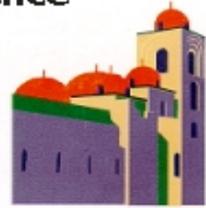


Multimedia and Architectural Disciplines

The 13th European Conference on Education in Computer Aided Architectural Design in Europe



MULTIMEDIA AND SPECIAL ARCHITECTURAL DISCIPLINES

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Introduction

A person is a wonderful creature. His high organization helps him not only to see and to hear the world around him, but to feel and understand, to condole and pity. A person is a sacramental creature too. His complex organization helps him to see day as light and darkness, as delivery and death, as delight and grief. Every human reaction has biological, physiological and sensitive components. That is why environment is able to call up physical and emotional associations. A human being can "see" sound and "hear" colours.

All history of human culture shows that the art can affect man in different ways: unconscious effects, spontaneous associations, general symbolic or specific conventional meanings. That is why architecture can not only protect (a safeguarded aspect), but give knowledge (an informational aspect) and set up mood (an emotional aspect). And that is why we speak about ambiguity of sense and about multiartistic works. Such as Skriabin's symphony 'Prometheus'. Two scores - musical and colouristic - are connected in this masterpiece.

Let us look through two architectural disciplines – from this point of view. The programmes of these disciplines are examples of such embedment. Any architectural discipline demands computer graphics. Any architectural discipline demands multimedia aided teaching, because multimedia in computer designing is a result of human being's complexity and ambivalence.

Colour science for architects

An architect must think "by colours" from the very beginning of designing and must use colour as a compositional expedient. Architectural colour theory gives the students of the architectural department fundamental rules of colour science and methods of their practical utilization. There are a lot of remarkable graphic packages, which help architects to wield vector-mode graphic display and raster-mode graphic display, to work with colour and shape. But today practical teaching is impossible without multimedia aided and we have animation as a first multimedia effect.

The first of this programme connected with the theoretical course and contains the main peculiarities of colour perception. Students learn the peculiarities of simultaneous contrasts at first on the fixed pictures, then on the moving pictures. They learn variations at the expense of transformations: of background

saturation, area, distance between figure and background, border contrast, etc. In this case we have animation as *a first multimedia effect*. Computer graphic permits to transform the elements and qualities of harmony groups. And here the *second multimedia effect* can be used. We can attract:

– verbal associate forms

- separate words (grif, joy, quiet, motion)
- separate poems
- musical associate forms.

The *third multimedia* effect is the usage of different graphic packages, the *forth one* is the usage of different data base.

Our teaching programme helps students to learn the main practical tasks - colour on perception, psychological influence of colour people, colour harmonies - are performed by the way of "colour modellator" (Fig.2). With the help of uncomplicated transformations it helps to receive a necessary set of simple figures for colour exercises.

Task 1. Students study the main conformities of colour perception: colour adaptation, simultaneous and successive contrasts. Students learn the peculiarities of simultaneous contrast at the expense of transformation of background saturation, transformation of background area, frontiers sharing common fields, distance between figure and background, border contrast. The next part of the programme is aimed at the study of colour harmonies and at their use in the architectural polychrome designing.

Task 2. Students study monochromatic harmonies (conformity to natural laws for colour rows), nuance harmonies, harmonies of complementary and contrast colours, harmonies of four and three colours, etc. Initial element (circle, square, rectangle, etc.) for harmony structure is picked out by the student independently. Computer graphic permits to transform dynamically selected figures, change the area of the object and background, the quality of the colour, (brightness of colour, saturation, hue). Computer permits to obtain many versions of colour combinations (Fig. 1).

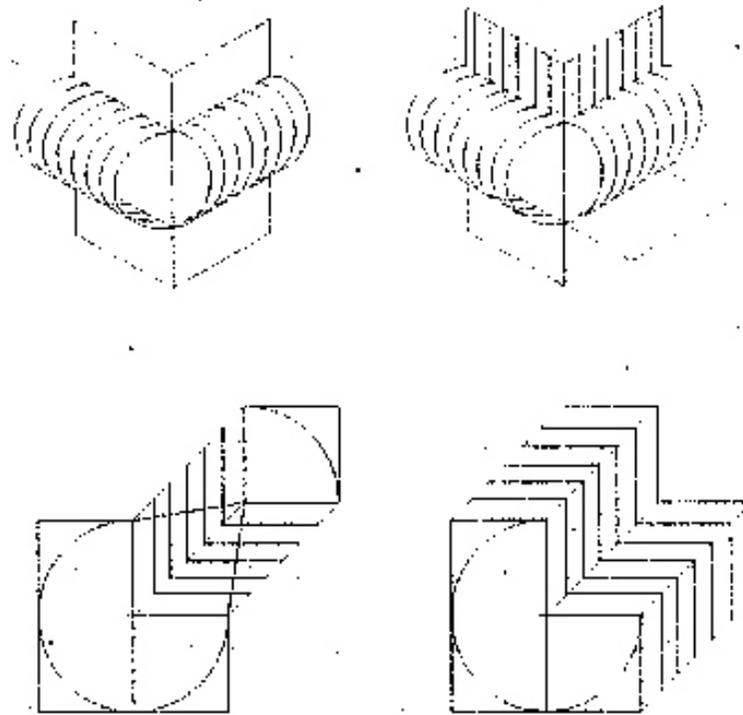


Fig. 1

Task 3. The construction of colour composition on the basis of colour associations. Colour associations can be divided into some big groups - physical, physiological, emotional, geographical and etc. The type of association is selected. Then the group of colour palette is selected from the multitude of colours, which can be associated with grief and joy, warmth and coldness, passivity and activity, etc.

The usage of multiplication, of bank of dates in the form of musical compact disks, slides, videocompactdisks gives a great number of versions for decision of 1, 2, 3 tasks, They are paramount important to acquire knowledge of colour science. The widest opportunity are opened up during the decision of the 3d task – the creation of colour compositions on the basis of colour associations.

Task 4. The aim of this exercise is to study the possibility of visual illusions. By using the model of cube, students can study how colour changes the shape, proportions, rhythmical laws, inside and outside, environment. During the decision of the 4th task – the studying of visual illusion – can be used those possibilities of multimedia aids which allow to transform colour cube model at first into colour space, then into colour environment and to forecast the colour influence on human state and behaviour.

Task 5. With the help of this exercise students can study the possibilities of colour to change the elevations of architectural objects. In the first case colour can emphasise architectural details, the structure of building; in the second case colour can change the shape of the same building.

Task 6. During this work students are to study the connection between the colour scheme of a building and the colour of the environment. Two conditions may be used in this exercise:

- . a real object in a real environment;

b. an arbitrary object in an arbitrary environment.

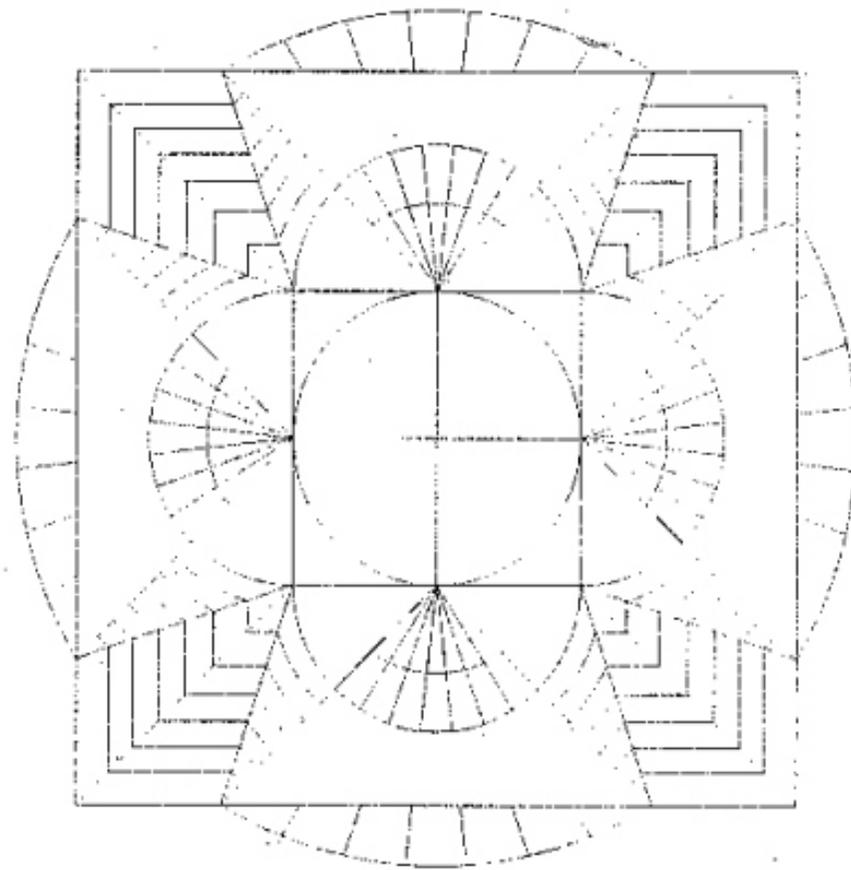
In both cases the landscape can be shown with the scanning of photo, slides, videoimages as different frame of figures photo. The first stage - studying of analytical materials: colour dominants of the natural or urban environment, the palette of local building materials, conditions of perception.

The second stage - choosing of the palette of main, auxiliary and accentuate colours.

The third stage - the carrying out of the elevations with the means of graphic and animation . It's possible to model objects, to give texture, to show lighting.

Task 7. The studying of polychromatic restoration in methods.

- . the method of roman system i.e. format, original colour image is neglected and colour image of restoration is restored.
- b. the method of colour stylization, when initial colours image is restored .
 - I. stage - the choice of main auxiliary and accentuate colours the composing of colour, palette. Students make natural sketches (by water-colour or pencil) to fix colour image. Then the sketch is scanning and is introduced in computer. 'This picture as a graphical file can be worked up with filters. It gives an effect of real existence of restored object.
 - II. stage - the elaboration of colour harmonies;
 - III. stage – the choice of the definitive version of colour scheme on the basis of the space colour zoning:
 - an object is a colour accent with neutral encirclement which is the transition from the colour of the object to the colour of the environment;
 - an object is included in it's encirclement which can be used as a colour background for an object;
 - the bottom of the buildings intensifies the colour sound of the object, but then upper floors can receive another colour.



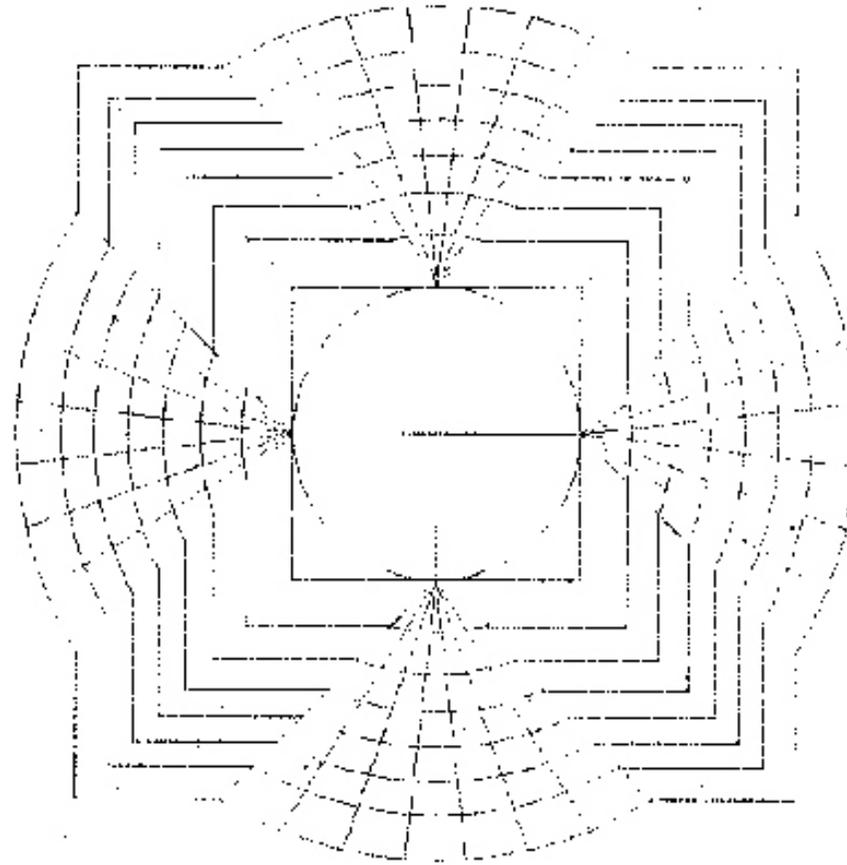


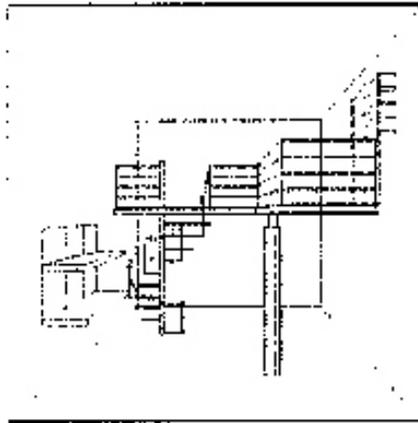
Fig. 2 - The "colour modulator"

Interiors design for architects

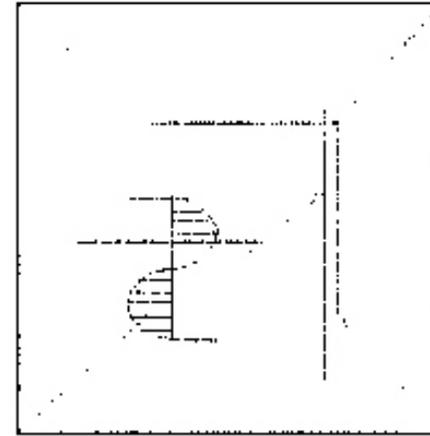
Let us take another architectural discipline as an example and look through "Interiors design".

The main category of this discipline is space. To understand the space is to understand the soul of the interiors. To understand the space student must use different parallel research methods – from functional programme to compositional ones. And this usage of parallel methods is an example of multimedia on the level of the initial data. Multimedia aids of this level are connected with the necessity to outline zones, ways, the places of compositional accents, etc.

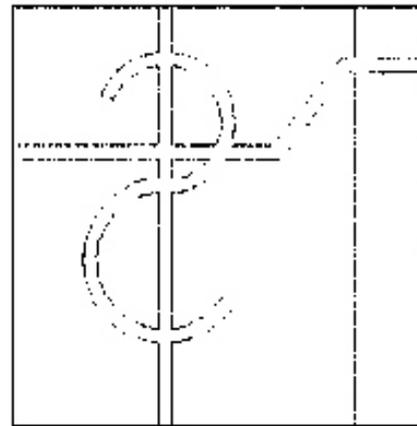
The next stage of this teaching programme is the studying of space. There are two types of teaching tasks: the analysis of real space and the designing of new space. In both cases they use the method of the superseding with different signs: iconic sign, sign- index, sign-symbol (Fig. 3), but the order of the superseding is different.



Icon-sign



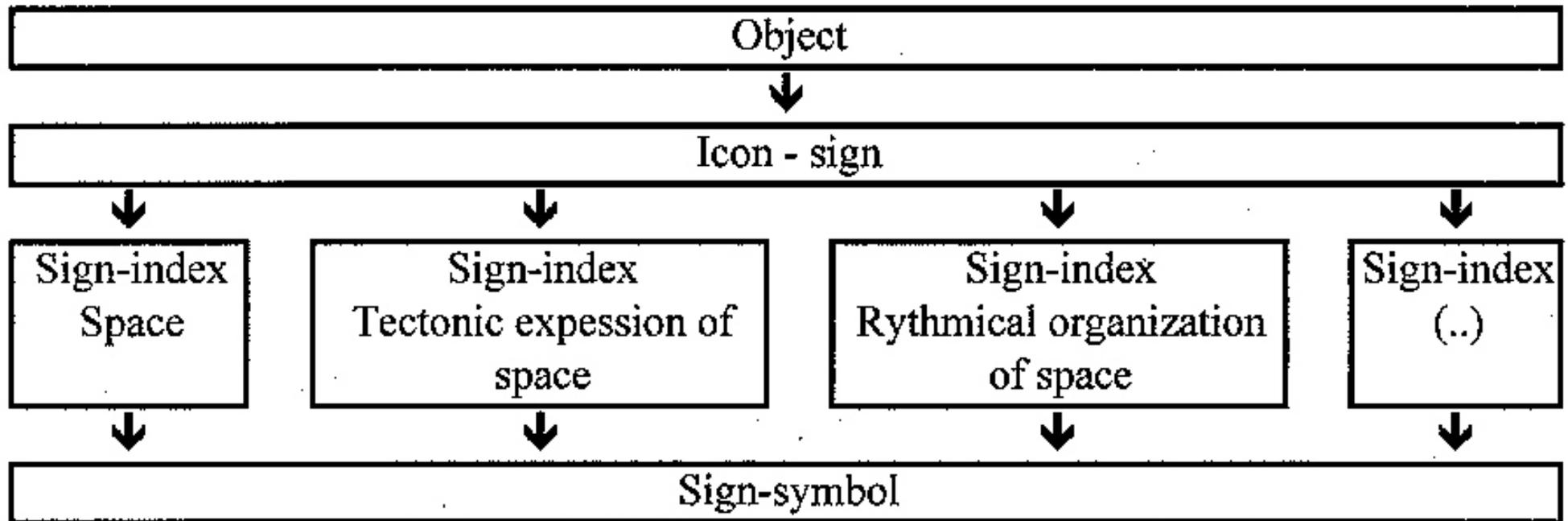
Sign-index



Sign-symbol

Fig. 3

The scheme of the real space analysis is:

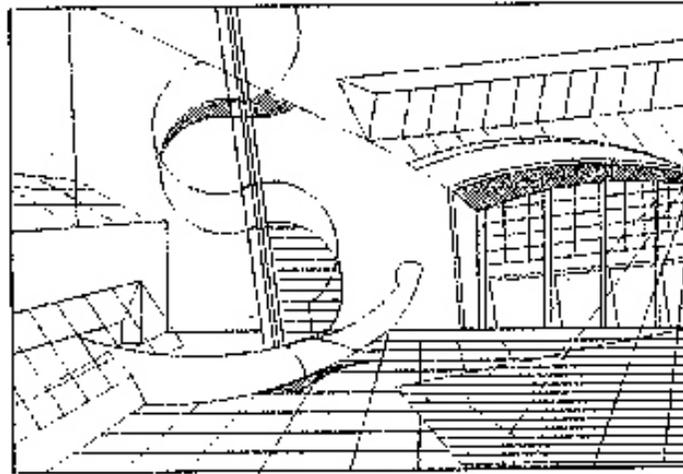


This scheme shows that an object has single icon-sign, but we can build a multitude of sign-indexes (Fig. 4). We have a lot of them because every sign-index can be built as a sign of any property of this space. These properties can be ranged: space – tectonic expression of space – rythmical organization of space-etc. (Fig. 5).

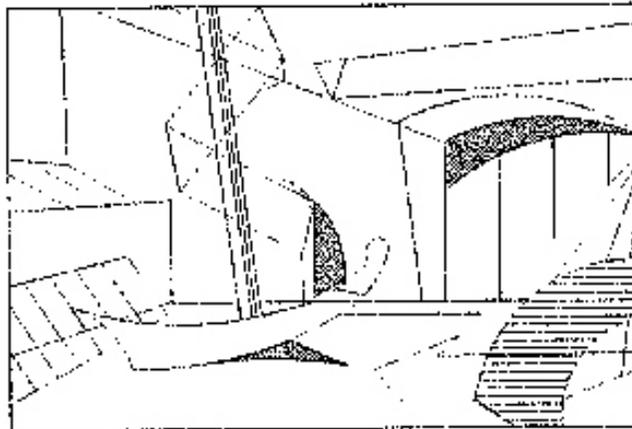
But inside every property we can find the ranging with the help of bipolar scales. For example:
space and its internal energy:

- open - close
- united - partitioned
- structural - inert
- centrifugal - centripetal-etc.

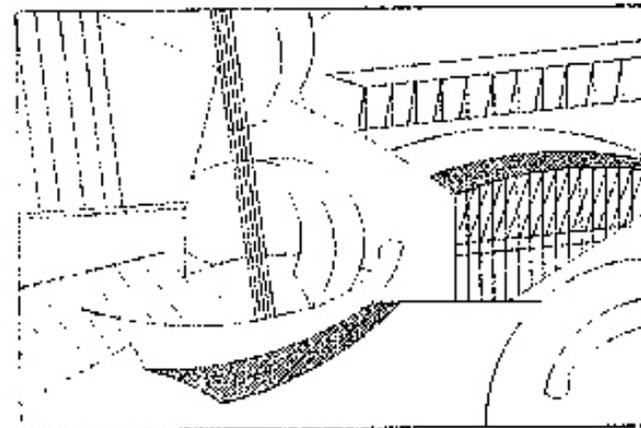
The ranging of these signs for designing is another. The sign-symbol of future interior can help to find different sign- indexes (the properties of future interior), to find icon-sign as a complex of interiors' elements and to design the object. In both cases we use all multimedia effects.



Icon-sign



Sign-index



Sign-index

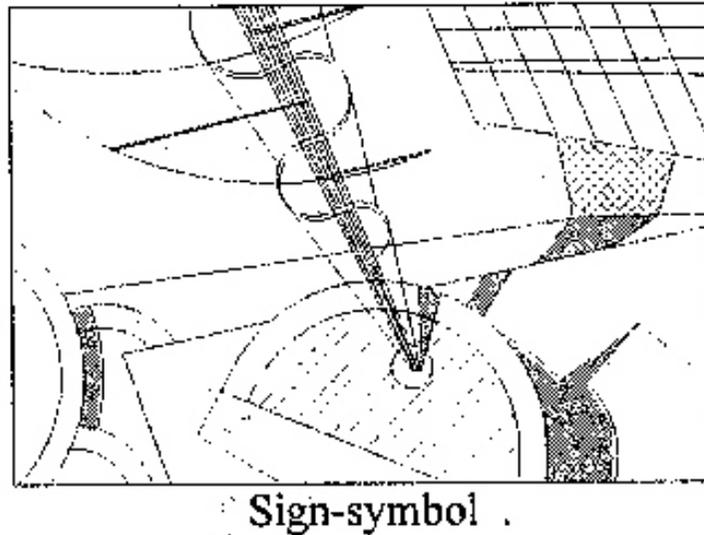


Fig. 5

General method of approach to colour modelling

The process of colour modelling with multimedia aids has several stages.

The first stage of colour modelling – *contextual* aspect of designing – the studying of the assignment, of the initial situation, of the regional colour, cultural, and building traditions, local constructive materials, visual conditions, etc.

The second stage – *conceptual* aspect of designing – the search of idea, the integration of space and colour conceptions, initial associations, connected with the character of space, data of the first stage analysis. Now we have common content matter and direction of colouristic idea, the character of colour composition. Specific multimedia aids of these stages- different data base. On the next two stages the action has *structural - morphological* character. So, the aim of the 3d stage is the search of optimal colour- space decision. Multimedia aids of this stage-scanning graphical painted sketches, machine modelling, colour combinations.

The aim of the 4th stage is the organization of colour - space bonds, the connections inside space system. Here it is important to find form made and at the same time colourformed principles and methods to create united tectonical space system.

The fifth stage permits to find the plot way of colour topic in time and space, the connection between colour stress and space structure. The method of *scenario modelling* includes videotapes, "telemaketoscope", cinematic and photographic device to forecast the development of colouristical topic in time, to come into environment.

With the help of accelerator for the synthesis of 3d stereomages in real time, helmet with stereo displays, sensor glove, 3d-sound possibilities, authors systems it is possible to create stages and models "inside" this virtual world, to animate objects "by hands". The aim of the 6th stage – an artistic and compositional one – to unite the results of preceding design procedures into intact colour – space composition.

During his work a student can return to the previous stage, to change colour decisions, proportions, to correct initial colour conception.

A hard copy or videocopy gives the teacher the opportunity to check up student's action, to analyse together the way and mistakes and to intensify the teaching

process.

An E-mail can give an opportunity to exchange student works and to organise students competitions.

So multimedia aided teaching is more perfect than traditional one.