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An innovative product design strategy: The technique of "insightful design"

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ABSTRACT

This study introduces "Insightful Design," a novel design methodology aimed at fostering creativity in product development. The proposed method incorporates four key steps: Ideation, Insight, Bricolage, and Integration, effectively capturing the iterative funnel-shaped process of design thinking through alternating divergent and convergent phases. The methodology begins with Ideation, generating abundant solutions to user problems. The Insight phase enables designers to identify links between user needs and solutions, streamlining the process and reducing the time required for systematic comparisons. Bricolage facilitates semi-intuitive matching of needs and solutions, promoting creative connections. Finally, the Integration step merges these elements into cohesive, innovative design outcomes. The effectiveness of this method was validated through its application to five designs that were recognized in competitions themed by the Taipei World Design Capital. These results highlight the method's ability to enhance creativity, linking user-centric needs with innovative solutions. "Insightful Design" offers a robust framework for tackling complex design challenges, advancing the practice of design thinking.

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1. Introduction

Creativity is a latent natural attribute inherent to all humans. In [1] the author defines it as follows: "Creativity refers to the ability to grasp a problem, combine and integrate various pieces of information to solve the problem, and generate new value on a social or personal level". Creativity, like intelligence, is possessed by everyone, though the degree varies among individuals.

This creative research combines the concepts of divergent and convergent thinking methods and bricolage during the process of logical creative thinking to form a "conceptual product creation process for insight design" that helps thinkers develop problem-solving skills for four main issues. Based on this, the following points are proposed:

1- Create a set of creative thinking tools.
2- Introduce these creative thinking tools to produce five creative works to verify the correctness of the tool principles.
3- Participate in competitions and exhibitions with the five creative works to gain more design recognition.

2. Methods

2.1. Techniques of creativity

From the origins of creativity studies, research on creative techniques began with creative engineering and gradually took shape in the development of creativity using psychology as a blueprint. It is precisely because various countries have summarized principles, techniques, and methods of creativity based on the developmental laws of creative thinking proposed by creativity scholars, and have crystallized many creative techniques, that creativity studies have been able to develop and mature continuously.

Therefore, creative techniques are scientific methods with broad application value for developing and nurturing creativity.

According to [2], a technique or skill is a specific method or technique. Learning creative techniques is akin to learning to use a tool, such as methods of frying, deep-frying, or simmering in cooking, which have specific steps, principles, and precautions, making the concept relatively straightforward.

International statistics show that humans have created over 340 techniques. Japanese creativity scholar [1], using J.P. Guilford's thinking model as a blueprint, divided the original divergent techniques (conceiving facts or ideas through divergent thinking) and convergent techniques (integrating facts or ideas conceived through divergent thinking) into two forms of existence: one is the "integrated technique" that combines divergent and convergent thinking methods into one group, and the other is the "attitude technique," which approaches from psychological traits, specifically creative attitudes. These are divided into four categories, as shown in Figure 1.

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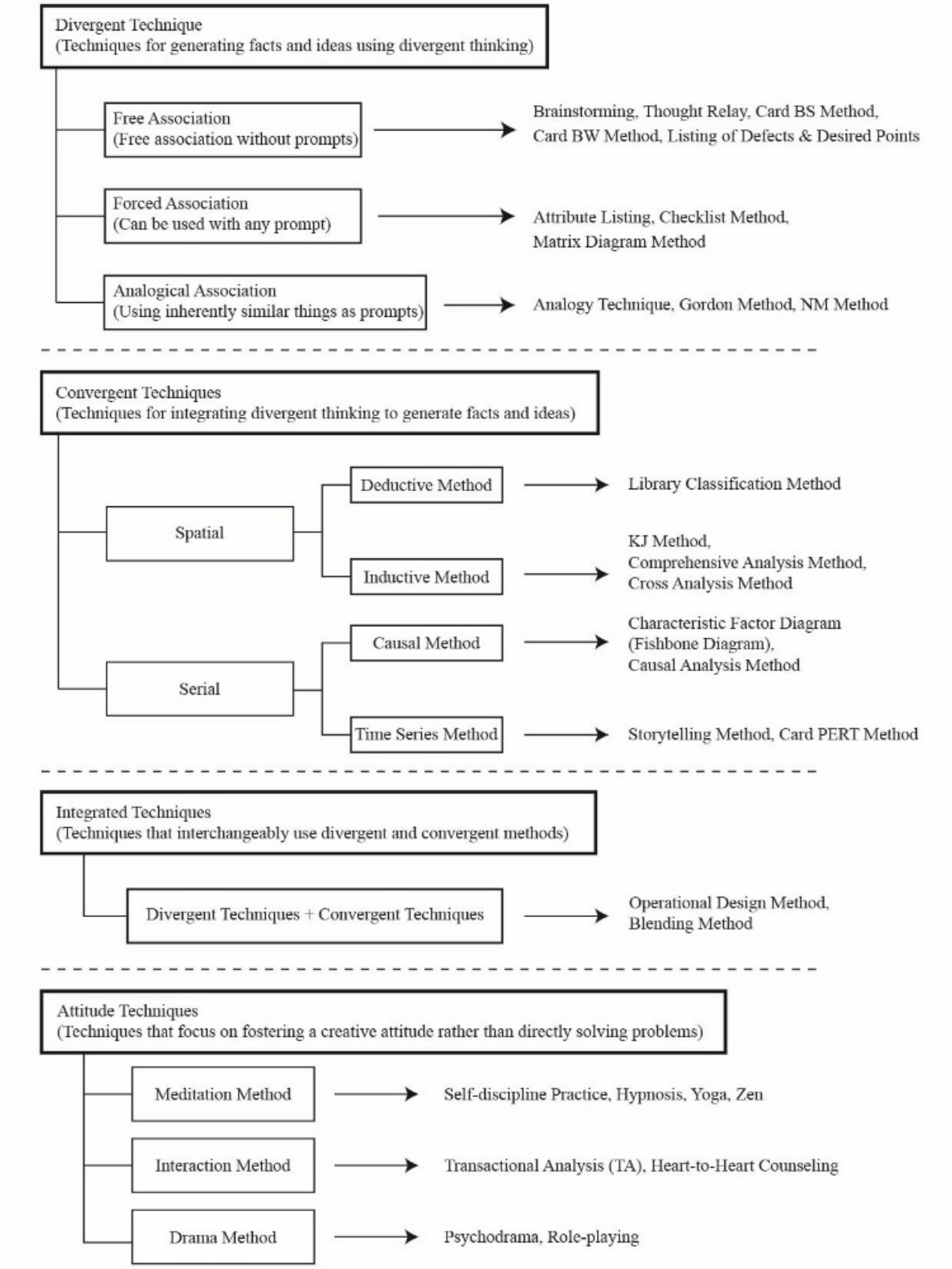

Figure 1. Diagram of the organizational structure of creative techniques.

2.2. Insightful design

The construction of the exploration and discovery process requires a method to integrate and systematize it. The design methods mentioned above can be analyzed to show that, under the operation of human logical thinking, the continuous search for suitable solutions brings many creative and meaningful things to life.

According to Guilford's Structure of Intellect model applied to thinking operations, the overall relationship covered by the design method focuses on the theme, ensuring that the result of the theme is affected by the thinking operation, thereby producing an "insight" effect.

The term "insight" comes from Middle English "inner sight," meaning a deep understanding of the true nature of something. Author in [3] pointed out that “insight” is not data but an attempt to derive understanding from observation to pursue innovation. In psychology, German Gestalt psychologists noted that "insight" is a term that refers to the process of sudden understanding or comprehension in problem-solving.

Therefore, from the Chinese and English definitions, it can be seen that the process of thoroughly and perceiving things is the "process" (cause), and discovering and obtaining "insights" is the result (effect) of "insight." Consequently, the design methods used in the observation, deconstruction, and combination of thinking processes can gather and clarify insights into things, which can be specifically depicted in tables and images to facilitate decision-making.

2.3. Insight design tool concept

The process of creativity follows an understanding of existing things, constantly adhering to the observation of whether value can be enhanced and closer to users' needs. It involves creating innovative combinations with limited resources to benefit the survival of businesses, which in the field of management is defined as the concept of "Bricolage." The term "Bricolage" comes from French and was first introduced by the French anthropologist Claude [4]. In his book, author described it as the work of a handyman who "does odd jobs" and "repairs things" using handcrafting methods, patchwork, and other bricolage work styles. Some dictionary also defines it as a form of work constructed using whatever materials are at hand (a way of shaping or thinking structure).

According to authors in [5], the bricolage perspective examines the process by which entrepreneurs establish new businesses and create new opportunities, maximizing benefits under resource constraints. Author in [6] explained that, in essence, bricolage involves using existing items or mismatched tools or parts, improvising or reassembling them to find new value, thus establishing new combinations or material usage concepts [4,6]. Additionally, authors in [7] and in [5] followed Lévi-Strauss's concept and summarized three key characteristics of bricolage (as shown in Table 1):

- Resource at hand
- Recombination of resources for new purposes
- Making do.

Table 1: Summary of the three key elements of bricolage (compiled in this study).

Overview of the three key elements of bricolage	Description
Resource at hand	Advocates using existing resources on hand to address immediate needs, enabling the establishment and development of various industries. In short, it serves as an alternative solution. These readily available resources can be proactively used to piece together new opportunities.
Recombination of resources for new purposes	Without a specific purpose, this involves re-examining tools or materials by combining unrelated resources to create new uses.
Making do	Involves reorganizing relevant tools or material resources that one already possesses. This approach is akin to "Do it yourself". It does not involve exploring new definitions or acquiring new resources, but rather passively utilizing all accessible resources on hand without external assistance.

Based on this study's investigation, author in [5] concluded that the root of Bricolage lies in "a refusal to accept limitations" and "making do by applying combinations of the resources at hand to new problems and opportunities." The original motivations of "refusing to bow to limited resources" and "using available resources to solve new problems or seize new opportunities" stem from an innovative spirit and insights that involve cross-disciplinary resource integration, rather than the unintentional piecing together of materials to generate creativity.

Moreover, "Bricolage" often carries a negative connotation of being arbitrary or careless, which does not accurately convey its true meaning. There is no unified translation of this term in the field of management, with some scholars translating it as "improvised creation." Therefore, this study redefines "Bricolage" as " Qiaobin", which more accurately aligns with the original meaning.

Based on the section on creative thinking and Guilford's Structure of Intellect model, which emphasizes divergent and convergent thinking processes, this creative research uses "insight" as the angle. It formulates strategies based on observed problems, establishing a set of design methods defined as "resources" by integrating the concept of Bricolage as proposed by Bill Buxton and other scholars [8] in "Sketching User Experiences," and incorporating Stuart Pugh's Design Funnel from 1990.

Compared to Stuart Pugh's Design Funnel, which only provides a broad process from idea generation to convergence to ensure the optimality of ideas, it lacks specific examples for practical operation. The new funnel introduces "thinking tools," reinterpreting the creative ideation process as the foundational workflow for "insight design"

creative research. This process begins with generating initial insights through divergent ideation and data analysis. Then, during the convergence phase, semi-intuitive Bricolage based on the generated insights is performed, blending and nurturing new creative ideas, as illustrated in Figure 2.

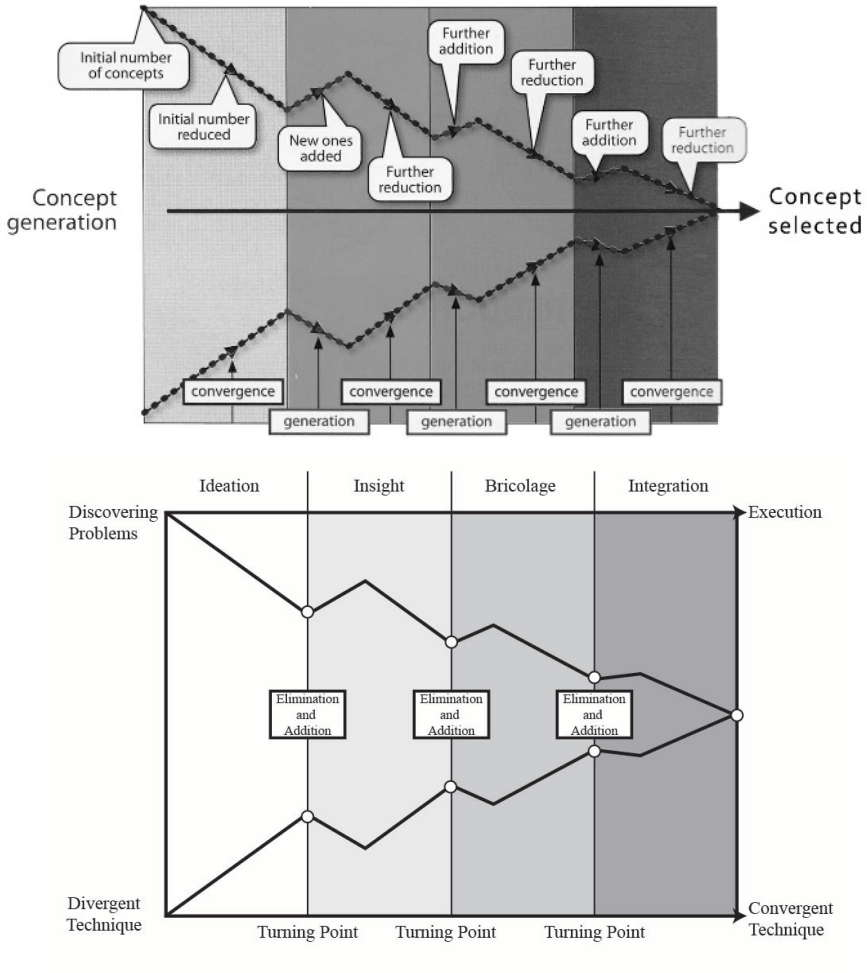

Figure 2. Comparative diagram of insight thinking and convergence.

3. Results and discussion

3.1. Insightful design process

The early stage "Forced Association Matrix Method" and the later stage "Morphological Analysis Matrix Chart" were established using the Bricolage combination approach. Utilizing the funnel-shaped framework, the source of new insights was analyzed.

This involves reconfiguring existing resources and deconstructing the forms and styles of objects, continuously seeking changes, and merging to create new uses, thereby effectively achieving complementary effects. Thus, the creative method in this chapter is carried out sequentially in four steps:

- Step 1: Define the theme focus to thoroughly explore the issue.
- Step 2: Use the "Forced Association Matrix Method" to embed the thematic attribute feature variables into the matrix chart.
- Step 3: Similar to Step 2, select one of the new insights described after the forced association from the three initial focus points.
- Step 4: Clearly outline the new concept's morphological contour and execute the design plan.

3.2. Case study-dice blocks

- Concept development: Educational toys are a type of game that primarily focuses on reasoning, knowledge, and wit. In the busy sphere of life, many pressures related to emotions, work, family, and other factors drive people to seek stress relief time to reduce their burdens.

  The forms of stress relief are diverse, ranging from indoor tabletop games to outdoor walks. Games provide an immediate and direct way to relieve stress, aiming to offer varied toy features that can meet the need for "play anytime, anywhere." Therefore, the theme focus of this creative process is identified as: enhancing combinable educational toys, as shown in Figure 3.

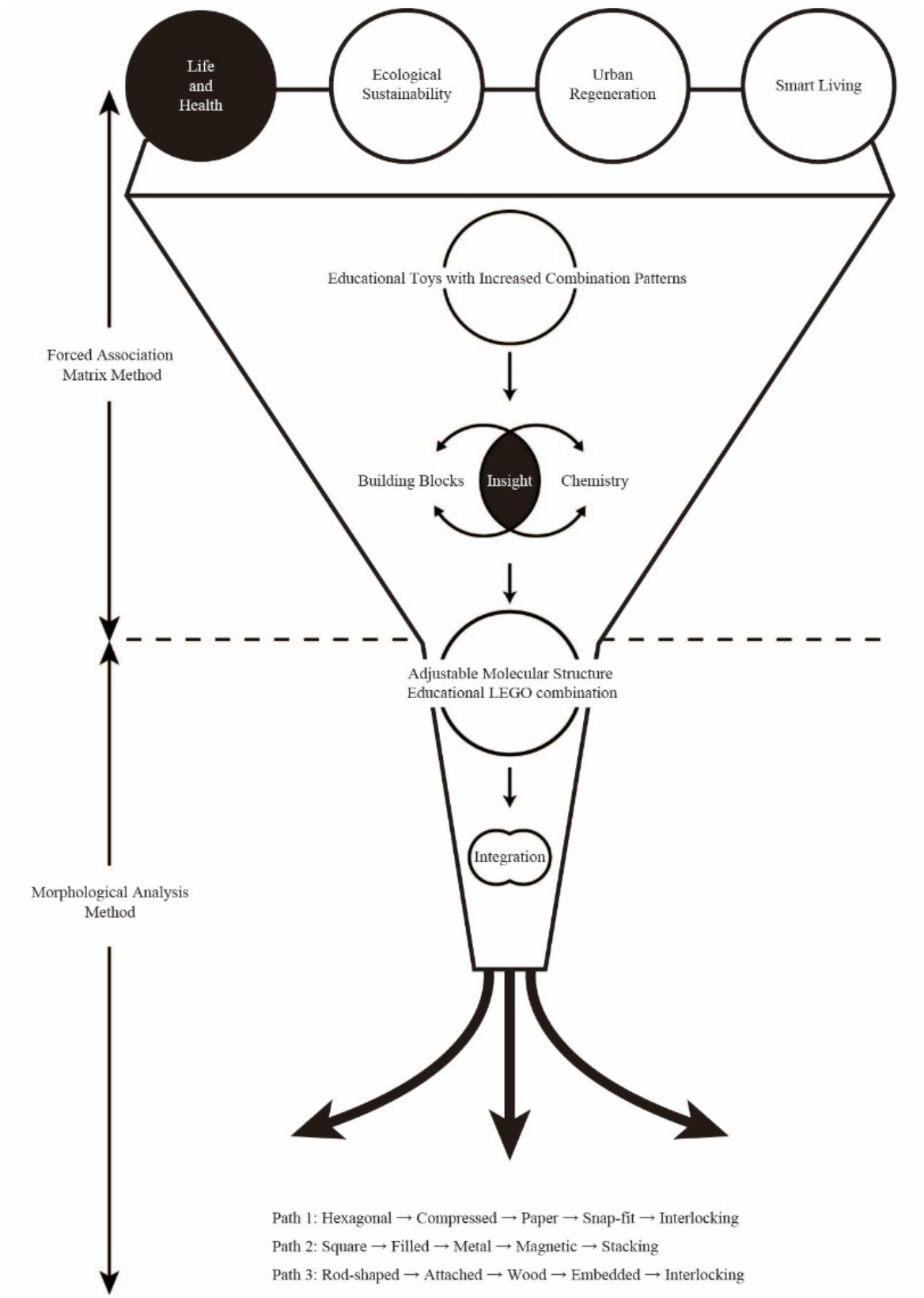

Figure 3. Dice blocks insight design process flowchart.

3.3. Design operation

By combining elements, the main idea was to set the horizontal axis target as: building blocks, and the vertical axis as: chemistry. This intersection yielded developmental elements with educational and experimental attributes, resulting in three solutions. These are:

4- Tubular connection educational LEGO set

5- Chromosome-shaped educational flower pieces set

6- Adjustable molecular structure educational LEGO set

These descriptions will aid in proceeding to the next convergent deconstruction stage, as shown in Figure 4.

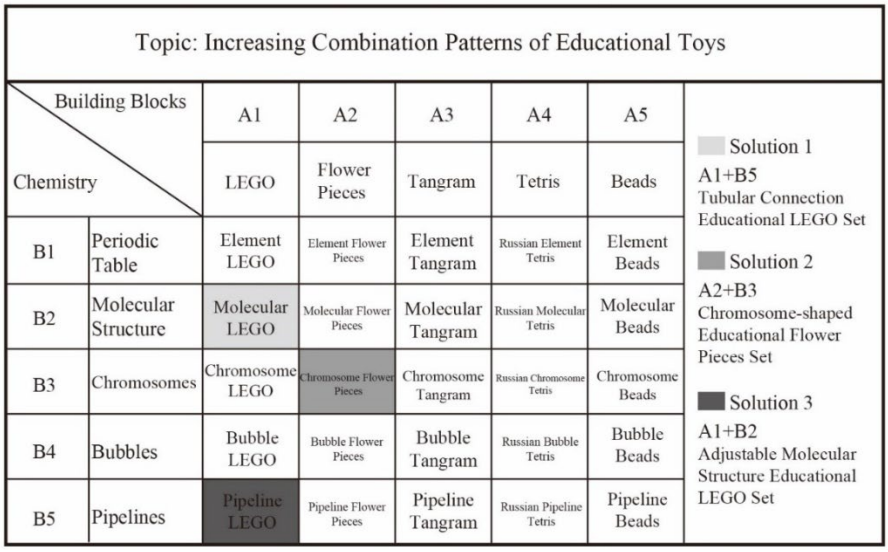

Figure 4. Dice blocks forced association matrix chart.

Based on the insights generated, the "adjustable" feature of Solution Three helps increase the developmental application of angular variations and can further refine and deconstruct the described insights. The deconstruction elements of the adjustable molecular structure educational LEGO combination (A1+B2) include: molecular structure, portability, material, combination method, and play method. Each element is sequentially integrated to produce three paths, as shown in Figure 5.,

which display different variable connections:

- Path 1: Hexagonal → Compressed → Paper → Snap-fit → Interlocking
- Path 2: Square → Filled → Metal → Magnetic → Stacking
- Path 3: Rod-shaped → Attached → Wood → Embedded → Interlocking

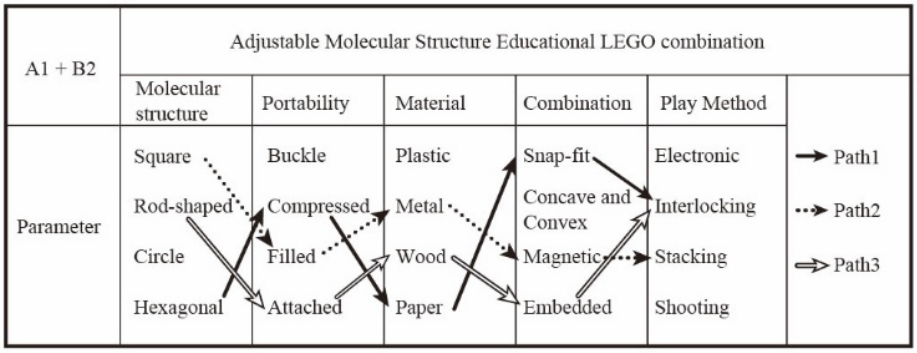

Figure 5. Dice blocks morphological analysis matrix chart.

3.4. Design concept

The three paths have clearly integrated to form the morphological insights for the "Adjustable Molecular Structure Educational LEGO Set." After discussion with the design team, it was decided to proceed with Path 2 for sketching and select Solution 2 for the 3D simulation rendering, completing the experimental creation, as shown in Figure 6. Building block games can enhance players' creativity by stimulating their imagination. Compared to other types of building blocks, this is a metal building block set. It significantly improves in terms of texture and refinement, making it suitable for adults. By utilizing the unique indentations of the dice and the principle of magnetic bead attraction, it can create more diverse combinations comp-

ared to existing building blocks, as shown in Figure 7.

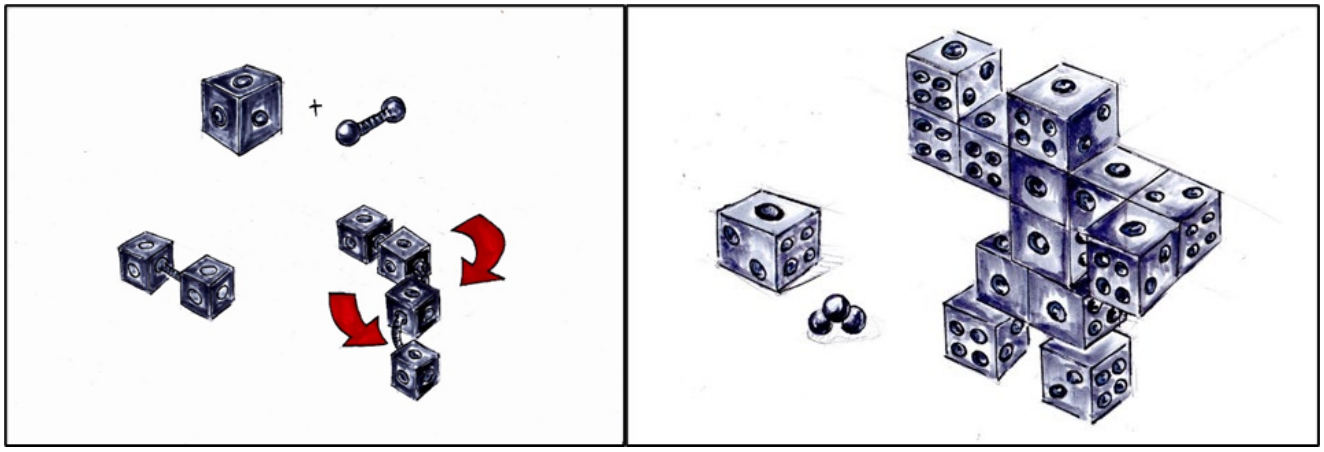

Figure 6. Concept sketch of "adjustable molecular structure educational LEGO Set" solution 1 and solution 2.

Figure 7. Dice blocks design and creation.

3.5. Concept approach

In the busy sphere of life, many pressures related to emotions, work, family, and other factors drive people to seek stress relief time to reduce their burdens. In this design case, the goal is to address the need for "play anytime, anywhere" by providing a toy with versatile features that cater to stress and relief. Therefore, the primary design considerations are small size and easy portability.

3.6. Bricolage integration

This creation takes the form of building blocks, using six faces as the development basis. The corresponding Bricolage object is the adjustable molecular structure educational LEGO set.

Due to the chemical nature of mixing and the experimental spirit it embodies, users can determine the combination direction based on the six faces of the blocks during play. Overall, the six faces of the blocks determine the stress-relief method.

3.7. Overall shape

The design uses the six faces of a dice as the basis for stress relief. The faces are machined from metal with semi-circular holes milled according to the dice points, allowing magnetic beads to be inserted into the holes to achieve different combination forms.

Through simulated combinations, various styles can be created, confirming that the variability in angles is a key feature of this design. The extent of stress relief will need further investigation through user experience to understand the feelings during play.

4. Conclusion

This creative thesis includes 20 creative works and one prototype product. Through an exhibition held over more than a month both on and off campus, it was found that most visitors resonated with and felt the need for the four major themes.

Feedback on the creative works was obtained, fulfilling the concept of the insight design process and providing creative thinkers with a clear direction. Additionally, according to the case studies that results in different findings as shown in the provided figures, and other works have received recognition and feedback in international design awards, demonstrating the applicability of this method. Based on the theoretical foundation and creative process of this study, the following results are proposed:

- The four steps of "Insight Design" ideation, insight, bricolage, and integration are conducive to practical design implementation: The four steps of the "Insight Design" method, ideation, insight, bricolage, and integration further explain the iterative divergent and convergent processes forming the existing design thinking model, facilitating practical design implementation.
- Insights generated from the problem and need analysis help to avoid subsequent step-by-step comparisons of solutions: Insights derived from problem and need analysis help identify the relationships between problems, needs, and solutions, thus avoiding time-consuming step-by-step comparisons of solutions.
- The bricolage step aids in quickly and semi-intuitively matching problems with solutions: The bricolage step assists in semi-intuitively and swiftly matching problems and needs with solutions.
- Integrating insights and bricolage is beneficial for forming creative outputs: Integrating insights and bricolage allows for appropriate solutions to complex problems, fostering creative outputs.

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