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PROJECT
LEARNING-BJ
FROM IDEA TO PRODUCT
LEKS
IKON

TECHNICAL CREATIVITY IN SCHOOL´S CURRICULA WITH THE FROM OF

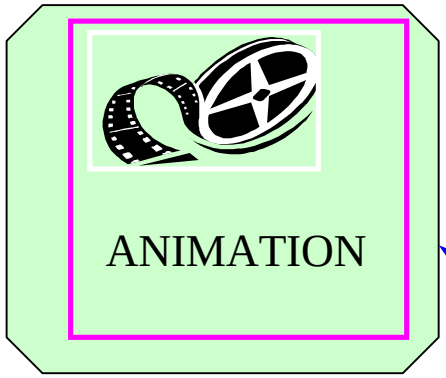
"PROJECT LEARNING FROM IDEA TO THE PRODUCT"

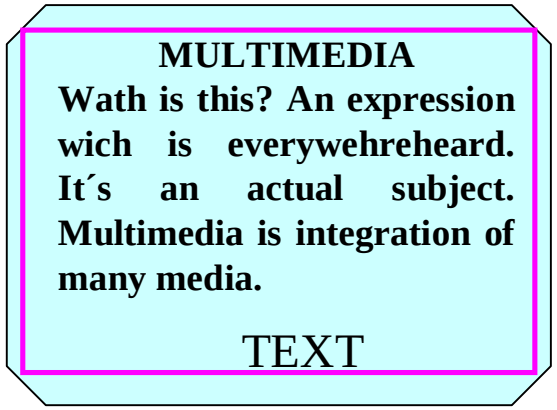
FROM THE KIDERGARTEN TO THE TECHNICAL FACULTY

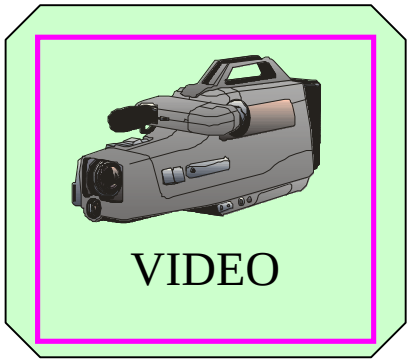
A PATH TO THE KNOWLEGE NATURAL-TECHNICAL SUBJECTS - BJ

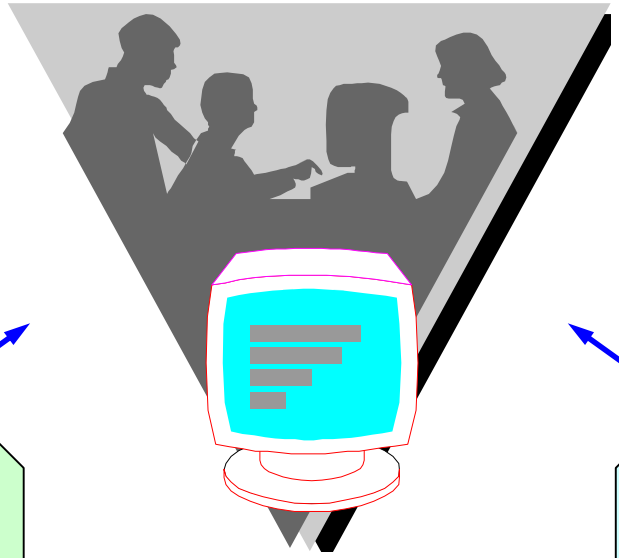
PROJECT LEARNING - BJ

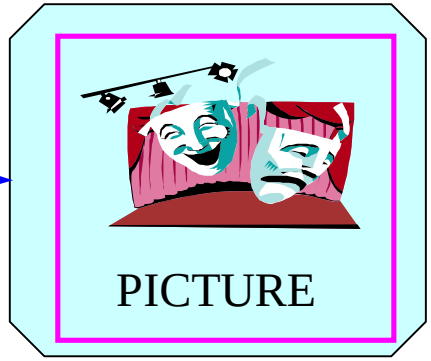
Scheme of MULTIMEDIA

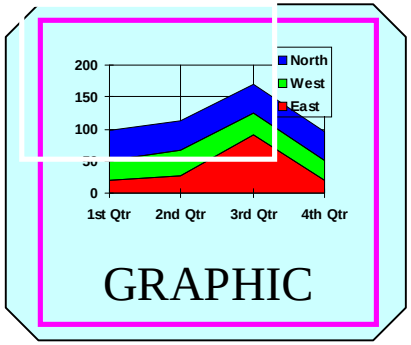












What did we make at Project Learning in Primary School

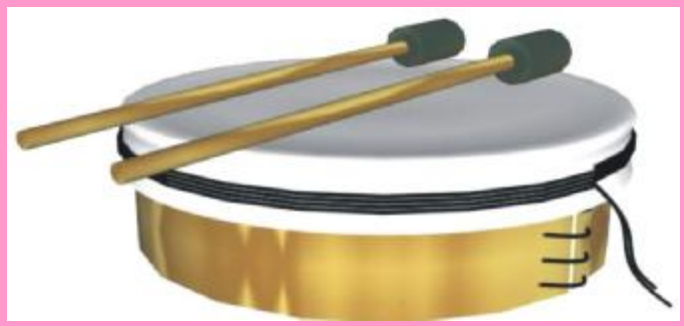


Photo 1: A child's drum

Photo 2: Folk instrument „Brlek“

Photo 3: Child's rattle

Photo 4: A cradle for playing

Photo 5: A cradle for baby doll

Photo 6: Rythmical instrument rattle with intarsia

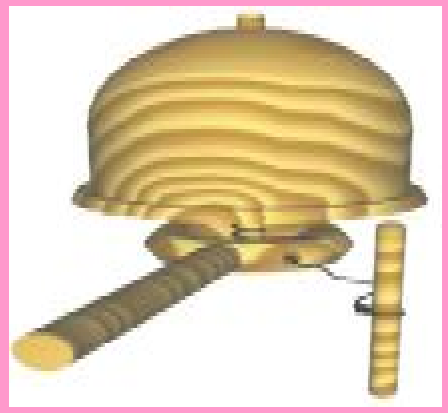


Photo 7: A folks instrument „drdra“

Photo 8: Model of airplane

Photo 9: A bird's hatchery

Photo 10: A bird's house

Photo 11: A bird's house

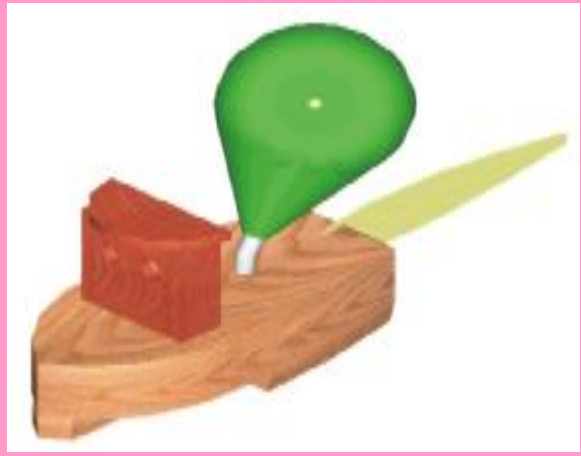


Photo 12: A model of a ship

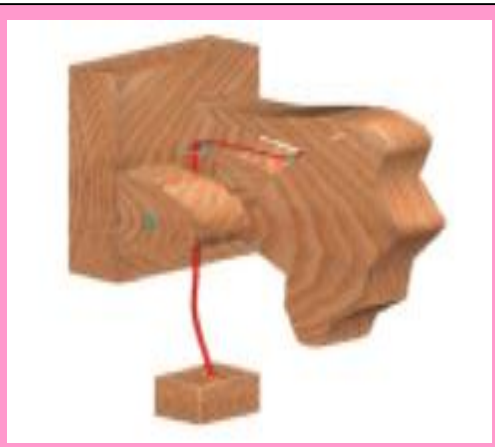


Photo 13: An object for knocking

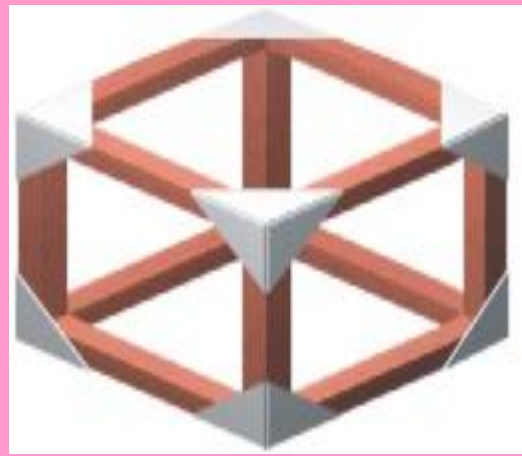


Photo 14: A model of cube

Photo 15: A bird's hatchery

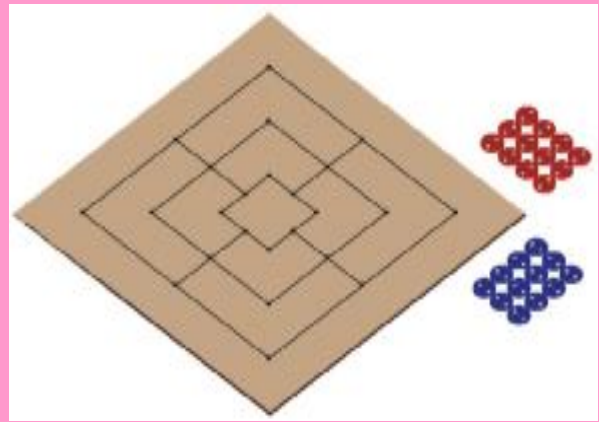


Photo 16: A folk play game „špana“

PROJECT LEARN WORK
"FROM IDEA TO THE PRODUCT"
PALIČNI PIANO

The note book:«From idea to the product»

Author dr. Jožica Bezjak

I. PRESENTATION OF THE TASK

Stick piano has origins in The African Congo about 500 years ago. It is made in many varieties and is known by following names: zanza, mbira, kalimba, etc.

Experts of African instruments opine that is in far relation with xilophone. It is made as five or eight- tone instrument which is known at the west side of black continent.

We sweep on particular strings with both thumbs and create particular tones. If we hange on the instrument some metal plugs, wire, etc, it serves like rithmical instrument.

That we give to the instrument touch of homeliness, we design it with Slovene motives as intarsia.

II. TECHNOLOGY OF THE WORK

1. Material

- *shell of Coconut (half)*
- *steel flat belt (5mm,longitude 20 cm)*
- *the tin can*
- *nail, longitude 5 cm*
- *drawing pins, longitude 1 cm*
- *bind wood, thickness 5 mm*
- *glue tape*
- *glue for a wood*
- *sheet of a indigo paper*
- *plywood of different colors*

2. Tools and requisits

- *a carpenter saw*
- *a saw for metal*
- *a drilling machine*
- *a brush*

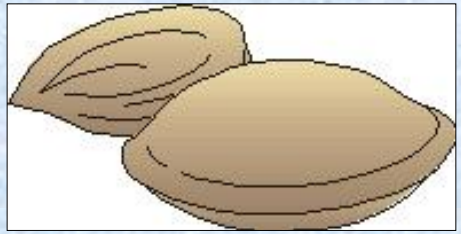
- *seizers*
- *a hammer*
- *a brush-paper*
- *a knife for paper*

III. TECHNOLOGY AT PHASES OF PRODUCTION

1. We drill coconut and pour out coconut milk out of it. After we saw coconut on two half.

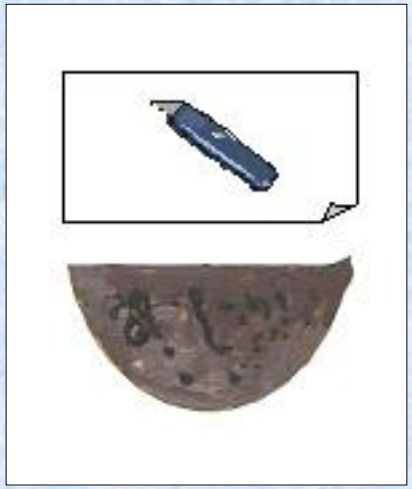
2. To remove corn of coconut, we can use many methods:
   - we let dry coconut on the sun for two days
   - coconut's half soak in the hot and cold water
   - inner part cut out with hand-knife

FIGURES



3. On the upper edge of coconut half, we put sheet of a paper and line its outline with a pencil. We cut outline with seizers.

4. We stick cut outline on the bind wood plate. We cut out the outline with a saw. After we compare the shape of cut piece with hole of coconut half. If it is need, we brush edge of cut piece with brush paper.



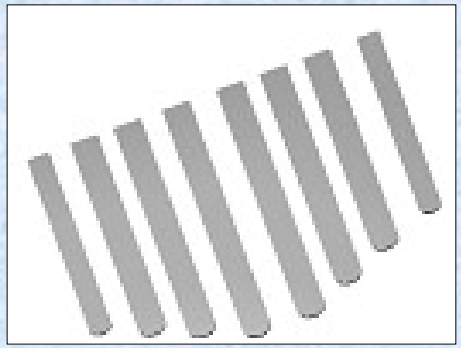
5. In the piece we drill a hole, radium 20 mm, for a better resonance. We make it in the center of the plate.

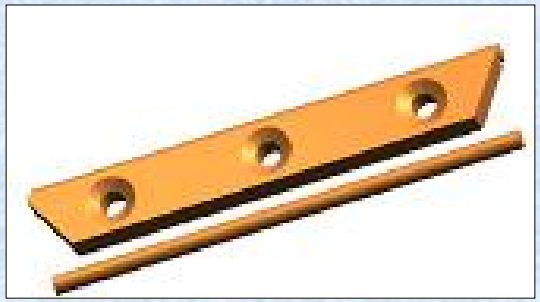
6. The plate can be designed with intarsia:

   - we choose motive and copy it with indigo on the plate
   - we make intarsia with different colors of plywood

7. Steel flat wire is cut with the saw for iron of different lengths, like: 2×52 mm, 2×57 mm, 2×60mm, 2×65mm. For our stick piano we need eight steel strings.

8. From steel or brass harrow (10×5×700mm) we cut out a hammer of length 75 mm, and round the harrow in the trapeze shape. We drill three, in the same distance, holes for screws.





9. On the bind wood plate, we put parallel two steel wires in distance of 15 mm and put over steel strings. At the end of strings we place metal block and screw it on.

IV. USE

On stick piano we play that we hold it with both hands and sweep on with both thumbs. We can also sweep just on the one string and so we can use it as rhythmic instrument. Melody is made while sweeping on the particular string.

How did we handle Project Learning at:

- subjects Technique and Technical Education at lob exercises
- practical work of degree
- seminars teachers of technique in Primary School´s and Secondary School´s with cooperation of masters of cottage industry

Photo 1:
Sculputer, Bojan Štine

Photo 2:
Bell-cast

Photo 3:
Castings-horse

Photo 4:
Making of model cast-positive

Photo 5: Etnographic title-kurent

Photo 6: Making intarsia

Photo 7: Use of instruments, made on Symposium

Photo 8: Participiants of Symposium-Project Learn

Presention of „Technical creativity also in a different way - Days of technical culture“

Photo 1: Association of Technical culture, Kranj

Photo 2: Association of teachers of technics subject, Lj.

Photo 3: Rocket club, V.M. Komarov

Photo 4: Products made of paper

Photo 5: Association of radioamateurs

Photo 6: Idrian´s lace-Lace school, Ljubljana

Photo 7: Secondary School of technical, SŠTS Šiška

Photo 8: Primary School Šentvid exibition of products

PRE-SCHOOL EDUCATION- KINDERGARTEN **PREDŠOLSKA VZGOJA- VRTEC** **M.Mav, J.Bezjak**	**PRIMARY SCHOOL TEACHING- ELEMENTARY SCHOOL** **RAZREDNI POUK- OSNOVNA ŠOLA** **B.Cizelj, J.Bezjak**	**SUBJECTS CLASSES- ELEMENTARY SCHOOL** **PRDMETNI POUK- OSNOVNA ŠOLA** **I.Ličar, Ž.Lebar, J.Bezjak**
SECONDARY SCHOOL FOR MECHANICAL ENGINEERING **SREDNJA TEHNIČNA STROJNA ŠOLA** **B.Polanc, S.Kostanjevec, J.Bezjak**	**SECONDARY SCHOOL FOR ELECTRICAL ENGINEERING** **SREDNJA TEHNIČA ELEKTRO ŠOLA** **E.Trdan, J.Bezjak**	**FACULTY OF EDUCATION FACULTY OF MECHANICAL ENGINEERING** **PEDAGOŠKA FAKULTETA, FAKULTETA ZA STROJNIŠTVO** **N.Burger, J.Bezjak, J.Duhovnik,**

Nazaj

PRE-SCHOOL EDUCATION-KINDERGARTEN

PREŠOLSKA VZGOJA-M.Mav

PROJECT WORK – WOODEN TOYS

"FROM IDEA TO THE PRODUCT"

Maja Mav, Pre-school teacher, Kindergarten Trzin

Doc. Dr. Jožica Bezjak, Faculty of Education, University of Ljubljana, Slovenia

Proceeding

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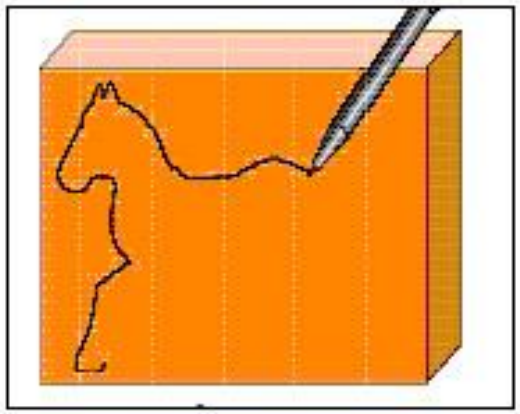
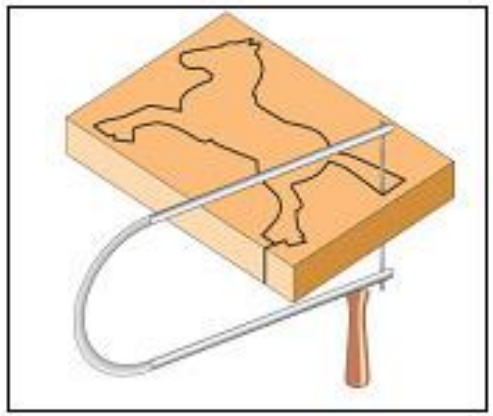
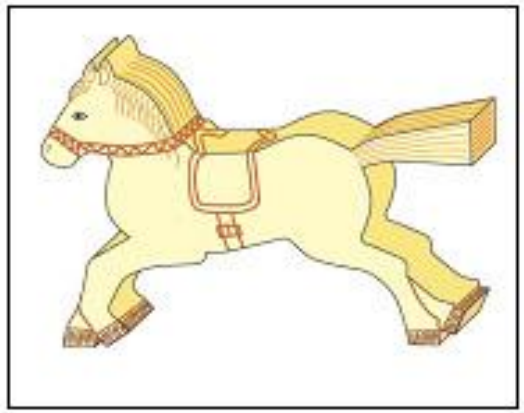
A WOODEN HORSE

Children and their grandfathers used to spend their free time and long winter evenings carving and making wooden figurines, toys. They used fir wood and a knife, and sometimes other tools, such as a small saw.

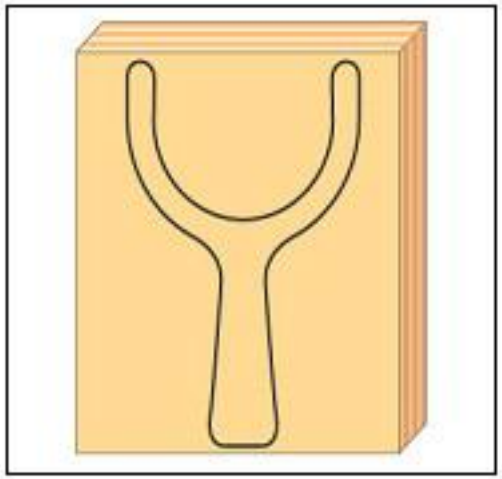


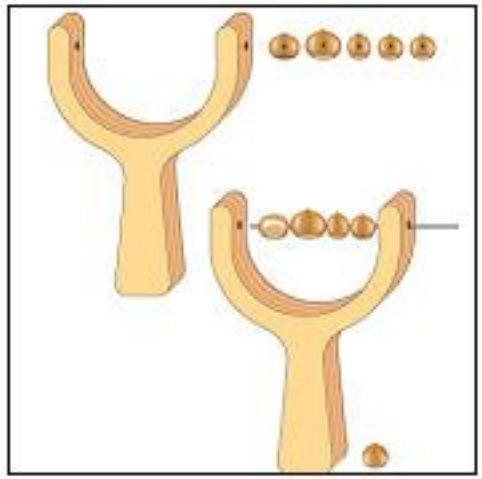




RATTLE

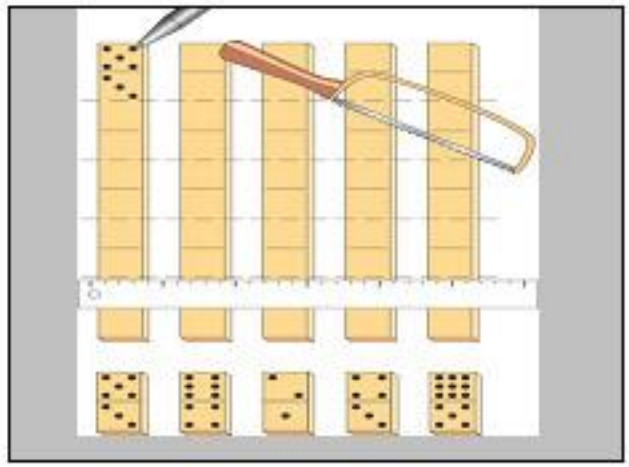
The rattle is made of wood. It was used as a toy or as a musical instrument with which the children accompanied various songs and games.





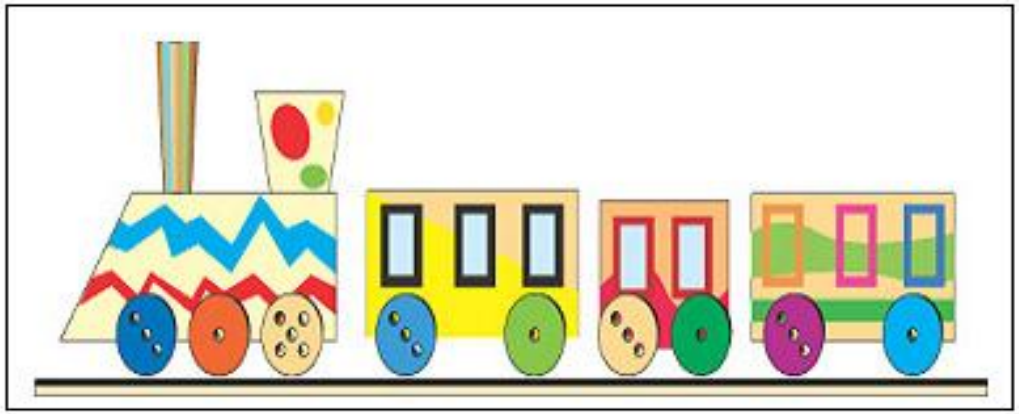
DOMINOES

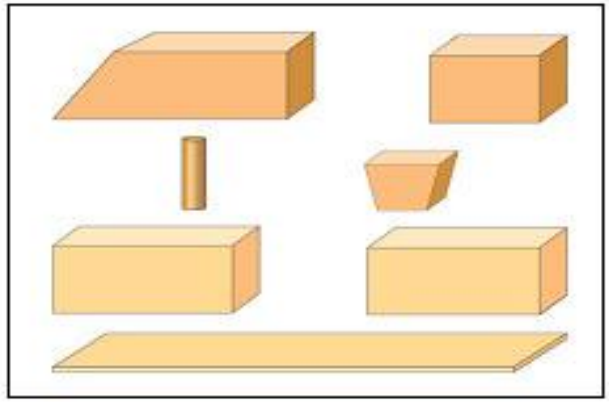
A very simple toy and a straightforward family game, which can be made of wood. This is a very old and still popular game played so that the pieces are laid on the table in such a manner that the number of dots on one half of a piece matches the number of dots on one half of the connecting piece.



TRAIN

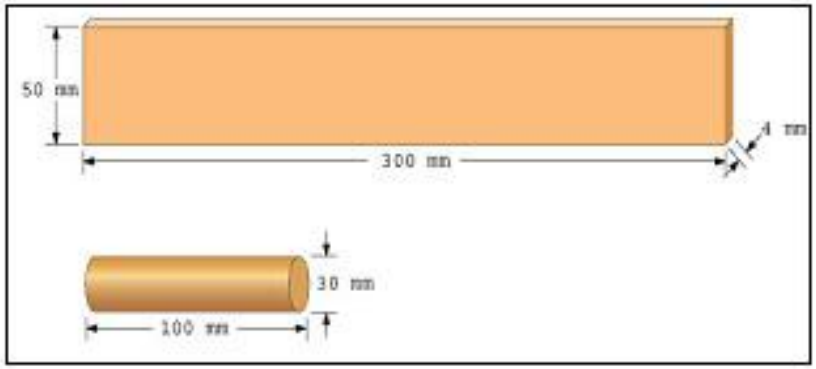
Trains were usually made of rubbish (boxes, corks, tin cans,….) but various other materials such as buttons, twigs, pieces of string, … were also used. Especially beautiful and valuable were wooden toy trains. Those were usually made by children who knew a carpenter. He would give them pieces of wood which the children then used in the construction of the train. They coloured some of the pieces and those among them who were more handy would sometimes decorate the trains with carved ornaments.

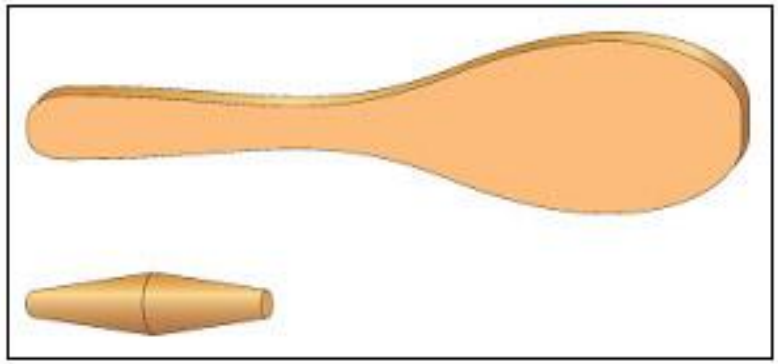




PANDOLA

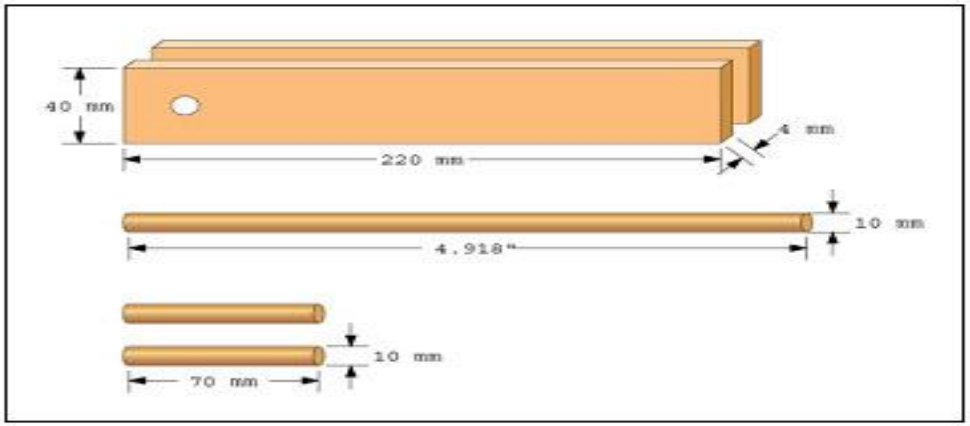
The pandola is one of the toys which required quite a large amount of skill from the children. It is easy to make. All we need is a cylinder, which we carve into a point on both sides, and a wooden board – we can substitute the board with an old wooden spoon.

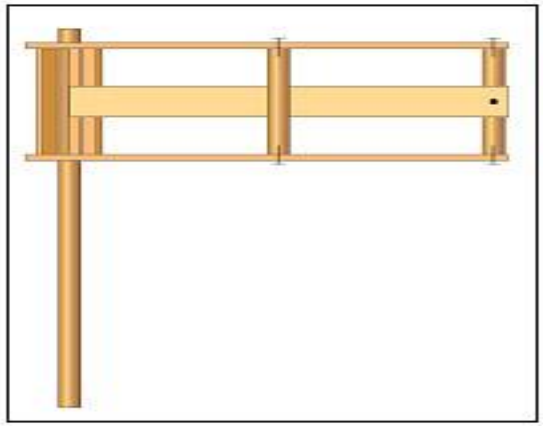




RATTLE

The rattle is a musical instrument which the children used in their games. They were also made by shepherds while they were minding the herd and made and played rattles to while away their time. They have been known for at least 80 years.

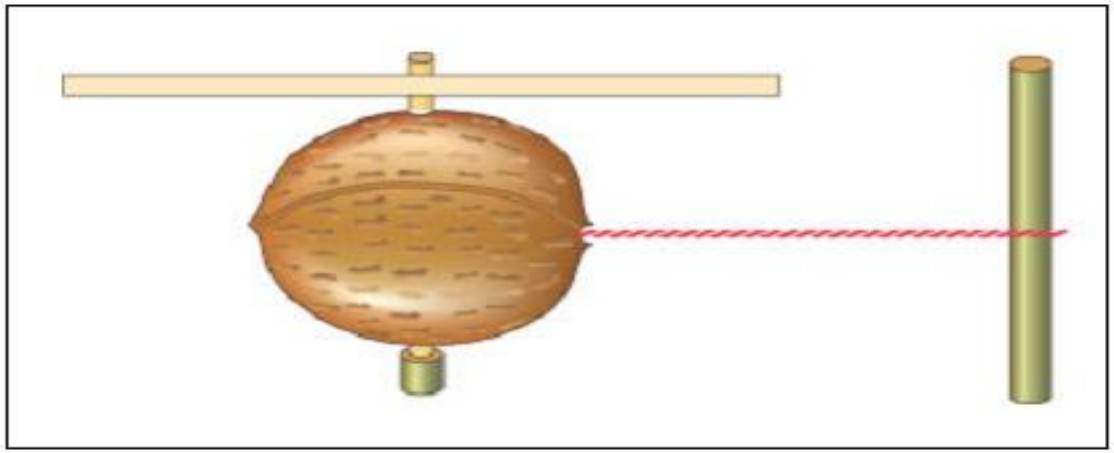


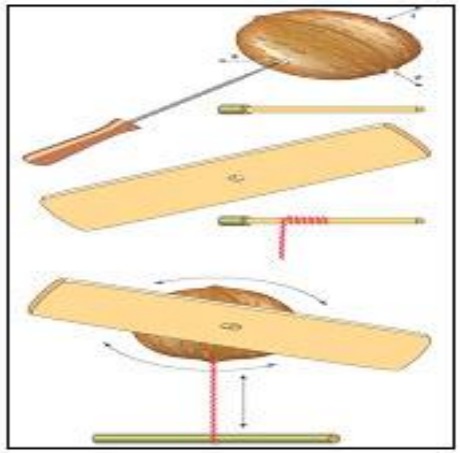


WINDMILL

The toy is made of a whole hollowed wallnut and wooden sticks. It is called a windmill. The walnut shell has three holes. Through two of the holes we push a wooden stick which is thicker on one end and serves as the axle onto which the string is wound. On the thinner end of the stick we place a flat wooden stick with a hole – the windmill.

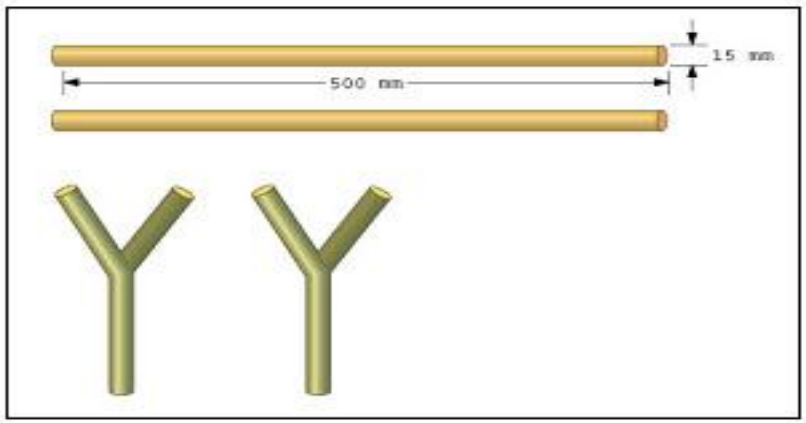
When we pull the string, the windmill turns and winds the string back onto the axle.

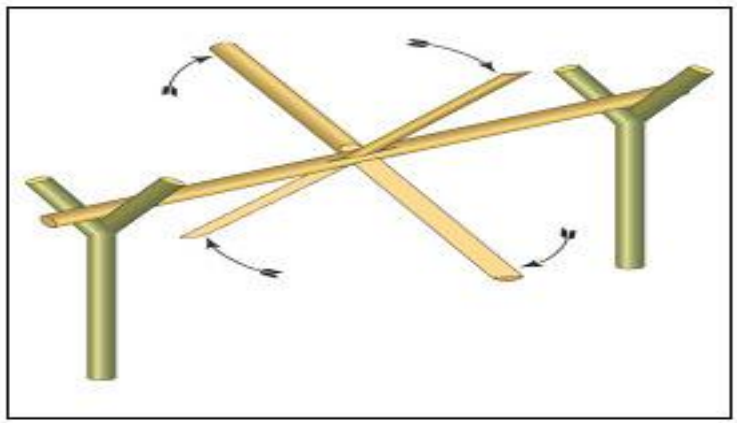




MILL

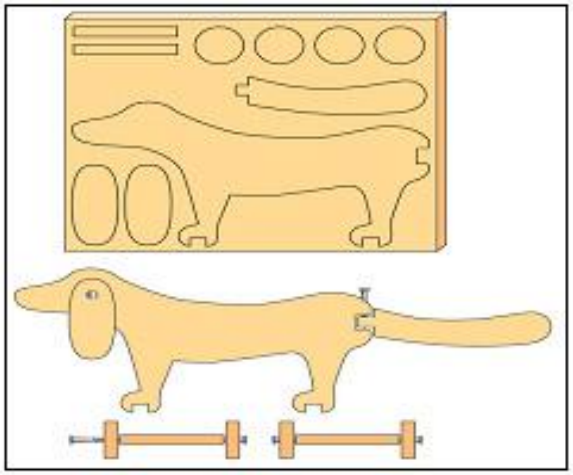
A lot of children live near water so they used to play with it as well. They made all sorts of things, one of them was also the mill. The materials were found in the nearby bushes. The construction required a lot of effort, but sometimes it was all in vain, because the water current which turned the mill was too strong and took the mill away.

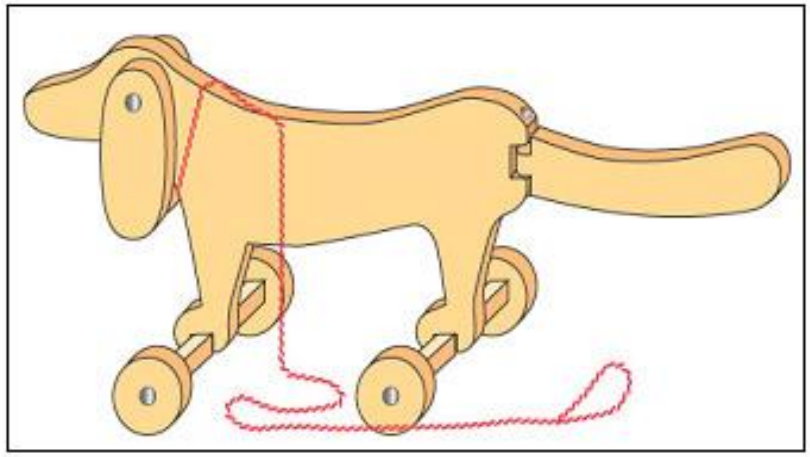




DOGGIE ON WHEELS

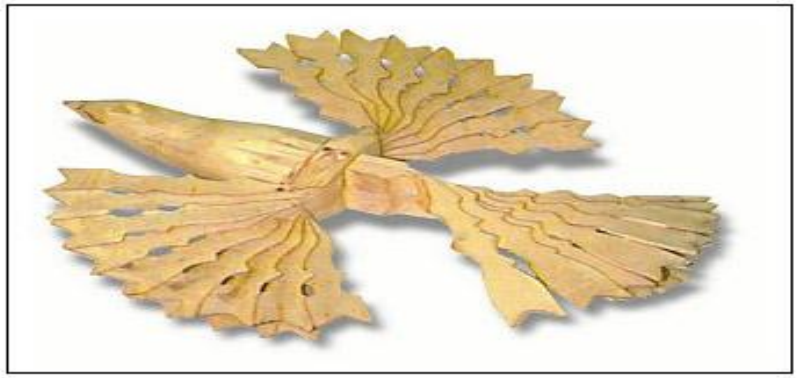
One of the toys that used to be made at home is also the doggie on wheels. This toy is especially popular with little children because they can attach a string to it and then take it for a walk.

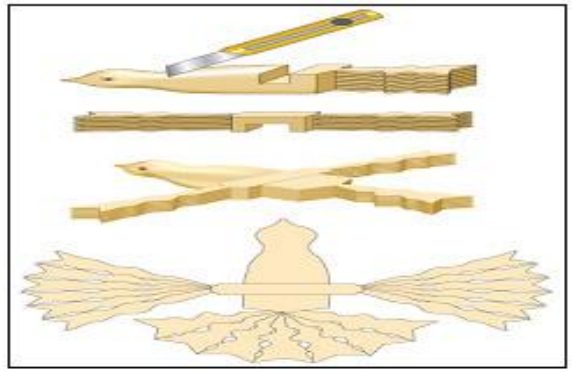




WOODEN PIGEON

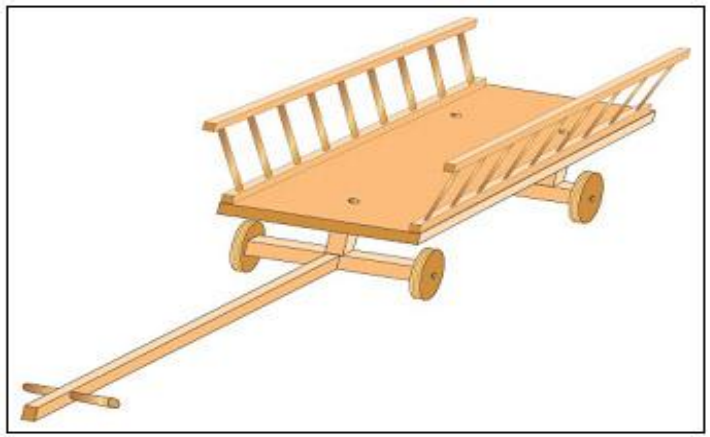
The pigeon is made of two pieces of fresh linden wood tied into a cross. The wood has to be fresh in order to enable the construction of the wings.

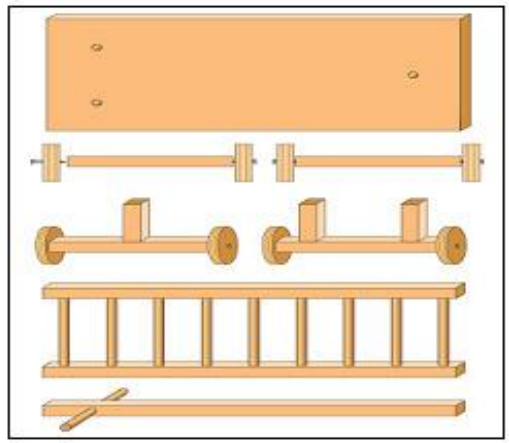




WAGGON

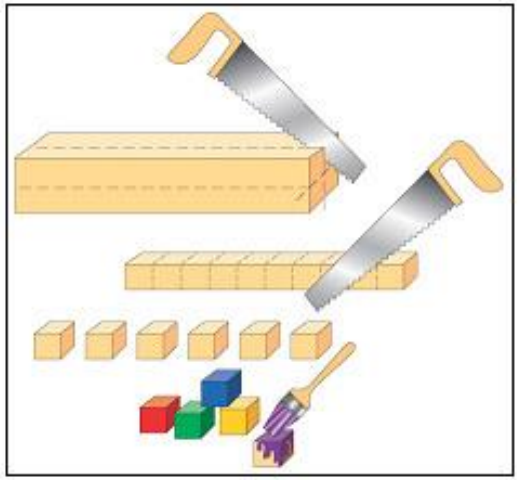
This is a wooden waggon that the children used for carrying people and things. The one presented here is slightly smaller and suitable for the transportation of smaller thigs, such as dolls, stones, wood, etc.





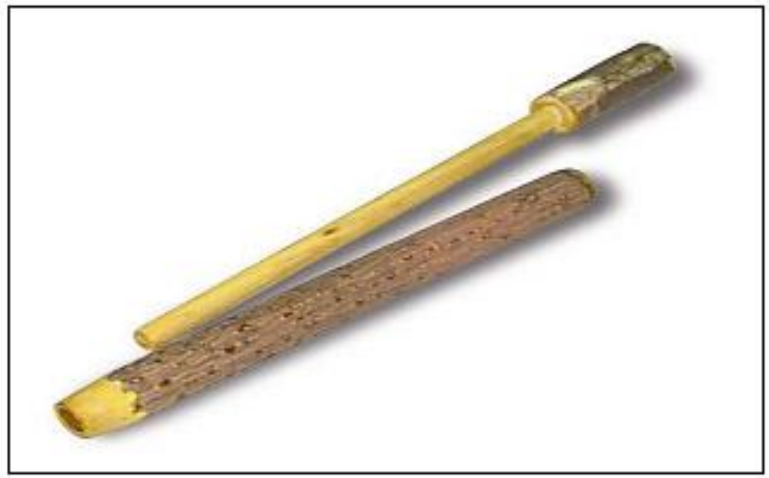
WOODEN BLOCKS

Wooden blocks are a very popular toy which is also easy to make. All we need is some wood and nimble fingers.



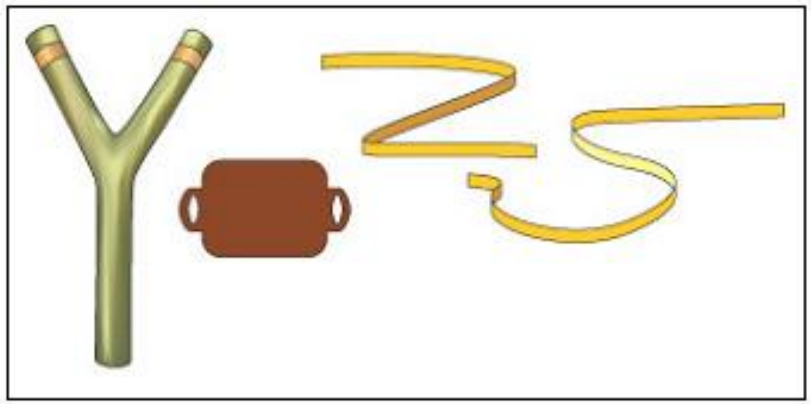
CRACKER

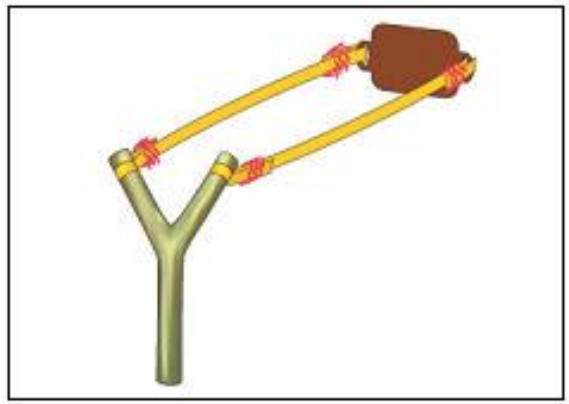
Crackers were mostly used by boys, because you had to be strong in order to play with it. They used to play while they were minding the grazing cattle. Every child had his own cracker which he then used to make as loud a cracking noise as possible. The toy is made of natural materials – wood, fruits. It consists of three parts: a tube, a piston and fodder.



SLING

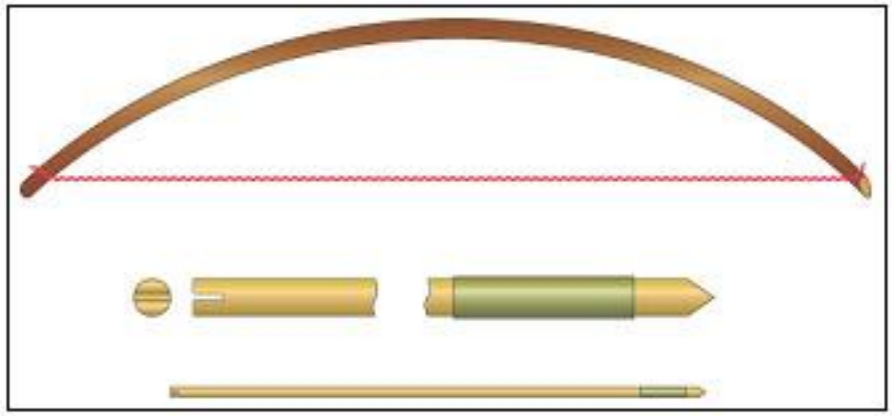
Slings were made of a smaller wooden branch and elastics that served for “shooting”. They prepared suitable targets or chose a pillar, or a bottle and tried to hit it with pebbles that whizzed though the air. In the process they sometimes broke a window that suddenly got in the way.

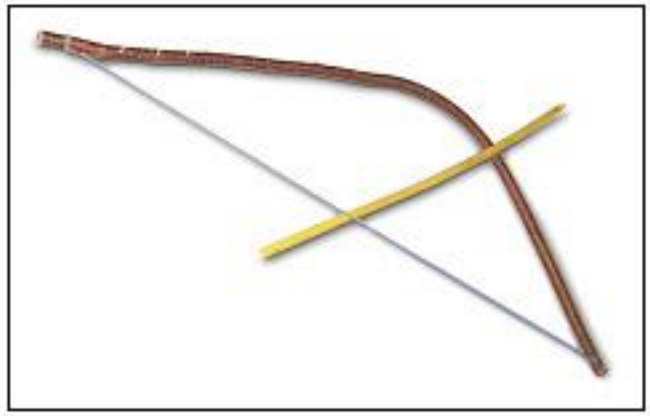




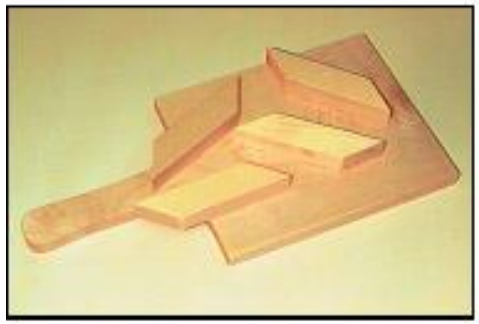
BOW AND ARROW

Bow and arrow are an almost vital part of childhood. The toy is not meant exclusively for boys, although they were usually the ones playing with them. The children would compete whose arrow flew further or higher. Therefore different bows were made. A bow consists of a wooden stick and string. We must not forget the arrows which were made of thin switches.

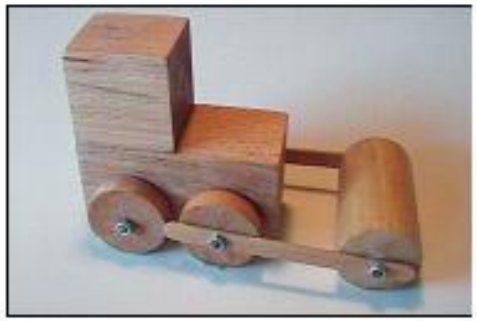




Some details captured on film at the exhibition of toys “The Toys of Yesteryear” at the Faculty of Education, University of Ljubljana. The exhibition was organised by a group of students of pre-school education and their mentor Jožica Bezjak, PhD. Bezjak, J. (2000), PeF- Project work "Wooden toys" (Picture 1-9)



Picture 1: Wooden board



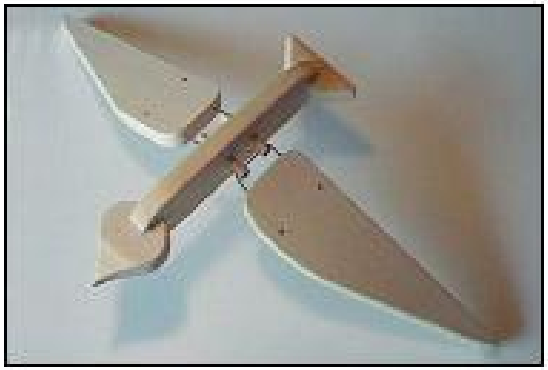
Picture 2: Peg

Picture 3: Clopping man

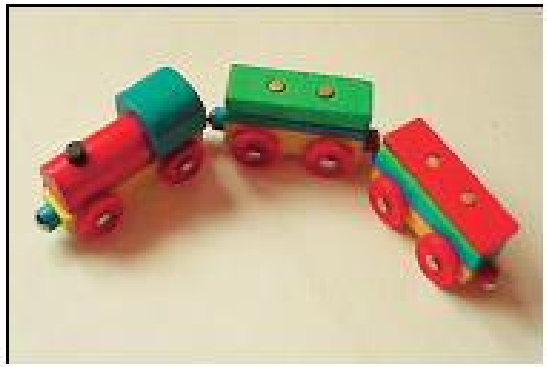
Picture 4: Yo-yo

Picture 5: Elephant

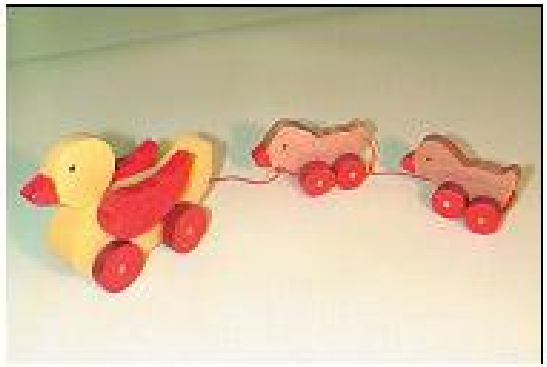
Picture 6: Blocks »City«



Picture 7: Bird



Picture 8: Train



Picture 9: Ducks

Nazaj

TECHNICAL DAYS IN NINE-YEAR PRIMARY SCHOOL WITH THE FORM OF PROJECT LEARNING – BIRDS IN WINTER

CIZELJ BRANKA, Prof., Doc. dr. BEZJAK JOŽICA, Faculty of Education, University of Ljubljana, Slovenia

BIRDS IN WINTER

WHAT DO WE KNOW?

- to divide birds in two groups:

MIGRATORIES BIRDS and CONSTANT BIRDS

- to count up constant birds:

BIG TITMOUSE, BLACKBIRD, DOMESTIC SPARROW, NUTHATCH, FINCH, BLUE TIT, BULLFINCH, WOOD OWL, GREEN WOODPECKER, GREY WOODPECKER, BIG WOODPECKER, ROBIN, etc.

- we have to feed the birds during the winter
- to using bird-houses in winter

WHAT WOULD WE LIKE TO KNOW ?

- how to make a bird-house
- how to make a suet - cake
- what can we feed the birds during the winter with

WHAT WOULD WE LIKE TO PRODUCE?

- make a bird-house
- make a suet-cake
- put the bird feeding house on the tree in the school garden
- take care for the bird food

We decided all together to build a bird feeding house.
For safety reasons I made all parts of feeding house at home. Students just put them together with the use of next tools:

-the hammer, the screw-driver, the scissors and electrical hammer for wood-clips.

And materials:

-wood-glue, stoppers of wood, the roof-cardboard, wood-clips, the wire, the silicon, the cord, the bound-slab, wood of spruce fir, nails and screws.

Students worked in couples. Every couple mount one part of the feedeng house. I directed them successfully and when they had some problem I helped them. (pictures 1-3)

Picture nr. 1

Picture nr. 2

Picture nr. 3

Picture nr. 4

For roof covering we used an adeguate pasteboard wich has a natural color and doesn't leak water.
Roofing was very interesting because students could use the electric hammer. The hammer was used under my supervision of course (look pictures nr. 4).
When it was finished, we hang the bird's house on tree with the help of the housekeeper. We hang it very high so the cats could not reach it. We used the rope to lift it up and to bring it down for food placement (look pictures nr. 5 to 7).

At the end we put in the suet-cake (look pictures nr. 8).

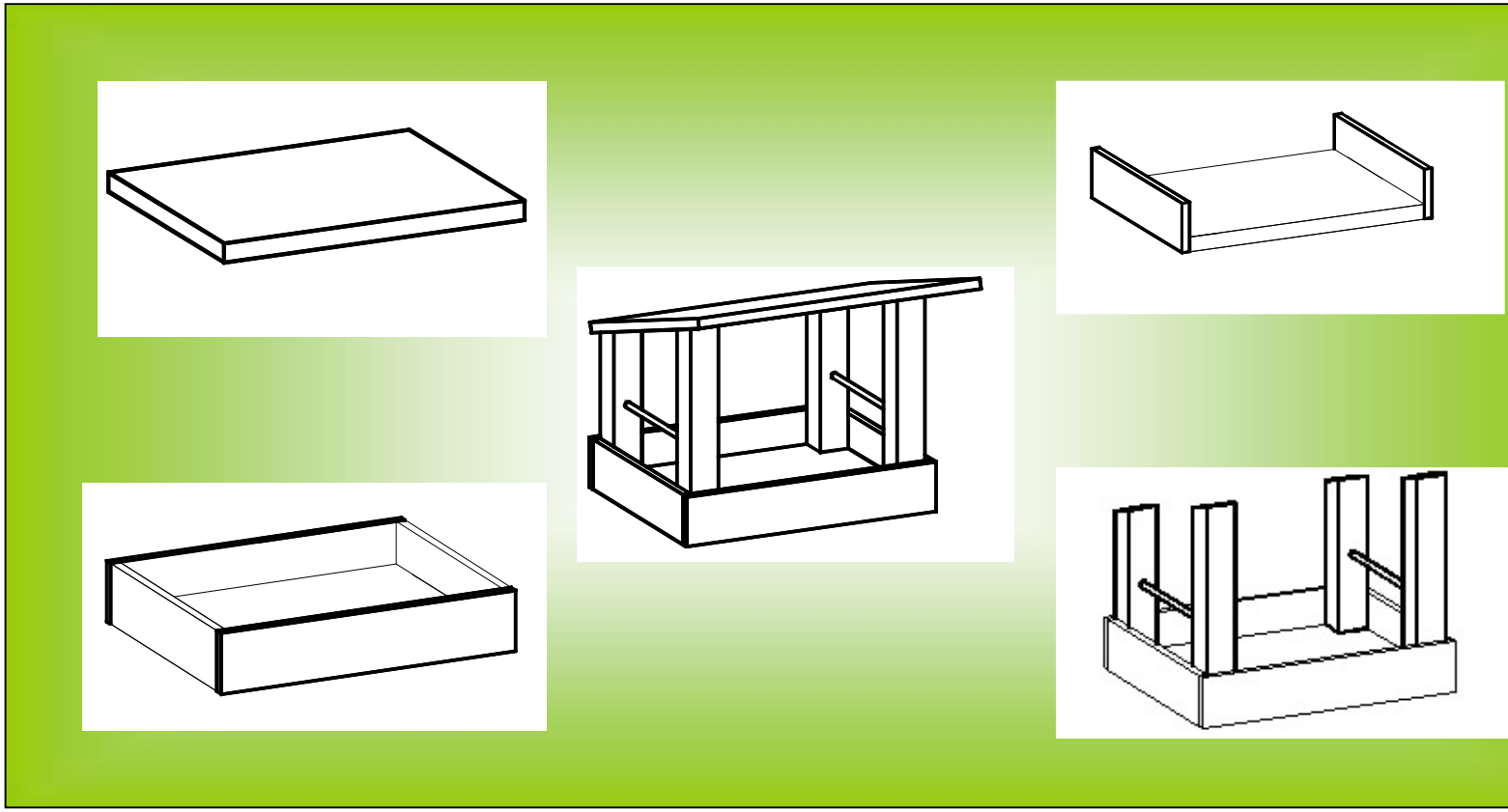
Picture nr. 5

Picture nr. 6

Picture nr. 7

Picture nr. 8

BUILDING PLAN OF THE WOOD BIRD FEEDING-HOUSE



KOS

Na jesen se mnoge ptice odselijo
in v tople južne kraje odletijo.
Črni Kos pa tudi v mrzli zimi
s čudovito pesmijo nas navdušuje.
Kosovko z njo k sebi vabi,
v ptičjo hiško, kjer domuje.

LASTOVKA SE JE VRNILA

V aprilu, ko narava že ozeleni,
se lastovka nam oglasi.
Iz toplih krajev k nam se je vrnila,
gnezdece svoje obnovila,
da do poznega poletja v njem bo
kraljevala in svoj nežni rod
mladičev negovala.

UGANKA

Na pomlad z južnih krajev pohitita,
da pri nas si spet družino naredita.
Vrh dimnika v gnezdu čez poletje
za zarod svoj skrbita.
Ko pa bliža se jesen in toplih
sončnih žarkov je še malo,
odletita. Pleteno gnezdo prazno bo
ostalo.

(štorklja)

PTIČJA HIŠICA

Pri nas je majhen črni kos,
po snegu skače čisto bos,
ko mrzel veter prav zaveje,
se v svoji hišici pogreje.

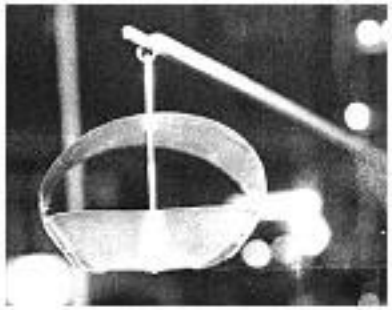
OREL

V skalovju ptica ujeda ta domuje,
s pogledom srepim se okoli ogleduje,
pogosto s skale kvišku poleti.
Z mogočnimi perutmi v zraku zaokroži,
potem kot strela hitro se spusti,
ubogo žrtev v svojih krempljih že drži.

SINIČKA

Sinička moja me vsak dan obišče,
tam v ptičji hiški svoji hrano išče,
vsak dan za kljunček njen jaz poskrbim,
zato prijazen njen pogled dobim.

SOME SORTS OF BIRD'S HOUSES

WITH SUET- CAKE	WITH SEEDS AND FRUITS	OF WOOD	OF OTHER MATERIALS
			
Picture nr. 7	Picture nr. 8	Picture nr. 9	Picture nr. 10

SOME KINDS OF BIRDS

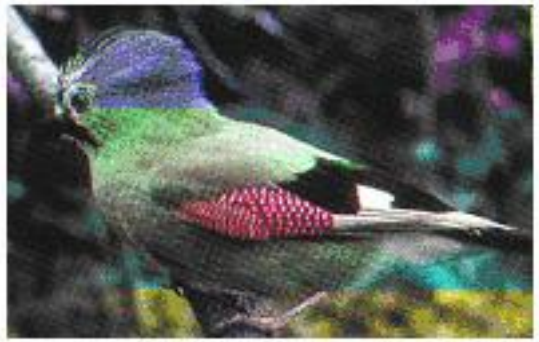
BIG TITMOUSE

BLUE TIT

BLACKBIRD

DOMESTIC SPARROW

ROBIN



JAY

BIRDS IN WINTER

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- take care for the bird food

Nazaj

SUBJECTS CLASSES - ELEMENTARY SCHOOL
PREDMETNI POUK - I. LIČER

PROJECT WORK - CONSTRUCTION OF FOLK MUSICAL INSTRUMENTS

Izdor Ličer, Prof., Primary School, Valentin Vodnik, Ljubljana, Doc. Dr. Jožica Bezjak, Faculty of Education, University of Ljubljana, Slovenia

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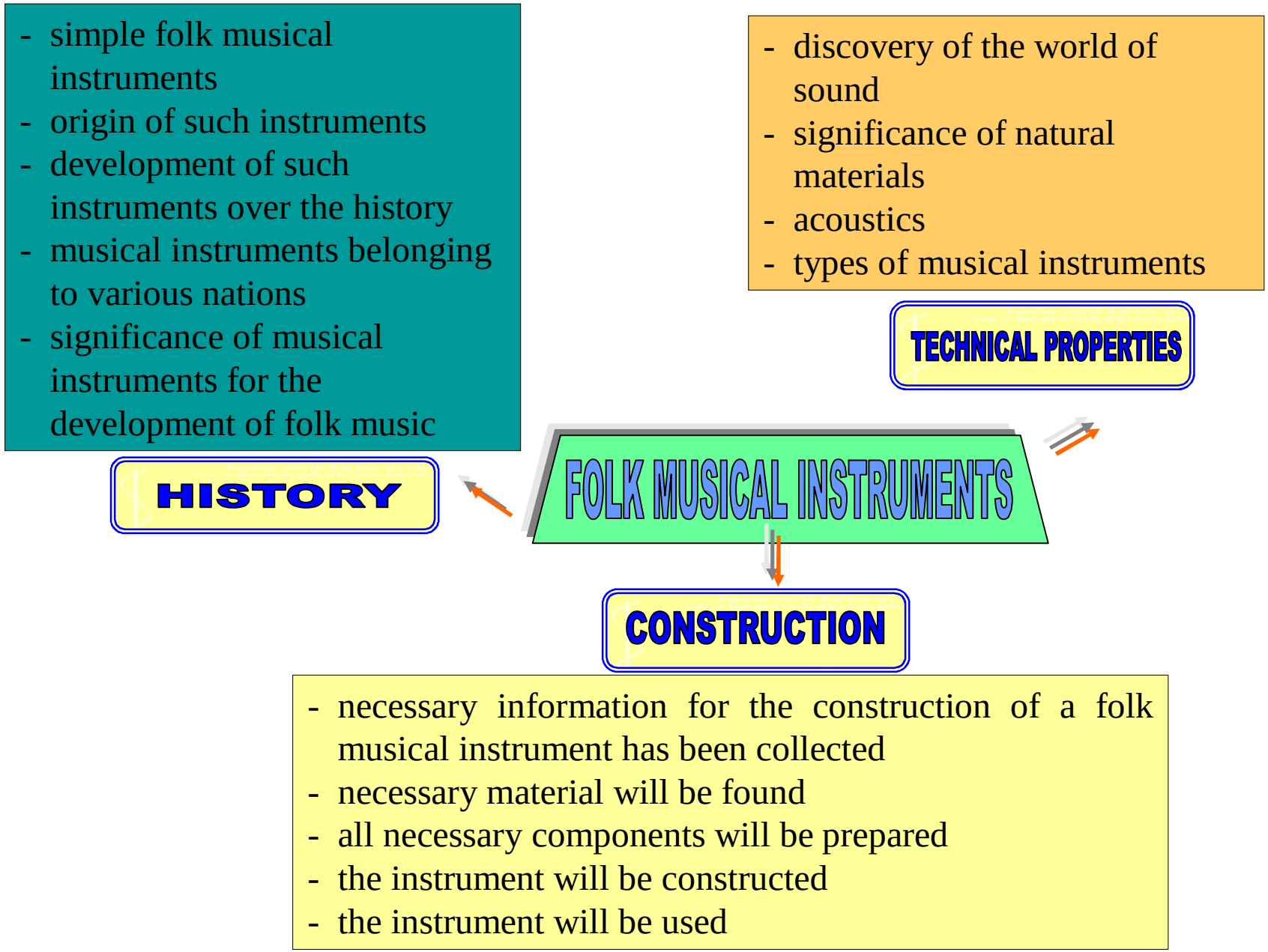

- simple folk musical instruments
- origin of such instruments
- development of such instruments over the history
- musical instruments belonging to various nations
- significance of musical instruments for the development of folk music
HISTORY
- discovery of the world of sound
- significance of natural materials
- acoustics
- types of musical instruments
TECHNICAL PROPERTIES
FOLK MUSICAL INSTRUMENTS
CONSTRUCTION
- necessary information for the construction of a folk musical instrument has been collected
- necessary material will be found
- all necessary components will be prepared
- the instrument will be constructed
- the instrument will be used

FOLK MUSICAL INSTRUMENTS MADE IN THE COURSE OF THE PROJECT WORK

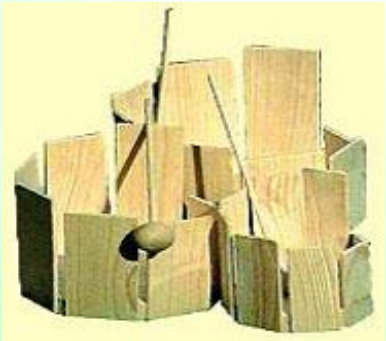
Picture 1: Rattle Drum

Picture 2: Rattle

Picture 3: Horn

Picture 4: Buzzer

Picture 5: Xylophone



Picture 6: Xylophone

Picture 7: Willow Pipe

Picture 8: Bow

Picture 9: Wooden Block with a Rift

Picture 10: Wind bells

FOLK MUSICAL INSTRUMENTS

HISTORY

- simple folk musical instruments
- origin of such instruments
- development of such instruments over the history
- musical instruments belonging to various nations
- significance of musical instruments for the development of folk music

TECHNICAL PROPERTIES

- discovery of the world of sound
- significance of natural materials
- acoustics
- types of musical instruments

CONSTRUCTION

- necessary information for the construction of a folk musical instrument has been collected
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Nazaj

SUBJECTS CLASSES - ELEMENTARY SCHOOL

PREDMETNI POUK - Ž.LEBAR

MAKING PUPPETS AS PROJECT BASED LEARNING

Žiga Lebar, Prof., Puppet Theatre of Ljubljana, Doc. Dr. Jožica Bezjak, Faculty of Education, University of Ljubljana, Slovenia

Proceeding

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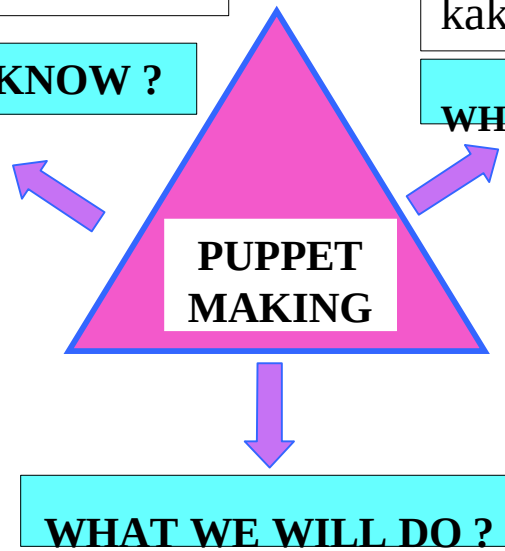
puppetry is a form of a theatre
a puppet is a useful product
puppetry has a very long tradition
by using puppets we create an illusion

WHAT WE ALREADY KNOW ?

how do we make a puppet which tools and materials do we needwhat are the levels of the puppet makinghow do we use puppets what kinds of puppet techniques are there
kakšne lutkovne tehnike obstajajo

WHAT WOULD WE LIKE TO KNOW ?



WHAT WE WILL DO ?

draw a sketch	draw a plan
choose materials and tools	make a puppet
use a puppet	organize an exhibition

MARIONETTE - DIGNITARY

The marionette technique is the most famous puppet technique. In European puppetry it holds the venerable position of the "classical puppet" therefore some languages use the term marionette for any kind of puppets. This technique is quite demanding for making the puppet as well as to animate it. It requires a lot of technical knowledge and practice. The presented puppet is an example of the common wooden marionette with a so-called "Slovene leading part" (scales).

puppetry is a form of a theatre
a puppet is a useful product
puppetry has a very long tradition
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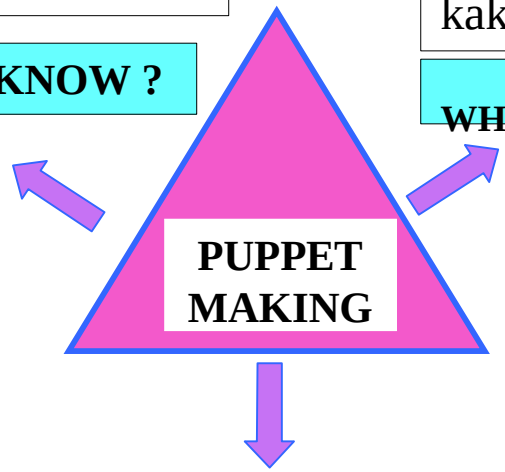


WHAT WE WILL DO ?

draw a sketch	draw a plan
choose materials and tools	make a puppet
use a puppet	organize an exhibition

Nazaj

SECONDARY SCHOOL FOR MECHANICAL ENGINEERING

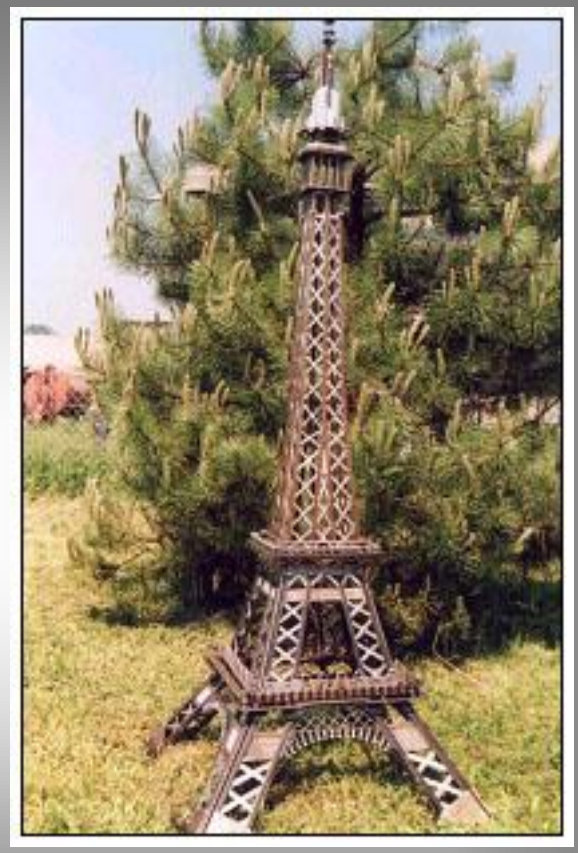
SREDNJA TEHNIČNA STROJNA ŠOLA

B.Polanc, S.Kostanjevec

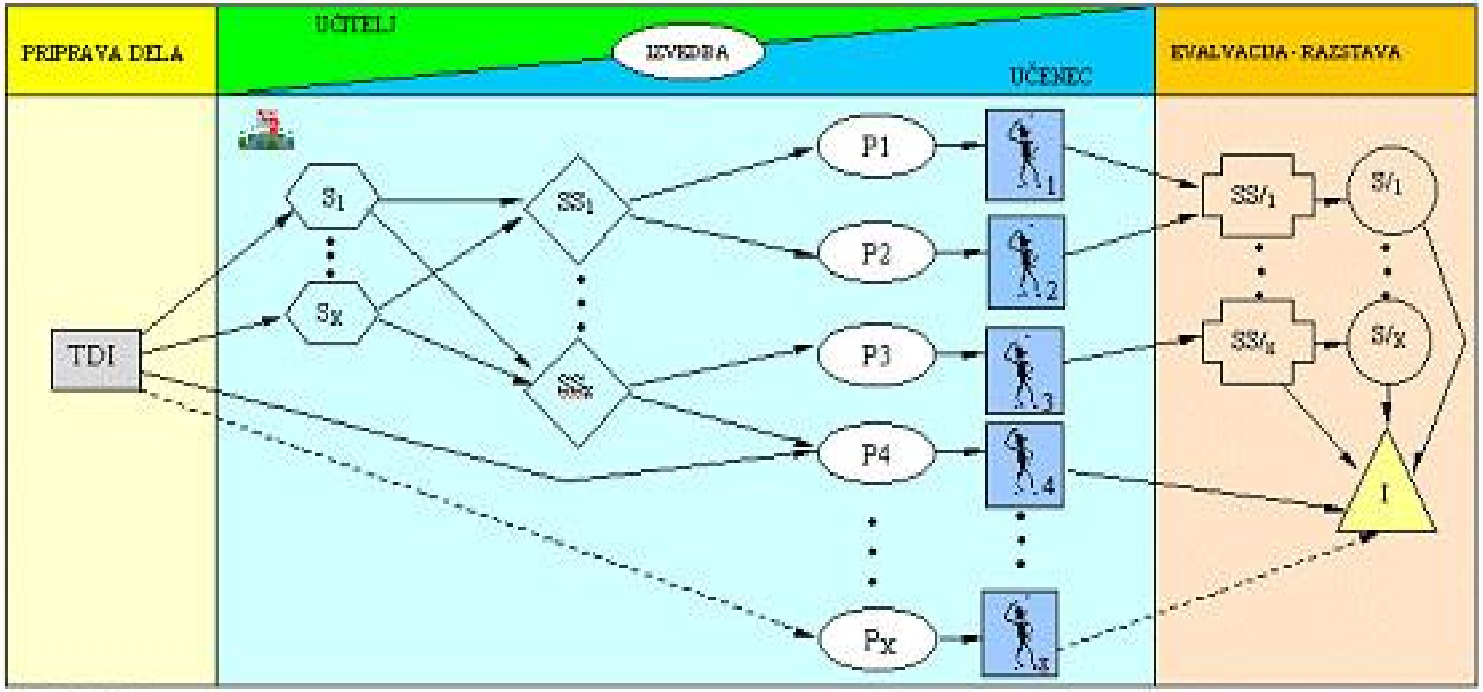
Project study work – working out an Eifel's Tower

Branko Polanec , Prof.,Stanko Kostanjevec, Prof., School Centre of Ptuj, Slovenia

Picture 1 : Tour de Eiffel - original



Piture 2: Tour de Eiffel – a product of the project



LEGENDA:

- TDI – tehniška dokumentacija izdelka,
- $S_1 \dots S_x$ – podsestavi izdelka,
- $SS_1 \dots SS_x$ – podsestavi podsestava,
- $P_1 \dots P_x$ – pozicije podsestavov in izdelka,
- $U.1 \dots U.x$ – učenci,
- $SS/_1 \dots SS/_x$ – podsestavi podsestava izdelka,
- $S/_1 \dots S/_x$ – podsestavi izdelka,
- I – izdelek,

Picture 3: scheme of the organisational structure

OPERATIONS

- measuring, control and safety at work
- drawing straight lines and measurement transmission, pointing and number and letter imprinting

PICTURES

Picture 4: Measuring

OPERATIONS

- profile and steel sheet sowing
- plane filing, angleness and parallelness filing
- groove cutting and filing
- incline and radius filing and inner thread
- cutting into blind pierce

PICTURES

Picture 5: Plane filing

OPERATIONS

- drilling, reaming, conical steel broaching and inner thread cutting
- cylindrical broaching

PICTURES

Picture 6: Cylindrical broaching

OPERATIONS	PICTURES
- thin plate sowing and shearing, by using different shears - thin plate casing preparation	

Picture 7: Thin plate sowing

OPERATIONS

- wire bending
- thin plate cutting
- thin plate bending into different forms by using pins and other things
- thin plate straightening
- boring and filing certain inner forms
- thin plate bending in a screw press by using tools

PICTURES

Picture 8: Wire bending

OPERATIONS

- borehole transmission to other products
- assemble and screwing the constituent elements into minor complexes
- pin preparation for outer threads and outer thread cutting
- final complex assembly of the off-road vehicle

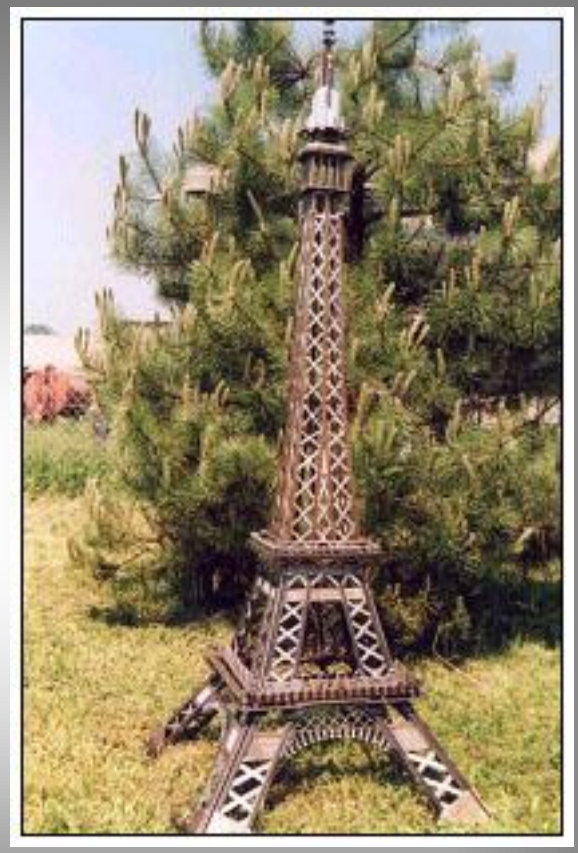
PICTURES

Picture 9: Assembly

Picture 10: Final montage is very pretentiousness.

Picture 11: Different angle of view.

Picture 1 : Tour de Eiffel - original



Piture 2: Tour de Eiffel – a product of the project

Nazaj

SECONDARY SCHOOL FOR ELECTRICAL ENGINEERING

SREDNJA TEHNIČNA ELEKTRO ŠOLA E.Trdan

PROJECT-BASED LEARNING – Mini mobilE robot "FROM THE IDEA TO THE PRODUCT"

Edvard Trdan, B.Sc., Peter Žitko, Andrej Žerovnik, Vocational School for Technical Sciences, Ljubljana, Slovenia

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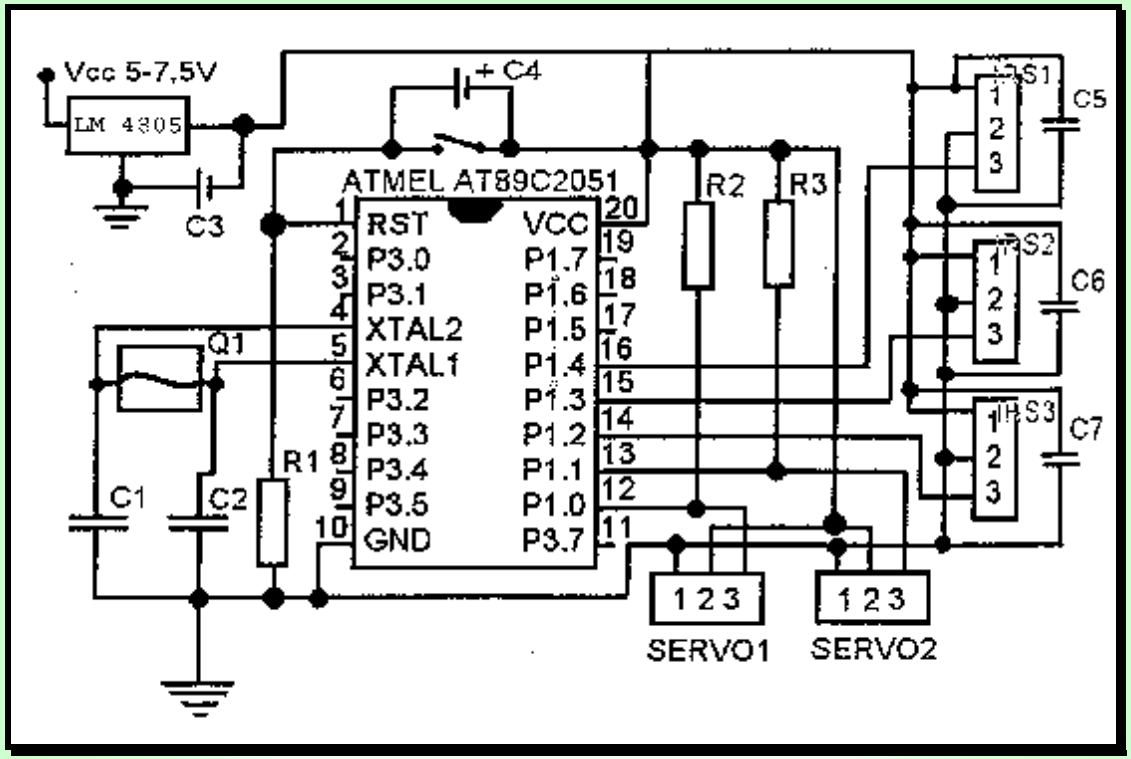


Fig. 1a: The first part shows the microcontroller with supplying parts and connectors for sensors and servo motors.

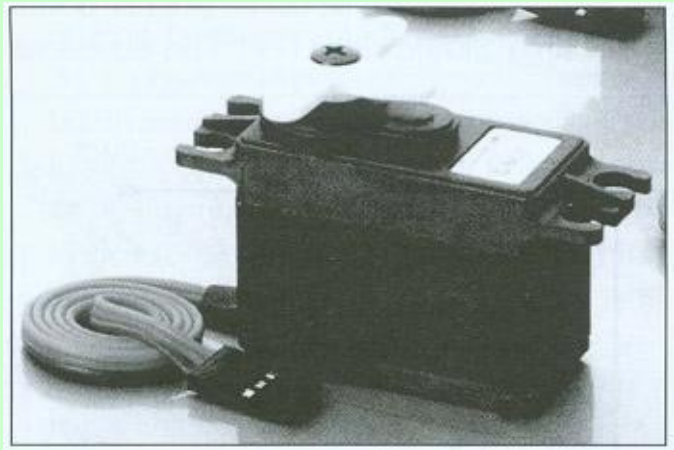


Fig. 2: Primer of a servo motor

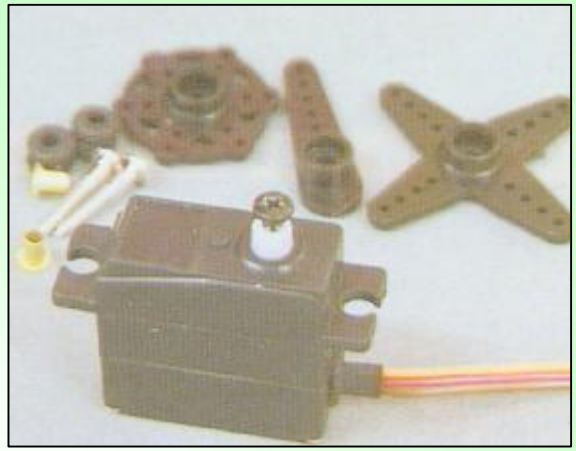


Fig. 3: All the components of a classical RC motor.

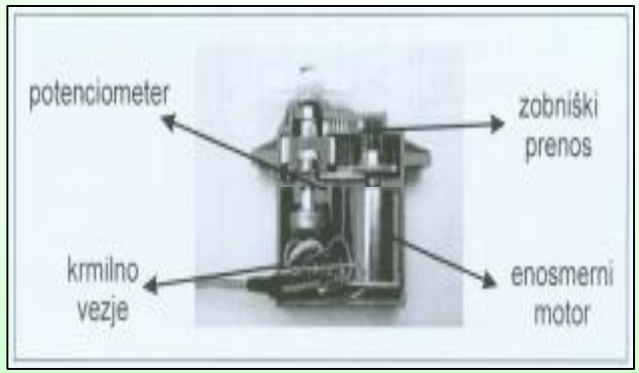


Fig. 4: Construction of a servo motor

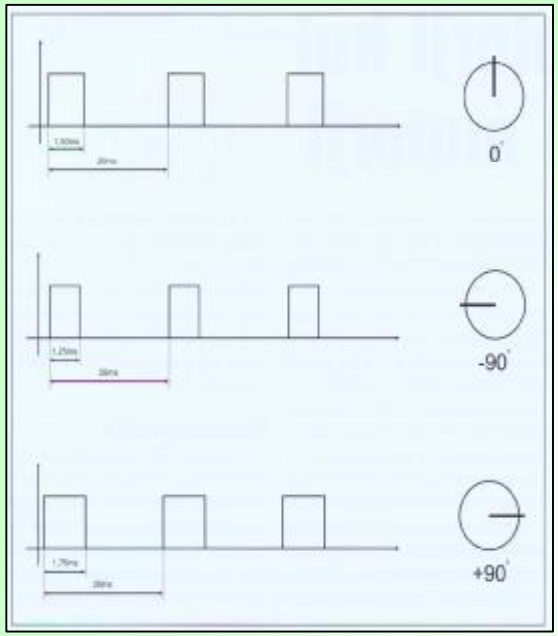


Fig. 5: PCM modulation

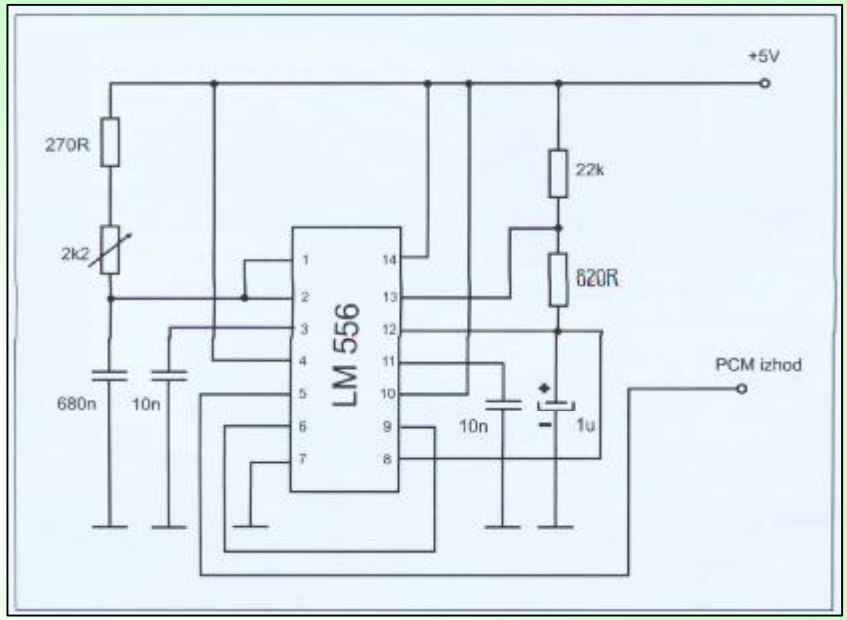


Fig. 6: PCM signal generator

Fig. 7: Servo motor dismantled.

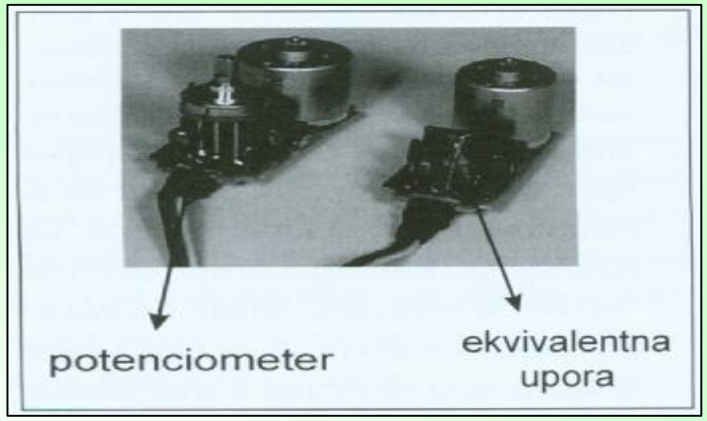


Fig. 8: Replacing the potentiometer with equivalent resistors

Fig. 9: On the cogwheel, remove the part preventing its rotation.

Fig. 10: Servo motor of R/C models and an element that can be used as a wheel

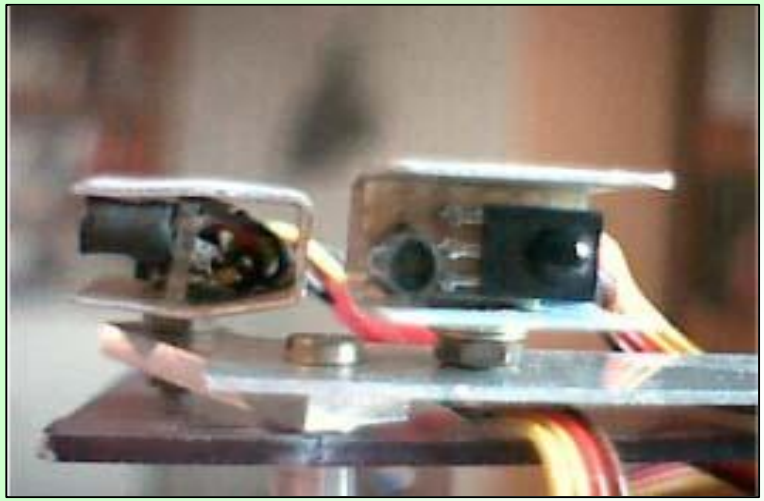


Fig. 11: Sensors arrangement.

Fig. 12: IR receiving and transmitting diode

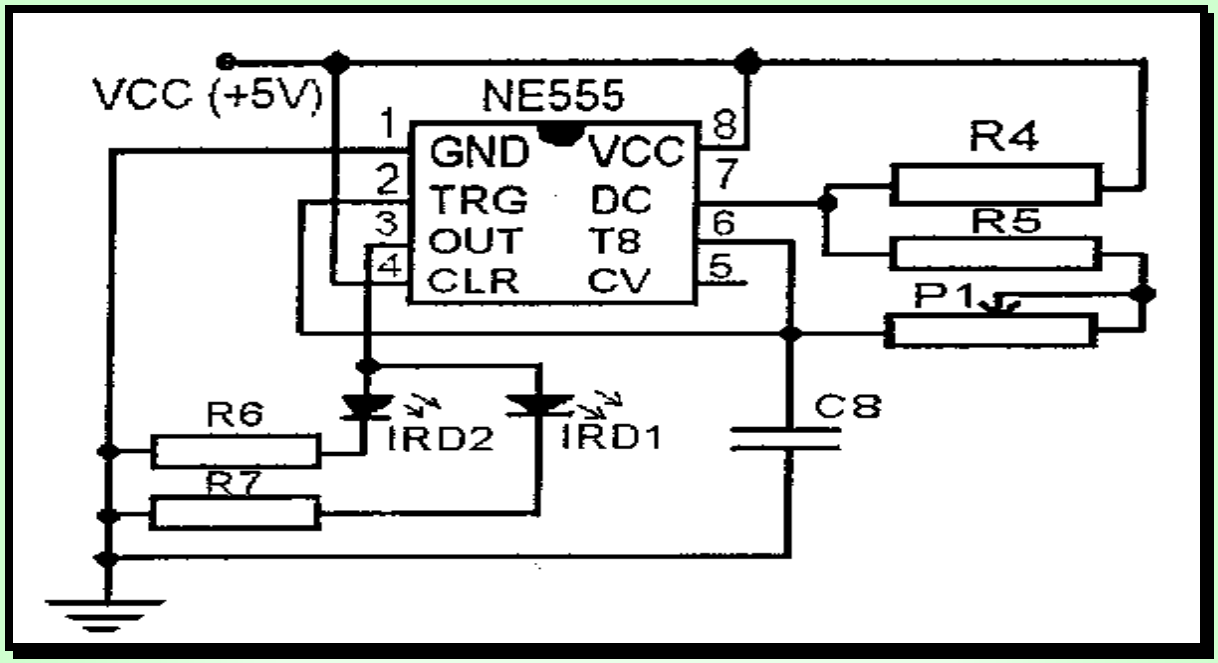


Fig. 13: Frequency generator.

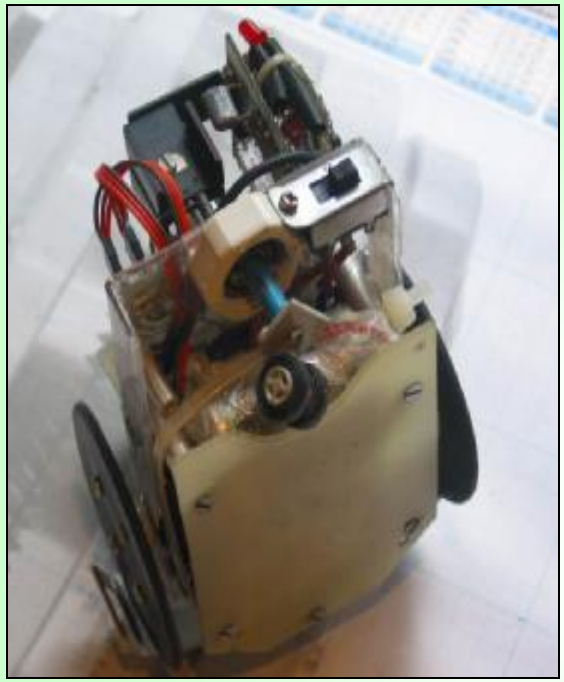


Fig. 14: One of potential housings

Fig. 15: Right: a freely turning wheel. Left: a plastic wheel coated with rubber

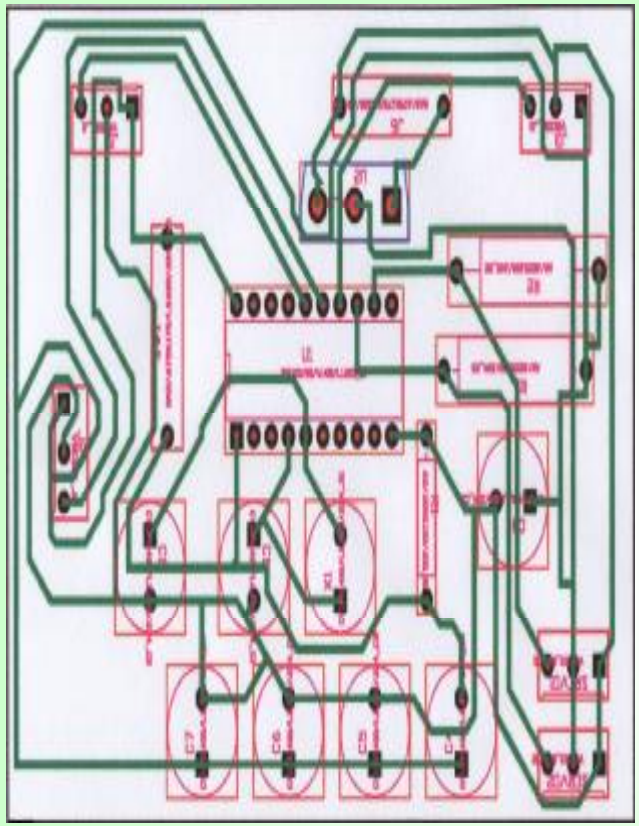


Fig. 16: Printed circuit

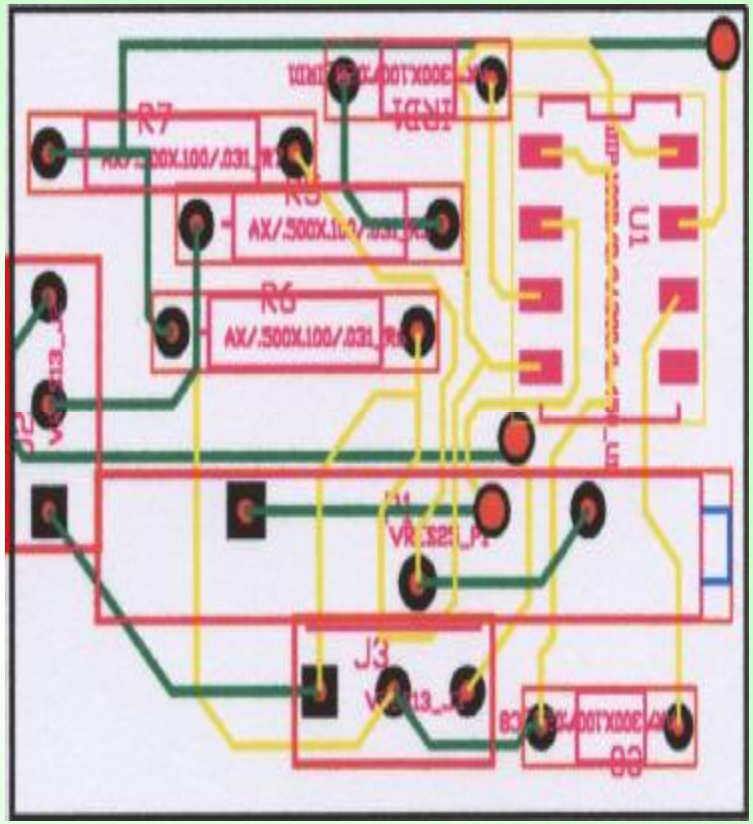


Fig. 17: Printed circuit and assembly diagram

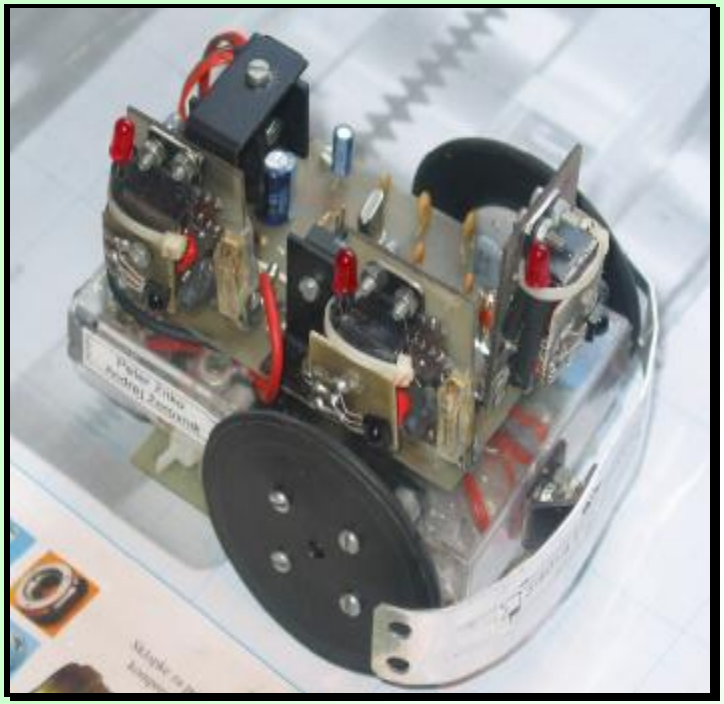


Fig. 18: Mini mobile robot.

Fig. 19: Mini mobile robot in labyrinth

Nazaj

FACULTY OF EDUCATION
PEDAGOŠKA FAKULTETA -N. Burger

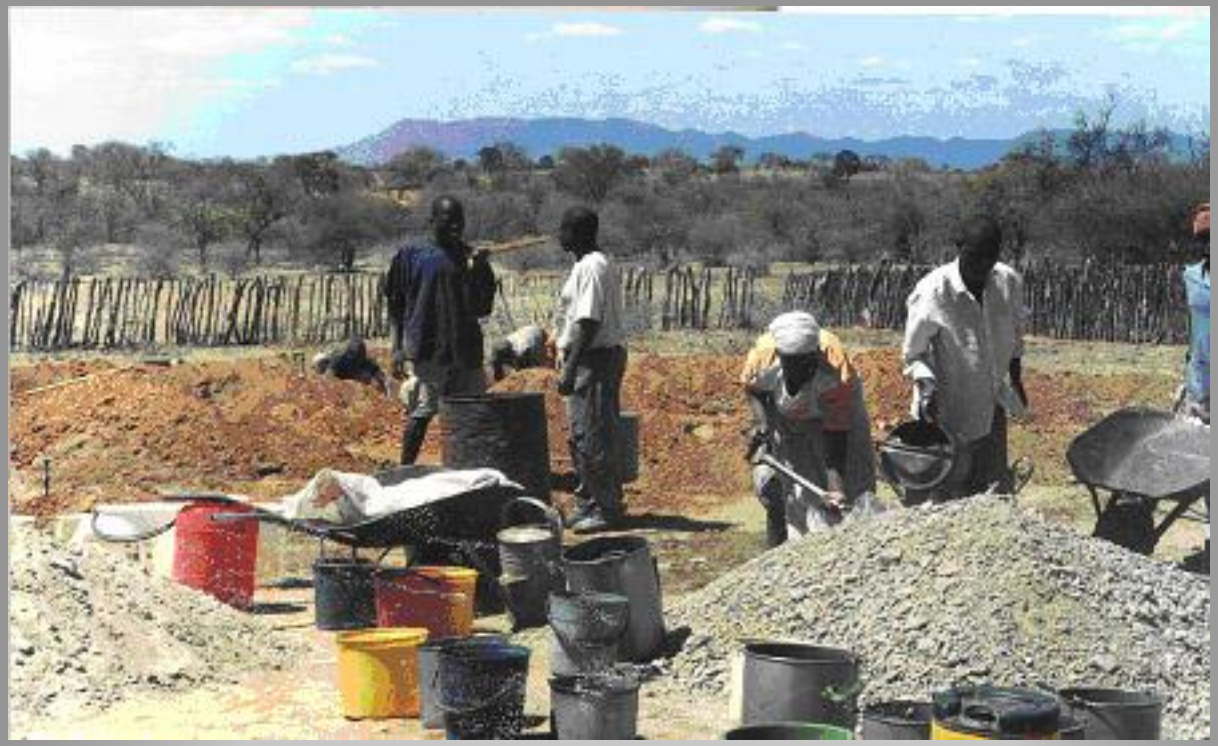
PROJECT LEARNING IN SEMINAR FORM AT STUDY FOR PRIMARY SCHOOL TEACHING – HOUSE BUILDING IN ZIMBABWE

Nina Burger, Student, Doc. Dr.Jožica Bezjak, Faculty of Education, University of Ljubljana, Slovenia

Picture 1: Visit in the kindergarten

Picture 2: Family Muleya in front of their traditional house

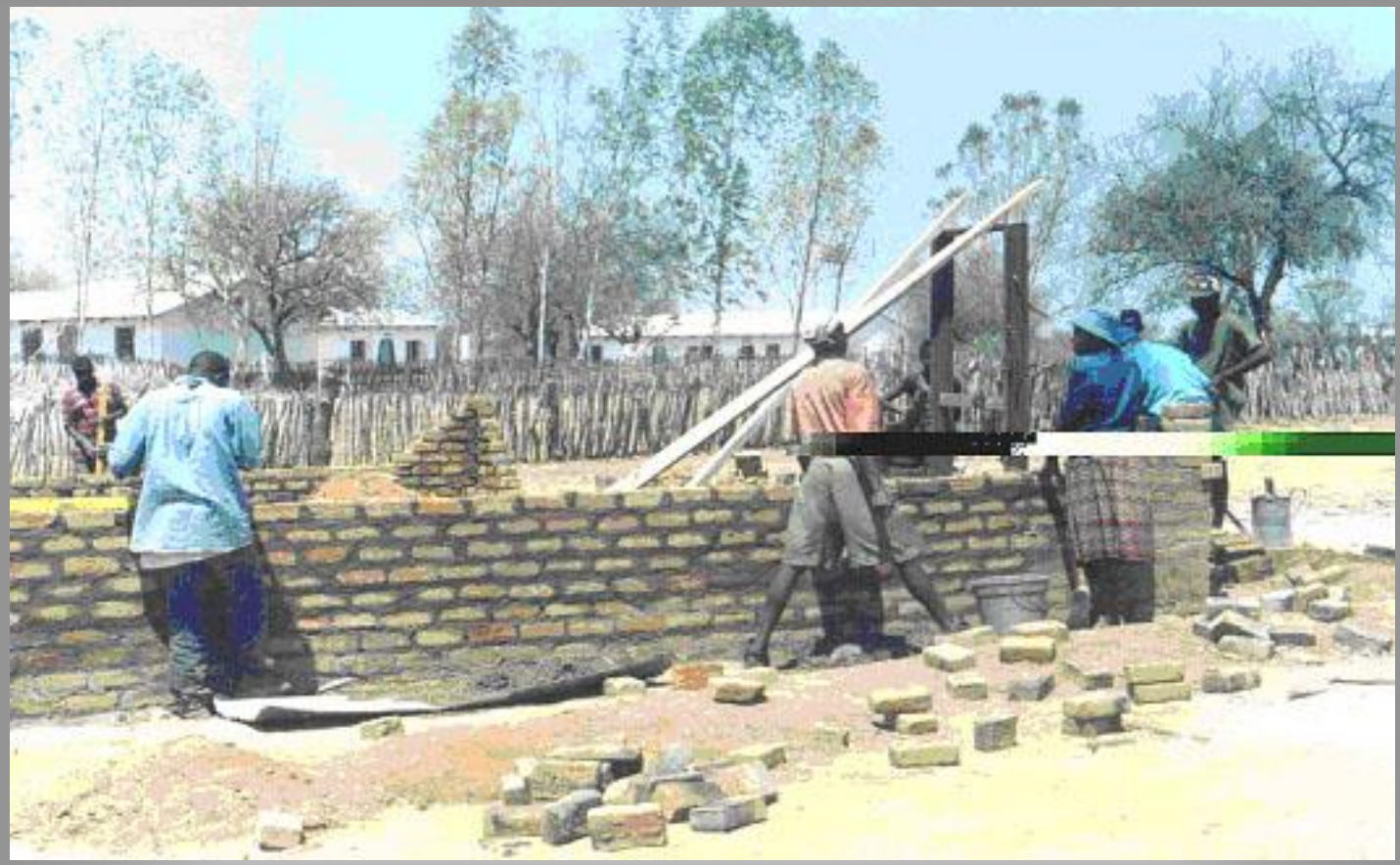
Picture 3: Digging and Ruth's drinking water



Picture 4: Mixing of concrete

Picture 5: process of burning bricks

Picture 6: Carrying bricks



Picture 7: House building

Picture 8: Traditional dancers and me in the middle

Nazaj

FACULTY OF EDUCATION
PEDAGOŠKA FAKULTETA -J. Bezjak

PROJECT LEARNING IN FORM OF STUDY EXCURSIONS FOR STUDENTS SUBJECTS, AT FACULTY OF EDUCATION, AT UNIVERSITY IN LJUBLJANA OF PEDAGOGIC STUDY AT NATURE SCIENCE-TEHNICS

Doc. Dr. Jožica Bezjak, Faculty of Education, University of Ljubljana, Slovenia

Photo 1: Metallurgy - demonstration of beggining steps, of malting metal, from their natural ingridients, from ore.

Photo 2: Metallurgy – demonstration of melting ore.

Photo 3: Machine tools – development of cutting machines, from 18th century.

Photo 4: Engines – water wheels for transforming water energy into mechanical energy

Photo 5: Engines – water wheels which are illustrated with model of Frankon's wheel for watering.

Photo 6: Engines – electro motor

Photo 7: Bridge building – the bridges present supporting structures in its own basic shape

Photo 8: Navel navigation - it's an economic regulation of ships route

Photo 9: Daimer sthalradwagen, 1889

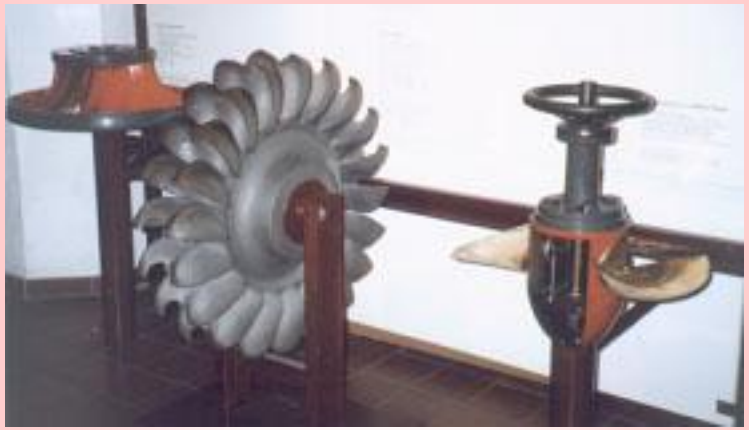


Photo 10:Runner of Pelton turbine

Photo 11: BMW 328, 1938

Photo 12: Bicycle from 1882 (English Hochrad)

Photo 13: Chanel building

Photo 14: Chemistry department

Photo 15: Musical department

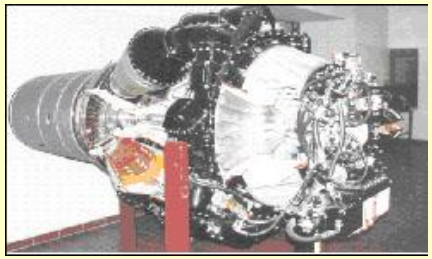
Photo 16: Physical experiment of gravity

Photo 17: Physical experiment of gravity

2. MACRO AND MICRO REALIZATION OF THE STUDY EXCURSION FOR STUDENTS OF TECHNICS, PRIMARY SCHOOL TEACHING AND PRE-SCHOOL EDUCATION

In accordance to collected literature (books and informations on internet) is made theoretical part of the seminar.

WHAT WE KNOW?



Aircraft engine , Rolce- Roys LTD, 1955

On the base of literal informations and independent sightseeing with active cooperation at demonstrations, we collect picture and video material.

WHAT WE WANT TO KNOW?

Metric system – models of balance

SIGHTSEEING OF NATURAL S CIENCE AND TECHNICAL REMARKABLENESS

WHAT WILL WE DO?

Students:

- independently select tourist agency, by help of their teacher – accompanier which defines technical programme of the excursion
- are organized in groups (three students in each group) and independently select the theme and collection which they want to see and research.
- Make technical report with picture and video material which was selected on the day of the excursion
- Present the report in the form of seminar
- Join reports into a whole and present the general report on a web-site

Nazaj

FACULTY OF MECHANICAL ENGINEERING

FAKULTETA ZA STROJNIŠTVO-J.Duhovnik

ACTIVE LEARNING AT AN INTERNATIONAL VIRTUAL PRODUCT DEVELOPMENT PROJECT

Dr. Jože Tavčar, Ph.D., Domel d.d., Železniki, Slovenia
Prof. Dr. Jože Duhovnik, University of Ljubljana, Faculty of Mechanical Engineering, Slovenia
Dipl. Eng. Janez Krek, University of Ljubljana, Faculty of Mechanical Engineering, Slovenia
Doc. Dr. Roman Žavbi, University of Ljubljana, Faculty of Mechanical Engineering, Slovenia

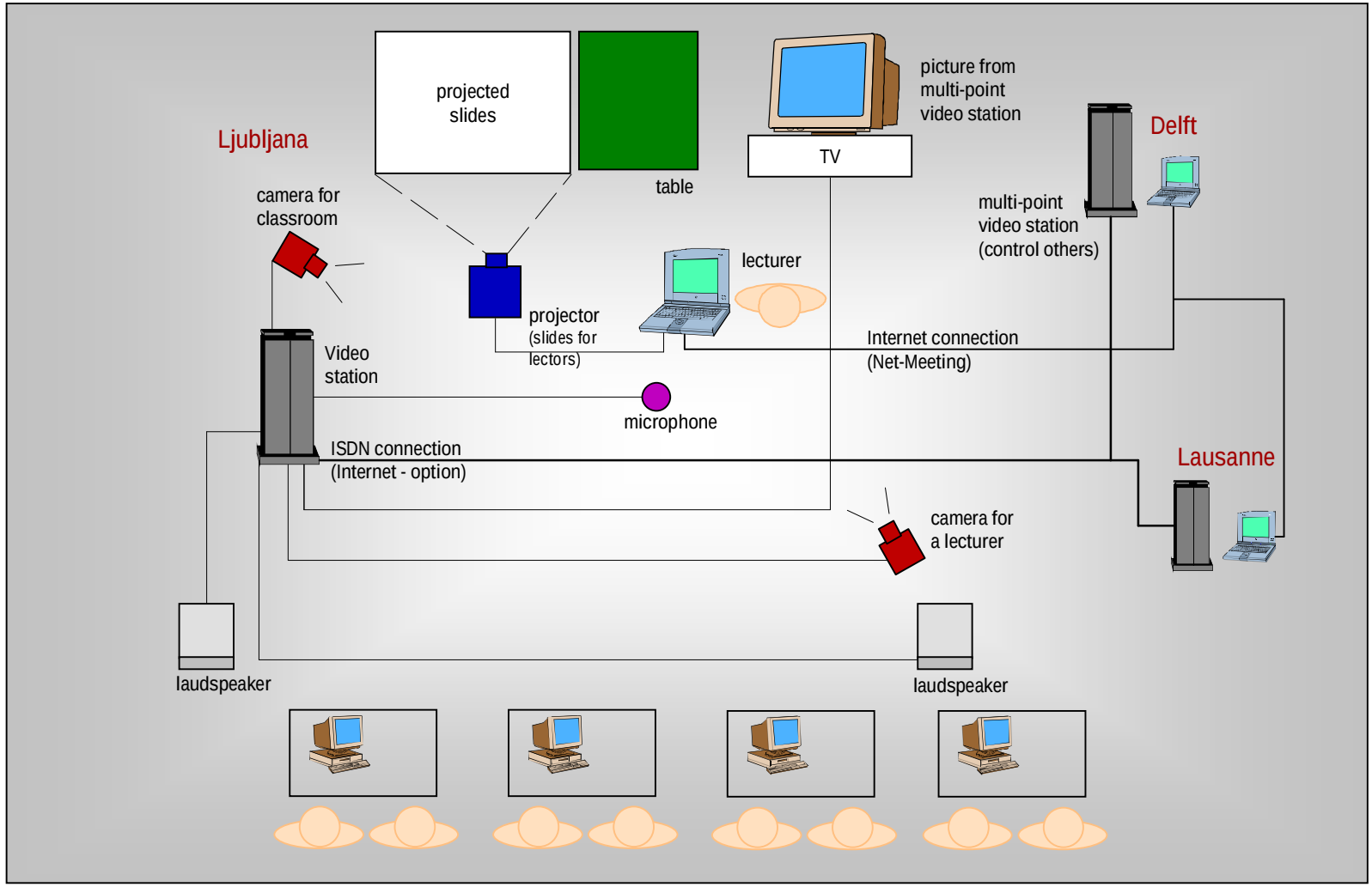


Figure 1: **Schematic of a virtual classroom at the Faculty of Mechanical Engineering.**

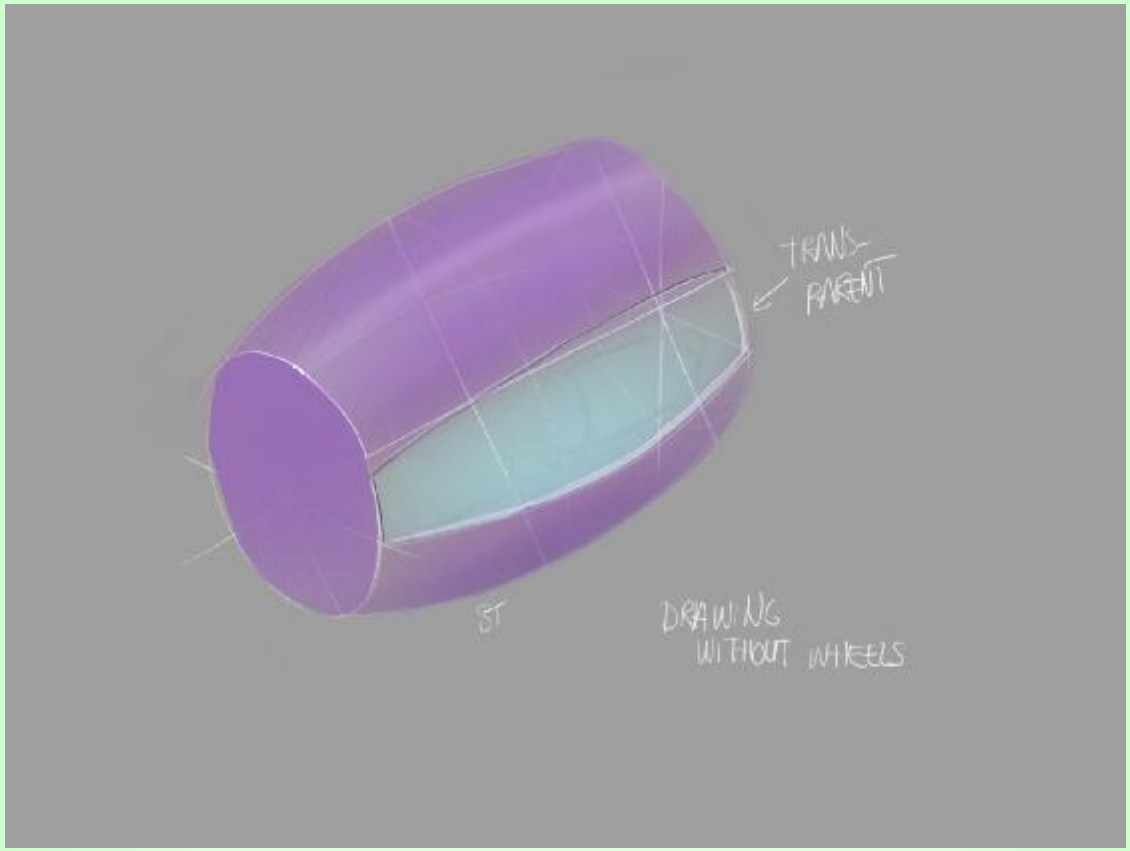


Figure 2: **First sketch of vacuum cleaner housing from one of the teams.**

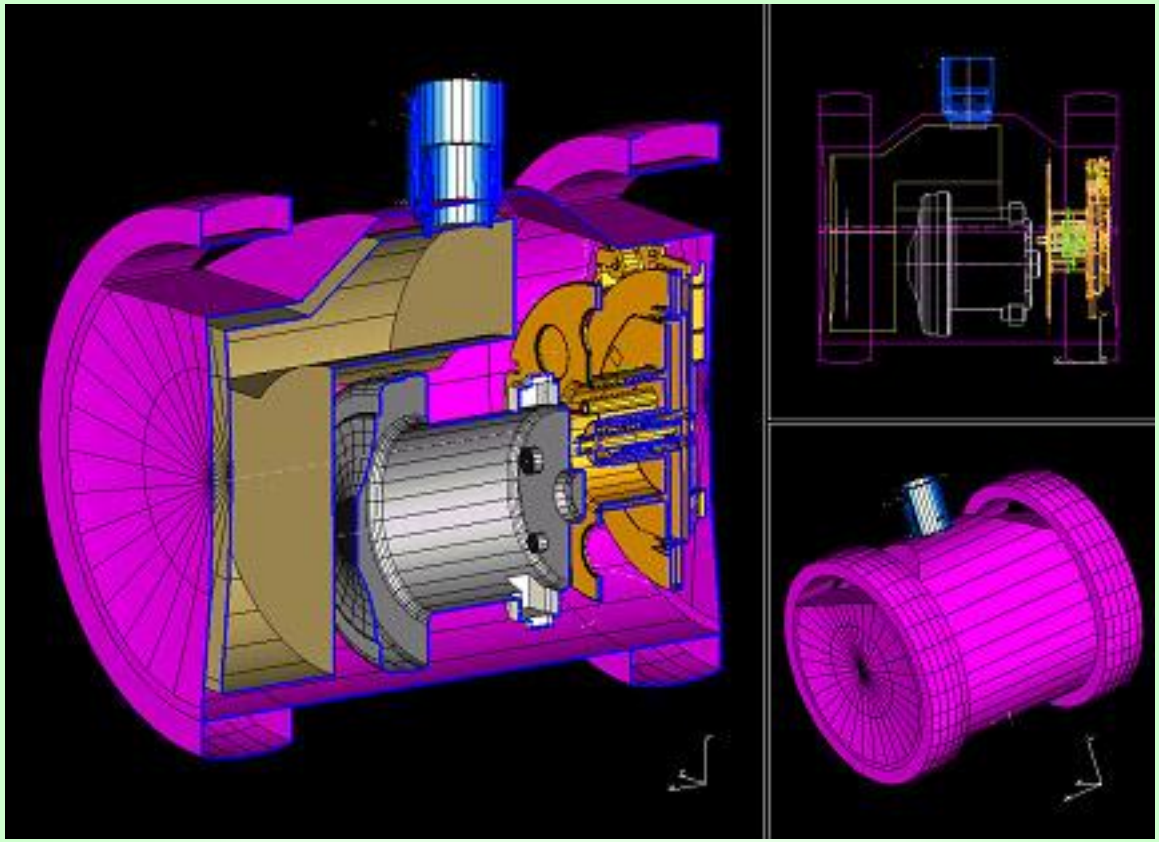


Figure 3: **3D vacuum cleaner assembly.**

Figure 4: **Project team's vacuum cleaner at the final presentation.**

Figure 5: Exhibited vacuum cleaner prototype (front) and one of initial prototypes (in the background).

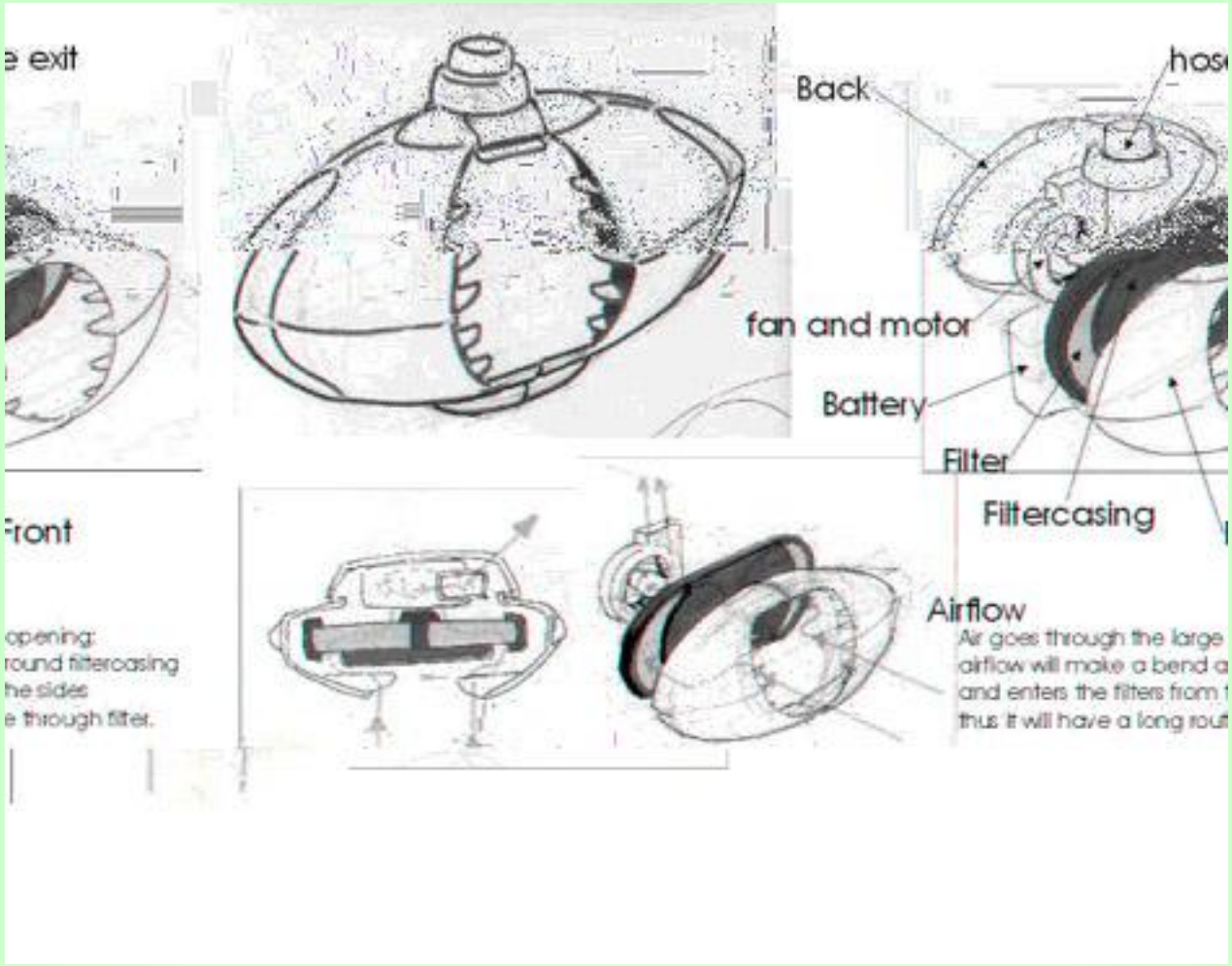


Figure 6: **Sketch of conceptual design of respiratory unit from one of the teams.**

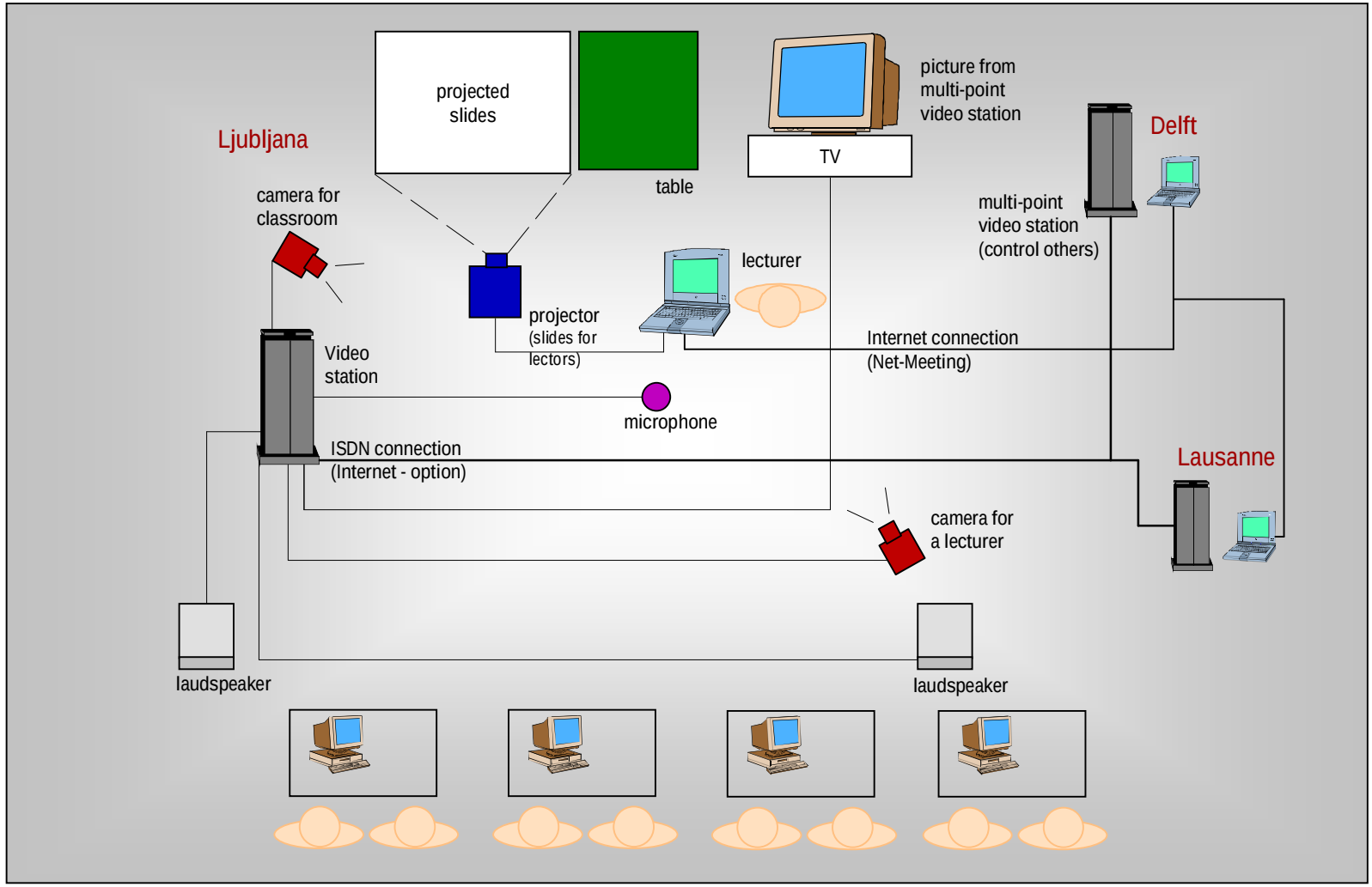
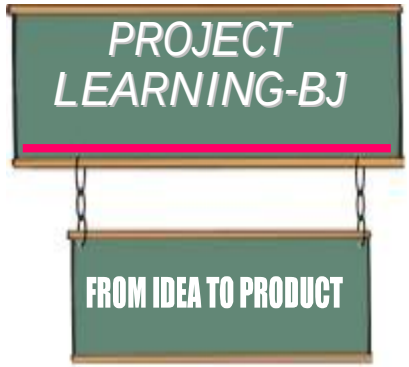


Figure 1: **Schematic of a virtual classroom at the Faculty of Mechanical Engineering.**

Nazaj


LEARNING,
LEARNING,
LEARNING,
LEARNING...


PROJECT
LEARNING-BJ
FROM IDEA TO PRODUCT