

Teaching colour to architecture students

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Teaching principles of colour to architecture students is a challenge different from teaching colour to artists. In the education of architects, the aspect of colour plays rather a marginal role and in the architectural planning process it is often considered a component that is secondary to the design of the plans or the shape and structure of the building. In the actual experience of architecture however, colour is experienced via the materials that make up the surfaces of buildings and spaces, and therefore colour constitutes an integral part of the perceptual process. How can this dichotomy between reception and production of architecture be resolved? How can students of architecture be taught to imagine the initial ideas about architectural shape and space with light, colour and texture right from the start, instead of merely draping a finished design at the end of the design process and thus disregarding the role of these materials as intrinsic components of the design process? How can this integrative approach be realised in teaching? [1]

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Didactic concept

In recent years, the curriculum at the Institute of Spatial Design at the Department of Architecture at the University of Dresden has been considerably revamped in order to better integrate colour in architecture, urban design and interior design. Rather than following the traditional path of teaching colour theory first, which then becomes more or less successfully applied to design, we start with an intuitive analysis of the universe of colour in everyday natural and manmade things and only then have the students discover that various phenomena of colour can be explained in a systematic manner. In other words, instead of proceeding from theory to practice, the experience of practice builds theoretical knowledge. Furthermore, we do not consider colour an isolated aspect, but investigate the components of light, colour and shape as part of an integrated whole.

During the introductory level of our course, the students are first familiarised with colour as a material. They learn to understand the systematics of colour as a result of experimentation and reflective thinking. Beginning with the manufacturing of their own colours from various natural materials and the production of a multitude of large colour swatches, they learn to value colour as a sensual medium. In a next step, by analysing colour in nature and in architectural surfaces, the students begin to understand the many facets of colour and learn how these have been systematised by a number of different theoretical models. These intuitively gathered principles will ultimately be applied to design exercises in architecture and interior design.

At the advanced level, students investigate the various connections between the components of spatial geometry, surface, colour/texture and light in terms of their spatial appearance and the atmosphere they create. The underlying idea is that these characteristics of architecture can be systematically analysed and subsequently taught as principles.

Introductory level – three weeks of colour

Three weeks of colour—this course is very unique in the landscape of architectural education in Germany, where colour is usually given little time and taught independently of the practical aspects of architecture. Moreover, in having three full weeks, students can fully concentrate on this subject without being distracted by other coursework.

Since students have little knowledge about colour when they come to us, we begin with very focused, basic exercises that only concentrate on the aspect of colour itself.

The starting point for all further exercises is the common practice of producing a multitude of paper swatches with different shades and hues of colour (Figure 1). This way the students get hands-on experience with the medium of colour. When the students produce these swatches themselves, they learn much about the intricacies of mixing colours and value the final results. This is the point of departure for all further exercises.



Figure 1: Students working on colour compositions in the outside studio space.

After this labor-intensive but instructive process students then begin with short exercises in collage techniques where they share colour swatches in group projects (Figure 2). The advantage of this process is direct experiential feedback. Students immediately see changes in the overall effect of the compositions due to qualitative and quantitative variations in detail and can react immediately without having to produce new swatches and are not delayed by having to wait for the paint to dry (Figure 3).



Figure 2: Students working with their hand-made colour swatches.

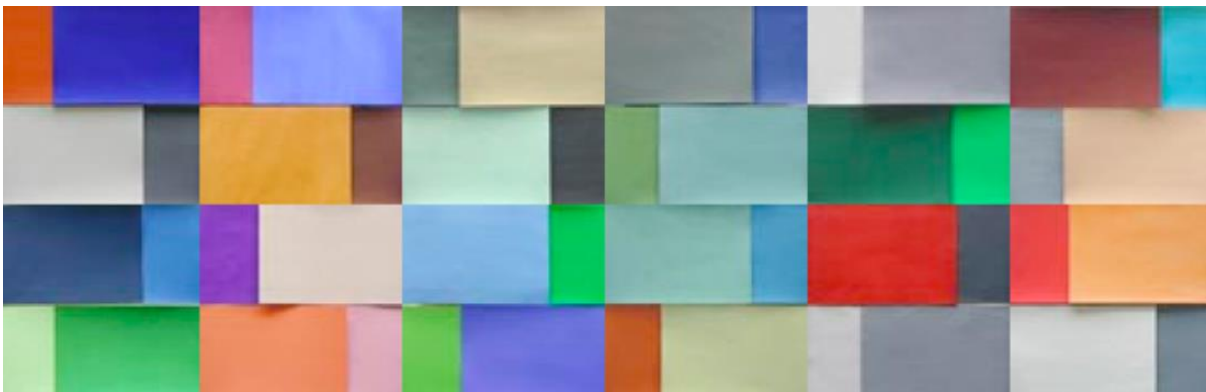


Figure 3: Collection of student colour swatches using four tones in two different magnitudes, resulting in a large variety of swatches.

During this process students realise that the effect of colour is relative. A colour in itself is neither ugly nor beautiful: such a judgement can be made only in the context of a composition as a whole. Students like mixing variations of their favourite colours, but in the beginning there is some resistance to mix colours they dislike colours they dislike. However, in the end they also begin to appreciate some of the variations of less favoured colours.

This very extensive collection of colour swatches forms the basis for all further exercises to investigate colour. Steps in this process can be described by terms such as: universes, systems, collections, interactions and associations of colour.

We begin this series of exercises with a deconstructive analysis of the colours in objects found in nature such as leaves and rocks. In the first step, the different colours present in the objects are identified within the collection of swatches and arranged in strips of equal width. In the second step, their relative amounts are represented through different proportions in a colour composition (Figure 4).

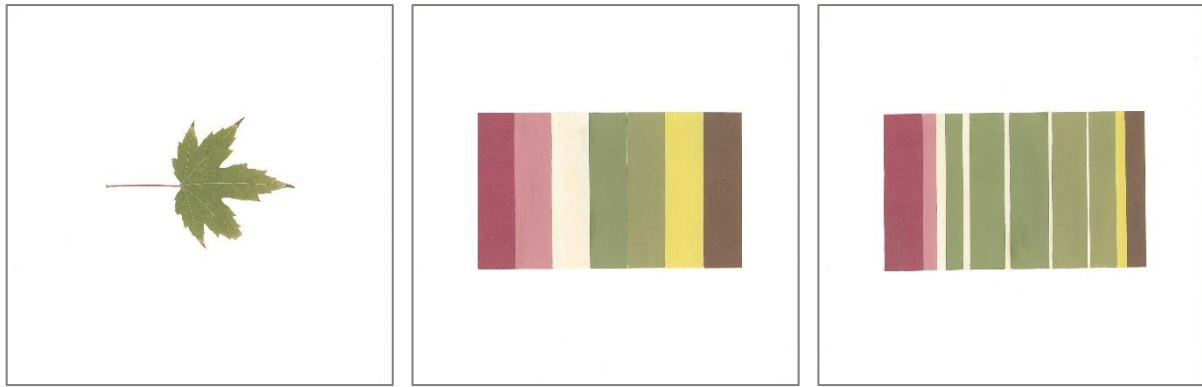


Figure 4: Qualitative (centre) and quantitative (right) colour analysis of a leaf (left).

In the third step, students try to establish a systematic order for the colours identified in the objects by locating them in a colour system such as the Natural Color System (NCS). Using this procedure, they will intuitively understand different properties of colour such as hue, tone and value as well as the relationship between the different properties within a system of colour classification (Figure 5).

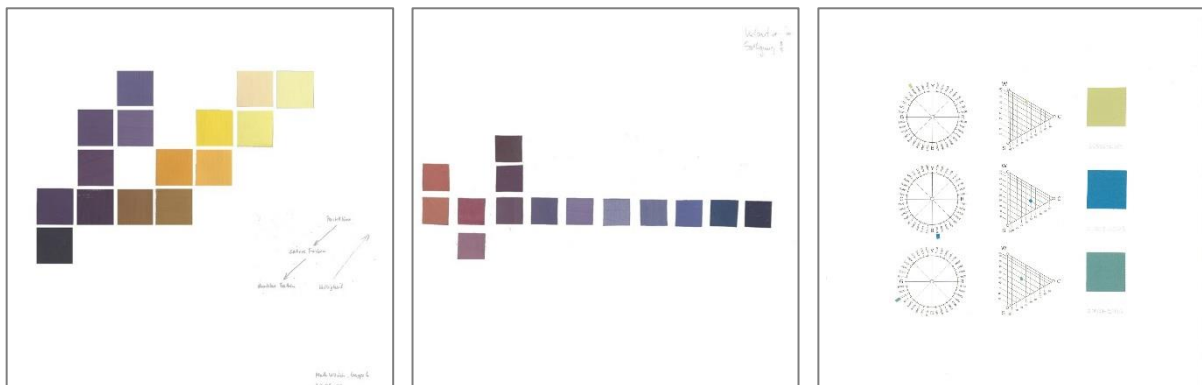


Figure 5: Taxonomy and systematic analysis of colours: analysis-based colour arrangements (left, centre), and the location of colours in the NCS (right). By students: U. Mack, A. Magert and T. Bialas.

Week One concludes with the students designing individual colour collections according to various themes. The themes of these collections might pertain to a design problem, a fashion exercise or a story that is to be illustrated using colour and space (Figure 6).



Figure 6: Creating an individual colour collection as a basis for further design projects.

By students: J. Wittstock, J. Wagner and M. Korth.

Week Two is devoted to colour on facades. Here, we focus on the colour scheme for an ensemble of buildings, e.g. a group of buildings in an historical village core. This process begins by developing a colour concept through collages that represent different moods or atmospheres. The next step is to extract the principal colours and form colour chords with varying quantities. Using these chords, students develop alternative colour compositions for the facades. Ultimately, one alternative is selected and further developed down to the last detail, including the roof, eaves, window frames, shutters, sills, doors, and ornamentation (Figure 7).



Figure 7: Alternative colour compositions of facades.

During Week Three our focus is colour and light in interior spaces. The students are assigned a room with set dimensions and select via lottery a function for the room, such as an office, a dentist's waiting room, a kindergarten, etc. Then the students make a colour theme collage that best expresses the specific atmosphere of the room's function. They build a model and cut different openings to test lighting and colour options by using the colour paper swatches from Week One (Figure 8). Various alternatives are developed, tested, photographed and revised. When they have set upon a final concept they make a 2D perspective on heavy paper.

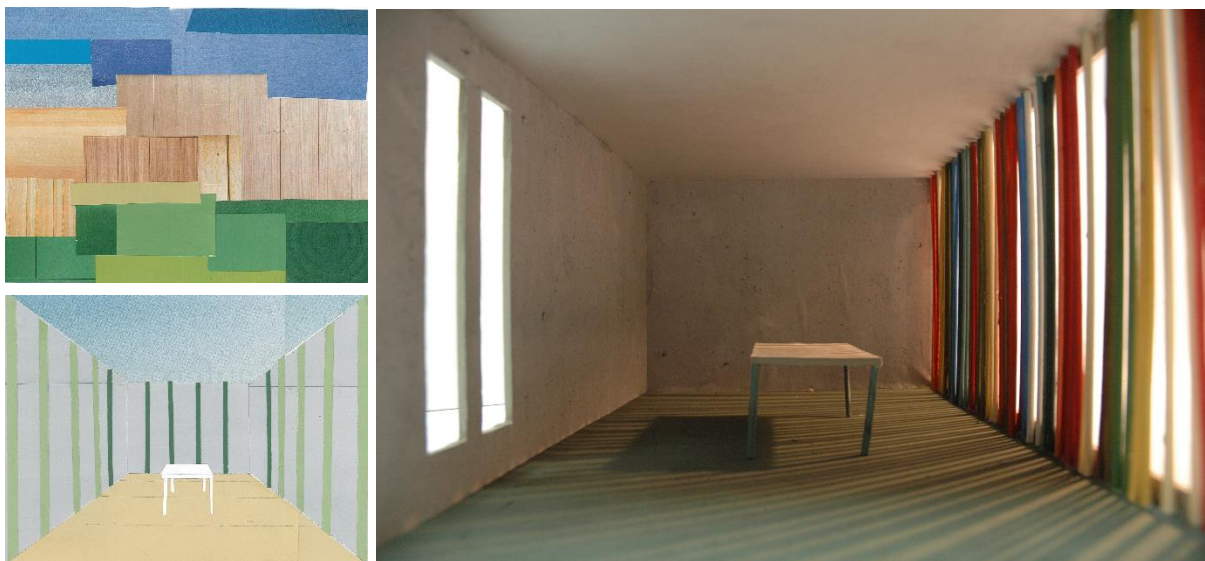


Figure 8: Colour and light in interiors: developing a theme via a collage (upper left), a colour scheme (lower left) and a model, $6 \times 4 \times 3\text{m}$, scale 1:20 (right).

Each week culminates in student presentations. After three weeks of intensive work, students see clear evidence of the learning that has taken place.

Because we offer three intensive weeks of colour instruction, we are able to add the aspect of light and its effect on colour. In addition, we could also introduce aspects such as perception and meaning of colour and offer excursions to the University's colour collection—*Sammlung Farbenlehre*—and to several museums in the city of Dresden. Guest lectures offered by scientists and artists round out the programme.

Advanced level – the triad of space, colour and light

In the seminar 'Space, Color, Light' students focus primarily on the triad of spatial geometry, colours/surfaces and light and its role in creating a colour/light atmosphere as an immanent part of the architectural concept (Figure 9). All three criteria are examined with varying emphasis in different exercises. The students learn to design through rapid exposure to 2D/3D media, such as making scale models, photographs, sketching, and using computer design programs, applying the process of multiple transpositions between these various media.

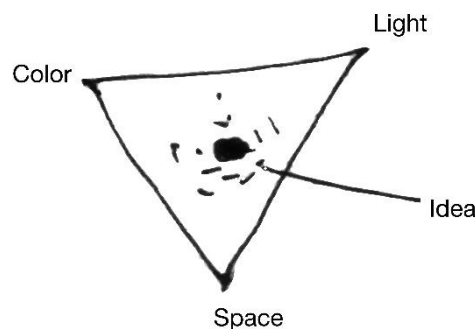


Figure 9: Triad of 'Space, Color and Light', with the 'Idea' somewhere in between.

Because we assume that at the graduate level students come into the program with a basic understanding of colour and light, we are able to focus upon the creative potential expressed in the triad model.

The exercises spread over the semester can be categorised into three areas of experience: material colour, immaterial colour and contextual colour. While each exercise concentrates on one of the aspects, the others figure in as well. The advantage of working with smaller groups of approximately 25 at the graduate level compared to 150 at the introductory level allows for more experimentation by each student.

Under the heading 'Material Color' exercises that deal with colouring materials and the inherent colours of materials are subsumed (Figure 10). We produce colours from a range of materials such as spices, minerals, plants, etc. and apply them directly. During this process students learn from unexpected results where reds—because of oxidation of organic materials—become blues. Students also learn about pigments, solvents and binding agents. Such experiments leave a long lasting impression. In addition, a variety of media and techniques applied in the arts are practiced: oil, tempera, gouache, acrylic, ink, wax, etc., as well as other more unusual media such as powders, detergents, glues, and household items. This allows for new and unexpected combinations, which give the impetus for extensive experimentation. Only in the next step does a systematic exploration of the materials and tools begin.



Figure 10: Student experiments with materials: colour 'Smörgåsbord' (left), paint & detergent (centre), and traces of tools (right).

Exercises that deal with the interplay between colour and light in space are subsumed under the heading 'Immaterial Color'. In addition to colour hues and shades, surface qualities such as luminosity, texture and transparency are explored directly in 3D space. We use photography twofold: to record the steps of the individual experiments and to critically explore its function as a medium in architectural presentation (Figure 11).



Figure 11: Experiments with light and colour in spaces of architectural models. Students vary the lighting conditions and the colours of the interior surfaces.

In the exercise 'Speed Dating', 2D photographs of famous architectural spaces are used as a starting point to produce a 3D model whose purpose is to represent the geometry, colour and light conditions of the original photograph. Then another photograph is taken of the model. By transposing the original architectural design through different media, its qualities become more distilled and furthers the student's own conceptual understanding (Figure 12).

Finally, the category of 'Contextual Color' broadens the spectrum of exercises to the level of symbolism and the role of colour in the arts and other areas of everyday life. We investigate the importance between the development of new colour preference in different times and the evolution of new stylistic periods in art but also the creation of scientific colour systems.

For some of the exercises, Dresden's world famous collection of Old Masters and the museums of contemporary art offer a unique and inspiring environment. More than just a typical museum tour the students conduct an in-depth investigation into how colour, light and space impact a particular work of art spanning from Lukas Cranach, Titian to Gerhard Richter. Students work on semester-long projects exploring how to alter actual architectural spaces in Dresden through artistic intervention, building

sculptures or modifying spaces in Dresden's public realm through light projections or the addition of spatial and sculptural elements (Figure 13).

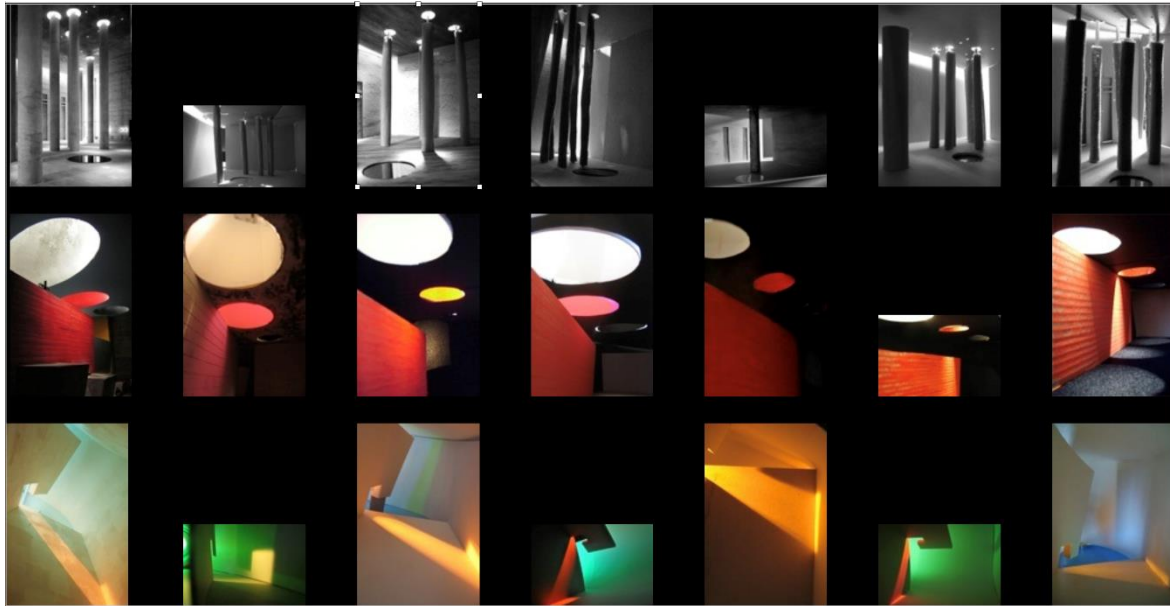


Figure 12: 'Speed Dating' – recreating a spatial atmosphere from photographs via drawings to models. Students build a model using photographs, then illuminate the model with different lighting conditions and a variety of coloured papers until the atmosphere of the original photo is recreated.

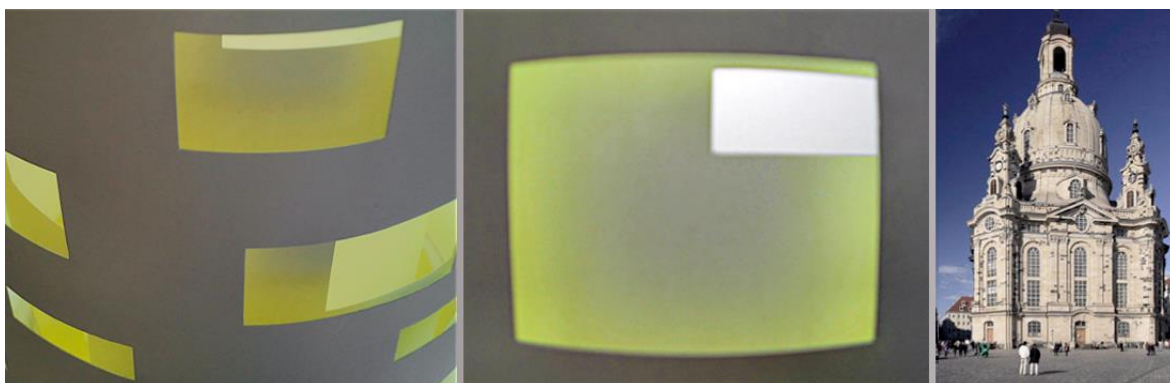


Figure 13: Sandstone a project by Lars Jacob conceived during the course 'Space Color Light—Ambassadors to Dresden'. The checkered sandstone facade of Dresden's Cathedral is used as a source of inspiration for a light sculpture.

Conclusions

It is not a subject of debate that a successful architect be proficient in the use of colour. It is sadly, however, not given due time in a student's path through most architecture programs. Over the years we have endeavored to change that. The courses described above have evolved, moving from a basic to an advanced level, with positive results throughout the process.

We have been teaching colour in this way for five years. We have noticed considerable differences in how an understanding of colour and light has developed throughout architectural design projects at our school. While students were usually bored by colour theory and did not really forge a connection to its

application in design practice, we now see a clearer understanding of colour theory. Because we do not take the traditional path from theory to practice in colour education but rather from practical and individual intuitive analysis to an understanding of the theoretical principles of colour by personal experience, we feel that students better grasp how colour can be used as a compositional instrument in designing architectural space and form. We also notice that students are beginning to think about creating a desired atmosphere for their projects, and hence, also about the influence of light, right from the start.

The only difficulty we encountered at the beginning of these intensive weeks was that students did not seem to have enough stamina to concentrate on one subject for a period of three weeks without any interruption by other courses and projects. In the meantime we have gradually introduced breaks through daily lectures and interim reviews or museum visits. Last year we found that students were able to uphold their level of excitement for the entire period, because they realised that they can achieve more when concentrating on one thing for a longer period of time. We also changed the order of weekly topics by moving the block of colour in urban design to the end. The new structure has the advantage that more complex topics come at the end of the course.

By now our course has become well known within the landscape of European architecture schools and we hope that this process of teaching colour to architecture students might serve as a future model for colour education in architecture.

Reference

1. Weber R and Kanthak (2011), Teaching color to architecture students, *Proceedings of the Midterm Meeting of the International Color Association (AIC 2011 Interaction of Colour and Light)*, 812-815, Zurich (Switzerland).