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VKhUTEMAS Pedagogy: Composition and the new language of form

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ABSTRACT
This article explores the application of a modernist educational practice into a contemporary studio environment. The aim is to investigate the impact that modernist design pedagogy has on visual perception and abstract thinking. The analysis examines the replication of two design exercises created by Alexander Rodchenko and Nikolai Ladovsky at VKhUTEMAS. The outcome suggests that a self-directed vocabulary of thoughts developed as a result of students engaging with these exercises. This could potentially help novice architecture students to perceive different capacities of form and composition, and to broaden ways in which architectural design is conceived in the studio.

KEYWORDS
VKhUTEMAS , composition, visual perception, abstract thinking, geometric forms

Introduction

While it is often believed that the first, modern school of architecture in Europe was the Bauhaus (German: Staatliches Bauhaus, meaning 'state building house') founded in 1919, its architecture department was not established until 1927. Therefore, the first modern architecture school in Europe was VKhUTEMAS, an acronym for the Higher State Art and Technical Studios (Russian: Высшие художественно-технические мастерские [Vysshiye Khudozhestvenno-Tekhnicheskiye Masterskiye), founded in 1920 in Moscow. Until its closure in 1930, VKhUTEMAS was arguably the strongest school for training architects because of its pioneering design pedagogy.[1] Although VKhUTEMAS was the first European school to reform architectural pedagogy during the early twentieth century, it has been less widely recognised and studied than the Bauhaus. In this project I will review some of the doctrines initiated at VKhUTEMAS with the intention to provide an alternative learning platform for first-year architecture students to embrace visual perception and abstract thinking in studio. Two of the most influential avant-garde artists and architects at VKhUTEMAS, Alexander Rodchenko and Nikolai Ladovsky, designed new assignment briefs to train spatial and visual perception of students with no prior artistic and architectural background.[2] They believed that abstract thinking should be encouraged prior to introducing students to pragmatic aspects of design.[3] Rodchenko, leader of the Graphics course, who initiated exercises in composition believed in artistic principles through aesthetico-formal means.[4] Ladovsky, the leader of the Space course, believed that it was important for students at the beginning of their architectural education to devote themselves to the study of composition based on psycho-physiological perception followed by perceiving geometric properties of forms.[5]

Considering this twentieth-century Modernist design pedagogy as a successful historical teaching mechanism, I investigated the use of two exercises adopted from Rodchenko's and Ladovsky's briefs at VKhUTEMAS as an extra activity for first-year students outside their design studio module at UWE, Bristol (The University of the West of England, Bristol, United Kingdom). In this experiment the very same exercises were given to the first-year architecture students, outside of their normal classes, followed by a focus group. The idea of using Rodchenko's and Ladovsky's teaching verbatim was to promote students' visual perception and to investigate how students, as digital natives (a.k.a. generation Z from the theory of generations), would reflect on exercises rooted in modernism. In particular, this pedagogical experiment would determine if these exercises encouraged students' abstract thinking within the current digital culture.

The aim and relevance

Since my aim is to reflect on the deployment of two design exercises from VKhUTEMAS into a contemporary studio environment, there is a degree of

speculative thinking and experimentation in this study as I seek to investigate the impact of two historical learning activities and the effectiveness of these activities in promoting the visual perception of the students.

Visual perception is a complex concept. According to James Gibson, who made a significant contribution to defining visual perception, numerous psychological experiments have been conducted on this subject, but none of them have provided a conclusive explanation. Gibson contended that artists 'too [...] have not made any significant discoveries about visual perception'.[6] Rudolf Arnheim argues that visual perception is a cognitive process, a result of information received by sight and the process of creating relationships between elements by the human mind. Perception of an image requires a series of cognitive processes such as comparison, comprehension, simplification, and abstraction.[7] In the context of this experiment, in keeping with Arnheim, visual perception is considered as the ability to interpret the relationships between elements and the field, to create visual harmony. Rodchenko and Ladovsky devised exercises using basic geometric forms to train visual perception and abstract thinking.

Twentieth-century modernist education considered itself to be the inevitable logical solution of intellectual, social and technical conditions.[8] However, the design pedagogy at VKhUTEMAS emerged in part from Suprematism and, therefore, looked at aesthetic principles independent of the industry's preferences. Suprematism was a movement in early 20th century which is associated with the work of Kazimir Malevich, who joined the faculty at VKhUTEMAS in 1925. Malevich and his followers aimed to create a new, non-objective form of art that was free from the constraints of representation. It is characterised by abstract compositions of basic geometric forms arranged in such a way as to create a sense of space and movement. Malevich believed art should remain an essentially spiritual activity and that drawings should have an agency of their own, liberated from classical representation and should present spatial freedom.[9] As such, geometrical thinking played an important role in teaching visual perception at VKhUTEMAS with assignment briefs that allowed students to consider perceptual qualities of geometric shapes through investigating proportion, scale, equilibrium, balance and order.[10]

These indicative qualities were introduced to students by Rodchenko through graphic exercises around a set of compositional constraints using simple geometric forms and rules. Ladovsky's briefs allowed students to consider physico-mechanical properties of geometric forms and volumes through investigating physical properties such as mass, weight, dynamism, rhythm, verticality, horizontality and proportionality.[11]

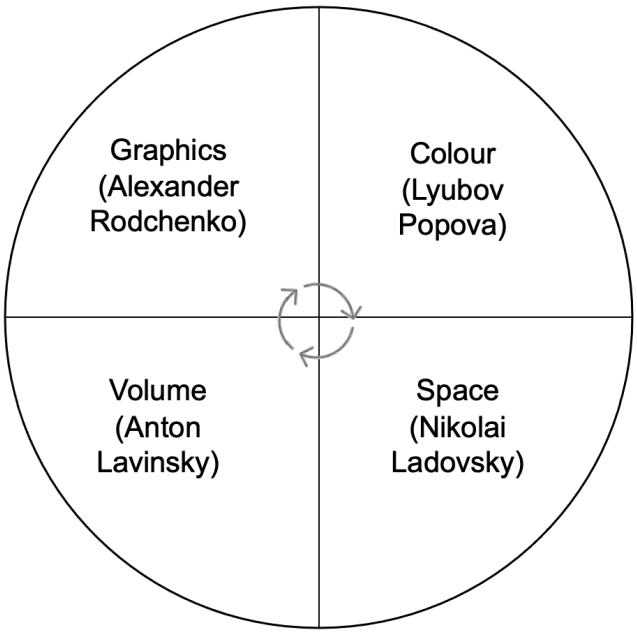


Figure 1:
Interpretation of VKhUTEMAS core courses (year 1) and course leaders adapted and redrawn from Khan-Magomedov, 1986 (Yahya Lavaf 2023).

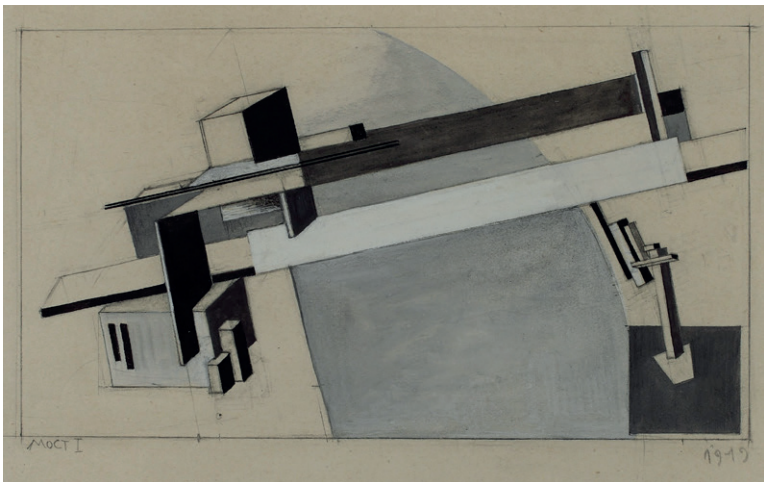
Avant-garde ideologies and design pedagogy at VKhUTEMAS

After the Russian Revolution in 1917 there was a reorganisation of all artistic education in the country, including architecture. The Moscow State Stroganov Academy of Industrial and Applied Arts (Russian: Московская Государственная Художественно-Промышленная Академия им. С.Г. Строганова) and The Moscow School of Painting, Sculpture and Architecture (Russian: Московское училище живописи, ваяния и зодчества, МУЖВЗ) were transformed into GSKhM I & II, an acronym for First and Second State Free Art Workshops (Russian: Первые и Вторые Государственные свободные художественные мастерские [ГСХМ I & II]) and later in 1920 were combined into a single educational institute called VKhUTEMAS.[12]

VKhUTEMAS was a specialised educational institute with interdisciplinary departments. The core curriculum of the school consisted of four preliminary courses including Graphics, Colour, Volume and Space each supplementing and leading to another course (Fig.1). The curriculum structure had a profound impact on architectural education in Russia and Europe. It also contributed to the Bauhaus teaching methods through its distinguished educators, such as Wassily Kandinsky who was invited to teach at the Bauhaus in 1922, and more broadly Kazimir Malevich and Lazar Lissitzky (El Lissitzsky) through their works in Germany after leaving Vkhutemas.[13]

Composition at VKhUTEMAS

Teaching abstraction was at the heart of the school. For instance, Rodchenko's, Malevich's, and Kandinsky's studios abolished the traditional sequence of drawings such as life or still-life drawings (buildings, human figures, etc.) and introduced a new language of visual expression through



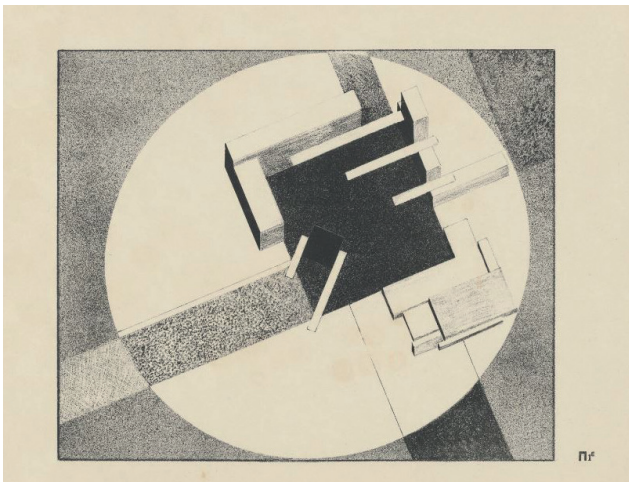


Figure 2: Proun 1A, bridge - left (Russian: Проун 1 А, мост) (Public Domain 2013).

Figure 3: Proun 1E, City - right (Russian: Проун 1 Е, Город), El Lissitzky 1919 (Artists Rights Society (ARS), New York / VG Bild-Kunst, Bonn 2013).

composition of basic geometric figures and elements of materials. The distinguishing feature of VKhUTEMAS from its predecessor schools, GSKhM I & II, was its focus on scientific and technological methods. These methods included exploring the psychological and physiological perception of various art forms, which played a significant role in shaping the development of architectural education.[14]

Malevich and Rodchenko incorporated geometric planes as fundamental elements of pictorial composition in their own work as well as in their teachings to students. They based the organisation of space on geometric figures. They believed the expressive qualities of a drawing developed from the intuitive organisation of simple geometric forms. To put it in the words of Meggs and Purvis, an expression of pure emotion can be conveyed through a harmonious combination of basic shapes.[15] Suprematist compositions were developed to volumetric Suprematism that introduced architectonic relationships which were later amplified in Malevich's Arkhitektons. Lissitzky, who was also inspired by Rodchenko and Malevich's experiments for the development of modern architecture, later created axonometric compositions representing various geometric solids. He then applied some of his compositions titled *Prouns* (Russian: Проун, acronym for проект утверждения нового (Project for the Affirmation of the New) to specific architectural tasks such as the city or bridge (Fig.2 & 3).[16]

Malevich taught architecture students to use simple geometric shapes as an opportunity for their combination in effective and complex spatial compositions. The juxtaposition of volumes in Malevich's *architectonic* compositions and Lissitzky's Prouns generated relationships and devices unprecedented in architectural applications. For instance, the dynamic arrangement of volumes expresses the placement of columns and beams in a simplified manner, where horizontal and vertical displacements create a visually engaging composition. The horizontal projection of one architectural element over another creates an interplay of layered volumes and dynamic spatial relationships. The juxtaposition of a bulky, undefined form above scattered smaller elements creates a striking contrast between the two scales

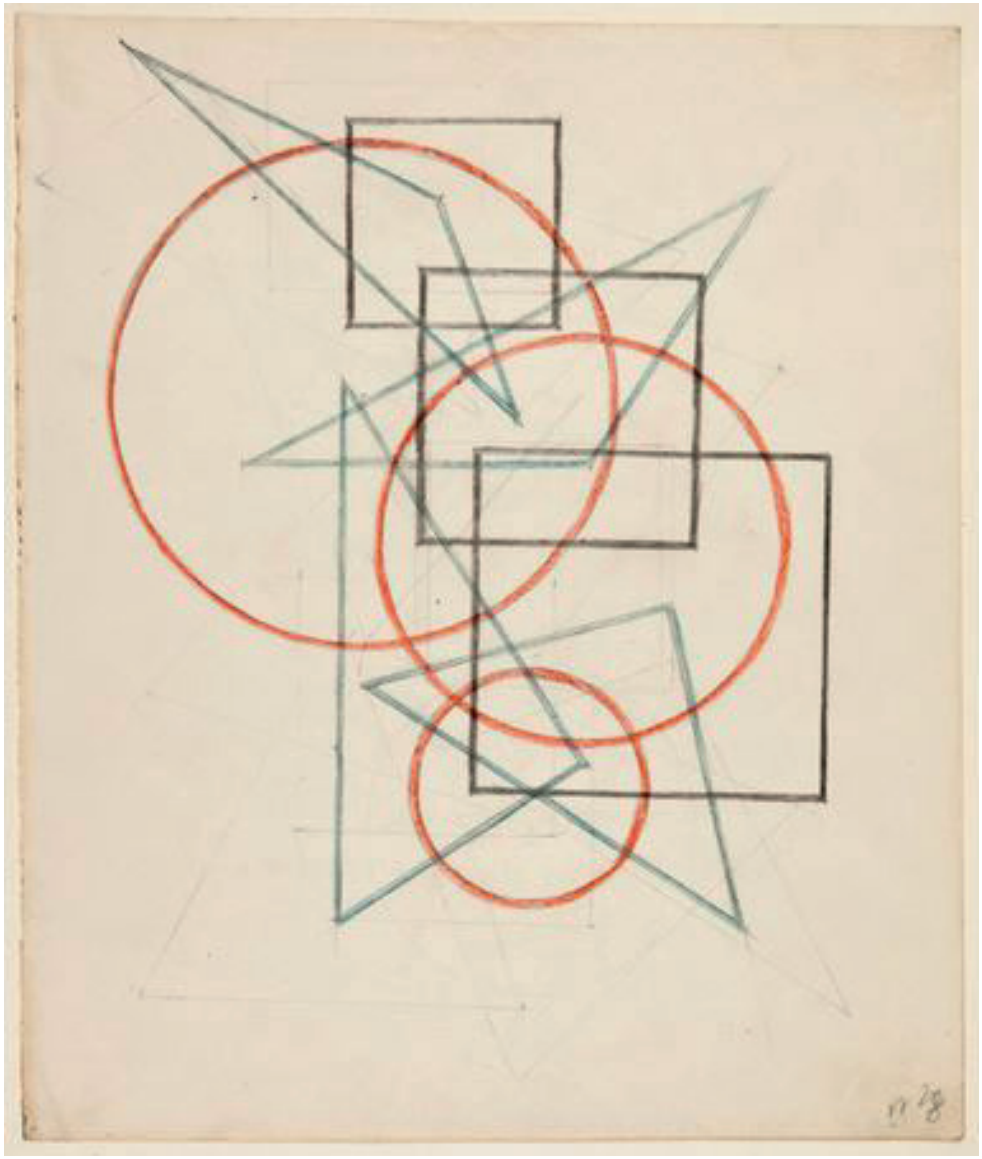


Figure 4:
Composition of a rectangle in space, Anastasia Akhtyrko, Alexander Rodchenko's studio at Vkhutemas, 1921, Moscown (Anna Bokov with the courtesy of the Rodchenko and Stepanova Archive 2021).

and shapes. The large volume appears to defy gravity as it soars upwards, seemingly unsupported by its relatively small point of contact with the ground. Malevich writes that '[t]he whole path retraced by the new art in all aspects of culture has emerged into the one truly contemporary art, which is architecture'.[17]

Unlike the anti-materialist philosophy of Suprematism prevalent at VKhUTEMAS, Vladimir Tatlin's Constructivist ideologies, applied aesthetics to everyday material experience creating spatial compositions (contre-relief) – a borderline between painting, sculpture and architecture. Rodchenko who arrived in late 1920 took up a position between Malevich and Tatlin.[18] The instructions Rodchenko produced for his assignment briefs (known as a recombination game or Initiative) made them equally accessible for anyone with or without prior artistic training. The instructions revolved around a set of compositional constraints and simple sequential operations, using basic geometric figures, such as circles, triangles, and squares. Rodchenko's Initiative exercise inspired staff and students at VKhUTEMAS (Fig.4).[19]

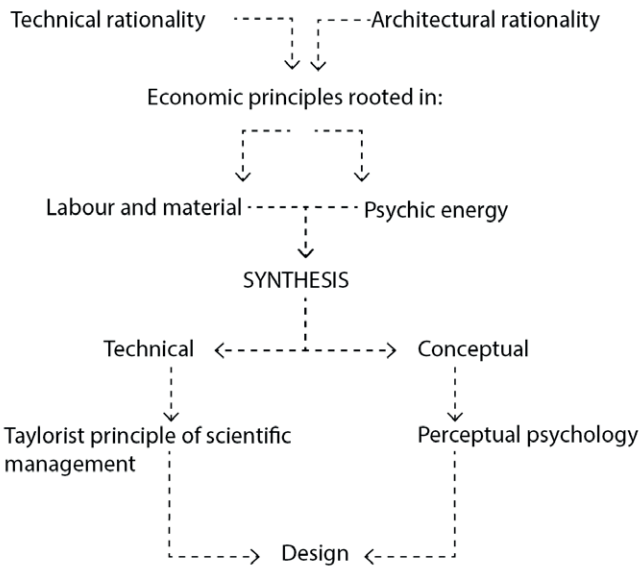


Figure 5:
Interpretation of Ladovsky's approach to design adopted from Bokov, 2014 (Yahya Lavaf 2023).

Form and space

At VKhUTEMAS, artists regarded themselves as laboratorians experimenting with construction. They recognised their work as the invention of technical grammar of practical elements.[20] Nikolai Ladovsky was one of the pioneers in implementing a new teaching methodology launched the Space course into the VKhUTEMAS curriculum. The main emphasis of the Space course was to bridge between art and science. Assignments designed by Ladovsky sought new ideas of synthesising all spatial arts, such as finding synergies between sculpture and architecture. He proposed a comprehensive foundation for a new formal language inspired by scientific thought in which the principles of architecture were rooted in rationality following objective laws and principles. For Ladovsky, such foundational exercises impart an understanding and appreciation of architecture that simultaneously draws on the technical and conceptual dimension of architecture known as *ratio-architecture*, which refers to the concept of architectural rationality that encompasses both technical precision and the perceptual experience of architectural form.[21]

According to architect and historian Anna Bokov, Ladovsky held the view that 'architectural form had an agency of its own and was grounded in timeless and scientifically verifiable properties i.e. architectural rationality'.[22] This rationality was based on economic principles of psychic energy through conditioning and controlling perception as well as economic principles rooted in labour and material (technical rationality) (Fig.5).[23]

The study

Research approach

This article is a reflection on a design studio module and not a general overview of year-1 undergraduate teaching at UWE, Bristol. It is acknowledged that other schools of architecture might operate differently, and exercises rooted in abstract thinking could still be the dominant means of investigation

	Prior design knowledge	Studio Engagement	Programme
Student A	None	Average	Architecture
Student B	Completed a foundation course in architecture/art	High	Architecture
Student C	Retaking Design studio 1	Average	Interior Architecture
Student D	None	High	Architectural and Environmental Engineering
Student E	Completed a foundation course in architecture/art	Low	Architecture and Planning
Student F	Completed a foundation course in architecture/art	Average	Interior Architecture
Student G	None	High	Architecture
Student H	None	Average	Architecture

Table 1: Participants list (Yahya Lavaf 2023).

and knowledge acquisition in first year architecture courses. The intention is a systematic self-critical inquiry to contribute to the improvement and advancement of the current module.

This study was carried out in a typical architectural studio module. The experiment developed through the 2018–19 academic year and involved a pilot workshop and semi-structured interviews with a small number of first year undergraduate students. The methodology used to capture the student's view was based on an interpretivist approach informed by observations. The interpretations were formed by the focus groups and interviews as well as looking into students' activities, logbooks, sketchbooks and design reviews. One of the stimuli for conducting this study was that experimentation and abstract thinking has become less mainstream in the first-year design studio at UWE, Bristol. It seems that the emphasis on practical skills, which are crucial for real-world practice, has resulted in a curriculum that places greater importance on pragmatic and technical aspects of design. Based on my observations of the Design Studio 1 module at UWE, Bristol, I argue that this approach has had an impact on the curriculum design, with less room for promoting composition and abstract thinking in the design studios. The intention of this project was to use composition and form-finding exercises as a vehicle to promote abstract thinking and to provide a platform of freewheeling exploration for the students. Therefore, in this experiment, the two exercises from Rodchenko's and Ladovsky's studios are used as a testbed.

Pilot workshop and briefs

A one-day pilot workshop was conducted outside of regular class hours with eight students from the first-year design studio module at UWE, Bristol. A non-probabilistic sampling was conducted to select participants according to a quota sampling method. The selection of participants was based on students' prior design knowledge, focus of the programme and engagement with the module (Table 1). Data was obtained from the class register and marks received from the studio reviews. Although it is acknowledged that the result

from the quota sampling cannot be generalised, the results from this pilot study have generated a new hypothesis.

The student participants were briefed on both exercises from Rodchenko's and Ladovsky's studios at VKhUTEMAS. While there was no prior lecture about composition and visual perception, instructions on how to proceed with these exercises were given. The students had one hour for Rodchenko's composition exercise and three hours for Ladovsky's form-making exercise. The facilitator only helped clarify questions with little influence on the activities. At the end of the pilot workshop a one-hour focus group was formed to generate dialogues and explore students' responses to these tasks. Later the research involved semi-structured interviews with the students who took part in the pilot workshop. The interview process was supported by observations from studios crits and a series of reflective blogs that the students submitted as part of their involvement in the pilot workshop. The following two exercises were adopted from Alexander Rodchenko and Nikolai Ladovsky's studios and were given to the first-year students at UWE in the pilot workshop.

Composition exercise: initiative

This exercise was designed around a set of compositional constraints (trajectories) and simple sequential operations using basic geometric figures. The students were asked to construct a composition using primary geometric forms (circle, square, triangle and parallelograms) which follow a trajectory (vertical, horizontal, diagonal and cross axes). Each exercise consists of a set of instructions as outlined in the following brief.

The brief:

The brief (Fig.6 & 7) asks students to create seven sheets of paper with a proportion of 2x3 or drawing a frame with the same proportion and then using different geometric figure to construct compositions. These geometric figure include two identical triangles, two identical rectangles of any size, and a circle with a radius equal to one of the sides of the triangles or rectangles. These geometric figures should be arranged in the following ways: 1) Placing them on a cross shape. 2) Placing them on an inclined cross formed by two diagonals. 3) Arranging them along the triangle so that the composition's gravity and magnitude are at the bottom. 4) Arranging them along the triangle so that the composition's gravity and magnitude are at the top. 5) Arranging them along the triangle so that the composition's gravity and magnitude are on the left side. 6) Arranging them along the triangle so that the composition's gravity and magnitude are on the right side. 7) Creating a free-style composition using the given shapes and proportions.[24] These instructions provide different ways to arrange the shapes and explore their visual relationships and compositions.

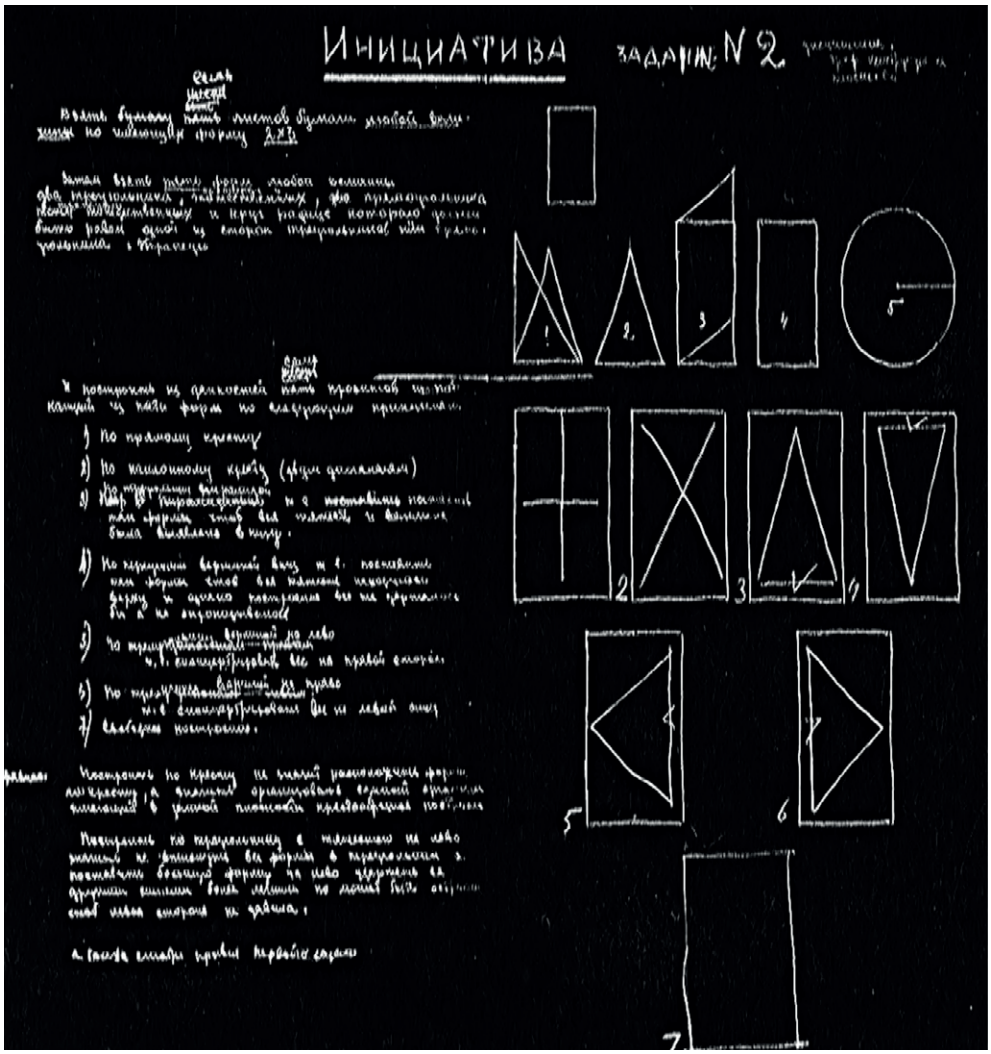
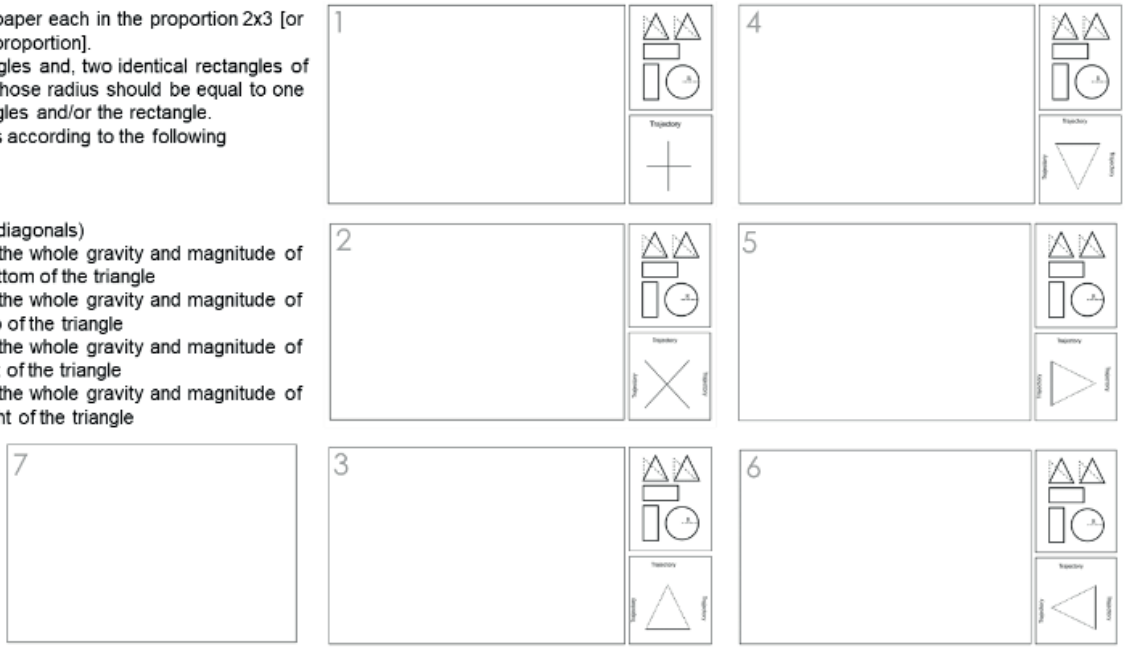


Figure 6:
Initiative exercise from Bokov (Alexander Rodchenko 1921).

Figure 7:
Design Studio 1 module assignment sheet (Yahya Lavaf 2023).

A. Make seven sheets of paper each in the proportion 2x3 [or draw a frame with this proportion].
B. Take two identical triangles and, two identical rectangles of any size, and a circle whose radius should be equal to one of the sides of the triangles and/or the rectangle.
C. Then arrange the forms according to the following trajectories:

1) On a cross
2) On an inclined cross (two diagonals)
3) Along the triangle, so that the whole gravity and magnitude of your composition is at the bottom of the triangle
4) Along the triangle, so that the whole gravity and magnitude of your composition is at the top of the triangle
5) Along the triangle, so that the whole gravity and magnitude of your composition is at the left of the triangle
6) Along the triangle, so that the whole gravity and magnitude of your composition is at the right of the triangle
7) Free style composition



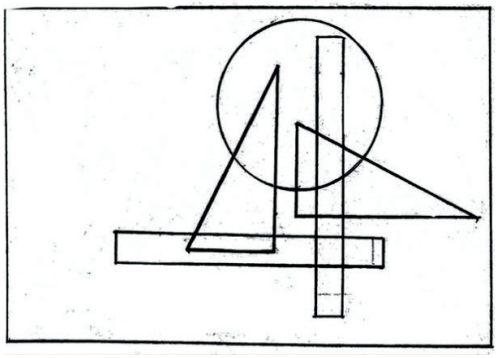


Figure 8:
Example of student work at UWE Bristol, composition on a triangular trajectory with gravity at the bottom (Student A 2018).

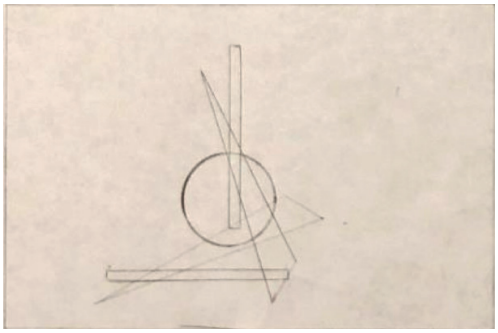


Figure 9:
Example of student work at UWE Bristol, composition on a triangular trajectory with gravity at the bottom (Student C 2018).

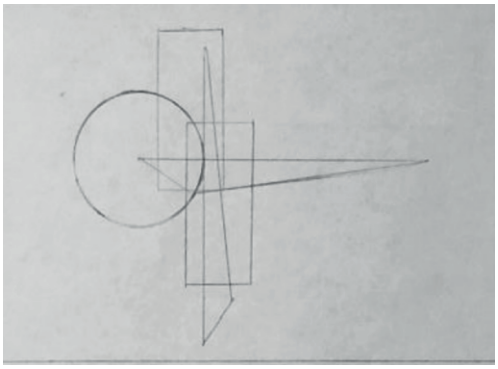


Figure 10:
Example of students work at UWE Bristol, composition on a cross (Student G 2018).

Selected examples of students' work from the pilot workshop held at UWE depict their responses to the composition exercise while taking into account trajectories (Fig.8, 9 & 10).

Form-making exercise: articulation of geometrical qualities

This exercise emphasised the articulation of abstract form as defined by Ladovsky, including geometrical, physical, logical and mechanical properties.[25] The properties were further developed into an assignment to articulate space, volume, rhythm and mass. During the pilot workshop students were tasked to articulate geometric qualities through sculptural forms. Each student was asked to articulate a different expression based on embodied forces, such as weight, rotation, mass, support, tension and dynamism.

The brief:

The brief asks students to choose a theme from a list (selected from a large list of Abstract & Applied Exercises and make forms to express one of the following

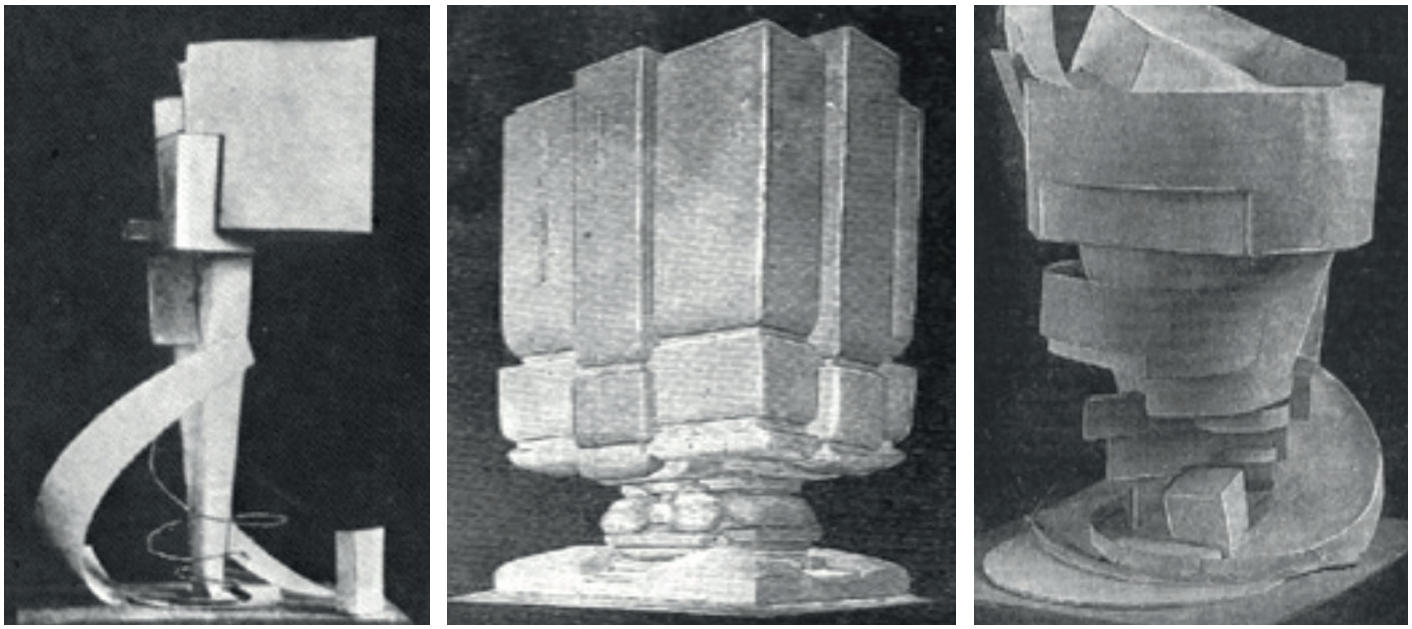


Figure 11:
Response to various geometric qualities (Anonymous Students VKhUTEMAS c. 1925).

geometric qualities: mass and weight; deep space using square forms; rotation and the interplay between mass and void; volumetric composition through the relationship between mass and support; volumetric architectonic composition using mass and space as the foundation.[26]

In this exercise at VKhUTEMAS, the students created sculptural works that demonstrated different architectonic qualities such as volumetric composition based on mass and support, expressing mass and weight, or articulating rotation of form (Fig.11). These works were likely created through various sculpting techniques such as carving, modelling, chiselling or shaping, and may have been predominantly made from materials such as plasticine and clay. In comparison UWE's students responded to the exercise by expressing rotation and void, rotation and mass and articulation of volumetric composition based on mass and support (Fig.12,13 & 14).

Discussions

Composition as a creative tool

The two exercises operated as an educational tool to enrich the skill set students acquire in the first-year design studio. In the studio environment, experiential learning is one of the dominant methods of acquiring knowledge.[27] Learning is achieved through the process of reflective practice, social discussions and individual understanding.[28] Students experiment with solutions for a given design problem and reflect on their work with the help of their tutors. They follow the feedback given by a tutor and think about alternative solutions, through which they conduct revisions. This process of iteration and revision often happens based on design activities to achieve the intended learning outcomes through logical steps converging to a design solution. Learning activities that promote creative and divergent thinking also have great impact in the studio environment. Brian Lawson, a renowned design theorist,

Figure 12:
Student work at UWE Bristol in response to the second exercise to articulate rotation and void through sculptural form (Student A 2018).

Figure 13:
Student work at UWE Bristol in response to the second exercise to articulate rotation and mass through sculptural form (Student B 2018).

Figure 14:
Student work at UWE Bristol in response to the second exercise to articulate volumetric composition based on mass and support through sculptural form (Student C 2018).

argues that designers should balance equal implementation of divergent and convergent thinking for a successful approach to design in architecture.[29] The exercises adopted from VKhUTEMAS triggered the notion of active learning through self-directed problem-based learning. As such, a design solution can be the result of a sudden illumination through experimentation or a subliminal accident.[30] Edward De Bono, in his seminal book on creativity in 1970, regards that logic is in control of the mind with vertical thinking. Whereas, lateral thinking, intuition and imagination are at the service of the mind.[31] I argue activities that are rooted in abstract thinking, such as the ones investigated in this project, could invoke lateral thinking in design studio.

Both what the students learn in studio and what was offered in the pilot workshop evoke experiential learning and the notion of learning by doing. However, the self-directed problem-based learning method used in the pilot workshop requires students to speculate and generate solutions through an ecological-enactive approach as opposed to an objective-based activities where a tutor leads and provides a cognitive framework.[32]

During the design phase of these exercises, ideas can arise incidentally and suddenly become potential solutions. Experimentation is essential for these subliminal accidents to emerge. Experienced designers find it easier to act on conception through experimentation because they have various media and tools to get inspired and find a solution. However, first-year design students often have limited knowledge to find a methodical way to get creative. Hereby, as a reflection to my teaching practice at UWE, I propose to emphasise composition tasks and form-making exercises through simple geometric and sculptural forms to give first year architecture students a medium in which to experiment. This way, students can use abstract compositions as a means of inception and lateral thinking in their design process.

Reflections

There are significant differences between the students who participated in the pilot workshop at UWE and those who studied at VKhUTEMAS. These differences include variations in the curriculum, teaching methods, and advancements in technology in today's educational environment. Furthermore, contemporary students are likely to be more concerned with issues such as accessibility, inclusivity, and the environment, whereas students in VKhUTEMAS may have been more focused on aesthetics and formalism. While it is important to consider these differences in future studies, the main goal of this paper is to enrich the design studio environment with abstract thinking and experimentation, which could also address contemporary challenges. Therefore, within the paper's scope, this section provides a reflection on teaching and learning process in the current first year design studio at UWE and draws on some of the key discussions from the focus group, semi-structured interviews and crits.

According to student feedback, participants in this project regarded the composition exercise as a valuable instructional tool that enabled them to grasp the intricacies of the ambiguous term composition. Student A said:

> the exercise provided me with visual examples of compositions which helped explain the term [that] cannot be fully explained through a set of words. Through these visual examples and a set of principles, I was able to begin to understand what compositions represented. It was through this process of experimentation and analysis of the final compositions that I was able to better understand how to create a composition.[33]

Student D also mentioned that the term composition came across as a very abstract idea however, the student stated 'the process of trial and error provided me with an ability to creatively produce a composition which seemed to be visually correct rather than theoretically'.[34]

In a slightly different tone student B (a well-engaged and confident student) said:

> I am not sure if the Initiative exercise made me understand the composition better, but it has made me realise that I struggle with experimenting with composition. The task was something I thought I might do quite well at the beginning, but I struggled through it and my outcomes were very safe compositions rather than free experimenting with geometric figures. May be [sic]...I am too scared to let go and be free with the design. I now know it is a weak area that I want to develop further.[35]

Further discussions with the student clarified that safe composition was perceived as a scenario where the students did not take risks and therefore did not experiment with different possibilities of constructing a composition. The student then added: 'I wasn't prepared to make mistakes, so I wasn't experimental'.

Some students who consciously followed a step-by-step process for solving a problem might not be prepared to diverge to a web of possibilities that rely on intuition and risk-taking. This could be because the students are not actively encouraged to practise provoking operations in studio. I believe such culture should be part of the professional skill set that architecture students should develop in their first year.

Some students B, D, E and F stressed that 'it seems that we start to differentiate between a good or bad composition'. With simple geometric forms, students took advantage of learning through a process of self-directed thoughts. The students independently came up with a list of attributes as they were discussing their compositions. This development of thought suggests a subconscious understanding of visual perception. Some of the attributes used by the students in the focus group included; harmony (repeatedly mentioned), balance (often mentioned), weight, edge, proportion (often), scale (often),

relationship, position, positive, negative, vertical, horizontal, overlapping (often), stable, dynamic, rhythm, order, one third, half, two third, cut-through, tangent and offset. Most of which correspond with what Rodchenko described as aesthetico-formal analysis.[36]

With regards to the second exercise the transcripts from the focus group indicated that the discussions on the notions of translating sculpture to architecture (space) were dominant. A group of students expressed that they felt quite free because the brief did not impose on them to think about a functional space. Rather, the brief asked them to show the form in its pure geometrical qualities regardless of function.
Student A argued:

> Considering that architecture is a substantial form of art, I find that creating a sculptural form which is then translated into spaces provides this visual advantage as we become more spatially aware. It is this awareness of the volume of the space which enables us to create logical spaces which provide the function of the building. It initiates the design process by creating a form which you could then alter to fit the necessary functions the building or space requires. It is through this iterative process that one is able to come to a creative and logical conclusion.[37]

Students commented on the plasticity of the material used (i.e. plasticine) and highlighted that manipulating forms through such plasticity was very expressive. It was apparent that thinking in models was a more expressive means of designing architectural forms for the participant students. Student D commented:

> As I was forming the plasticine, I was thinking about things like, should I make these sides (referring to the base of the model) equal!? Should I straighten the curves!? Should I emphasis [sic] on curves or will it make it predictable!? I sometimes changed my mind and tried a different option which I didn't even think of, and then I would kind of say, I like it, let's keep it. This was perhaps because it was easier to form it.[38]

This also alludes to the process of self-reflection while designing in models which is different from using sketch models as an intermediate device to progress with an idea. Furthermore, the fact that this mode of experimentation in models exposes the eye with new possibilities and opens up new ways of perceiving geometrical and architectural form. Expressed by Nikolai Ladovsky, in his essay published in *Asnova* in 1923, 'architecture operates with geometric qualities'.[39] Ladovsky's exercise was designed to articulate geometric qualities such as rotation, mass, void, bulges, lumps, weight, heaviness, lightness and other physical and mechanical properties. Experiments of this nature enable students to construct a form without necessarily knowing how it will be perceived as an architectural form. This raises questions about what is needed to create an architectural form, among others, and opens up a realm of possibilities that encourages lateral thinking.

Conclusion

Following the implementation of two assignments from VKhUTEMAS and reflecting on this teaching experiment, I conclude that the tasks introduced in the pilot workshop hold significant importance for the current curriculum at UWE. These assignments have the potential to function as potent educational tools that can encourage abstract and lateral thinking within the first-year design studio at UWE. The pedagogical approach embedded in these tasks promoted abstract thinking through experimentation and learning to design in models reinforcing lateral thinking. Students who took part in this experiment stated that they developed the means and ability to navigate lateral thinking. Prior to the pilot workshops most of the participants believed that abstract thinking and experimentation was a *bonus* to a design project in first-year undergraduate studio and not the underpinning principle of design. After the workshop some students used composition as a starting point in their subsequent studio projects to overcome their perceived ambiguity of abstraction. For instance, by creating space through sculptural forms, the students benefited from the absence of explicit function. Therefore, conditioning and controlling perception through form-making become modifiers of design. Students subconsciously found architectonic relationships such as weight, mass, support, density, edges, angles, surface, volume, void and space. Such qualities could express spatial and volumetric properties of architectural forms and it seemed that the exercise provided students with a self-directed thought process to perceive geometrical qualities of an abstract form.

As evidenced from the observations, the pilot workshop provoked a self-directed thought process for the students to engage with the tasks. The participants subconsciously developed a new visual and perceptual thought process which is often bypassed by the use of digital tools that dilute design into a clean and linear production. The act of *constructing* a drawing and forging forms is thus seen as a means of investigation and important as a generator of design. Primary to this approach is a suspension of mitigating factors that so often overwhelm students new to the design: construction, function and programme. Instead, the process of self-directed experimentation and decision-making creates a feedback loop that leads to new design possibilities.

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