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Original Article

Developing and Evaluating a Structured Façade-Observation Process for Improving Visual Recall in Architectural Education

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Abstract *- Observation and recall of façade attributes are essential in architectural education, but students' approaches to building façades tend to be intuitive rather than structured, and may hinder their capacity to recall and depict specific attributes when exposed to building façades for short periods. While façade-analysis models identify common descriptors of composition, openings, materials, articulation, and complexity, these descriptors are not typically developed into pedagogic tools. This research offers and tests a process of façade observation to aid visual encoding and recall for undergraduate architecture students. It was developed based on existing façade-analysis frameworks with input from expert practitioners via the Delphi method. The process's short-term instructional efficacy was tested using a single-group pretest–posttest design with a recognition and sketching task before and after a brief teaching lecture. The findings show a statistically significant increase in students' posttest scores. The exploratory nature of the study, lack of a control group, and small sample size mean these results should be interpreted with caution. However, the study offers initial evidence for the teachability of façade observation skills. It provides directions for more evidence-based methods of teaching visual analysis in architecture.*

Keywords - *Architecture Façade, Architectural Education, Façade-Analysis, Observation.*

1. Introduction

Architectural façades constitute one of the most visible components of the built environment. A façade is commonly understood as the exterior face of a building and is often articulated through the arrangement of openings, materials, proportions, surface treatments, and compositional features [1]. Beyond its technical function as part of the building envelope, the façade is commonly treated as a key interface through which buildings communicate aspects of function, identity, and significance [2]. Accordingly, façades attract sustained critical attention and are often interpreted as visual "texts," from which observers infer design intentions and broader architectural discourse [3]. In parallel, architects frequently use façade design deliberately to convey specific ideas and narratives to intended audiences [3].

In architectural education, the ability to observe, describe, and recall façade attributes is foundational to precedent analysis, design decisions, and the communication of design decisions. Students are frequently asked to analyze buildings visually, identify compositional strategies, compare design precedents, and translate observed features into verbal or graphic representations. Most architecture students begin their learning by responding to their environment in an impressionistic or intuitive way, largely through their visual senses, rather than in a structured and methodical way. This presents an instructional challenge; although students may find a façade visually appealing, intricate, symmetrical, or culturally relevant, they may have difficulty identifying or remembering the visual elements that contribute to these perceptions. Therefore, establishing systematic approaches to analyzing the factors that contribute to façade design could improve students' visual literacy and their capacity to encode and represent architectural ideas.

Research on design cognition suggests that visual understanding depends not only on direct perception but also on the organization of internal representations. Chan's work on mental imagery and internal representation in architecture indicates that designers use mental images to support recognition, interpretation, and reconstruction of architectural form [5]. This does not imply that visual memory reproduces façades literally; rather, it suggests that visual recall depends on how architectural information is encoded, organized, and retrieved [5]. Similarly, Lynch's theory of environmental imageability demonstrates that people form mental

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representations of the built environment through identifiable and structured elements, such as paths, edges, districts, nodes, and landmarks [6]. Though Lynch is examining urban environments rather than façades in a specific way, that has a broader purpose, and one that is to utilize visual characteristics of a building to assist observers with environmental data processing. It is suggested that systematic categories of observation may allow architecture students to encode façade attributes more deeply. The long-term methods for investigating façades and architectural composition have been given in architectural literature. Classical and formal systems emphasize order, proportion, hierarchy, rhythm, symmetry, and the interrelations of the parts to the whole and to one another. Tzonis and Lefaivre, for example, point to a multi-dimensional picture of the composition of classical architecture as a multi-layered system of order, classification, and relational coherence. Correspondingly, Krier's concerns are with compositional principles and organization of architectural form [2]. Van der Laan's approach to the architectonic area is likewise concerned with proportion, with spatial organization as integral for experience in architecture [10]. Although all of these approaches are conceptualized differently (with different theoretical orientations), they are informed by the same concern to think of the architecture through the association of structural layout and topology.

Other façade-analysis traditions extend the formal emphasis into additional material, cultural, sensory, and environmental considerations. Engel's examination of the Japanese house, for instance, demonstrates that façade and spatial production have to be understood with reference to materiality, texture, modularity, and to the culturally conditioned continuity that is the basis of the construction of the form [8]. Similarly, Kroll's study of complexity questions compositional principles of rigidity in favor of diversity, participation, and different architectural worlds [9]. Moreover, a diverging, though related framework to this is the fractal geometry of Bovill, who treats architectural form as a higher-order mathematical system in a hierarchical manner to theorize visual complexity and richness of surfaces [11]. These findings suggest that façade elements can be investigated in various ways (i.e., formal composition, material expression, cultural meaning, proportionality, and complexity).

Conversely, the perceived façade evaluation has been conducted empirically, and it becomes available to operationalize and analyze façade qualities through a human perspective. It has been established that the dimensions defined by Stamps as the dimensions of surface complexity, the complexity of silhouette, and the articulation of the façade are the physical determinants of preferred residential façades according to the residential façade [12]. The features of the building frontages and building wall surfaces and openings are part of building façade features, as well as architectural detailing has been shown in urban design literature that they contribute to the visual quality of streets and urban environments [13]. In previous works, the façade properties are rigorously formulated by translating visual and compositional features into systematic descriptors: symmetry, rhythm, pattern, materiality, openness, and complexity [14]. Similarly, analyses of façade construction have explored how the design process can formalize the control over geometry, the distribution of the elements, and the specification of the façade articulation in computational forms [15]. Such works provide a solid basis for recognizing repeated façade properties that you could then learn, witness, or assess within architectural education.

So, at this point in time, the research on façade is increasingly focusing on measurable/computational-based frameworks and perception-based approaches. Ghomeishi studied the relationship between laypersons' aesthetic preferences and conceptual properties in building-facade design and concluded that the evaluation of façade can be studied through perceptual responses to design features [16]. Many more recent works have taken this line using street-view photography, computational analysis, machine learning, and immersive technologies to evaluate building exteriors and features incorporated within the urban façade [23, 24, 26]. Street view methods hold relevance to the broader scale of assessing building exterior quality as well and have been implicated in how urban environments are perceived anthropologically [23]. Machine-learning [24] based techniques have also been utilized to determine and measure physical disorder and architectural façades' visual features to develop innovative methods for systematic analysis of façade condition [24]. Furthermore, immersive and augmented reality are further studied as a way of assessing those attitudes towards façade retrofit (retrofitting through building) scenarios and building external alternatives, among non-experts [26].

Other recent studies have examined façade complexity, visual attractiveness, environmental comfort, and psychological response. Lee and Ostwald investigated the visual attractiveness of architectural façades by examining relationships between visual complexity and attractive strength [25]. Khan and Ghiai reviewed façade-surface strategies in relation to outdoor environmental comfort and microclimatic performance, indicating that façade materials and surface treatments can contribute to environmental experience beyond visual appearance alone [20]. Research on reflective façades has also shown that façade surface properties may influence visual perception and psychological response, particularly in relation to visual discomfort, disorientation, or affective experience [22]. In parallel, emerging work on morphological complexity and visual memory has begun to examine how façade complexity may influence the precision of visual memory in university-building façades [21]. Collectively, these recent studies show that façade attributes can be investigated through empirical, perceptual, and computational methods rather than treated only as matters of stylistic interpretation.

Despite the growing body of façade analysis literature, there is a significant void in pedagogies. Most research focuses on façade composition (artistic rendering) and interpretations of façade preference, its complexity in visual perception, and how to use computational techniques for calculating façade analysis and generation. Yet there has been little attempt to apply the information on façade-analysis as a structured pedagogic which enables the development of students' visual observation and memory skills. This gap is particularly important in the field of architectural education, where students are increasingly expected to process precedents, recognize compositional strategies, and communicate characteristics of the façade accurately through sketching, diagram, and verbal analyses.

The major characteristics of a façade, such as symmetry, rhythm, openings, materiality, articulation, and complexity, are discussed in architectural literature, but not always as explicit observation methods. As such, there are no overarching methods to help consolidate such notions during study. Closing this knowledge gap may lead to improved architectural teaching by providing students with more in-depth knowledge of façade design.

Cognitive research provides a theoretical basis for expecting structured observation to improve visual recall. Prior knowledge can influence the acquisition and organization of new factual information [17], while schema-based memory theory suggests that people encode and retrieve information through organized knowledge structures rather than as isolated details [18].

In the context of façade observation, structured categories may therefore help students attend to diagnostically relevant visual features, organize what they see, and retrieve those features more accurately after exposure. Research on individual differences in visual perception also indicates that visual processing is heterogeneous across observers [19], which further supports the need for systematic observational procedures rather than reliance on unguided visual impressions. However, such cognitive principles have not been sufficiently applied to façade-observation pedagogy in architectural education.

This research presents an evidence-based framework for observing façades aimed at architecture students. The framework builds on the literature of façade analysis and expert opinions that were gathered using the Delphi method to enhance students' memory performance and visualization of façade attributes. This framework shifts the façade analysis from a descriptive, interpretive approach to a learning process that can be empirically assessed, going beyond conventional approaches. This approach has considerable benefits for architectural education, improves design cognition, and provides insights for façade valuation research.

The research examines whether façade observation skills can be trained and how the use of category systems can help to shift students' awareness of architectural settings from a vague to a more refined approach. Beyond contributing to façade research, this study also advances the field by designing an observational learning course based on established façade analysis techniques. This course is then evaluated for its cognitive benefits. Rather than simply describing, interpreting, or designing façades, as with previous research, this study considers façade observation as a cognitive learning process.

1.1. Research Aim

This study's main goal is to conceive and test a structured system of façade observation to improve the visual memory and precision of architecture students in memorising and drawing the properties of façades.

1.2. Objectives

- To synthesize recurring façade attributes from architectural composition, façade-analysis, and perception literature.
- To develop a structured façade-observation framework through expert consensus.
- To evaluate the short-term instructional effectiveness of the framework using pretest–posttest measures of façade recall and visual representation accuracy.

2. Methods

2.1. Study Design

The study used a one-group pretest-posttest quasi-experimental approach to test the hypothesis that a systematic façade-observation process would enhance undergraduate architecture students' recall and representation of physical façade features. The intervention was a short teaching session introducing the systematic observation approach. The effects of the intervention were evaluated immediately before and after in similar pretest and posttest tasks.

Design notation:

$$N \rightarrow O_1 \rightarrow X \rightarrow O_2$$

where N is a non-randomized one-group, O_1 is the pretest, X is the instruction, and O_2 is the posttest. The nature of the study (exploratory) and design (no control group) meant that it was used to measure short-term performance changes rather than to infer causal relationships.

Figure 1 depicts the research process, including designing the observation framework, designing the lecture content, and evaluating the teaching process.

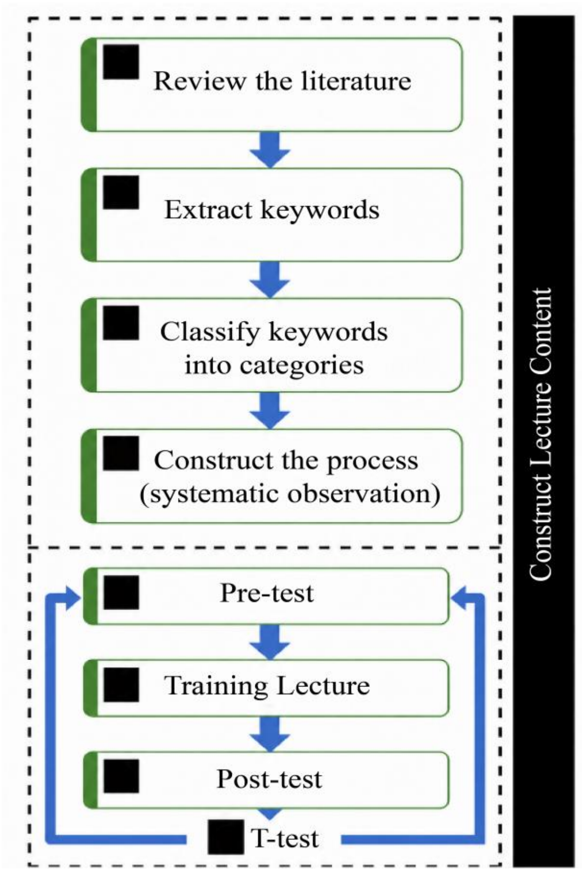

Fig. 1 Research procedure

2.2. Framework Façade-Observation

The constructed framework for façade observation is executed in two sequential steps as follows: literature-oriented keywords extraction and Delphi-oriented expert validation.

2.2.1. Literature Review and Keyword Extraction

A literature review of published façade-analysis systems was performed to identify recurring descriptors related to façade shape, framing, composition, and appearance. Eleven analytical frameworks were studied [2, 7, 8, 14-16, 28-34]. Based on these data, façade-related keywords were extracted from the literature. Subsequently, similar, overlapping, and synonymous terms were synthesized in order to prepare a refined list of descriptors for expert input.

2.2.2. Delphi-Based Categorization

Delphi was used to separate the more refined façade descriptors into higher-order observational categories. Eight experienced academic and professional practitioners in architectural design, architectural theory, and façade analysis joined the validation process. It was requested that the experts identify and assign the descriptor to the category that best described its main perceptual or compositional function.

The Delphi approach was repeated in two rounds. Consensus was defined as agreement between at least 80% of the respondents. Descriptors that failed to meet a consensus in the first round were revised, added clarification, or reassigned according to experts' input, and evaluated again in the second round. The final validated categories were used to construct the systematic observation, which was introduced to students during the instructional lecture. Figure 2 summarizes the merging and assignment of façade descriptors from literature analysis within the new frame.

2.3. Participants and Sampling

Participants were recruited via a call to the second and third years of the undergraduate architecture students at Jordan University of Science and Technology. Participation was voluntary. The participants were students who had completed or were enrolled in architectural design studio courses but did not have any prior experience in systematic façade observation. The study employed convenience sampling because the intervention was delivered in an educational setting. Paired statistical analysis was carried out using only students who had completed the pretest and posttest. Due to the small sample size and design, this study is placed as a pilot study to see the feasibility and the short-term learning opportunity of the suggested observational model as opposed to generating generalizable findings.

2.4. Instruments and Tasks

Student performance was measured using two paired tasks aiming to gauge the recall and representation accuracy of façade characteristics: a recognition task and a reconstruction task.

Recognition task: In this one, participants were shown a screen image regarding a façade of a building for two minutes and then prompted to watch the image carefully. Following the removal of the image, they filled out a 12-item multiple-choice questionnaire. Items covered important façade-observation categories such as the outline of the façade, openings, surface articulation, and various physical façade attributes. Correct or incorrect response to each item was scored. A score of 1 was given for correct answers and 0 for incorrect answers. All these parameters were considered as total recognition. The score for recognition was 0 to 12.

Reconstruction task: In this task, participants were presented with the different façade images for 2 min. Upon removal of the image, they were required to create a freehand sketch of the façade from memory. Sketching was performed to test the students' ability to retrieve important façade elements rather than their creative capabilities. Sketches were scored with reference to the occurrence and correctness of several significant façade features defined by the observation framework. Assessment concentrated on aspects such as the dominant façade outline, the organization of openings, surface articulation, and other related visual characteristics. The scoring was intended to facilitate recall and representation, rather than drawing accuracy.

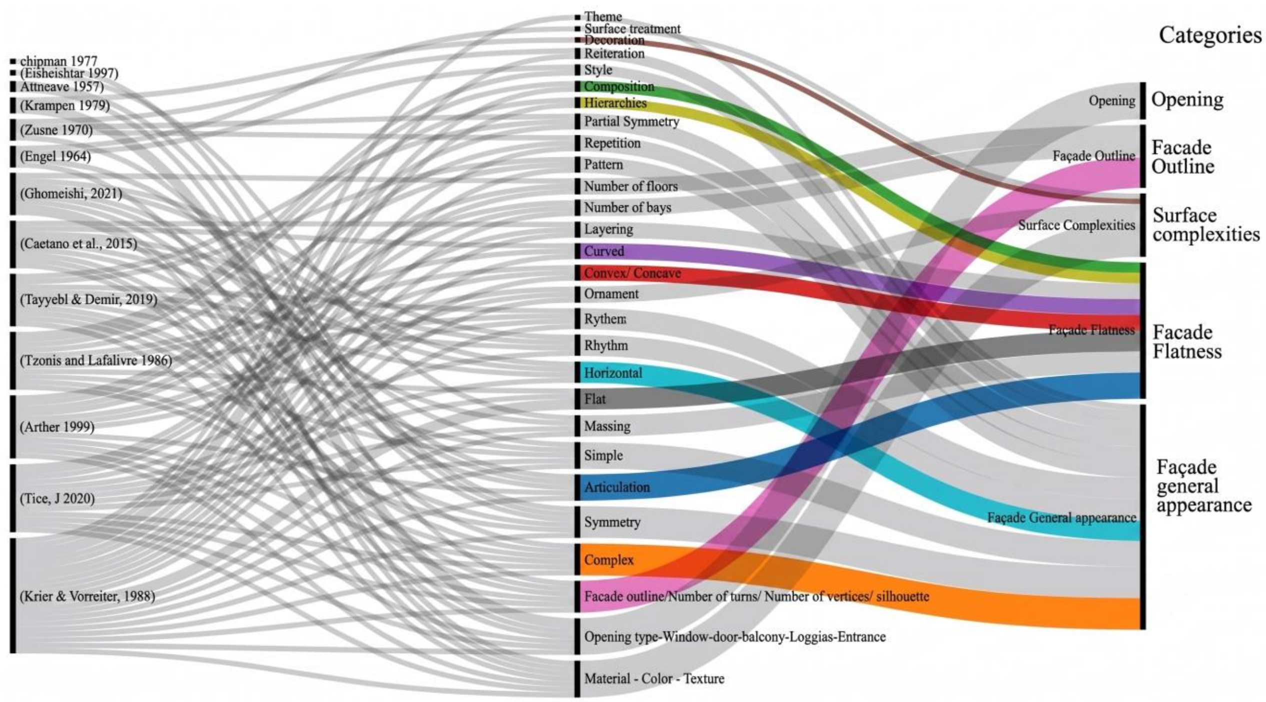

Fig. 2 Synthesis and categorization of façade attributes from literature to an observational framework using the Delphi method

2.5. Procedure

2.5.1. Pretest

The pretest comprised the recognition and reconstruction tasks. There was no prior instruction to participants about systematic observation or façade categorization. The pretest assessed baseline recall and representation of façade attributes.

2.5.2. Instructional Intervention

Following the pretest, participants received a brief instructional lecture designed to introduce the systematic façade-observation process. The lecture described the validated observation categories and illustrated how these categories can be used to direct attention while viewing façades. The instructional content was taken from the literature review and the Delphi-based categorization process. The lecture duration was around 30 minutes, comprising visual examples, a step-by-step guided explanation, and a practice demonstration, whereby it was explained coherently how the various observation categories apply when studying building façades.

2.5.3. Posttest

The same structure followed once again from the pretest, but different façade images were employed to reduce test–retest effects. Recognition and reconstruction tasks were carried out directly after hearing the instructional lecture.

2.6. Research Question and Hypotheses

The study was motivated by the following research question: Does instruction in a systematic façade observation process lead undergraduate architecture students to recall and represent physical façade attributes after only a brief visual exposure? To answer this question, the following statistical hypotheses were formulated for a paired pretest–posttest comparison:

H_1 (Alternative hypothesis): The mean posttest score for façade attribute recall and representation accuracy is significantly higher than the mean pretest score for the same participants.

H_0 (Null hypothesis): There is no significant difference between mean pretest and posttest scores for façade attribute recall and representation accuracy.

Formally, these hypotheses are specified as follows:

- H_1: $\mu(post) > \mu(pre)$
- H_0: $\mu(post) = \mu(pre)$

where $\mu(pre)$ and $\mu(post)$ represent the population means of pretest and posttest scores, for students instructed in systematic façade observation conditions, respectively.

2.7. Data Analysis

Descriptive statistics (mean, standard deviation, minimum, maximum) were used to compare pretest scores with posttest averages. Since the same subjects were assessed at two different points, paired-samples t-tests were employed to compare means computed before and after each test. Statistical analysis was done using the software SPSS, and a significance level was set at $p < .05$.

2.8. Ethical Considerations

Before each participant's participation in the study, they each received a detailed explanation of its purpose and procedures. Consent was obtained from all participants. Students were informed that their responses would be anonymous and that involvement in or lack of involvement would not impact their academic grades. Information was collected and analyzed in a summarized format in order to keep it confidential. All measures in the study were informed by the ethical guidelines of the institution.

3. Results

3.1. Literature Review and Keyword Extraction Results

In this process, the literature review was performed to identify common descriptors found in façade-analysis and architectural composition frameworks. A total of eleven frameworks were reviewed, including formal composition, classical order, cultural and material interpretation, visual complexity, façade preference, computational façade generation, and attribute-based façade description. The reviewed references and their extracted descriptor domains are summarized in Table 1.

Across the literature surveyed, façade appearance is consistently characterized through characteristics of the general visual impression of the façade, the global shape or outline of the façade, openings configuration, the articulation and complexity of the surface, and the level of flatness or relief. This reappearance suggested that façade observation would be a systematic category of sorts, rather than a purely intuitive visual practice.

The original extraction yielded 53 keywords associated with façades. Following the elimination of synonymous, overlapping, and conceptually similar words, the list is consolidated into 24 refined descriptors. The Delphi-based expert categorization was built on these 24 descriptors.

Table 1. Reviewed façade-analysis references and extracted descriptor domains

Reference	Analytical focus	Descriptor domains extracted
Krier and Vorreiter [2]	Architectural composition and formal order	Proportion, hierarchy, rhythm, symmetry, compositional order
Tzonis and Lefaivre [7]	Classical compositional systems	Order, elements, symmetry, relational coherence, proportional relationships
Engel [8]	Traditional Japanese architectural expression	Materiality, texture, modularity, surface treatment, cultural expression
Tayyebi and Demir [14]	Systematic identification of visual attributes	Visual attributes, composition, balance, rhythm, form, complexity
Caetano et al. [15]	Computational façade generation	Geometry, element distribution, articulation, and algorithmic façade parameters
Ghomeishi [16]	Façade preference and conceptual properties	Aesthetic preference, clarity, simplicity, originality, meaningfulness
Additional reviewed frameworks [28-34]	Façade analysis, composition, and visual-description frameworks	Additional descriptors related to openings, surface articulation, visual complexity, flatness, and façade organization

3.2. Delphi-Based Categorization Results

The twenty-four refined façade descriptors were subjected to expert review using the Delphi process. After two rounds at Delphi and using the initial consensus threshold of 80 %, the descriptors were organized into five higher-order descriptors: general appearance, overall façade shape/outline, openings, façade surface complexity, and façade flatness. The last categories and their concepts are included in Table 2.

These five categories comprise the ultimate layout of the systematic façade-observation process employed in the educational lecture. Figure 2 provides evidence for the synthesis and categorization of façade descriptors from literature into higher-level observation categories. The visualization (Figure 2) using RAWGraphs demonstrates how descriptors selected from various analytic frameworks were pooled and confirmed through the Delphi process to yield the final structured observation framework. Figure 2 shows how an extensive collection of façade-related terms was condensed into a single term and packaged into a succinct teaching tool applicable to architectural education.

Table 2. Final observational categories derived from the Delphi process

Final observation category	Description of category
General appearance	Overall visual impression and dominant perceptual character of the façade
Overall façade shape/outline	Global form, silhouette, massing outline, and overall external boundary
Openings	Arrangement, proportion, rhythm, and distribution of windows, doors, and voids
Façade surface complexity	Articulation, pattern, rhythm, depth, texture, and surface richness
Façade flatness	Degree of projection, relief, recession, layering, and surface depth

3.3. Participant Flow and Baseline Performance

Fourteen undergraduate architecture students took the pretest. Eight participants were male, and six were female (57.1% and 42.9% of the baseline sample, respectively). Ten out of the fourteen students attended the instructional lecture and took the posttest. Thus, the pretest–posttest analysis was performed using the paired data of the ten students who completed both assessments.

The pretest recognition task resulted in a maximum possible (12) score. According to Table 3, the mean pretest score was 7.28/12 (SD = 2.33) for the full baseline, with the scores between 3 and 11. This shows a mean baseline performance and some variability in students' ability to remember the physical façade characteristics after short exposure to visuals.

Mean pretest scores by gender indicated male students obtained 7.75 (SD = 2.81) and female students achieved 6.66 (SD = 1.50). Prior to the intervention, pretest gender difference at baseline was also found by an independent-samples t-test with p=0.374 (Table 3), indicating almost the same performance between the two sexes.

Table 3. Pretest recognition scores by gender

	Male	**Female**	**Total**
N	8	6	14
%	57%	43%	100%
Mean	7.75	6.66	7.28
Minimum	3	5	3
Maximum	11	9	11
Range	8	4	8
St.Dev	2.81	1.5	2.33
***P*-value**	0.374	-	-

3.4. Posttest Performance

Ten students also sat the posttest following instructions. The posttest was equivalent to the pretest but featured different façade stimuli to minimize test-retest effects. As reported in Table 4, the posttest mean score was 9.60 out of 12 (SD = 2.00), with scores from 7 to 12.

Compared with the baseline pretest results presented in Table 3, the posttest results in Table 4 showed a higher minimum score and a narrower score range, suggesting more consistent performance after the instructional intervention.

Male students had a mean posttest score of 11.00 (SD = 1.00), while female students had a mean posttest score of 8.30 (SD = 1.00), as reported in Table 4. Although this descriptive difference suggests higher posttest scores among male students, the posttest subgroup sizes were small and unequal. Therefore, gender-based posttest comparisons should be interpreted as exploratory only and should not be used to draw firm conclusions.

Table 4. Posttest recognition scores by gender

	Male	**Female**	**Total**
N	6	4	10
%	60%	40%	100%
Mean	11	8.3	9.60
Minimum	8	7	7
Maximum	12	10	12
Range	4	3	5
St.Dev	1	1	2
***P*-value**	0.374		

3.5. Effect of the Systematic Façade-Observation Process

To evaluate the short-term instructional effect of the systematic façade-observation process, pretest and posttest scores were compared for the ten students who completed both assessments. As shown in Table 5, the paired-samples t-test showed a statistically significant improvement in scores after the instructional intervention ($p = 0.011$).

Using the pretest-minus-posttest difference convention, the mean difference was −2.30, with a 95% confidence interval from −4.03 to −0.59. The negative value indicates that posttest scores were higher than pretest scores.

As reported in Table 5, the effect size was large, Cohen's $d = 0.96$, indicating a substantial short-term improvement in recognition of physical façade attributes after the instructional lecture. The pretest–posttest change is also presented visually in Figure 3.

These findings suggest that the structured façade-observation process was associated with improved student performance. However, because the study used a single-group pretest–posttest design without a control group, the findings should be interpreted as preliminary evidence of short-term learning improvement rather than definitive causal evidence.

Table 5. Paired-samples comparison of pretest and posttest recognition scores

Comparison	**Mean difference**	**95% CI**	***p*-value**	**Cohen's *d***
Pretest – Posttest	−2.30	−4.03 to −0.59	0.011	0.96

Overall, the results show that the systematic façade-observation process was associated with a statistically significant improvement in students' recognition of physical façade attributes. This improvement is supported by the paired comparison reported in Table 5 and illustrated in Figure 3. The improvement was reflected in higher posttest scores, a higher minimum score, and reduced score dispersion when comparing the baseline results in Table 3 with the posttest results in Table 4.

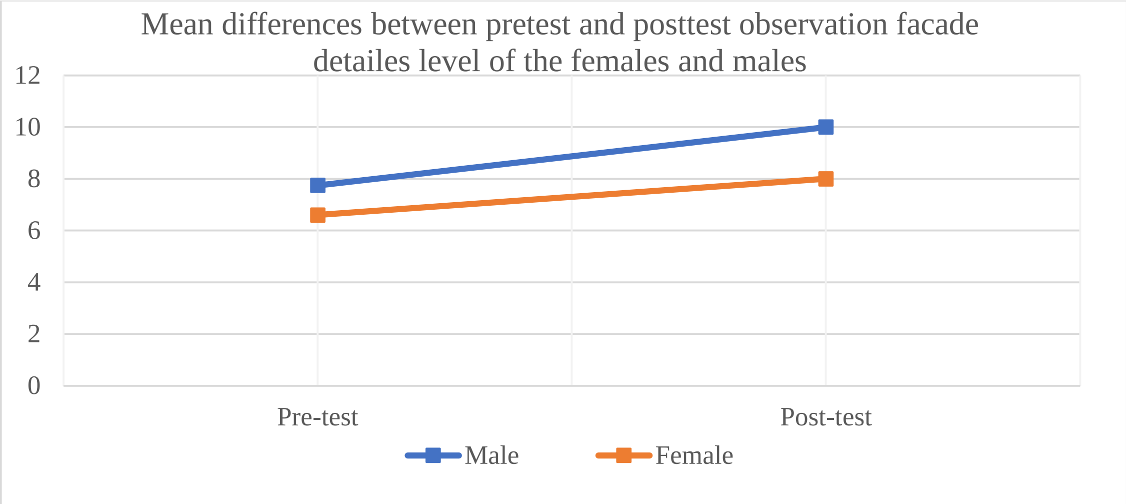

Fig. 3 Comparison of the results of the pretest and posttest by gender

At the same time, the findings should be interpreted with caution because of the exploratory nature of the study, the small sample size, the absence of a control group, and attrition between the pretest and posttest. Gender-based findings are particularly limited and should be treated as exploratory. Future studies with larger samples, control groups, and separate scoring of recognition and sketch-based reconstruction tasks are needed to further validate the instructional effectiveness of the proposed observation framework.

4. Discussion

The aim of this study was to test whether teaching a systematic façade-observation process led undergraduate architecture students to have a greater ability to remember and represent physical façade attributes after brief visual exposure. Pretest–posttest results indicated a statistically significant enhancement of students' performance following the educational lecture. These results aligned with the theoretical perspective introduced in Figure 3, which hypothesized that focused attention directed to particular façade attributes would lead to a more orderly structure of visual encoding and retrieval.

From a cognitive viewpoint, the result is in agreement with prior evidence indicating that previous experience and organized schemas are important predictors of the way new information is perceived, processed, categorized, and retrieved [17, 18]. For the purposes of this paper, the identified observation categories created from literature and distilled by expert consensus may have been of the instructional stage of scaffolding instruction, with students scaffolding the organization of façade information rather than just viewing in an intuitive way or randomly across the façade. This reading also coincides with architectural cognition research, which has found that images, or internal representations, are involved in perception and reconstruction [5]. Nevertheless, the present study did not directly assess attentional processes or mental representation, so the proposed mechanism of cognition should be read as a theoretically informed and non-directly tested causal mechanism.

The results are useful for architectural education. Student-directed analysis, such as analyzing precedents, identifying compositional strategies, and characterizing façade features through drawing and/or verbal description, is common, but visual-analysis skills have been assumed, in theory and in practice, to be "secondary modes of development" that emerge "in a studio setting." Our current results suggest that explicit instruction on types of observation could help make this process more systematic and measurable. By translating the façade-analysis frameworks into a structured observation protocol, the study offers a pilot for teaching façade observation as a cognitive and representational skill.

Importantly, it should be accepted that the improvement should be interpreted as a short-term increase in task performance under controlled instructional conditions. The results do not reflect general effects on design creativity, studio achievement, long-term learning, or competence. Rather, they propose that a relatively short structured observation lecture could enhance the immediate recall and recognition of physical façade attributes in students. The current findings indicate that improved understanding can benefit researchers who further explore whether those learning gains remain durable and if they transfer to complex design-analysis or precedent-study situations.

Since the study group sizes were small and inconsistent, gender descriptive patterns should be treated with caution. The study was not designed or powered to test for gender differences, and any differences observed should thus be deemed to be exploratory. Further studies on larger participants and adequate interaction testing could improve the hypothesis that this effect is heterogeneous across demographic groups.

Several limitations restrict how findings can be interpreted. First, there was a single group pretest–posttest design with no control group, restricting causal inference and allowing possible alternative reasons, such as practice effects, a heightened task familiarity, or differences between pre- and posttest façade stimuli. Second, the sample size was relatively small, with four subjects who took the pretest failing to perform the posttest. Third, this assessment was not conducted to assess retention or transfer, but rather immediate performance post-intervention. Finally, while recognition and sketch-based tasks were employed to measure recall and representation, there was a need to further validate the scoring procedures and inter-rater reliability.

While the study has its constraints, it provides some preliminary empirical evidence of the pedagogical relevance of applying façade-analysis frameworks to explicit observation protocols. The research helps shape evidence-informed approaches to visual-analysis pedagogy in architectural education by operationalizing façade observation to structured categories and assessing students' performance pre- and post-instruction.

5. Conclusion

This study developed and evaluated a systematic façade-observation process designed to support undergraduate architecture students' visual encoding, recall, and representation of physical façade attributes. Grounded in established façade-analysis frameworks and refined through expert consensus, the process translated recurring façade descriptors into a structured observation protocol for instructional use. The pretest–posttest findings showed that short-term instruction was associated with statistically significant improvement in students' performance.

The findings suggest that explicitly guiding students' attention through defined façade-observation categories may improve their immediate ability to recognize and represent façade attributes. This is relevant to architectural education, where visual-analysis skills are central to precedent study, design criticism, and architectural communication but are often taught implicitly. The study therefore provides preliminary evidence that façade observation can be approached as a teachable and assessable cognitive skill.

These conclusions should be interpreted in light of the study's limitations. The absence of a control group, small sample size, participant attrition, and focus on immediate outcomes limit generalizability and causal inference. The study does not demonstrate effects on long-term retention, creative design performance, studio achievement, or professional competence.

Future research should test the observation protocol with larger samples, comparison groups, delayed posttests, and diverse façade typologies. Further work should also validate the scoring procedures for recognition and sketch-based reconstruction tasks. With additional testing, the protocol may be refined for use in early architectural education, precedent-analysis exercises, and digital learning environments.

Overall, this study contributes to architectural pedagogy by proposing and preliminarily evaluating a structured approach to façade observation. By linking façade analysis with attention-guided encoding and recall, it offers a basis for more intentional and evidence-informed teaching of visual analysis in architecture.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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