformed from an actual artifact, to a broader virtual reading.

Through the 'Tanahku Indonesia' exhibition, earth materials and their various processing can not only convey the narrative of form and configuration. Earth materials can also open various other portals, such as material production, various processing tools and devices, processing subjects or actors, and various other things. The illustration of the position of material as a portal reinforces the discussion of material itself as one of the greatest potentials in the discussion of spatial practices. Figure 09 illustrates the position of material as an opening to access various other things that are not directly visible, which are closely related to it.

FIGURE9

Figure 9. *Actual material as portal to access many virtual related entities*

5.2 Materiality: from actual practice multiplicated to virtual knowledge

Reflecting on the exhibition practice above, the understanding of materiality tends to be positioned in terms of the deep things that precede the material itself. Materiality even tends to emphasize culture, especially in the discussion of locality related to materials (Loschke, 2016; Picon, 2003a). Materiality is not just about form and type, but includes transformation, context and various practical knowledge that is closely related to it (Author, 2020; Frampton, 1993). Materiality will always be about practice, the whole complex process of material realization (DeLanda, 2015; Ingold, 2007; Renfrew et al., 2005). Through reflection on the exhibition in the study above, materiality has the potential to be positioned not only as a discussion of process and practice, but also on the construction of knowledge that emerges from it. Knowledge becomes virtual, invisible, but can be extracted into a deriving knowledge for the development of practice.

Through the 'Tanahku Indonesia' exhibition, the complex materiality of land as an earth-based material is not just a documentation of practice. But more deeply, the exhibition documenting practices that can then be formulated into a deep set of knowledge. The presence of multiplicative forms of representation such as diagrams, models, and various other things, emphasizes the position of materiality as an actual practice, shifting into a virtual knowledge that can be accessed at any time. Figure 10 illustrates the position of materiality that discusses the practice of processing materials from raw to processed, into a practical knowledge that can be formulated and demonstrated through various creative multiplications.

FIGURE10

Figure 10. *Materiality as documentation of process that can be positioned as set of knowledge*

5.3 *Materialscape*: from actual location multiplicated to virtual mapping

Based on the reflection of the context of the 'Tanahku Indonesia' exhibition practice, the emphasis on the collectivity of material collections in the geographical landscape of Indonesia,

which is an archipelago, makes location the most important aspect of local land materials. *Materialscape* (or material landscape) is an idea related to the mapping of materials based on diverse origins into a deep information and site specific data map (Author, 2020; Johanes & Wahid, 2018). Material is not just a form, but rather specific data and information (Hosoya et al., 1997; Howes et al., 2018; Miltiadis, 2020; Mitchell, 2005). The virtual can be understood as an attempt to map the relationship between actual objects (Braga, 2019; Busch, 2016; Kalaga, 2003). The relation of the material to the context of its place becomes so intense, both in the discussion of its embodiment and in its processed-based design (DeLanda, 2015; Paramita et al., 2022; Picon, 2020; Vahdat, 2022). Through reflection on the exhibition above, a new position on the materialscape itself can be proposed, which is from data and location information, to a virtual mapping that shows the richness of a complex region. The material landscape is a mapping of the distribution of material sources and potentially, a database for future designs contextual to each place.

The collectivity of materials collected into a representative entity is not only able to show a form of richness. However, deeper than that, the actual location-based mapping carried out, becomes a collective collection of data and information that is virtual, invisible, but the relationship between them can be represented. This relationship is crucial, because the material and all the richness of its context, is one of the design basis that delivers contextuality as its important manifestation. Figure 11 illustrates how a location mapping can appear and have a crucial position as a landscape of data and information, which has the potential to be one of the basis of future contextual design.

FIGURE11

Figure 11. *Collectivity of materials is not just a collection, but a database of contextual knowledge*

The discussion of material, will relate materiality as an inseparable relationship. In certain geographical contexts, the collectivity of materials and materiality presents a deeper discussion on the idea of *materialscape*, a landscape of data and information as the basis of contextualized design. In an actual-virtual framework, discussing materials in the context of exhibitions presents a variety of crucial new positions. The exhibition as a discourse that has

the potential to generate various extensions of knowledge is particularly demonstrated through the dismantling of this study. More deeply, various multiplicative operations in exhibitions have the potential to present a variety of varied spatialities, especially with the support of various rapid representation technologies in the future.

6 Conclusion & implication

This study reflects on exhibition practice as a demonstration of multiplication abstract ideas in practical architectural spatial design. The concept of multiplication can be demonstrated through identifying the elements, their operations, and various connections between objects in the exhibition. In addition, this study offers three concepts. First, the idea of multiplication opens up opportunities to read objects as portals to access various knowledge behind them. Second, multiplication is a design operation that constructs representation-based space. Third, the multiplication connection allows multiple spatial reproductions in different time dimensions. Multiplication becomes the basis of reading and generating designs based on multi-layer representations in architecture.

This study reveals a new perspective that extends the understanding of the actual-virtual as a multiplication connection that works on research and design practice. Exhibitions are no longer just a showcase for spatial design creativity or a form of knowledge discussion; they also have the potential to be explored as a practical set of design operations that are relevant to various design contexts and issues. This framework concept of multiplication can be applied to object-based spatial practices with multiple layers of information behind them. As the basis of design operations, multiplication can offer various forms of representing information in the exhibition content.

This study expands the understanding of multiplication theory as an abstract thought on an operational and technical basis of design discourse. The exhibition becomes the spatial practice of multiplication, which positions objects not as singular but as varied and potentially present in various creative forms and formats. This study expands the understanding of locality through observing the culture of their material-materiality and its multiplication in the exhibition as a knowledge of the production design process.

This study is limited to a specific case study, which comes with all kinds of limitations. The potential sustainability of this study is in the intervention of various representation

technologies related to multiplicative operations that will become more intensive in the future. In addition, local contexts in other regions that are different also have the potential to be provisions for further in-depth studies. The diversity of local practices can collectively encourage the development of knowledge itself. The exhibition is one form of strategic multiplication practice to be contemplated as a form of knowledge construction that continues to expand.

References

Abdelhameed, W. A. (2013). Virtual reality use in architectural design studios: A case of studying structure and construction. *Procedia Computer Science*, *25*, 220–230. https://doi.org/10.1016/j.procs.2013.11.027

Alexander, C. (1977). *A pattern language: towns, buildings, construction*. Oxford university press.

Arya, R. (2019). *Virtual Space* (pp. 137–156). https://doi.org/10.1002/9781119112297.ch7

Author (2020)

Author (2021)

Author (2022)

Author (2023)

Battista, K. (2021). The White Cube in Virtual Reality. *Architectural Design*, *91*(3), 102–111. https://doi.org/10.1002/ad.2699

Baudrillard, J. (1994). *Simulacra and simulation*. University of Michigan press.

Beckmann, J. (1998). *The Virtual Dimension: Architecture, Representation, and Crash Culture*. Princeton Architectural Press.

Betsky, A. (2005). From Box to Intersection. In *Disappearing Architecture* (pp. 250–257). Springer.

Bolton, G. (2006). Narrative writing: reflective enquiry into professional practice. *Educational Action Research*, *14*(2), 203–218.

Braga, J. (2019). Imagination and Virtuality. On Susanne Langer's Theory of Artistic Forms.

Conceiving Virtuality: From Art To Technology, 81–93.

Brown, A., & Szacka, L. C. (2019). The Architecture Exhibition as Environment. *Architectural Theory Review*, *23*(1), 1–4. https://doi.org/10.1080/13264826.2019.1616369

Busch, B. T. (2016). *Curating Architecture : The Architecture of Estrangement Alison Hugill in conversation with Carson Chan*. *31*, 47–51.

Cai, G., Xu, L., Gao, W., Wang, K., Hong, Y., & Wang, Y. (2022). Knowledge archaeology on relations between the Venice Architecture Biennale (1980–2018) and the Pritzker Architecture Prize (1979–2019). *Journal of Asian Architecture and Building Engineering*, *21*(2), 224–233. https://doi.org/10.1080/13467581.2020.1869010

Carpo, M., & Lemerle, F. (2013). *Perspective, projections and design: technologies of architectural representation*. Routledge.

Chaturvedi, A. R., Dolk, D. R., & Drnevich, P. L. (2011). Design principles for virtual worlds. *MIS Quarterly: Management Information Systems*, *35*(3), 673–684. https://doi.org/10.2307/23042803

Cook, P. (2013). Looking and drawing. *Architectural Design*, *83*(5), 80–87.

Creswell, J. (2018). *Qualitative inquiry & research design : choosing among five approaches*. SAGE.

De Souza, R. C. F. (2019). Case Studies as method for architectural research. *Accessed On*, *19*.

DeLanda, M. (2015). The new materiality. *Architectural Design*, *85*(5), 16–21. https://doi.org/10.1002/ad.1948

Deleuze, G. (1994). *Difference and repetition*. Columbia University Press.

Deleuze, G. (2002). The Actual and The Virtual." Translated by Eliot Ross Albert. *Dialogues II*.

Deleuze, G., & Parnet, C. (2007). *dialogues II*. Columbia University Press.

Deutsch, D. (2005). The Architecture of the Multiverse. In *Disappearing Architecture* (pp. 24–29). Springer.

Eloy, S. (2022). *Virtual aesthetics in architecture : designing in mixed realities*. Routledge.

Frampton, K. (1993). 20 Toward a Critical Regionalism: Six points for an architecture of resistance. *Postmodernism: A Reader*, *268*.

Frayling, C. (1993). Research in Art and Design. In *Royal College of Art Research Papers* (Vol. 1, Issue 1, pp. 1–5).

Gadanho, P. (2010). On Curating Architecture As Critical Practice. *Abitare*, 506.

Garrido Castellano, C. (2014). Conceptual Materialism: Installation Art and the Dismantlingof Caribbean Historicism. *Third Text*, *28*(2), 149–162.

Gay, P. (2001). Installation art: actual meets virtual. *Digital Creativity*, *12*(4), 229–235. https://doi.org/10.1076/digc.12.4.229.3217

Groat, L. N., & Wang, D. (2013). *Architectural Research Methods*. Wiley. https://books.google.co.id/books?id=0jADDQAAQBAJ

Grosz, E. (1998). Thinking the new: Of futures yet unthought. *Symplok{\=e}*, *6*(1/2), 38–55.

Grosz, E. (2001). *Architecture from the outside: Essays on virtual and real space*. MIT press.

Hosoya, K., Kato, Y., Kawanobe, A., Kakuta, S., & Fukuhara, Y. (1997). A collaborative educational environment based on a multi-user virtual space. *Systems and Computers in Japan*, *28*(8), 1–7.

Howes, D., Clarke, E., Macpherson, F., Best, B., & Cox, R. (2018). Sensing art and artifacts: explorations in sensory museology. *Senses and Society*, *13*(3), 317–334. https://doi.org/10.1080/17458927.2018.1516024

Ingold, T. (2007). Materials against materiality. *Archaeological Dialogues*, *14*(1), 1–16.

Jecu, M. (2010). Concepts Are Mental Images: The Work as Ruin. *E-Flux Journal*, *18*.

Jecu, M. (2015). Architecture and the Virtual. In *First Monday* (Issue SPEC. ISS. 5).

Johanes, M., & Wahid, A. R. (2018). Tanahku Indonesia: Celebrating the indigenous interior. *Interiority*, *1*(1), 79–86. https://doi.org/10.7454/in.v1i1.10

Kalaga, W. (2003). The trouble with the virtual. *Symplokē 11*, *11*(1/2), 96–103. http://www.jstor.org/stable/40536937.

Kraus, K., Hansen, D., Bonsignore, E., Ahn, J., Koepfler, J., Frew, K. K., Pellicone, A., & Holl-Jensen, C. (2015). *Mixed-Reality Design for Broken-World Thinking*. JSTOR.

Lee, S. (2015). Virtual space and national division: Crow's Eye View: The Korean peninsula at the Venice architecture Biennale (2014). *Journal of Korean Studies*, *20*(2), 291–332.

https://doi.org/10.1353/jks.2015.0018

Liapi, K., & Liosi, D. (2021). *An Immersive Modular Museum-Archive Concept Model-An integration of shape grammars with virtual reality*.

Loschke, S. K. (2016). *Materiality and architecture*. Routledge.

Lucas, R. (2016). *Research methods for architecture*. Hachette UK.

Lucas, R. (2019). *Drawing Parallels: Knowledge Production in Axonometric, Isometric and Oblique Drawings*. Routledge.

Mccabe, H. (2019). We Have Always Been Virtual: Gilles Deleuze and the Computer-Generated Image. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3359852.3359895

Miltiadis, C. (2020). Oblivious to Gravity: Virtual Architecture between disciplinary dead ends and complex intersections. *Archi DOCT*, *July*.

Mitchell, W. J. (1996). *City of bits: space, place, and the infobahn*. MIT press.

Mitchell, W. J. (2005). Constructing an authentic architecture of the digital era. In *Disappearing Architecture* (pp. 80–89). Birkhäuser.

Moural, A., & Hassan, R. (2021). Virtual Reality in Landscape Design: Findings From Experimental Participatory Set-Ups. In *Virtual Aesthetics in Architecture* (pp. 150–155). Routledge.

Nash, A., Geck, K., & Miller, A. (2021). Virtual interiorities. *Interiority*, *4*(2), 207–222. https://doi.org/10.7454/in.v4i2.153

Nathania, K., & Wahid, A. R. (2022). Spatialising time: Perceiving multiple layers of time in narrative environment. *ARSNET*, *2*(2), 108–123.

Norberg-Schulz, C., & Borsano, G. (1980). *Genius Loci: Towards a Phenomenology of Architecture*. Rizzoli. https://books.google.co.id/books?id=FlYkAQAAMAAJ

O'Neill, P. (2007). The curatorial turn: From practice to discourse. *Issues in Curating Contemporary Art and Performance*, *25*.

Papasarantou, C. (2020). The notion of Mixed Embodied Presence as a variable for generating mixed environments. *Archi DOCT*, *July*.

Paramita, K. D. (2022). Architecture as a projection of multiplicities. *ARSNET*, *2*(2), 82–87.

Picon, A. (2003a). *Architecture and the virtual: towards a new materiality?*

Picon, A. (2003b). Architecture and the Virtual. In *Thesis. Wissenschaftliche Zeitschrift der Bauhaus-Universität Weimar* (pp. 106–111).

Picon, A. (2020). Beyond Digital Avant-Gardes: The Materiality of Architecture and Its Impact. *Architectural Design*, *90*(5), 118–125. https://doi.org/10.1002/ad.2618

Picon, A. (2021). *The materiality of architecture*. U of Minnesota Press.

Rendell, J. (2007). Critical spatial practice: Curating, editing, writing. *Issues in Curating Contemporary Art and Performance*, 59–75.

Renfrew, C., Gosden, C., & DeMarrais, L. (2005). Rethinking materiality. *Cambridge: McDonald Archaeological Institute*.

Rose, G., & Tolia-Kelly, D. P. (2016). Visuality/materiality: Introducing a manifesto for practice. In *Visuality/materiality* (pp. 1–11). Routledge.

Schon, D. A., & DeSanctis, V. (1986). *The reflective practitioner: How professionals think in action*. Taylor \& Francis.

Spiller, N. (2020). Cyberspace: Speculative Futures of the Recent Past. *Architectural Design*, *90*(3), 128–133. https://doi.org/10.1002/ad.2579

Stanek, L., & Kaminer, T. (2007). Trans-disciplinarity: The Singularities and multiplicities of architecture. *Footprint*, *1*, 1–5.

Thomas, K. L. (2006). *Material matters: Architecture and material practice*. Routledge.

Thomas, K. L. (2010). *Building materials: conceptualising materials via the architectural specification*. Middlesex University.

Till, J. (2006). *British pavilion • venice architecture biennale 2006 • a proposal echo cities*.

Till, J. (2012). Is doing architecture doing research? *4IAU 4ª Jornadas Internacionales Sobre Investigación …*, 1–9.

Tilley, C. (2007). Materiality in materials. *Archaeological Dialogues*, *14*(1), 16–20.

Vahdat, V. (2022). Meta-Virtuality: Strategies of Disembeddedness in Virtual Interiorities.

Journal of Interior Design, 1–14. https://doi.org/10.1111/joid.12230

Verbeke, J. (2013). This is research by design. In *Design research in architecture* (pp. 137–160). Routledge.

Wahid, A. R., Yatmo, Y. A., & Paramita, K. D. (2020). More than Just a Material Perfection: Preserved Human-Environment Relationship in Traditional Brick-Making Scenarios. *Journal of Physics: Conference Series*, *1655*(1). https://doi.org/10.1088/1742-6596/1655/1/012125

Wells, L. (2007). Curatorial strategy as critical intervention: the genesis of facing east. *Issues in Curating Contemporary Art and Performance*, 28–43.

Whyte, J. (2007). *Virtual reality and the built environment*. Routledge.

Wigglesworth, S. (2005). Critical practice. *The Journal of Architecture*, *10*(3), 335–346.

Wigglesworth, S., & Till, J. (1998). *The everyday and architecture*. *134*, 6–9.

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