From Form to Meaning in Basic Design Studio 🔶

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Abstract

Early design education typically focuses on developing visual literacy through formal principles; however, the systematic integration of conceptual thinking into this process remains limited. Based on the hypothesis that conceptual scaffolding transforms how basic design students employ formal principles, this study investigates how conceptual frameworks function as pedagogical tools through a two-phase studio experiment. In the first phase, 35 first-year architecture students produced visual compositions by intuitively applying principles such as balance, rhythm, and contrast; in the second phase, they reinterpreted these principles through paired conceptual themes-order/chaos, tension/calmness, and introversion/extroversion-as vehicles for meaning-making. Paired visual compositions and short reflective texts were examined through qualitative interpretive comparison, and 18 paired works were purposively selected to represent diverse visual strategies, conceptual interpretations, and levels of compositional complexity. The findings show that conceptual framing altered how students applied fundamental design principles. While first-phase compositions primarily relied on symmetry, repetition, and formal balance, second-phase works demonstrated a more conscious compositional hierarchy, integrated use of multiple principles, and stronger conceptual interpretation. These improvements in compositional clarity, application of principles, originality, and conceptual depth indicate a shift from formal production toward reflective and critical awareness. Accordingly, the study reveals that the basic design studio serves not only to develop aesthetic competence but also to foster conceptual thinking, cognitive awareness, and meaning-making. The results further suggest that conceptual thinking functions as an interface bridging cognitive and emotional learning in early design education, forming the basis for a new model of instruction grounded in visual–textual integration.

Keywords: Basic Design Education, Conceptual Thinking, Visual Principles, Spatial Composition, Design Pedagogy.

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1. Introduction

Basic design education, which represents the first stage of architectural education and introduces students to the visual language and conceptual foundations of design, goes beyond developing aesthetic awareness by providing students with intellectual tools for structuring their thoughts and engaging in creative problem-solving processes. The pedagogical emphasis of this education is not only to produce visually appealing compositions but also to develop the ability to transform abstract ideas into consistent and communicable forms. In this context, basic design education functions as a formative ground where intuition meets analysis, and perception intersects with reasoning.

At this formative stage, visual principles go beyond being merely aesthetic rules and emerge as intellectual frameworks that shape how students perceive, organize, and communicate ideas. Early psychological theories such as Gestalt psychology have shown that human perception is inherently structured and holistic (Wertheimer, 1938; Köhler, 1970; Koffka, 2013). Recent research in the field of visual perception emphasizes that grouping and figure–ground organization remain valid at both behavioral and neural levels, revealing that perception operates through predictive and inferential processes that transform fragmented inputs into meaningful wholes (Wagemans et al., 2012; Manassi & Whitney, 2022). Fundamental concepts such as proximity, similarity, continuity, closure, and figure–ground reveal the human mind's tendency to organize fragmented stimuli into coherent structures. These findings, when incorporated into design education, show that clarity in composition is not merely a visual issue but also a cognitive phenomenon compatible with innate perceptual tendencies.

On the other hand, research on design pedagogy increasingly emphasizes that visual structuring lies at the center of abstraction, idea generation, and discovery processes (Oxman, 1997; Tergan & Keller, 2005; Ware, 2019). Students learn not only to arrange points, lines, and colors, but also to use these elements as conceptual tools for shaping complex and often abstract ideas. Studio-based learning, which is accepted as the distinctive teaching model of architecture, provides a social and reflective environment in which knowledge is constructed through production, critique, and iteration (Schön, 1983; Kampen, 2018). In this context, learning is both an experiential and dialogical process; it allows students to externalize their thoughts through visual experiments. This approach overlaps with the constructivist understanding of learning, which prioritizes active participation, reflection, and learner autonomy (Fosnot, 2005; Schunk, 2012).

Many studies and practices on basic design educa-

tion today are still shaped around formal or stylistic concerns. In exercises, principles such as balance, rhythm, and contrast are often handled as independent rules rather than as cognitive tools that support thinking processes. However, the decisive role of conceptual thinking in the design process has long been emphasized in the literature (Archer, 1966; Dorst, 2011; Carlgren et al., 2016). Design thinking is generally defined as an analytic and creative process that engages a person in opportunities to experiment, create, and prototype models, gather feedback, and redesign (Razzouk & Shute, 2012). Dorst (2011) emphasizes the need to build up a conceptual framework that is fundamental enough to anchor the variety of approaches that designers take and connect the many descriptions of design thinking that have arisen in design research. Nevertheless, the lack of integrated approaches that explicitly link perceptual organization, compositional principles, and conceptual frameworks continues to persist in pedagogical practices. This deficiency reveals the need for studies that investigate how conceptualization can be developed through the conscious integration of perceptual and cognitive dimensions in design education. Addressing this gap, the present study examines how conceptual thinking influences the use of basic design principles in early studio education. In particular, it investigates how conceptual framing shapes students' use of basic design principles and how conceptual integration relates to compositional clarity, originality, and conceptual depth in student works. Through the ways students translate abstract concepts into visual compositions, the study indicates the pedagogical potential of conceptualization in producing layered, symbolic, and emotional meanings, while introducing a visual–textual analytical perspective that makes students' conceptual reasoning visible within their formal design decisions.

In this context, the study approaches design principles not as static rules but as dynamic tools that support processes of abstraction, interpretation, and reflection. The pedagogical framework of the study is grounded in constructivist learning theory, which emphasizes active participation, reflection, and learner autonomy (Fosnot, 2005; Schunk, 2012). Within this perspective, students are positioned not only as producers of form but also as creators and interpreters of meaning. Accordingly, conceptual thinking is considered a pedagogical mechanism that supports reflective engagement and higher-order metacognitive awareness in early studio learning.

2. Theoretical Framework

Basic design education goes far beyond providing students with formal or aesthetic skills; it forms the foundations of visual reasoning and conceptual thin-

king. Perception and cognition together constitute the essential basis of this process, while visual principles function not only as formal guides but also as cognitive tools that enable the externalization, structuring, and communication of abstract ideas. In this context, perceptual organization and conceptual thinking become intertwined learning domains that support students' transition from intuitive experimentation to reflective design practice. This approach also aligns with the goals of higher education, which aims to foster creative and critical thinking beyond formal mastery.

From a cognitive perspective, perception is not the passive reception of external inputs but the active structuring of experience (Arnheim, 1954; Gibson, 1966; Goldstein, 2010; Neisser, 2014; Nes et al., 2023). Arnheim (1954) argues that perception is itself a mode of thinking, asserting that visual organization reflects mental processes and that clarity and coherence in composition are not merely aesthetic achievements but also cognitive necessities. Wong (1993) points out that Gestalt-based visual principles such as proximity, similarity, continuity, closure, and figure–ground provide design students with a framework for transforming fragmented visual data into coherent wholes. Recent studies support these views, showing that grouping and figure–ground organization remain strongly valid at both behavioral and neural levels (Wagemans et al., 2012). Therefore, principles regarded as compositional "rules" are in fact rooted in innate perceptual strategies through which people interpret and organize their surroundings. This perspective also clarifies the significance of attention direction and visual salience for novice learners. Structured contrasts and groupings help students organize visual information without losing meaning amidst complexity (Ware, 2019).

In this sense, the basic design principles gain pedagogical depth beyond technical instruction. Principles such as balance, rhythm, contrast, unity, emphasis, proportion, and scale embody the mind's tendencies to organize experience. Balance reflects the search for stability; rhythm guides perceptual grouping and continuity; contrast sharpens figure–ground relationships; unity synthesizes diverse elements into a coherent whole; and proportion and scale construct hierarchies of meaning and expression. When approached as extensions of perceptual logic, these principles function not only as strategies of formal arrangement but also as scaffolds for conceptual thinking and communicative expression (Gezer, 2019; Öztuna, 2007; Özsoy, 2016; Demirci-oğlu, 2016; Ocvirk et al., 2012). Explicit definition of such principles supports self-regulatory (metacognitive) processes such as planning, monitoring, and evaluation in the learning process (Flavell, 1979) and

corresponds to the principle of constructive alignment, which ensures coherence among intended outcomes, learning activities, and assessment criteria (Biggs et al., 2022).

On the other hand, visual literacy is increasingly defined not merely as a process of reception but as a reflective practice that externalizes decision-making. Visual reflection is a learning experience that involves reading, writing, thinking, and feeling with and through images (Guglietti, 2023). Studies conducted in higher education studio settings indicate that reflective visual journals, particularly under conditions of visual overload, enhance students' visual thinking and multimodal literacy skills. These journals deepen learning by making iterative decisions visible and open to discussion. Accordingly, reflective visual outputs act as mediators linking formal principles with conceptual intent, foregrounding meaning-making over superficial arrangement (Guglietti, 2023).

Cognitive science, in particular, emphasizes the role of visualization in abstraction and reasoning processes. Visual representation enables learners to externalize complex ideas as structured images (Tergan & Keller, 2005), whereas perception exhibits high sensitivity to spatial order and contrast (Ware, 2019). Research in design cognition demonstrates that sketches, diagrams, and compositions function not only as representational but also as generative practices (Oxman, 2004; Hsieh et al., 2021; Samaniego et al., 2024; Gümüştaş Babalı & Erem, 2025). Curriculum models that integrate learning outcomes, activities, and assessments around higher-order thinking emphasize that structured, yet flexible task constraints establish a productive balance between divergent and convergent thinking (Treffinger et al., 2023). In this regard, originality is often conceptualized as a combination of novelty and effectiveness (Runco & Jaeger, 2012). Therefore, the holistic use of design principles develops a layered mode of reasoning in which students negotiate spatial hierarchy, emotional resonance, and symbolic association (Jackson, 2008).

Conceptual thinking transforms visual experimentation into an intellectual process of inquiry. A concept is understood as an abstract yet productive framework that structures perception, intention, and communication (Archer, 1966; Kömürcüoğlu Turan & Altaş, 2011). Concept is also defined as *"the figure of an object, along with other representations, such as attributes or functions of the object, which existed, is existing, or might exist in the human mind, as well as in the real world"* (Taura & Nagai, 2013; Eilouti, 2018). In studio contexts, concepts function not as fixed starting points but as flexible guides that allow reinterpretation and evolution while directing design decisions (Eilouti, 2018). Empirical studies

indicate that the level of abstraction in conceptual representation influences the design process and that concrete concepts tend to yield more successful spatial outcomes (Türkmen, 2020). In general, studies on perceptual contrast and balance (Arnheim, 1954; Wong, 1993), constraint-based creativity (Stokes, 2005), and framing approaches within divergent–convergent cycles (Dorst, 2011; Treffinger et al., 2023) demonstrate that opposing conceptual themes should be treated as productive stimuli for exploratory reasoning and meaning-making. Conceptual thinking plays a critical role in design education by enabling students to structure ideas beyond formal manipulation. Thinking creatively involves generating uncommon yet practical solutions and represents an authentic, innovative way of conceiving and addressing reality (Samaniego et al., 2024), reinforcing the role of conceptual engagement in the studio process.

An increasing number of studies highlight that conceptual thinking fosters a mode of engagement that goes beyond superficial aesthetics. Designing around abstract themes encourages symbolic reasoning and emotional interpretation (Yılmaz et al., 2023). Meaning in design is often shaped through emotional and personal associations (Orth et al., 2018). Accordingly, formal elements such as point, line, plane, and color-when reinterpreted through rhythm, tone, and spatial organization-become carriers of multilayered narratives. The convergence of perceptual clarity and conceptual clarity repositions studio work as a site of meaning production, and this emphasis is reflected in the graduate competencies of design programs.

The cognitive dimension of this process is closely related to the concept of internal modeling. Abstract ideas are mentally represented through internal models that bridge cognition and visual form (Johnson-Laird, 1998). Design thinking, as both a conceptual and practical process, unfolds through cycles of imagining, experimenting, and developing (Carlgren et al., 2016). This cycle also aligns with the stages of experiential learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2014). At the level of learning outcomes, the revised taxonomy distinguishes conceptual understanding and metacognitive knowledge as explicit targets for teaching and assessment, establishing a shared language between tasks and evaluations (Anderson & Krathwohl, 2001). Complementing these approaches, Daalhuizen and colleagues (2019) define a "design-making architecture" in which iterative cycles of production, reflection, and flexible methodological guidance structure the inquiry process. The design process is described in abstracted phases and steps for a specific design practice intended to provide a comprehensive account of its structure. This structure provides a clear pedagogical rationale for sequential tasks in early design education.

Finally, the cyclical nature of studio learning aligns with Schön's (1983) concept of reflective practice: "reflection-in-action" that occurs during the design process and "reflection-on-action" that follows it. Constructivist approaches similarly position learning as the active construction of meaning through studio-based experimentation and dialogue (Fosnot, 2005; Schunk, 2012; Lawson, 2006; Oxman, 2004; Luka, 2019). Taken together, these perspectives offer a coherent framework for integrating perceptual and conceptual processes in early design education and provide a holistic view of how studio routines can foster the reflective and creative competencies valued in contemporary higher education (Cross, 2023; Dorst, 2011; Thoring et al., 2021; Sawyer & Henriksen, 2024).

The design-based research approach extends this framework into a practice-oriented dimension, emphasizing the role of instructional scaffolds- such as fixed materials, model analyses, and explicit criteria-in shaping both student performance and instructors' professional learning. Findings indicate that such designed scaffolds stabilize practice while allowing reflective adaptation by instructors, thereby strengthening the transformation of principles into purposeful communication (Kuiper & Smit, 2022). In studio-based tasks, these scaffolds connect procedural transparency with meaning-oriented outcomes and guide the learning process.

3. Method of the Study

This exploratory qualitative studio-based study was conducted within the first-year Basic Design studio of an undergraduate architecture program and was structured as a two-phase process implemented over six weekly studio sessions (eight hours each), using the course as an experimental setting to explore students' transition from formal sensitivity to conceptual awareness. Thirty-five students completed the study as part of the regular course flow; the exercises were naturally integrated into the learning process without any evaluative purpose. Within the scope of the research, eighteen paired works, purposively selected to represent a diversity in visual strategies, conceptual interpretations, and levels of compositional complexity, were identified as the sample for detailed analysis.

In the first phase, students were asked to produce two-dimensional compositions using only basic geometric forms without being given any thematic direction. This exercise encouraged the iterative trial-and-error process that lies at the core of Basic

Design pedagogy, allowing students to discover and apply visual principles such as balance, rhythm, and contrast through direct experience. This stage aimed to develop students' ability to intuitively analyze the interaction of formal elements and establish visual relationships. In the second phase, students participated in a short presentation introducing conceptual thinking and its role in design, after which they were given conceptual themes to frame the study. The structure and instructional components of this presentation are summarized in Table 1.

Table 1. Structure and Instructional Components of the Conceptual Thinking Presentation

Component	Content of the Presentation
Introduction to conceptual thinking	Short explanation of conceptual thinking in design and its role in linking abstract ideas with visual form
Verbal discussion	Collective discussion of how abstract concepts may guide formal decisions
Visual examples	Selected visual examples illustrating how abstract ideas can be translated into compositional strategies
Conceptual framing	Presentation of binary conceptual themes (order–chaos, tension–calmness, introversion–extroversion)

These themes were designed as productive constraints-concrete enough to be comprehensible for beginners yet open to personal interpretation and meaning construction. Çubukçu and Çetintahra (2010) noted that *"one of the educational techniques that could enhance creative thinking suggests that cues from familiar conceptual domains (or previous examples) can be used to trigger creative idea generation"*. Oppositions such as order and chaos or tension and calmness are, as Arnheim (1954) and Wong (1993) suggest, directly related to the perceptual notions of contrast and balance. Such dualities encourage exploratory framing in the design process (Dorst, 2011; Stokes, 2005) and, as noted in the literature on structured creativity, help establish a productive balance between divergent and convergent thinking (Treffinger et al., 2023).

The transition from the first to the second phase was structured to support students' creative thinking processes. To this end, fixed materials, sample analyses, and explicit evaluation criteria were used as instructional scaffolds. This arrangement provided a guiding framework for students' visual decision-making processes while allowing instructors to reflect on their pedagogical practices. The two-phase structure also aligns with the "architecture of design-making" approach proposed by Daalhuizen et al. (2019), which conceptualizes learning as iterative cycles of production, reflection, and methodological guidance. The research design and pedagogical logic of the transition between the two phases are summarized in Figure 1, which holistically illustrates the relationships among thematic orientation, conceptual framework, and analytical procedures (Figure 1). The distinctive feature of this study is that students not only produced visual compositions but also articulated their work through short reflective texts. These texts functioned as cognitive tools that revealed the invisible dimension of the design process, aligning with Schön's (1983) concept of reflection-on-action and Oxman's (2004) notion of externalization of design knowledge. Recent research similarly indicates that learning deepens through reflective visual-verbal outputs, as students construct their own conceptual frameworks by verbalizing their design decisions (Luka, 2019; Guglietti, 2023). In this study, the texts were analyzed through qualitative interpretive analysis to identify how students articulated the relationship between conceptual intentions and formal decisions in their visual compositions, offering insight into how conceptual reasoning informed their visual decisions as they described their design choices, the conceptual rationale behind their formal strategies, and their thematic interpretations in their own words.
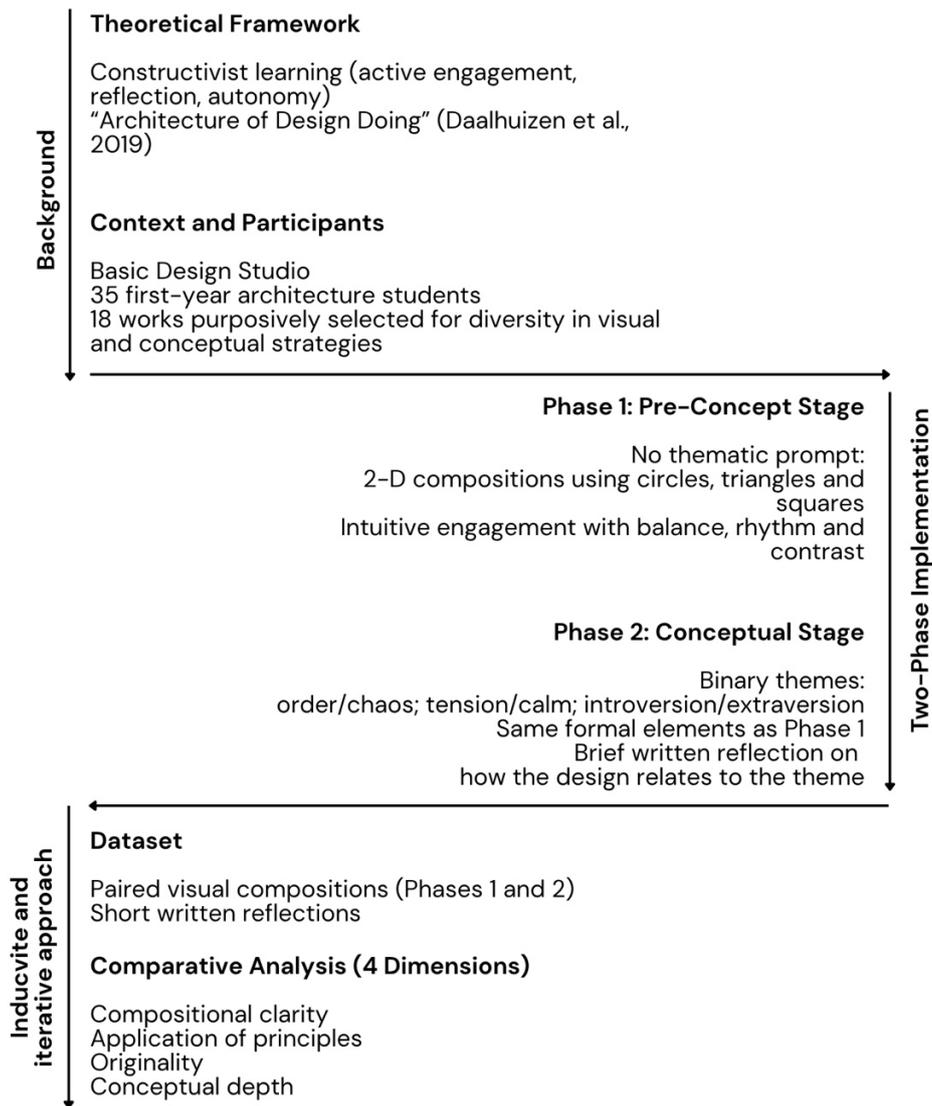
Background

Theoretical Framework

Constructivist learning (active engagement, reflection, autonomy)
"Architecture of Design Doing" (Daalhuizen et al., 2019)

Context and Participants

Basic Design Studio
35 first–year architecture students
18 works purposively selected for diversity in visual and conceptual strategies

Two–Phase Implementation

Phase 1: Pre–Concept Stage

No thematic prompt:
2–D compositions using circles, triangles and squares
Intuitive engagement with balance, rhythm and contrast

Phase 2: Conceptual Stage

Binary themes:
order/chaos; tension/calm; introversion/extraversion
Same formal elements as Phase 1
Brief written reflection on how the design relates to the theme

Inducvite and iterative approach

Dataset

Paired visual compositions (Phases 1 and 2)
Short written reflections

Comparative Analysis (4 Dimensions)

Compositional clarity
Application of principles
Originality
Conceptual depth

Figure 1. Overview of the Research Design and Two-Phase Implementation Process

During the analysis phase, the paired visual compositions and reflective texts were interpreted through four analytical dimensions-compositional clarity, application of principles, originality, and conceptual depth-as illustrated in Figure 1 and further elaborated in the Analytical Framework section. Each student's first- and second-phase outcomes were compared in paired form, and a trajectory of conceptual development was traced through the relationship between visual and textual expressions. This method made visible not only formal production but also how meaning was constructed, revealing indicators of the transition from perceptual order to cognitive coherence. Relationships among the data were evaluated across three axes: visual–textual coherence, inter-phase transformation, and expansion of meaning. In this way, students' processes of transition from formal experimentation to conceptual thinking were interpreted holistically.

All student works used in the study were anonymized, and no personally identifiable data were reported. Since the exercises were conducted within the regular course flow, the process did not involve any additional intervention or incentive. Students were informed that their works and reflective statements might be analyzed for research purposes.

4. Analytical Framework

Within the scope of this study, which examines how the inclusion of conceptual frameworks in the design process affects both visual quality and intellectual depth, paired student outputs were compared-one developed intuitively without thematic guidance, and the other developed through an assigned binary concept. Through this comparison, the study explored how six basic design principles (balance, rhythm, contrast, emphasis, unity/harmony, and pro-

portion/scale) were interpreted and transformed across two phases. These principles were evaluated through four analytical dimensions: compositional clarity, application of principles, originality, and conceptual depth. This multidimensional analytical framework allows not only the visual assessment of formal production but also the interpretation of how students used design tools as instruments of thought and meaning-making. The findings are organized according to each basic design principle and are supported by selected student works that exemplify the pedagogical transformations observed during the shift from intuitive to concept-based approaches (Table 2). Each example combines visual observation with interpretive commentary, illustrating how the relationship between form and meaning evolved after conceptual integration and how spatial strategy, expressive intent, and intellectual orientation changed. References are made to the analytical dimensions (compositional clarity, application of principles, originality, and conceptual depth) where relevant.

Table 2. Analytical Dimensions and Observational Criteria Used in the Evaluation

Analytical Dimension	Observational Focus	Indicators in Student Works
Compositional Clarity	Structural organization of visual elements	Presence of clear visual hierarchy, balanced spatial relationships, and coherent figure–ground organization
Application of Principles	Use of design principles within the composition	Integration of multiple principles (balance, rhythm, contrast, emphasis, unity, proportion/scale) rather than isolated or purely formal use
Originality	Creative deviation from repetitive or formulaic arrangements	Novel spatial strategies, unexpected formal relationships, or non-symmetrical solutions
Conceptual Depth	Relationship between visual form and conceptual intention	Degree to which visual decisions communicate symbolic, emotional, or narrative meaning consistent with the selected conceptual theme

4.1. Phase 1 – Intuitive Use of Visual Principles

In the first phase, students primarily used symmetrical or central arrangements to achieve balance and evenly spaced vertical or horizontal elements to create rhythm. Unity similarly emerged through repetition and the use of regular spacing. These strategies reflected a fundamental understanding of visual order and compositional stability. However, the works generally lacked emotional depth and conceptual richness, displaying limited thematic diversity. From an analytical perspective, the compositions in this phase exhibited a high level of compositional clarity, yet the application of principles remained superficial, and both originality and conceptual depth were limited.

Likewise, the principles of contrast, emphasis, and proportion/scale were applied mostly on a formal level and in isolation from one another. Contrast was typically established through variations in color, shape, or scale; while visually striking, it often remained a purely formal device rather than a narrative or expressive one. Emphasis was achieved mainly by enlarging or centering a specific form; although such choices guided attention, they did not convey intentional meaning. Proportion and scale were commonly used to maintain balance or establish contrast. Although students demonstrated a certain level of spatial awareness, their decisions lacked symbolic or interpretive depth. Overall, the compositions in the first phase reflected an intuitive yet formulaic use of visual principles. Order and clarity were consistently achieved; however, interpretive depth, narrative intent, and conceptual meaning-making remained largely underdeveloped.

4.2. Phase 2 – Conceptual Integration and Expressive Transformation

In the second phase, the inclusion of conceptual themes was observed to change how students approached visual principles. The compositions evolved from structural exercises into tools for expressing thought, emotional nuance, and symbolic tension. This shift became evident as students reinterpreted the principles of balance, rhythm, contrast, emphasis, unity/harmony, and proportion/scale-not merely to ensure order, but to construct reflection and narrative. The following subsections explain this transformation through paired examples.

Regarding the principle of balance, the earlier approach, limited to symmetry and stability, was transformed into an expression of emotional contrasts such as fragility and tension. While in the first phase, students established balance primarily through central arrangements, with the addition of a conceptual framework, this order gained a more narrative quality. For instance, under the order/chaos theme, one student, who in the first phase had created a regular structure with black squares arranged around a green square at the center, described their second-phase reinterpretation as follows: *"I wanted to delibe-*

rately disrupt the central order with irregular blocks and directional bars so that chaos could fragment the structure." Under the tension/calmness theme, another student constructed a composition with radial lines surrounding a central space and described it as: *"The radiating lines around a silent center pull the gaze inward while simultaneously releasing it outward."* In the introversion/extroversion theme, a

composition that initially established a fixed order (a blue square surrounded by black rectangles of different sizes) was reconstructed with overlapping transparent layers. The student explained this new configuration as: *"Layered transparent squares turn balance inward while extending it outward - creating a fragile equilibrium rather than a static one."* (Figure 2).
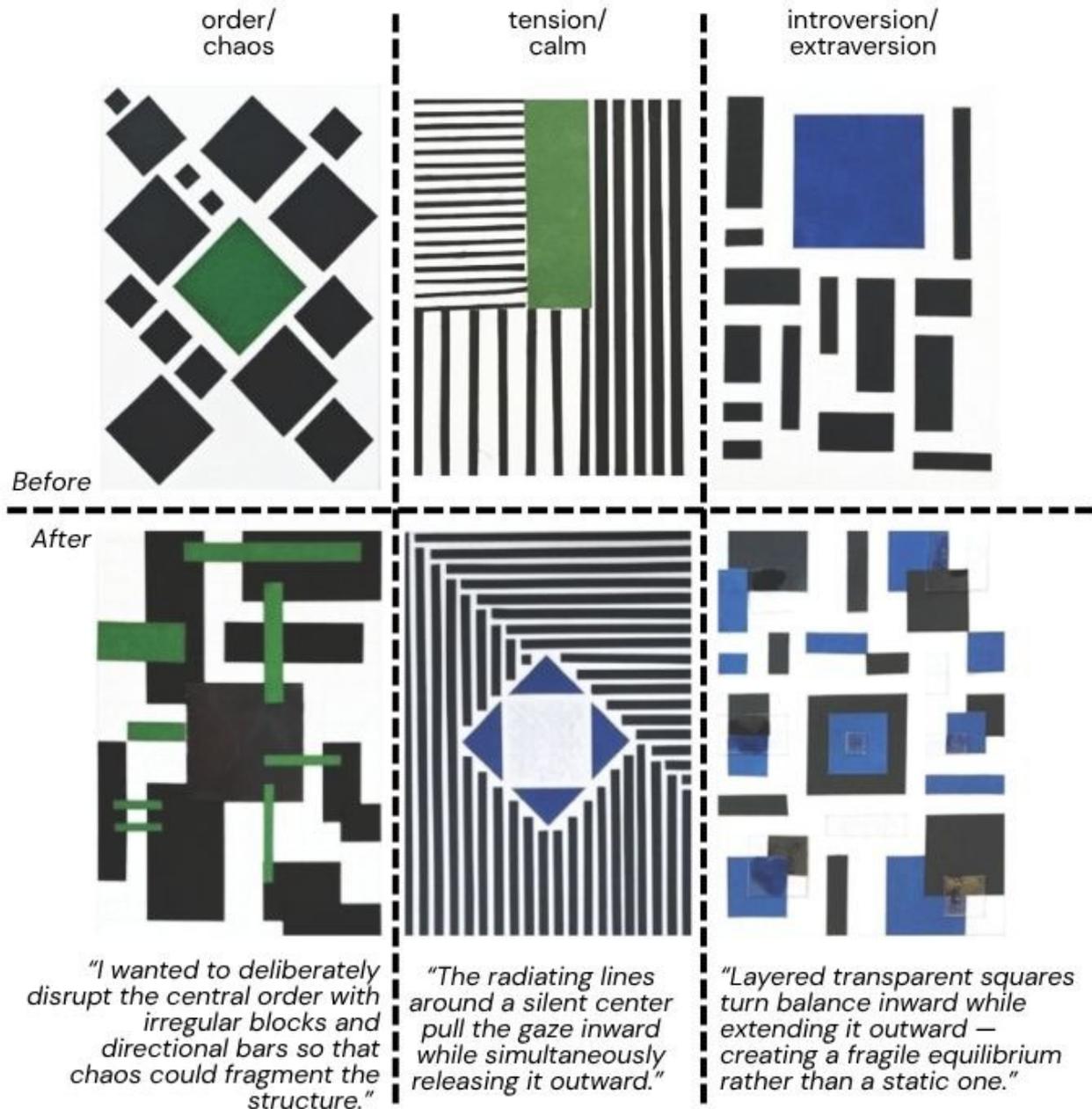
Figure 2. Interpretation of the Principle of Balance Before and After the Conceptual Phase

The principle of rhythm similarly transformed from mechanical repetition into a narrative device focused on expression. In the first phase, evenly spaced elements were typically arranged in vertical sequences or regular rows, creating a stable, metronome-like visual rhythm. However, with the inclusion of the conceptual framework, rhythm became a means of expressing movement, disruption, and narrative energy. Under the order/chaos theme, one student created a radiating explosion effect extending outward from the center and explained the design as: *"An energy suddenly released, like the bursting of a thought."* In the tension/calmness theme, another student intentionally disrupted the regular pattern of sequential forms, stating: *"I wanted the rhythm to feel interrupted, like a system under tension."*

In the introversion/extroversion theme, a student slightly bent the lines to distort the regular grid, explaining: *"I used slanted lines to make the rhythm feel unbalanced, as if going out of control."* Across these works, rhythm ceased to be merely an indicator of order and became an expression of psychological fluctuation, rupture, and motion (Figure 3).
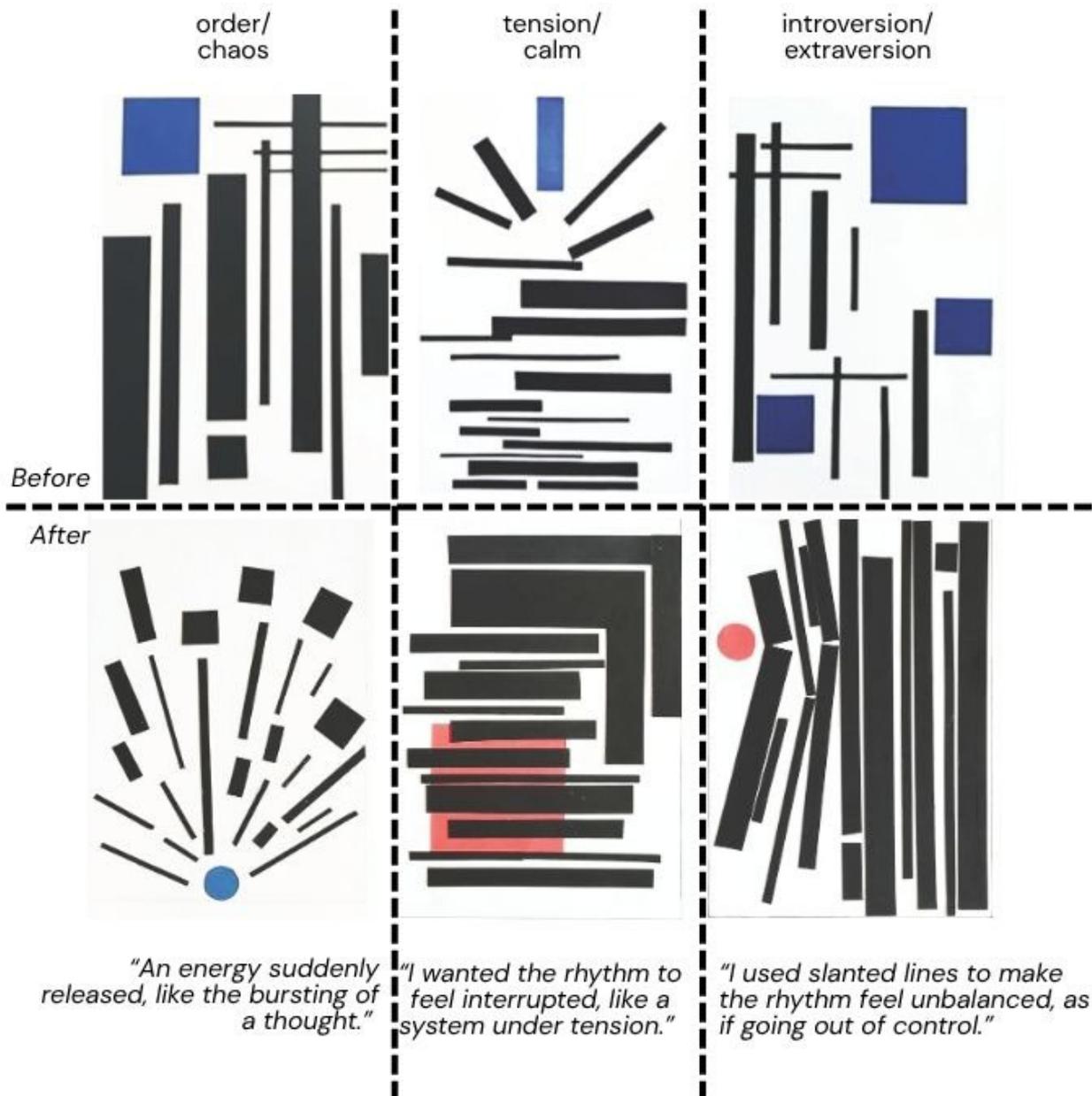

Figure 3. Interpretation of the Principle of Rhythm Before and After the Conceptual Phase

Initially treated merely as a difference in color or shape, the principle of contrast was reinterpreted in this phase as a language of opposition and emotional polarity. Under the order/chaos theme, one student disrupted the integrity of a linear field with a triangular incision and explained this choice as follows: *"I wanted the triangle to interrupt the rhythm of the lines and create a tension between order and disruption."* In the tension/calmness theme, another student placed a red square within a confined area and noted: *"I wanted the red to feel enclosed, as if something significant were being held under tension."* Under the introversion/extroversion theme, a student used triangles facing opposite directions within an oriented sequence, explaining: *"Each triangle seemed to push against the next - like two opposing forces."* Through these symbolic oppositions, the principle of contrast transcended decorative function and evolved into a visual reasoning tool centered on conflict and equilibrium (Figure 4).
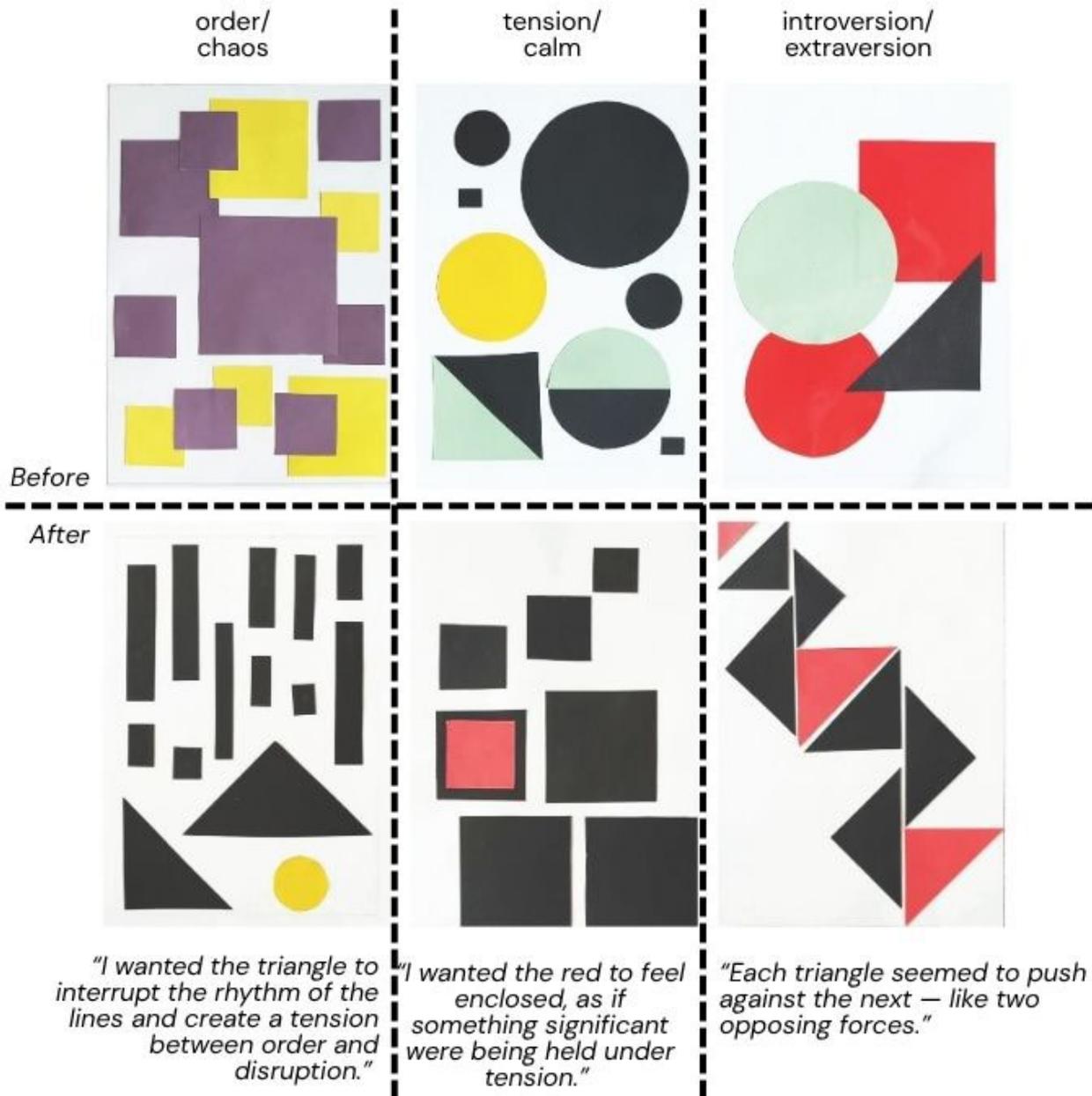
Figure 4. Interpretation of the Principle of Contrast Before and After the Conceptual Phase

The principle of emphasis, similarly, evolved from a simple means of establishing focus into a symbolic narrative device. In the first phase, emphasis was typically achieved by enlarging shapes or placing them at the center, often without consideration of visual hierarchy. However, with the integration of the conceptual framework in the second phase, emphasis became a purposeful and narrative tool for visual direction. Under the order/chaos theme, one student transitioned from a scattered arrangement of triangles to a linear composition in which a blue square was placed off-balance. The student explained this change as: *"The blue square was the focal point at first; now it loses balance, showing how focus can shift."* In the tension/calmness theme, an initial composition featuring a central orange square and black diagonal bars of varying thickness was transformed into a rigid grid interrupted by a single red accent. The student described: *"I placed the red bar to disrupt the order and create a sense of tension."* For the introversion/extroversion theme, a student who initially used clusters of triangles without a clear focal point later redefined emphasis through outward motion, explaining: *"I wanted to express an outward burst of energy - like the rays of the sun spreading out."* Across these examples, emphasis shifted from a centering device to a deliberate disruption, functioning as a visual and semantic strategy that redirects meaning. Spatial unity was thus reorganized, and emphasis emerged as an active agent shaping the direction of expression (Figure 5).
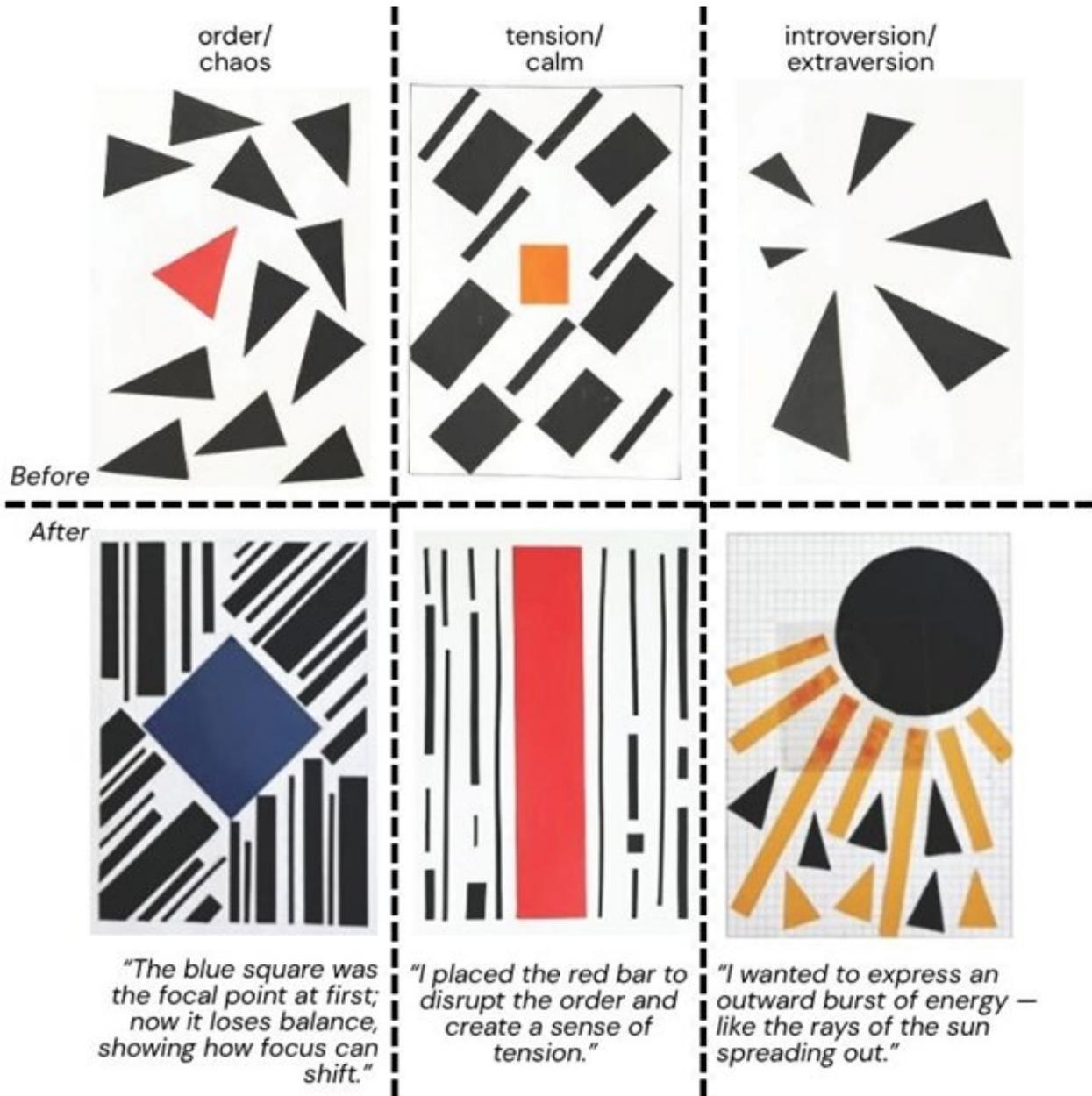
Figure 5. Interpretation of the Principle of Emphasis Before and After the Conceptual Phase

Initially associated with repetition and symmetry, the principle of unity and harmony gained relational depth through the conceptual framework. One student described connecting forms through interlacing lines, stating: *"I integrated the shapes by weaving them together."* In the tension/calmness theme, another student emphasized mutual dependency among elements, explaining: *"I wanted the shapes to feel connected, as if sharing a fragile balance."* For the introversion/extroversion theme, a student highlighted the ideas of attraction and focus, noting: *"I gathered the small squares like fragments orbiting around the center."* These reflections show that unity no longer represented mechanical consistency but rather an expression of movement, balance, and relational coherence. Consequently, unity and harmony evolved from a repetition-based order into a lived relational mode among forms (Figure 6).

Before

After

"I integrated the shapes by weaving them together."

"I wanted the shapes to feel connected, as if sharing a fragile balance."

"I gathered the small squares like fragments orbiting around the center."
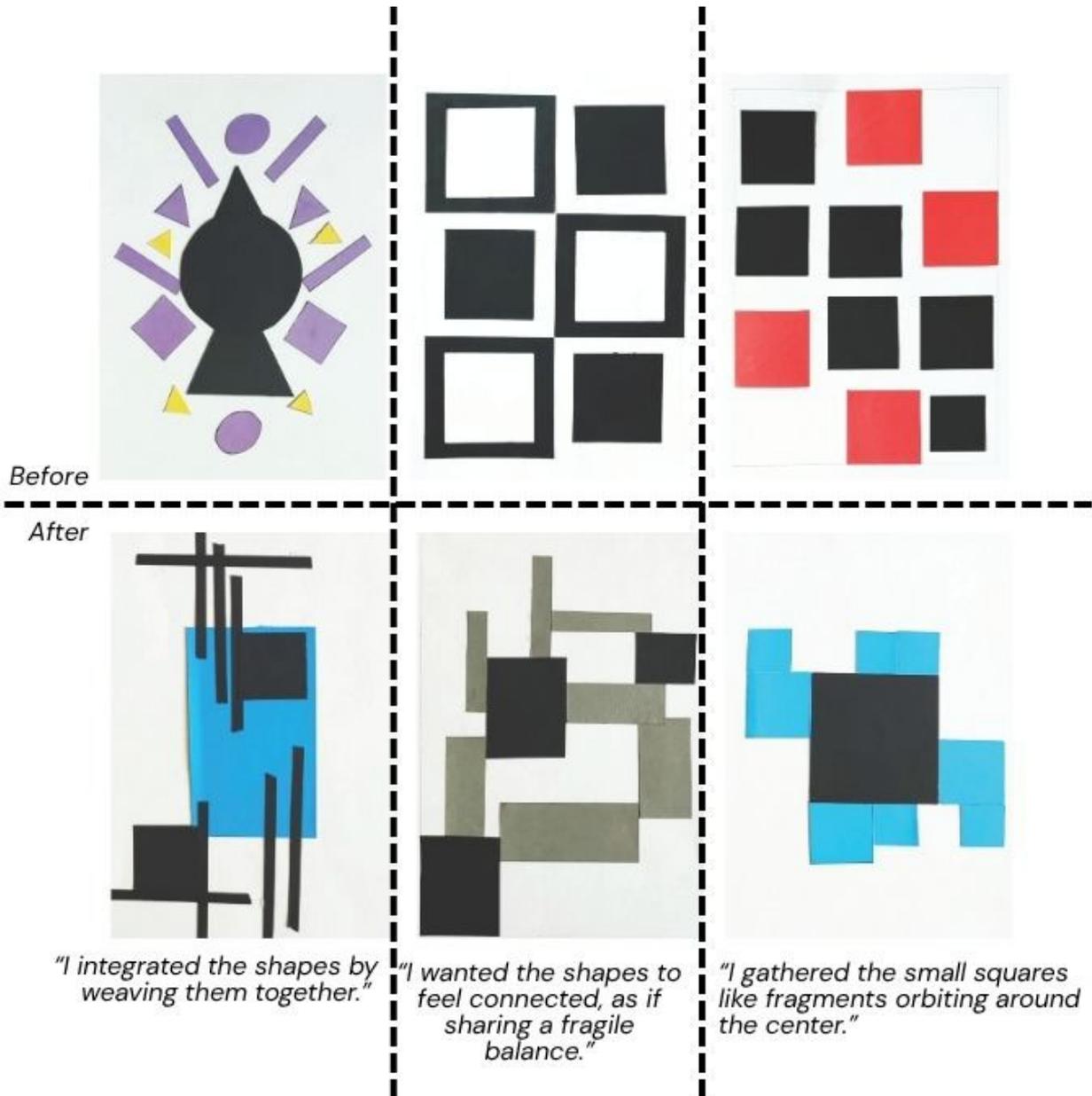
Figure 6. Interpretation of the Principle of Unity and Harmony Before and After the Conceptual Phase

In the final phase, the principle of proportion and scale evolved from a mere tool of order and variety into a carrier of narrative and emotion. Initially, proportion was applied primarily to achieve diversity or balance. However, within the conceptual framework, it transformed into a means of reinforcing specific meanings. Under the order/chaos theme, a student used a directional triangle within a structural layout and explained: "*The triangle gave me a sense of direction - as if I were building an upward structure.*" In the tension/calmness theme, another student surrounded a red shape with dense black bars to cre-ate a feeling of psychological pressure, noting: "*By enclosing the red form with dark black lines, I made it feel fragile - almost compressed.*" In the introversion/extroversion theme, a student positioned a small blue square with a deliberate shift in scale and placement to evoke isolation, stating: "*I used the small blue square to convey a sense of distance, as if it were detached from everything.*" Collectively, these examples illustrate how proportion and scale evolved beyond compositional regulation, becoming spatial metaphors that articulate themes of structure, constraint, and inward reflection (Figure 7).
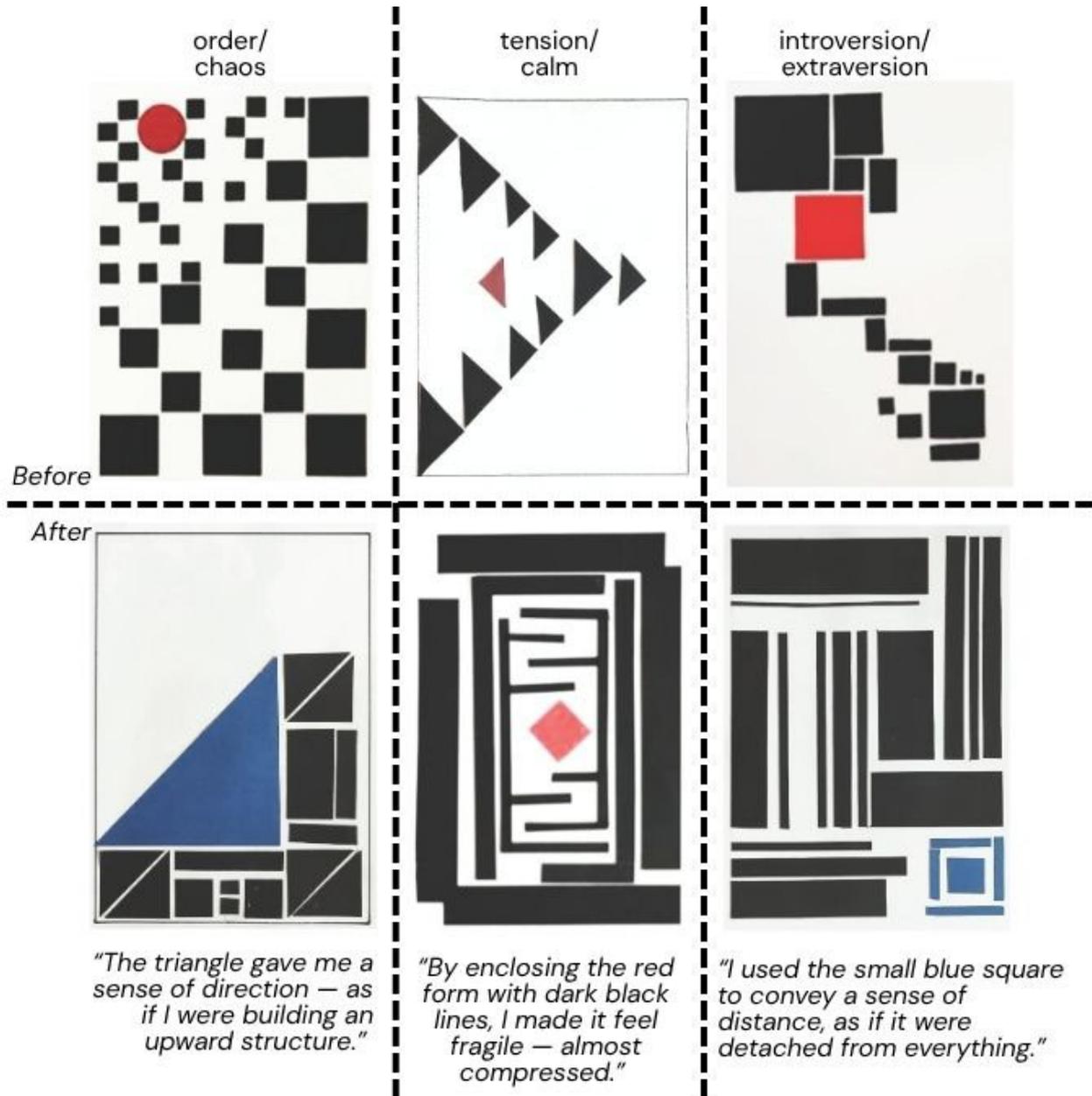
Figure 7. Interpretation of the Principle of Proportion and Scale Before and After the Conceptual Phase

When all examples are considered together, it becomes evident that conceptual integration broadened the pedagogical function of design principles. Each student's reflective text indicated a shift from an intuitive arrangement to a deliberate meaning-making process - from a search for visual order to an awareness of cognitive and emotional intent. Through strategies such as imbalance, interruption, layering, and limitation, students began to externalize their thinking process through form itself. Thus, the study revealed that conceptual thinking transforms formal principles into expressive and interpretive tools, making their potential for meaning-making clearly visible.

5. Discussion

The findings demonstrate a distinct pedagogical transformation in how students applied basic design principles following the integration of conceptual thinking. In the first phase, compositions were primarily guided by visual order, symmetry, repetition, and proportion-strategies that provided stability and coherence yet often lacked interpretive or emotional depth. In contrast, during the second phase, students began to use design principles not merely as formal guidelines but as cognitive and communicative tools. Through thematic framing, form evolved into a medium for expressing emotional tension and abstract meaning, shifting from static arrangements

to dynamic visual arguments. This transformation was analyzed through the four analytical dimensions outlined in the methodology-compositional clarity, application of principles, originality, and conceptual depth. Theoretically, this shift aligns with Gestalt-based theories of perceptual organization and balance (Arnheim, 1954; Wong, 1993; Wagemans et al., 2012), productive constraints and framing approaches (Stokes, 2005; Dorst, 2011), and creative models balancing divergent–convergent cycles (Treffinger et al., 2023).

Compositional clarity demonstrates how conceptual integration enhances the visual hierarchy and structural logic-directly related to Gestalt principles of figure–ground selectivity and grouping tendencies (Arnheim, 1954; Wong, 1993). Application of principles reflects the extent to which students began to use formal tools not only for order-making but also for meaning construction. The explicit articulation of design principles as a shared "visual grammar" (Ocvirk et al., 2012) and the constructive alignment between intended outcomes, activities, and assessment criteria (Biggs et al., 2022) fostered deliberate, meaning-oriented actions. Originality, defined as "the combination of novelty and effectiveness" (Runco & Jaeger, 2012), emerged as a dimension capturing creative deviations from symmetrical or

decorative tendencies, consistent with studies on constrained creativity (Stokes, 2005). Conceptual depth evaluated the degree to which symbolic, emotional, or narrative content was embedded within visual decisions- rooted in theories of concepts as structuring tools for thought (Archer, 1966; Kömürcüoğlu Turan & Altaş, 2011; Eilouti, 2018) and the iterative nature of design thinking (Carlgren et al., 2016; Çubukçu & Çetintahra, 2010).

To concretize these dynamics, Table 3 presents a comparative summary of how students' use of basic design principles evolved across the two experimental phases. It contrasts intuitive or decorative tendencies from the first phase with the intentional, symbolic, and narrative-oriented practices of the second phase. For instance, rhythm evolved from mechanical repetition to narrative flow; contrast shifted from surface-level variation to thematic duality. This evolution resonates with the classical view of composition as the foundation of meaningful visual communication (Ching, 2002) and with studies highlighting how abstract themes stimulate symbolic reasoning (Yılmaz et al., 2023). Thus, the table not only summarizes empirical outcomes but also serves as a pedagogical map to understand how conceptual frameworks enrich cognitive and expressive dimensions in early design education.

Table 3. Observed Shifts in Students' Application of Basic Design Principles Across the Two-Phase Experimental Process

Design Principle	Pre-Concept Phase	Post-Concept Phase	Observed Transformation
Balance	Symmetrical, static compositions	Layered, unstable forms; thematic expression	Application of principles + Conceptual depth
Rhythm	Mechanical repetition	Narrative flow with emotional resonance	Compositional clarity + Conceptual depth
Contrast	Simple visual differences	Symbolic opposition and emotional duality	Application of principles + Originality + Conceptual depth
Emphasis	Accidental focal points	Thematic hierarchy	Application of principles + Compositional clarity + Conceptual depth
Unity & Harmony	Formal repetition for cohesion	Relational integration around a theme	Compositional clarity + Conceptual depth
Proportion & Scale	Used for interest or balance	Indicator of hierarchy or isolation	Originality + Conceptual depth

The accompanying reflective texts provided additional insight into students' cognitive processes. These metacognitive explanations affirm the cyclical interaction between ideation, representation, and reflection identified by Carlgren et al. (2016). In this sense, metacognitive regulation (Flavell, 1979) and the revised taxonomy's higher-order learning categories (Anderson & Krathwohl, 2001) clarify why short reflective statements effectively bridge formal decisions and conceptual reasoning. Visualization thus functioned not only as a tool of production but also as a

method of inquiry, allowing students to externalize abstract thought, test relationships, and iteratively refine meaning.

Pedagogically, integrating conceptual thinking into early design education encouraged students to move from asking "What am I designing?" to "Why am I designing?", fostering greater cognitive and emotional awareness. This orientation parallels Aras's (2024) study on narrative frameworks in first-year architectural education, which emphasized the role of symbolic and imaginative contexts in en-

hancing individual expression and interpretive awareness. While Aras foregrounds narrative frameworks as liberating tools, the present study demonstrates that even non-narrative conceptual dualities can structure meaning-oriented exploration and deepen cognitive engagement. Similarly, findings align with Eilouti (2018) and Kömürcüoğlu Turan & Altaş (2011), which emphasize the function of concepts as flexible drivers of form generation in design pedagogy. It should also be noted that the study was conducted within a single studio context in which the conceptual themes and reflective tasks were introduced as part of the instructional structure. While students' visual and conceptual interpretations remained individually developed, the pedagogical framing may have influenced how conceptual reasoning was articulated during the design process. Nevertheless, the patterns observed across the two phases suggest that conceptual framing can play a constructive role in supporting meaning-oriented engagement in early design learning.

6. Conclusion

Building on these findings, the comparison between the intuitive and concept-driven phases indicates a clear shift in how students employed basic design principles. Across all four analytical dimensions, the second-phase works exhibited a more explicit figure–ground hierarchy and intentional visual order (compositional clarity); synchronized use of multiple principles within individual decisions (application of principles); deliberate deviations from grid-based and centralized patterns (originality); and clear semantic connections among contrasting formal choices (conceptual depth). The short reflective texts made these meaning relations visible, strengthening conceptual awareness by enabling students to articulate their design intentions. These patterns align with classical theories of perceptual organization (Arnheim, 1954; Wong, 1993), productive constraints and framing approaches (Stokes, 2005; Dorst, 2011), and creative models that balance divergent and convergent thinking cycles (Treffinger et al., 2023). Thus, conceptual scaffolding transforms basic design principles from formal rules into cognitive, emotional, and communicative tools.

Pedagogically, the study demonstrates that the relationship between visual reasoning, reflective thinking, and meaning-making can be systematically structured in the early stages of the basic design studio. When students use formal tools not merely to organize but to generate and convey ideas, the studio evolves from an aesthetic practice space into a site of intellectual inquiry. Moreover, the inclusion of short reflective texts alongside visual outputs highlights a rarely systematized data type in early design pedagogy. This method renders students' cognitive logic visible within their formal decisions, providing a new interpretive lens for basic design research.

The study's limitations stem from its focus on a single studio context and qualitative analysis of visual–textual data. Nevertheless, the findings suggest that basic design education provides a robust foundation not only for formal competence but also for higher-order learning outcomes, such as cognitive awareness, self-reflection, and meaning construction. In this respect, the study empirically illustrates how conceptual thinking can serve as an interface linking cognitive and emotional learning in early design pedagogy, contributing an original perspective to the field through its visual and textual integrative approach. Comparative studies across institutions, varied conceptual themes, and alternative modes of representation would be valuable for testing the transferability of this approach. Future research may also investigate how conceptual scaffolding operates across different stages of design education and how visual–textual reflection practices influence long-term development of design reasoning.

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