



College of Human Ecology

Project:
**ENHANCING CHILDREN'S
WELL-BEING BY
SUSTAINABLE SCHOOL
FURNITURE DESIGN**

Leader

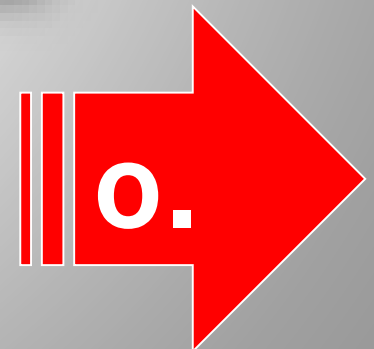
Danijela Domljan, Assist. Prof., PhD, MA in design
University of Zagreb Faculty of Forestry
Department of Furniture and Wood Products

DEA's team co-leaders

John Elliott, Gary Evans and Nancy Wells
Cornell University, College of Human Ecology
Department of Design and Environmental Analyses



INTRODUCTION to PREVIOUS WORK...





... observations, twenty five years ago...
...imagination and concept ...

Faculty of Architecture
Interfaculty School of Design

School furniture system
Didactic educational tool

Design of school desk - development of
children's creativity

MA Thesis

Zagreb, 1996.



School furniture ORLA
Tvin d.o.o. Wood Industry Virovitica
prototypes
1998



ORLA
still in mass production
1998 - 2019





University of Zagreb
Faculty of Forestry

**The Design of Contemporary School
Furniture as a Prerequisite for
Maintenance of Pupils' Health**

Ph.D. Thesis

Zagreb, 2011.

design concept of *dynamic sitting* by using
ecological wooden materials



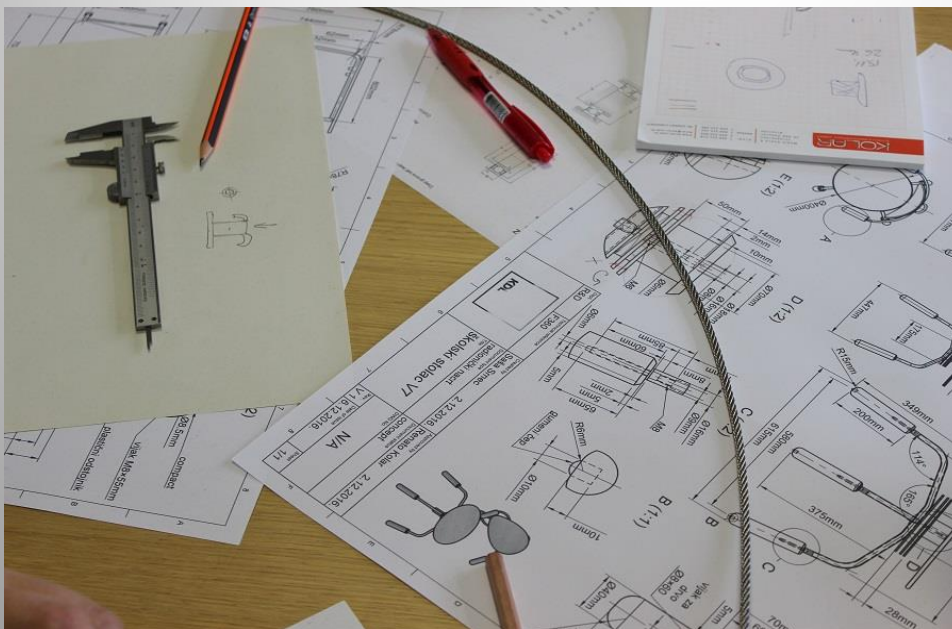
Croatian Ministry of Science and Education
University of Zagreb Faculty of Forestry

SCIENTIFIC PROJECTS

2013-14 _ *Development of new furniture for sitting in educational institutions.*

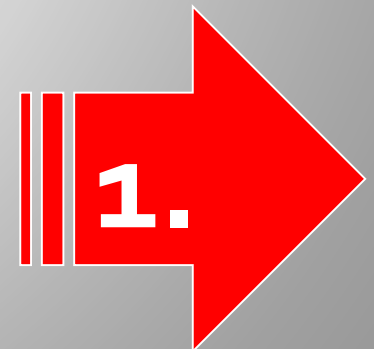
2015-16 _ *Development of school furniture by applying new forms and constructions.*

School chair aimed for dynamic sitting, tested in Lab for furniture quality, according to the standard EN 1729





FUNDAMENTAL ITEMS / QUESTIONS...



MAIN QUESTIONS:

- **SITTING:** Can a young body struggle with today's length of sitting and inactivity without minor / major psychophysical disorders ?!
 - ...today's pupils are sitting longer (and even more!) and have less physical activities than in the last century
- **DESIGN:** Why school furniture has not undergone almost no change for more than 300 years??
 - ...design, construction, technological, functional... almost the same - office / school comparison
- **WELL-BEING:** Does and HOW DOES school furniture affect pupils health?



MAIN DESIGNER'S QUESTION:

- What are contemporary pupils' needs and requirements for healthy growth and development ...and *well-being*?
 - ergonomics / anthropometric
 - creativity (aesthetic - visual)
 - functionality
 - ecologically
 - social behaviour
 - safety
 - feeling "good"
- How should look like the classroom of the future?

School furniture is not the first teacher's or kid's issue in the classroom, but may cause several huge health problems in the future!



Definitely, an inter-, multi- and trans-disciplinary approach is needed

2011_PROJECT WOOD IS GOOD

financial support: Croatian Chamber of Economy;
Croatian Forests; Ministry of Agriculture Republic
of Croatia

two competitions

The goal: higher use of wood and wood
materials in educational buildings
(kindergartens)

1. The competition for the architectural concept of the facility - typical wooden structures kindergarten.
2. The competition for the design of furniture and equipment for kindergartens

The problem of realization! – WHY?



2013 – 1015_PROJECT WOOD IS GOOD

Creating a book of technical descriptions for wood products - educational institution (2012-2013)

Leader / editor: Danijela Domljan

Collaborators : Ivica Grbac, Vlatka Jirouš Rajković, Zoran Vlaović, Vjekoslav Živković, Ivica Župčić

Publisher: University of Zagreb Faculty of Forestry,
Croatian Chamber of Economy

UNIVERSITY MANUAL (2015)

Quality and Technical Descriptions of Wood Products - Volume I - Equipping Educational Facilities

The problem of implementation! – WHY?



WHAT IS THE OPTIMAL DESIGN OF SCHOOL FURNITURE?

INTERACTION OF INTERDISCIPLINARY FACTORS

HUMAN FACTOR

DESIGN

- functionality
- ergonomy
- anthropometry
- anthropology
- ecology
- aesthetic appearance
- colours, dimensions
- multifunctionality

ERGONOMICS

- relation user-product-environment
- working environment
- ergonomics surveys
- anthropometric measurements

SOCIAL FACTOR

PEDAGOGY

- new curricula
- flexibility and dynamics
- *moving school*
- polyvalence
- contemporary trends in school development (facilities, free time, playing, IT / computers, furniture,...)

SOCIOLOGY

- cognitive development
- social environmental impact
- neighbourhood / cultural background

PSYCHOLOGY

- psychic and physical development of the child
- work conditions
- interference (noise, light, air)

OPTIMAL SCHOOL FURNITURE DESIGN

MEDICINE

doctors & healthcare

- Physical Therapists (PT)
- Physical Therapy Assistants (PTA)
- Occupational Therapists (OT)
- Occupational Therapy Assistants (OTA)
- child orthopedy
- Nurse Practitioners (NP)
- Anatomy
- ... **HOLISTIC APPROACH**

ECOLOGY

- environmental protection
- user's health
- raw material utilization
- energy
- recycling
- storage

PRODUCTION

- quality of production
- user's friendly materials
- usability
- maintenance
- ease of use
- durability and endurance
- safety
- hardness
- stability
- reliability
- service
- non-toxic
- mechanical safety

QUALITY

- standards
- EN 1729 – Furniture: Chairs and tables for educational institutions**
- functional dimensions
- safety requirements and test methods

CONSTRUCTION

- functional requirements
- technology and complexity
- standard elements
- controlling
- rationalization
- innovative solutions and materials
- finishing, surface treatment

FUNCTIONAL FACTOR

ECONOMY

- competitiveness of products
- product price list
- lower product price
- market innovation
- assembly, service
- parts replacement

ECONOMIC FACTOR

MARKETING

- innovation
- branding
- promotion



WHY I'M HERE? ☺ PROPOSAL + PROJECT APPLICATION

2.



UNITYTHROUGH
KNOWLEDGEFUND



College of Human Ecology

Title of the project :

ENHANCING CHILDREN'S WELLBEING BY SUSTAINABLE SCHOOL FURNITURE DESIGN

- **funded by:** Croatian Ministry of Science and Education + Croatian Science Foundation + University of Zagreb + Faculty of Forestry, Zagreb, Croatia
- **duration:** September 26 – November 26, 2019
- **collaboration with:** DE+A, College of Human Ecology, Cornell University + elementary schools in Ithaca district + Science Center Ithaca
- **leader** of the project: Danijela Domljan
- **DE+A's collaborators / professors:** Jack Elliott, Gary Evans, Nancy Wells + ...?
- **DE+A's main participants:** students from DE+A, all classes/ levels, voluntary,... 😊
- **INTERDISCIPLINARY APPROACH**



MAIN GOAL

improving healthy school environment

by designing new and innovative sustainable concepts of wooden products (furniture, equipment, sensory-didactic elements etc.)

that will meet the children's needs and achieve a sense of well-being at school in the future

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METHODOLOGY

- **Mosaic methods:** user-oriented approach
- **Design methods:**
 - **observing** children's behavior and body positions while working, playing, etc. – usual daily activities at school environment
 - **photography, video-recording**
 - **questionnaire** on favorable things in school
 - **talks, interviews** with kids and teachers
 - **children's drawings** upon the title:
 - „Draw your ideal classroom“ /
 - „Design your desired school environment“



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POLYGONS / VISITS

- Visiting the **elementary schools** in Ithaca district
- Workshop at **Science Center Ithaca**
- Visiting the **Community Playthings factory**, Ulster Park, NY





MAIN FOCUS

Focus is on

- design, innovation, multidisciplinary and usage of sustainable wood materials in school furniture conceptual development;
- creative analytical approaches, application of various design methods of research
- comparison of the environment and equipment in US schools and other worldwide schools, depending of student's background.

MAIN FOCUS and CONTRIBUTIONS

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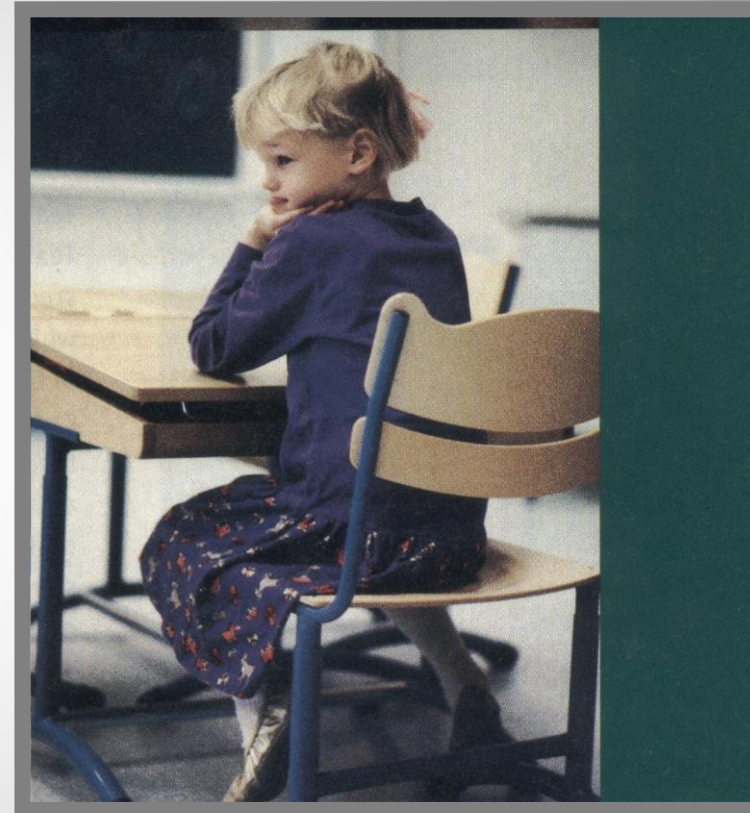
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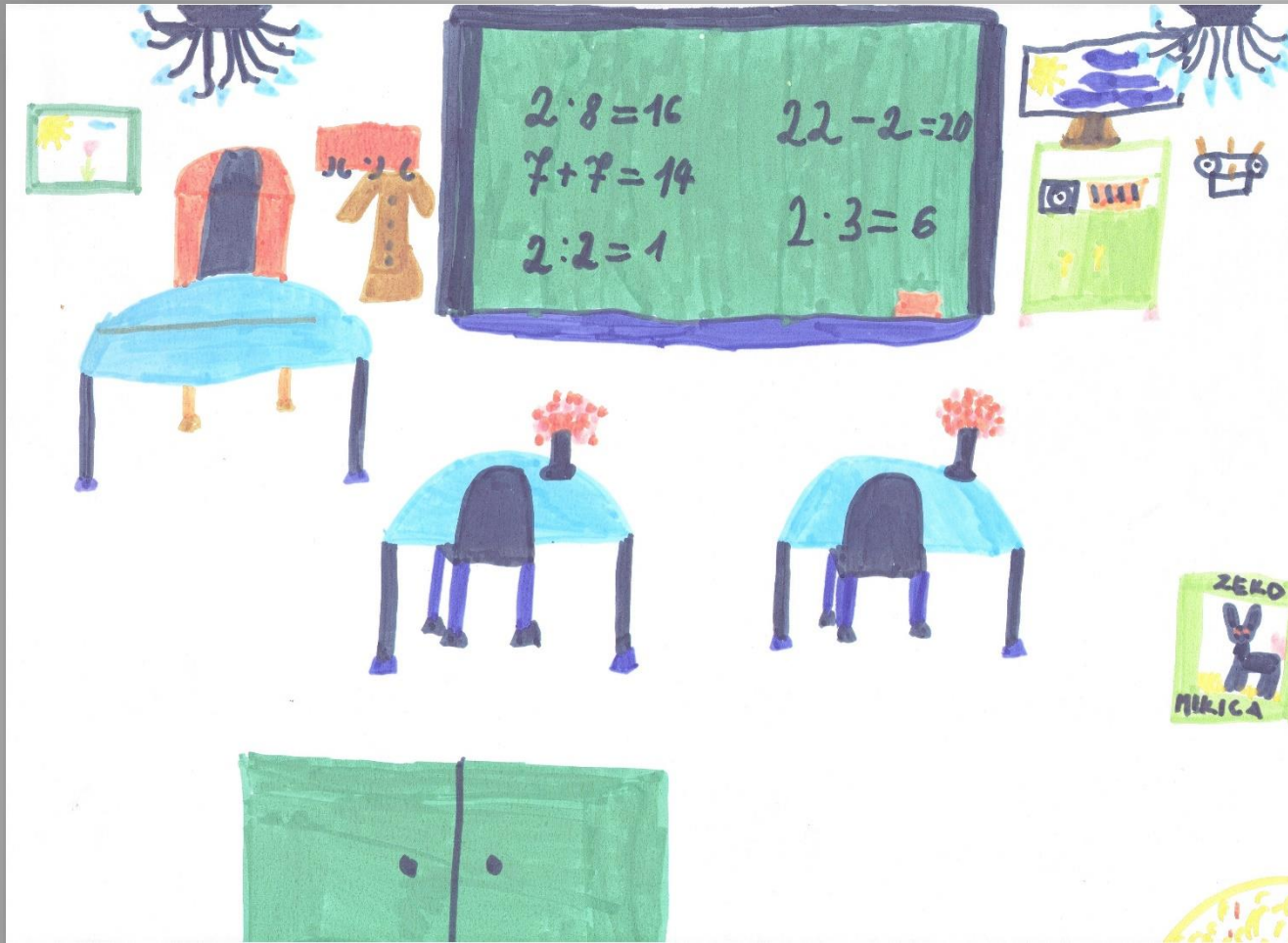
Contribution is in / outcomes

- development of new approaches and methods in the school environment design and user's behavior
- application of wood and wood materials in school products (furniture, didactic materials etc,)
- promotion of well-being and health of pupils in school
- prototype development with the possible production in Croatian wood companies, wood industry and furniture production
- new collaboration and research project application between team members and participating organizations.

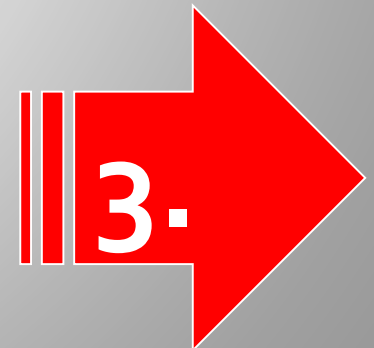
EXPECTED OUTCOMES

- **new product concepts** in terms of human/children oriented design
- **student's conceptual drawings, models & prototypes** produced at Design Studio DE+A
- **published brochure** about the project
- **exhibition at DE+A** – children's drawings and student's concepts / prototypes
- **dissemination** of the project results – journals and international conferences
 - December 13, 2019 in Zagreb - International Conference on Wood Science Technology ICWST
- **production of new innovative school products** based on Croatian wood and wood materials in cooperation with Croatian wood companies





THEORETICAL BACKGROUND AND PROBLEM ANALYSIS



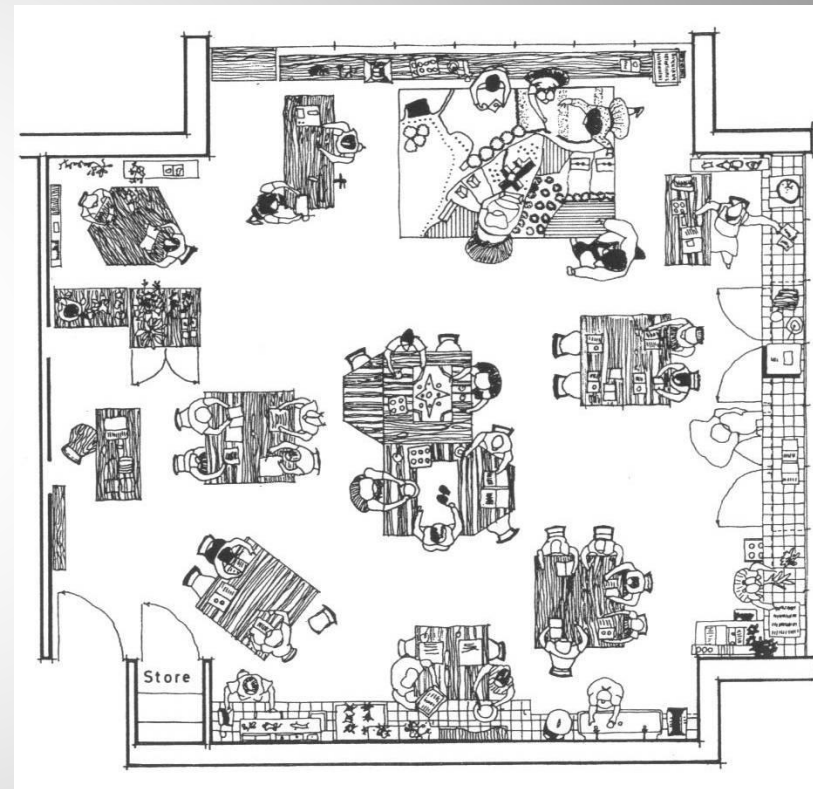
CURRENT STATE:

- ...It is **astonishing how little scientific literature dealing** with the effects and consequences of school environments and furniture on children's health, perception, behavior and feelings (...)
- ...All the research so far has been conducted in environments based on the traditional chalk and panel attitude and the term standardized one size fits all (...)
- ...This leads to the recurrence of the past and the transmission of the same mistakes into the future. "

Toby Greany: The Impact of School Environments ,
Design Council, UK (Higgins et al., 2005)

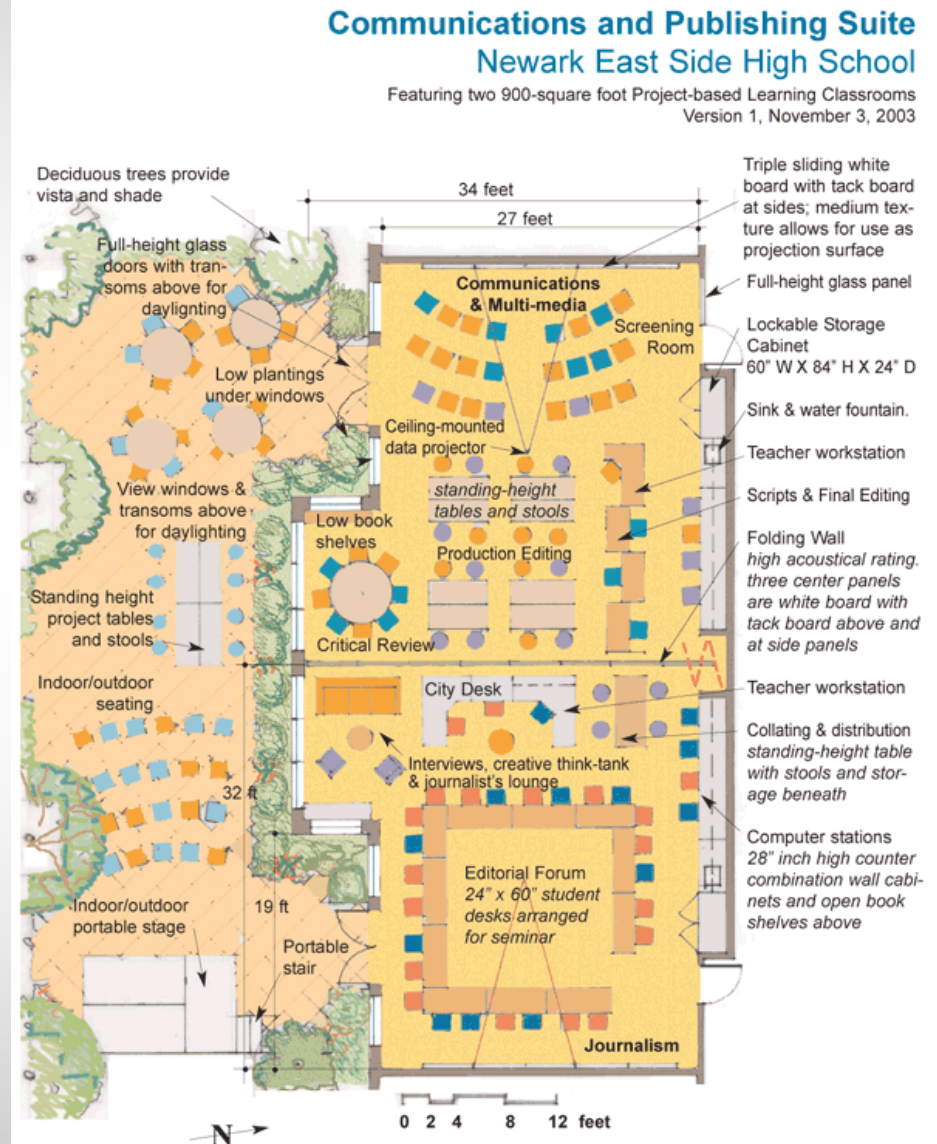
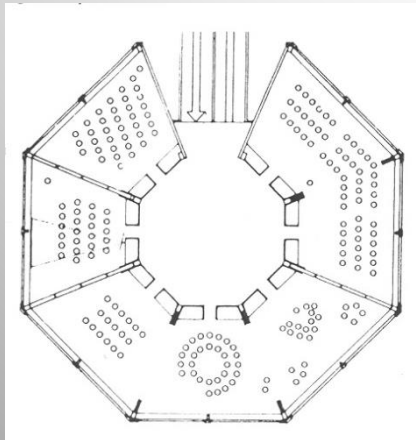
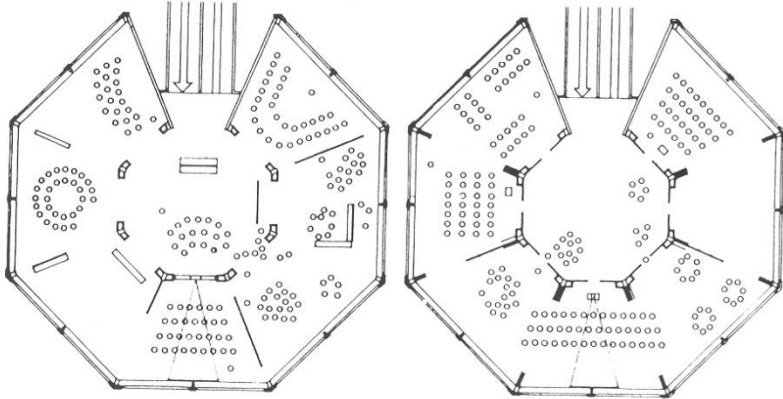


design _ pedagogy _ anthropology+ergonomy_ecology+sustainability_functionality+technology_economy_...



design _ pedagogy _ anthropology+ergonomy_ecology+sustainability_functionality+technology_economy_...

_ open schools?



design _ pedagogy _ anthropology + ergonomy _ ecology + sustainability _ functionality + technology _ economy _



design _ pedagogy _ anthropology+ergonomy _ ecology+sustainability _ functionality+technology _ economy _...

A, a



B, b



C, c



D, d



E, e



F, f



G, g



h



design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_.

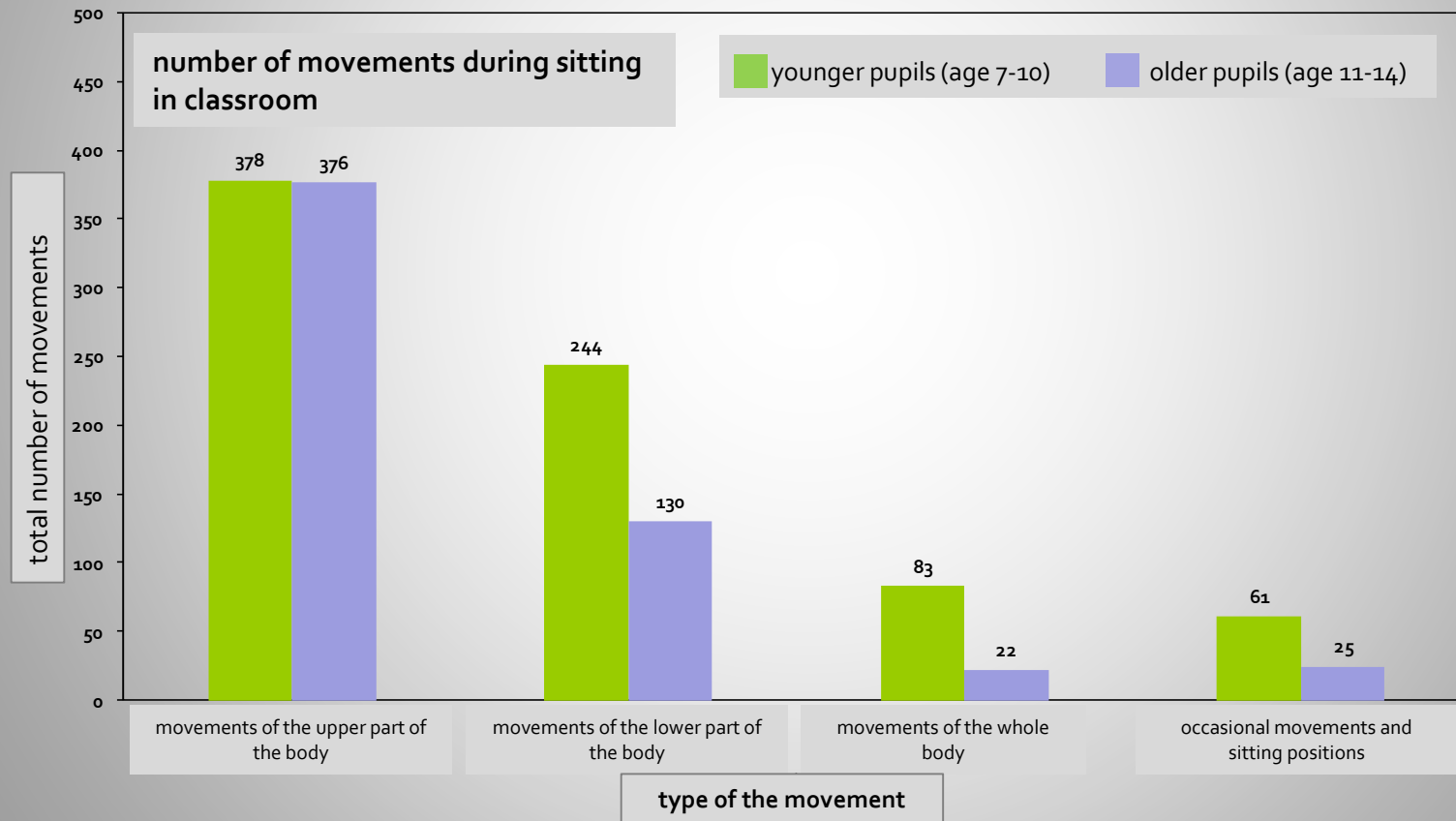


design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_..



design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_..

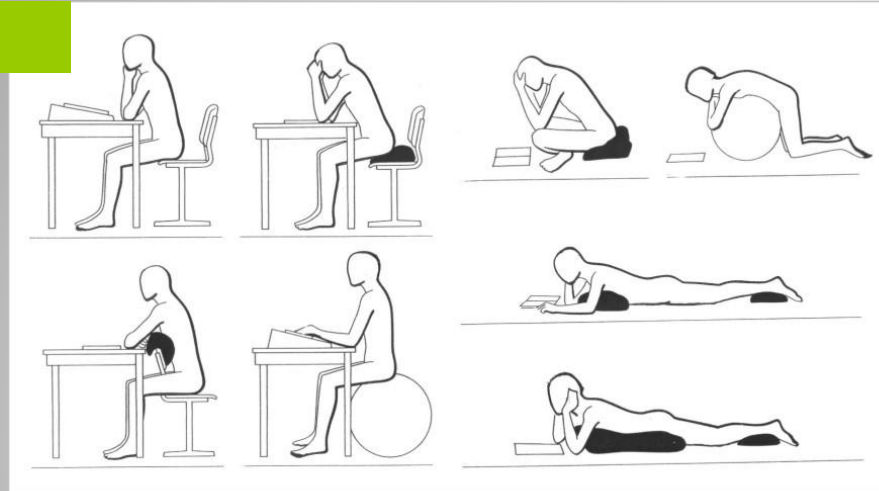
design_ _sitting & moving...



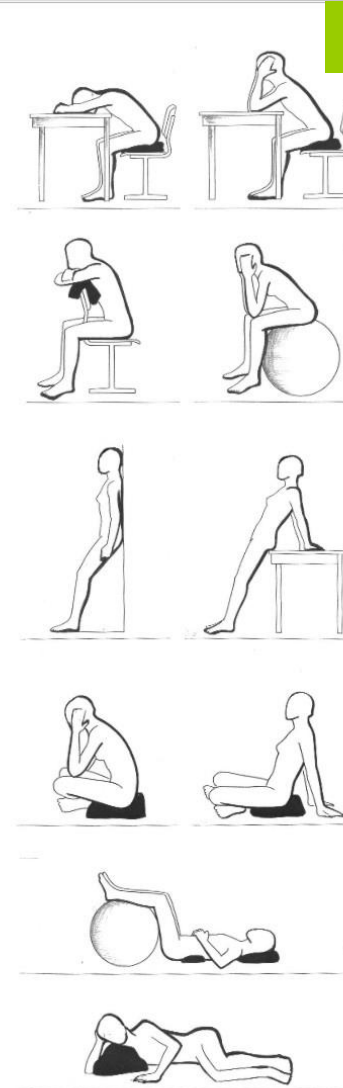
Field research in primary schools City of Zagreb. Source: Domljan, 2011

design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_..

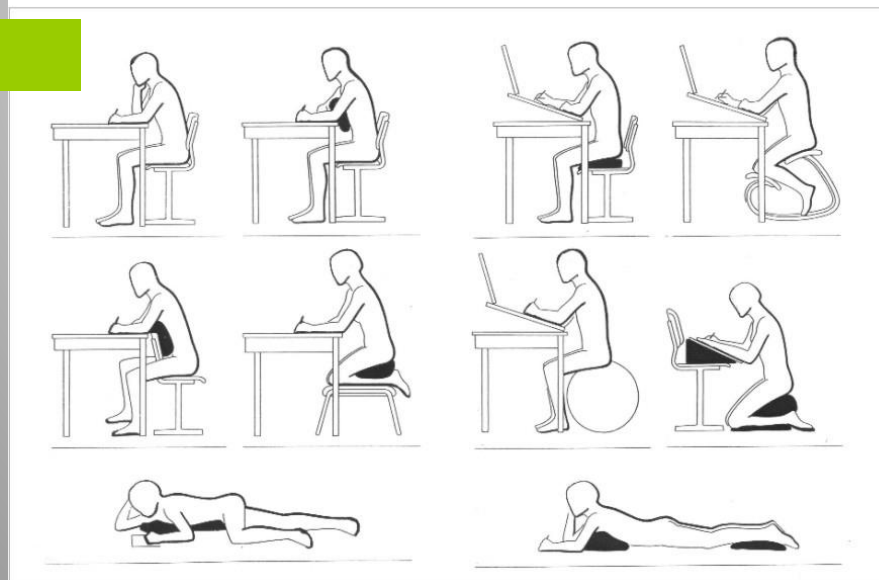
reading



listening

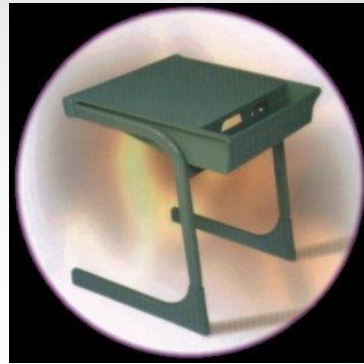


writing



Source: SVSS,
Schweizerische
Verband für Sport in der
Schule, 1995

design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_...



Postura, UK



VS Germany

design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_...

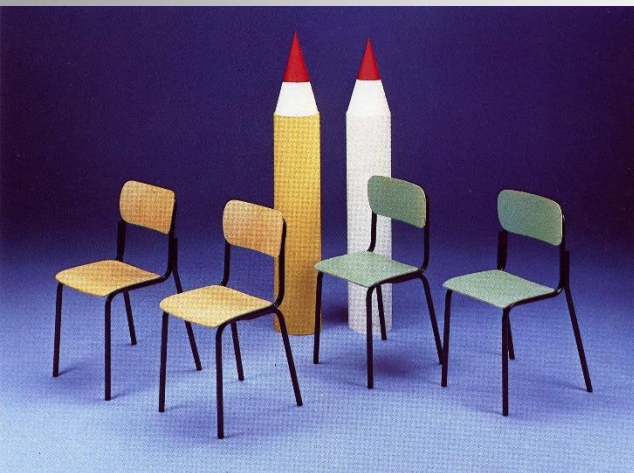
VS Germany



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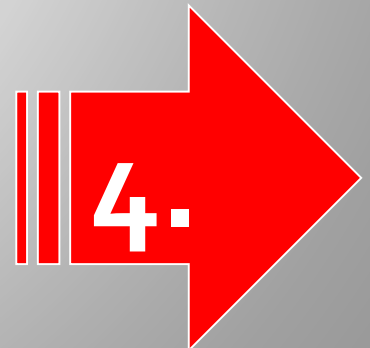


design_pedagogy_anthropometry+ergonomy_ecology+sustainability_functionality+technology_economy_...





CASE STUDIES...



CHILDREN'S DRAWINGS _ *My dreaming (ideal) classroom / Design your favorable school environment ...*



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CHILDREN'S DRAWINGS _ *My dreaming (ideal) classroom / elementary school – age 10 / 3rd grade*



CHILDREN'S DRAWINGS _ *My dreaming (ideal) classroom / elementary school – age 10 / 3rd grade*



Moja učionica iz
snova

Željela bih da stolice budu
tapicirane. Stolovi da se ne klimaju.
Pod da bude kao trava. Lusteri
da su dugački i lijepi.
Na sliku sam nacrtala tapicirane
stolice, prozore sa zavjesama, lijepe
lustere, ploču i pano.

Kristina Čulina, 2. r.

MOSAIC METHOD - ASKING KIDS 😊

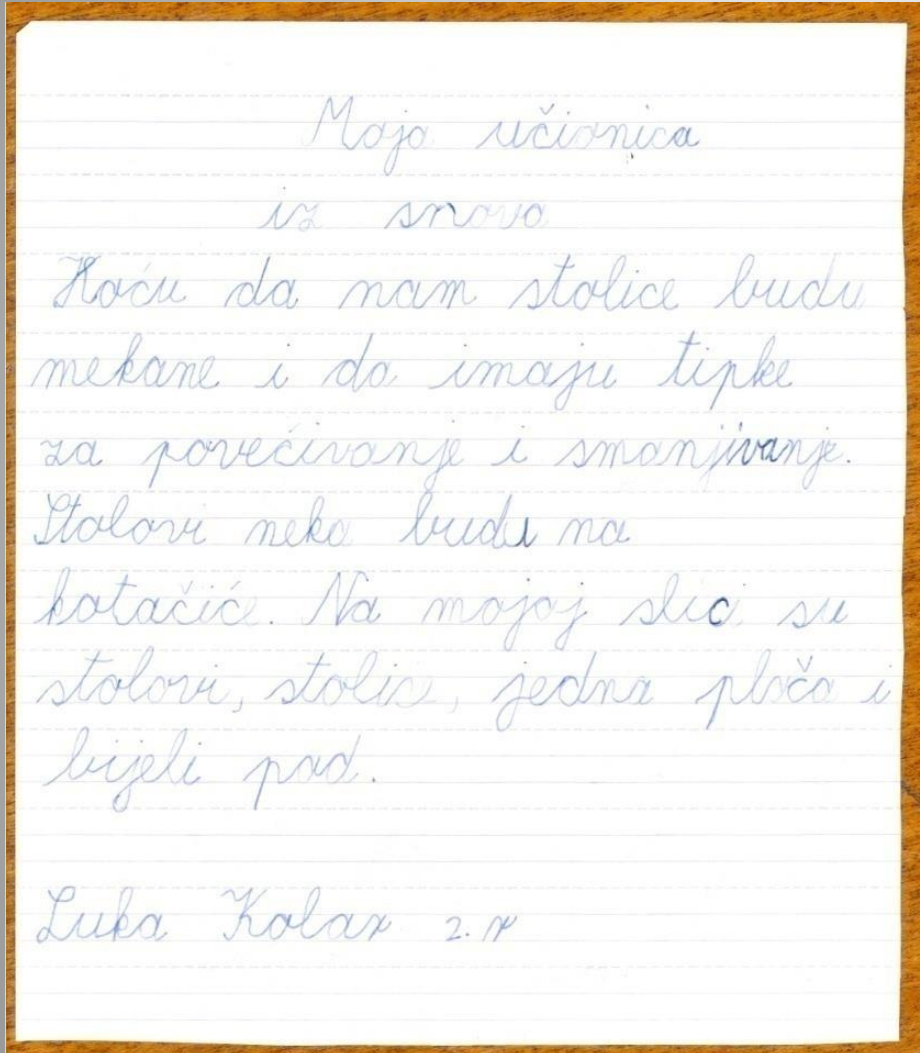
My „dreaming“ classroom

„ I would like to have upholstered
chairs....and non-swinging tables.

Floor as a grass. Lamps should be long and
beautiful.

At the picture I drew upholstered chairs,
windows with carpets, nice lamps
blackboard and a notice board”

KR; age 9; 2. grade; Bjelovar



My „dreaming“ classroom

„I want to have soft chairs with zoom
button (up and down).

Tables should have wheels.

In my picture there are tables, chairs, one
blackboard and white floor”

LK; age 9 / 2. grade; Bjelovar

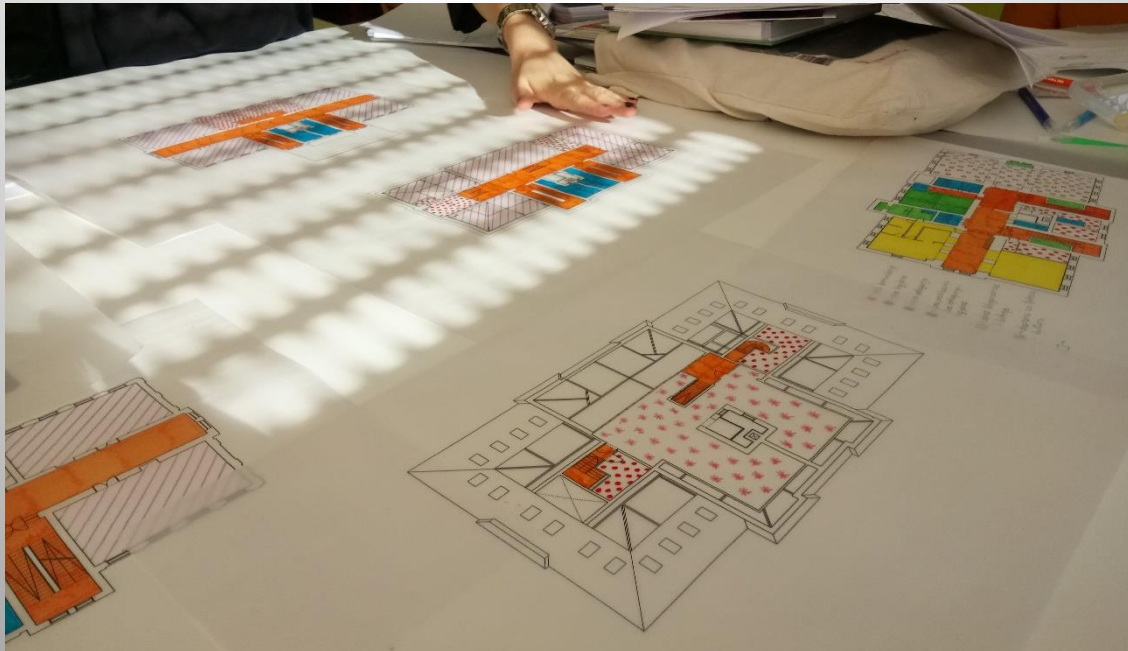
CASE STUDIES IN ELEMENTARY SCHOOLS ZAGREB, CROATIA

2011-2019

Course _ *Furniture and equipping interiors* _
MA study, 1st year

students + school children and teachers





Equipping the classroom and cabinet for chemistry lessons (2018-2019) Elementary school Antun Gustav Matoš, Zagreb

University of Zagreb Faculty of Forestry Department of furniture and wooden products + Laboratory for testing furniture

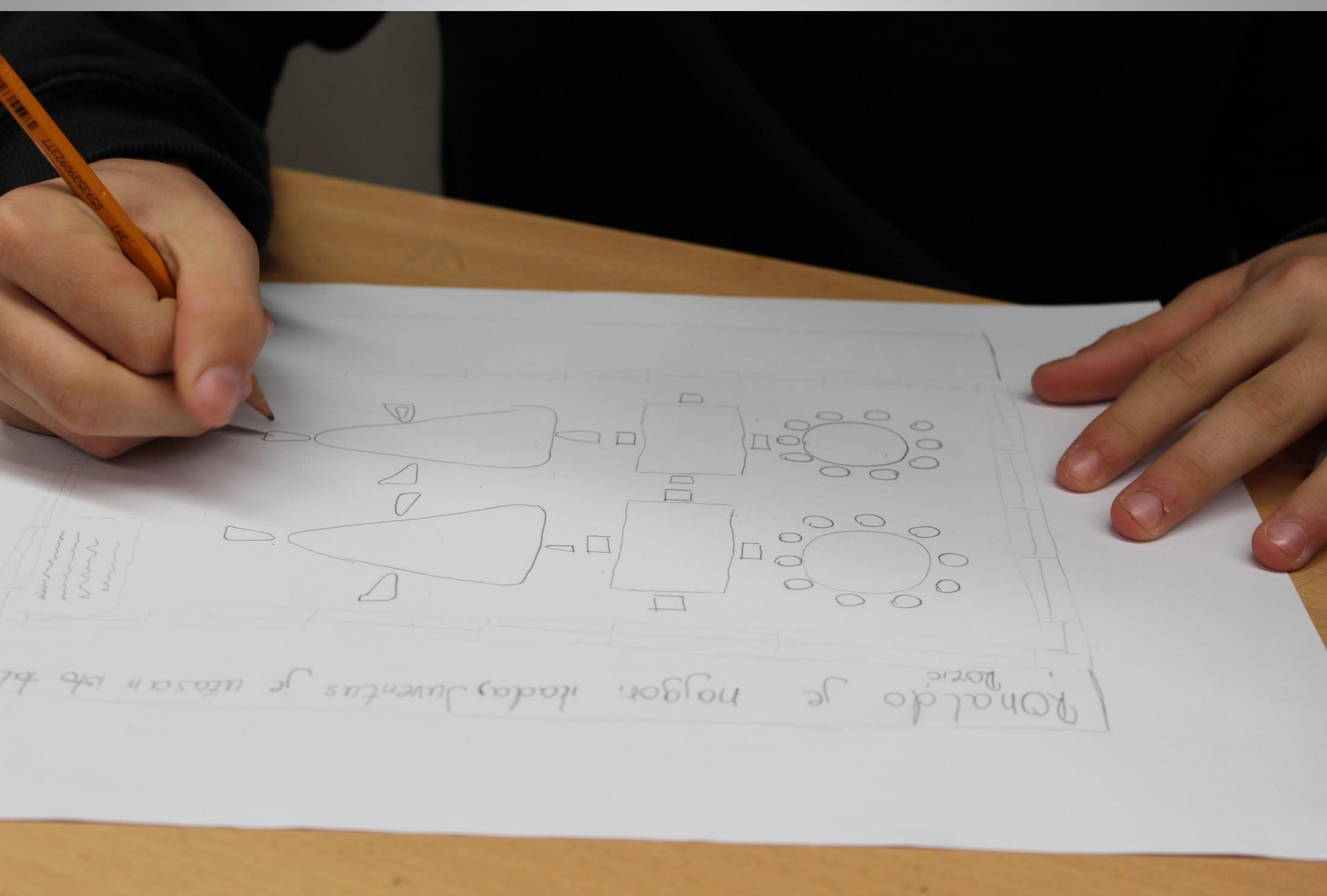
Course _ *Furniture and equipping interiors* _ MA study, 1st year, 8 students

+ children from elementary school 5th & 6th grade / 12-13 years old + school teachers



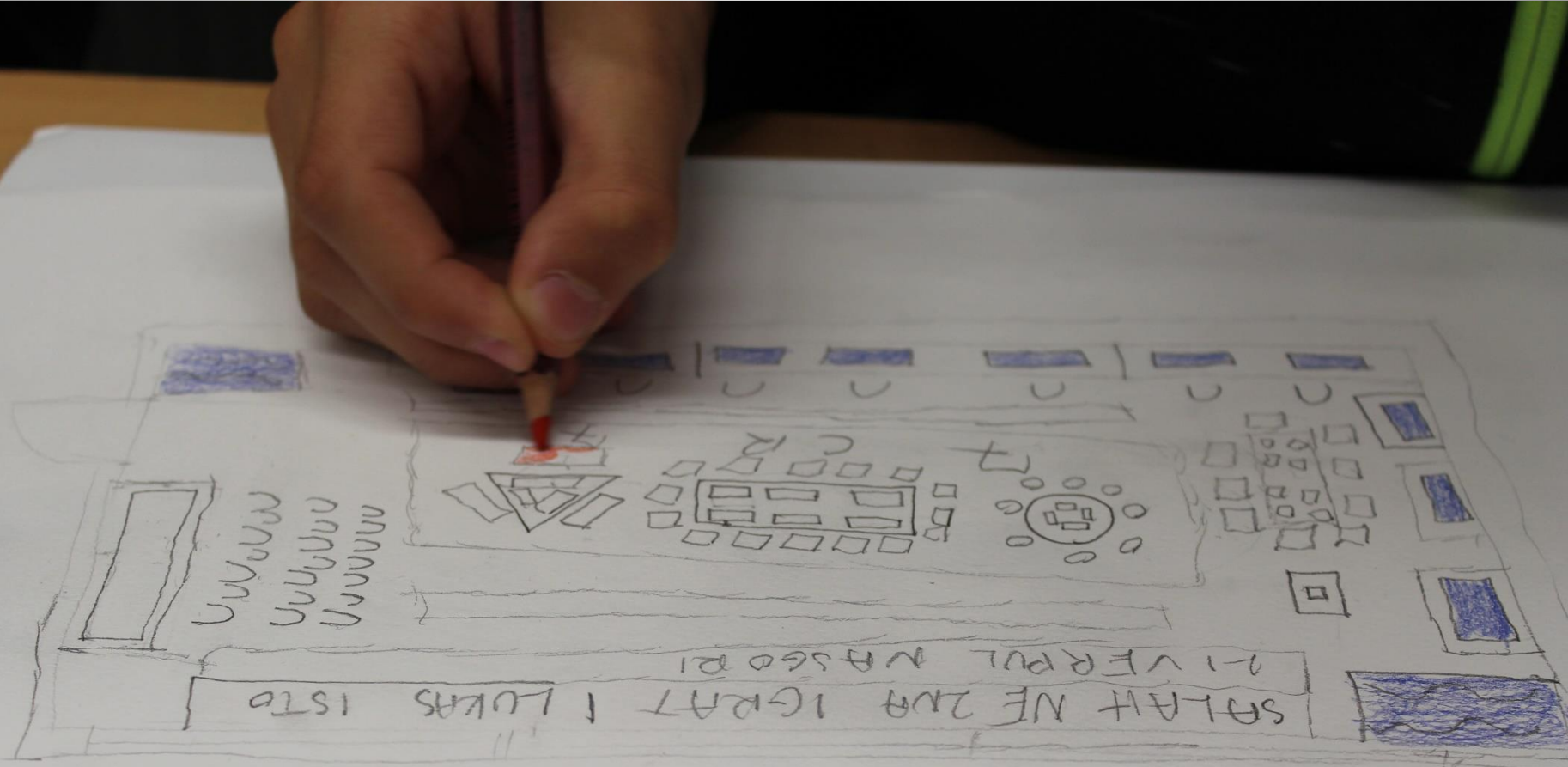


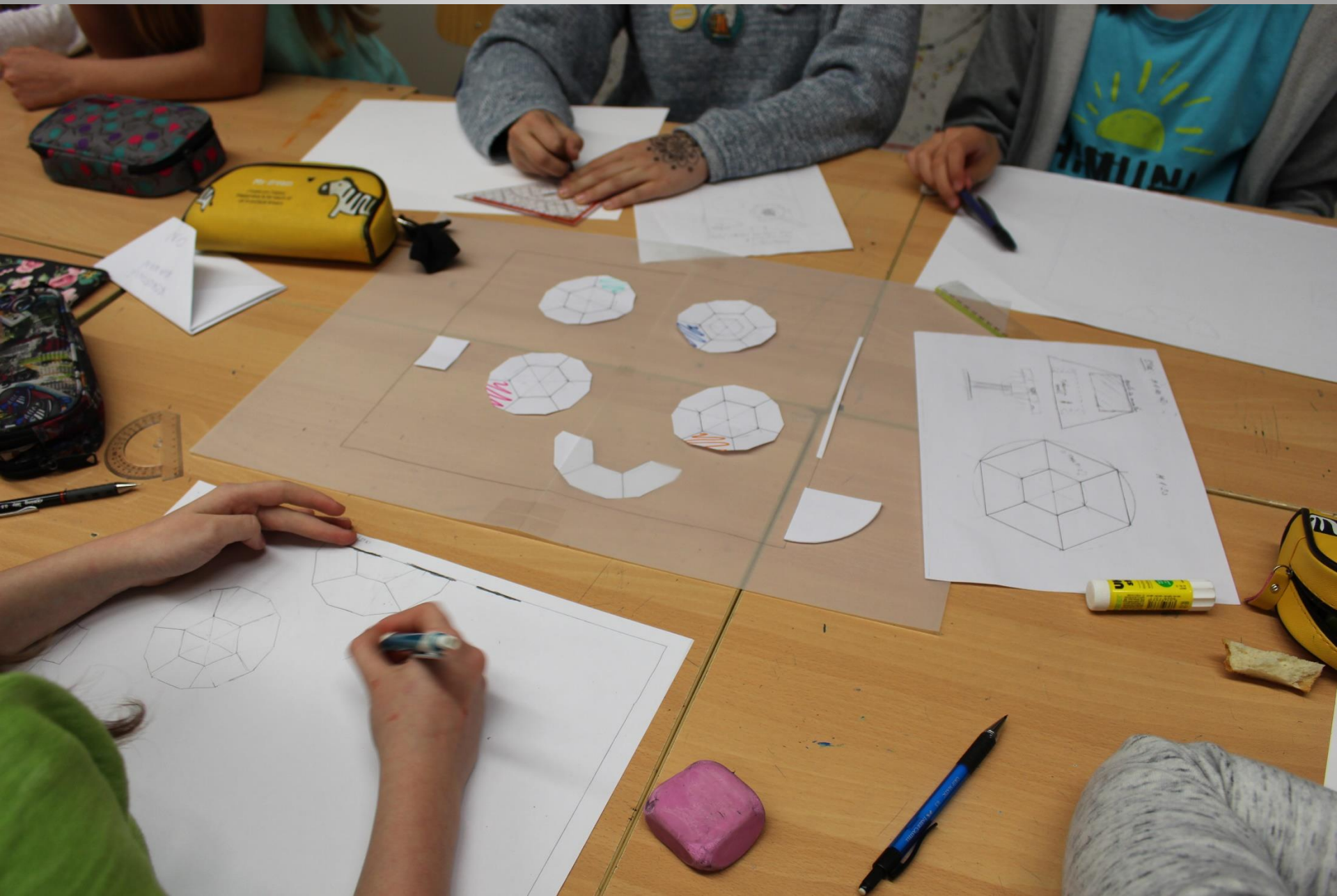


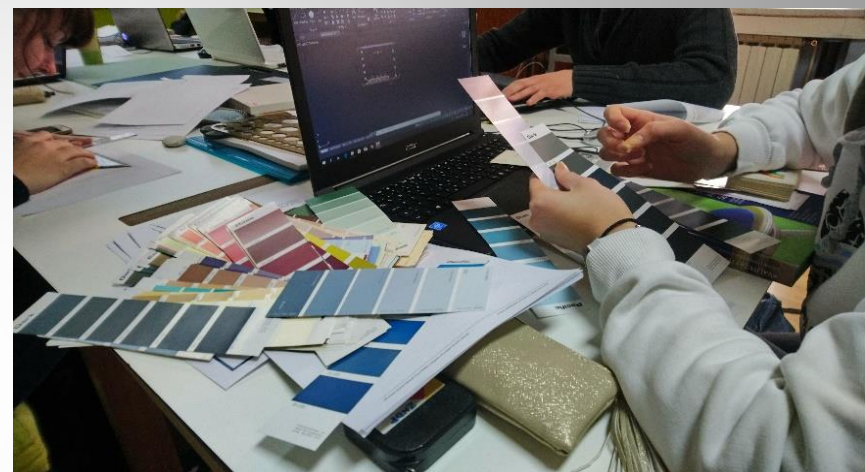


Handwritten scribbles in a small box.

Ronaldo je najgor, klady Juventus je usasan isto fil
Doric







CASE STUDIES

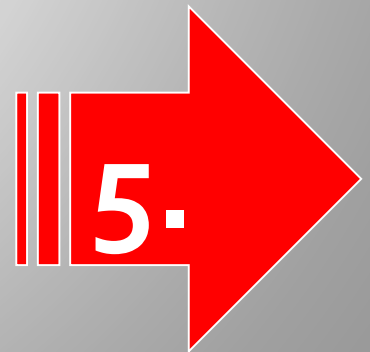
Equipping the classroom and cabinet for chemistry lessons (2018-2019)

Elementary school Antun Gustav Matoš, Zagreb

School is already started.... 😊



CONCLUSION ????





THANK YOU!



questions
&
discussion
😊