

Design and Technology Education in Cypriot Schools for Children 12-15 Years

Abstract

Technology as a school subject was first introduced into four general schools (lower secondary schools called Gymnasium, for ages 12-15) in Cyprus through agreements between UNICEF and the government of Cyprus during the school year 1967/68. The first name given to the subject was Practical Knowledge which was very similar to Handicraft taught in the UK. It consisted of woodwork, metalwork and technical drawing which was only offered to boys. Girls were offered home economics. The teachers appointed were elementary teachers with practical experience in handicrafts.

History of the subject

Within four years the UNICEF agreement expanded, covering 20 more schools and eventually included all of the remaining schools. The agreement included supply of equipment and the construction of new workshops. Unfortunately the project was suspended after the events in 1974 (the Turkish invasion and occupation of northern Cyprus). As a result of this, the subject of Practical Knowledge presented serious weaknesses and it gradually became evident that the subject should either be put onto a new modern basis or abolished altogether.

A report prepared in 1988 proposed that the subject of Practical Knowledge needed to be upgraded, since it found:

- weaknesses in research
- absence of creativity concerning pupils' work
- low morale of teachers
- unsatisfactory conditions of workshops.

Similar views over the same year were also expressed by overseas experts, including the Bedfordshire Education Authority. So it was agreed that for pedagogical and economical reasons a new subject of technology should be introduced to replace the existing handicrafts.

A five year (1989-1993) experimental plan was introduced for upgrading technology education in the Gymnasium. The British Council in Cyprus informed the Ministry of Education that the British Overseas Development Administration was to offer technical assistance through Bedfordshire for the implementation of the proposed scheme, particularly in the training of the teaching staff.

In 1990 a new subject named design and technology was introduced and it was to be taught to both boys and girls in all three years (12-14 years old) of Gymnasium. After 10 years many things still need to be acted upon

i.e. the syllabus of the subject, how to teach certain elements, assessment, curriculum time, textbooks for both pupils and teachers etc.

Lesson organisation

Since 1992 the text that the pupils are following is *An introduction to Craft Design and Technology* written by Steward Bennet which has been translated into Greek. Teachers are university graduates with different backgrounds including electrical and mechanical engineering – they follow a part time two year course relating to the subject. Over the last five years new teachers are becoming qualified in this subject.

Lessons are carried out individually or in small groups (3-4). A design process for the solution of a problem is followed.

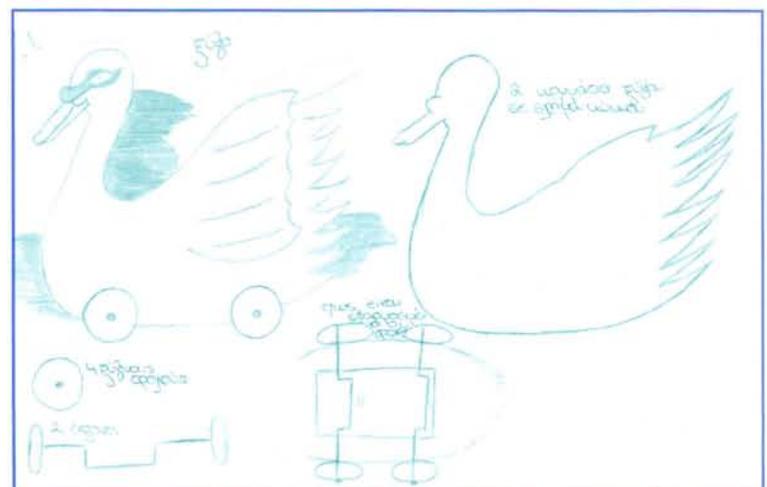
- Problem (situation-specification)
- Research
- Initial ideas
- Development of best idea
- Working plan/model
- Making
- Evaluation

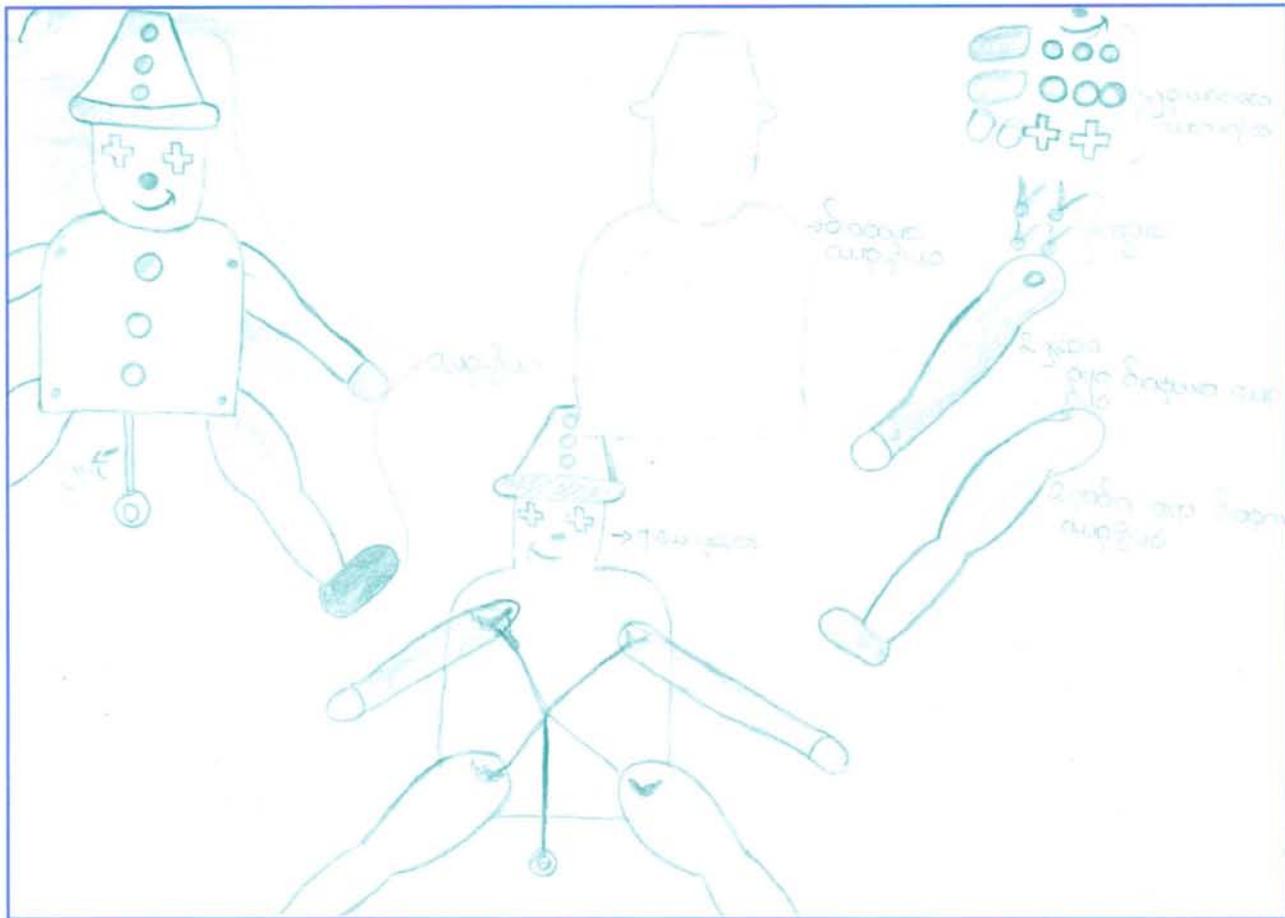
Lesson objectives

The general aim of the subject is the creation of an educational environment which challenges pupils to solve practical problems. In this attempt pupils must use their judgement, creativity and knowledge to solve a specific problem. So it is expected that pupils should:

- understand and improve the nature of technology taking into consideration the aesthetic and material views
- develop creative ideas
- improve their skills in solving a practical problem using designing
- research personal resources for practical and technological knowledge and skills
- take into consideration the economic factor.

**Georgios
Koutsides**





Aims

- find and analyse human needs - natural, moral, social and suggest solutions for a problem
- collect, choose and evaluate information
- present solutions in a graphical, three dimensional and written format
- recognise the importance of safety and learn to use machines and tools within the design and technology workshop
- show skills required for the making of a model
- compare and evaluate artefacts with comparison to the specifications
- work within groups and individually for solving a practical problem
- show progress around the impact of technology and society.

Pupils involved in technological activities must acquire certain skills including:

- safe use of tools and machines
- appropriate choice of tools, materials and methods of carrying out practical activity
- use of IT
- making technical experimenting, measuring and modeling
- communication relating to service manuals, pictures and symbols

- evaluation of their own abilities skills and interests
- evaluation of products from an economical and ecological perspective.

Programme of study

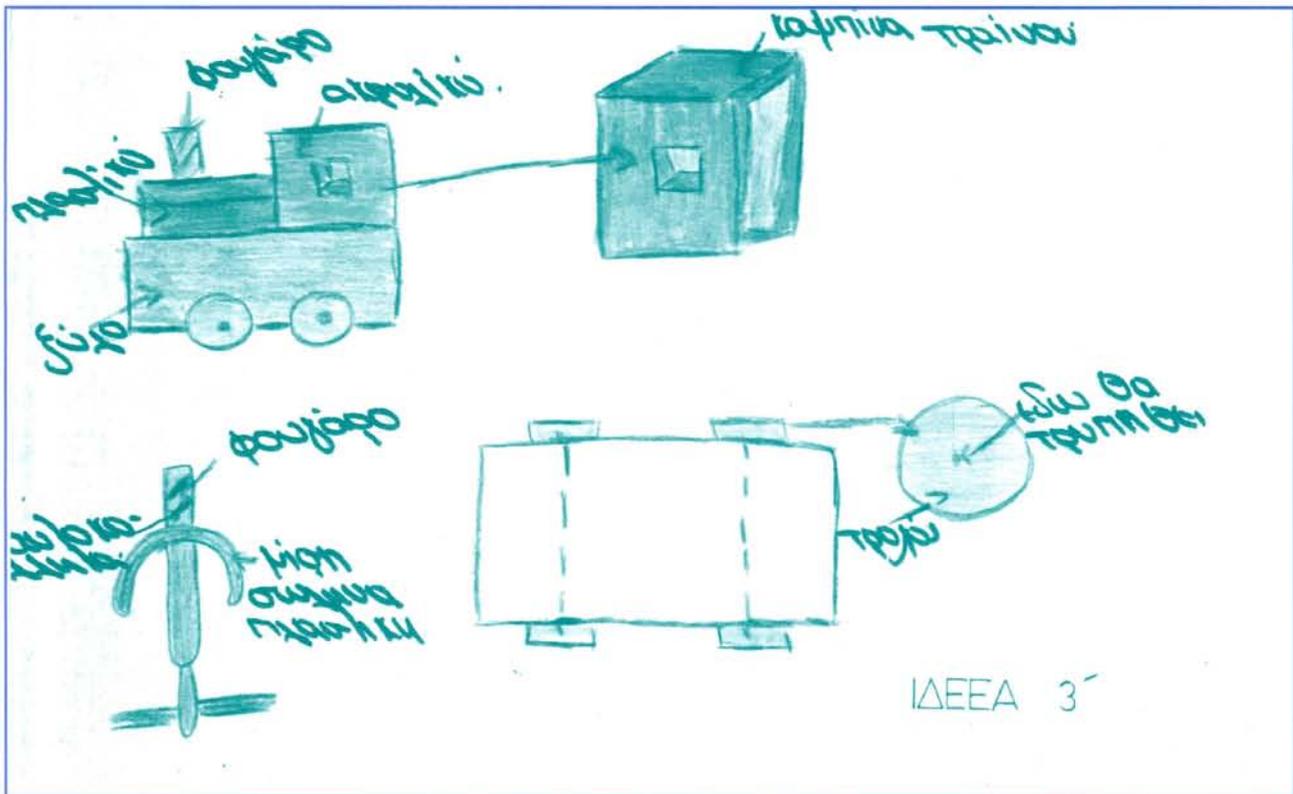
Pupils are taught to develop their design capability by combining their design and making skills with knowledge and understanding in order to design and make a product.

Designing skills

- use of resources to help pupils in their designing
- generate ideas
- evaluate their design – proposals
- be able to communicate (collect and transfer information) by using graphic skills.

Making skills

- select appropriate materials, tools and machines to help in their making
- combine materials
- quality
- planning processes and suggesting alternatives
- evaluate their products and be able to implement improvements.



and that they appreciate responsibility for each others' safety and opportunities of learning.

The displaying of all pupils' work is regarded as being an important element of the ethos of the school. This department policy ensures that displays of quality and sensitivity take place not only within the school but also within the general community, giving the pupils a feeling of pride in seeing their work displayed publicly.

The department recognises the importance for constantly reviewing its 'Learning and Teaching' policy and organisation, to ensure that its curricular contribution to all pupils has continuity, coherence and progression.

During their three years in school, pupils are taught in mixed ability groups in multi-purpose workshops. This curriculum experience is enhanced by specialist in-house resources/facilities including ICT, control/systems and graphic resources.

The degree of responsibility for decision making by pupils, within the projects set in these three years, increases as they gain in maturity. In Year 9 (14-15) all pupils are given the responsibility to research and develop all aspects of designing and making, in order to solve given problems/situations.

Designing and making

The core activities of designing and making are not sequential and linear processes but are integrated and cumulative processes comprising of:

Designing

- a. the design task
- b. designing procedures
 - task identification
 - investigation
 - experimentation
 - modeling of ideas
 - decision making
- c. appropriate use of knowledge and skills.

Making

1. Communication
 - written
 - oral
 - graphical
 - electronic
2. Discrimination
 - analysing
 - researching
 - decision making
 - logical planning and evaluation
3. Realisation
 - manipulation of materials
 - solving of three dimensional problems
 - safe solutions

- 4. Others
 - mathematics
 - scientific
 - personal and social study

society
man-made

- 5. Human factors
 - anthropometric
 - ergonomics.

Concepts

- 1. Materials
 - properties
 - processes
 - techniques and uses
- 2. Control
 - structural
 - mechanical
 - electrical
 - electronic
 - computer
- 3. Energy
 - forms of sources
 - storage
 - transmission
 - conversion
 - conservation
- 4. Environment
 - family
 - community

At the heart of the design and technology curriculum is a “Design Process”. This problem solving approach, centred on realistic and identifiable needs and situations, endeavours to provide each pupil with a rich and varied experience of a wide range of materials, processes and systems. It is through this process that appropriate skills and concepts are learnt.

The department’s commitment to ‘child-centred’ learning ensures that each pupil’s contribution to either individual or group based projects is positively valued. Opportunities for group or class based discussion, brain-storming, etc. ensure that each individual pupil has the opportunity to express their opinion and so contribute to the richness of the experience.

Lesson 1

Defining the problem.
Design process.

Lesson 2

Talking about mechanisms.

Lesson 3-4

Observation of other toys and making notes how other different mechanisms work.

Watch a video/Posters Observation of a mechanical toys the teacher made using different mechanisms.

Lesson 5

Revision of accurate measuring using a ruler, compass and triangles.

Lesson 6

Pupils decided to make automata and choose different mechanisms for their best idea.

Lesson 7

Cutting models of mechanisms out of card using a compass, ruler and a pair of scissors.

2D and 3D shapes were explored during this process. Students must construct models following and explain the function of the mechanism they will use for their construction, by close observation and interaction. Math skills must be tested while they develop and explain the phenomena they observe from the automata, and try to put them forward to their own theories.

Lesson 8

Brief discussion of best idea.

Lesson 9

Production of the working drawing.

Scaling down procedures were discussed.

Presentation of the three elevations.

Lesson 10

Materials and costing list.

Lesson 11-13

Accurate measuring and cutting of materials.

Lesson 14-18

Making.

Making a dynamic toy

Key Stage 3, Year 8

The project described in this assignment is a part of the National Curriculum for design and technology for Year 8 (learning mechanisms).

Design brief

Design and make a dynamic toy, suitable for a pre-school child. The specifications and limitations are as follows:

- your solution must be based upon a theme: animals or insects or transport
- it must incorporate at least ONE mechanical system
- it must be manufactured using mainly wood and plastic.

Factors to be considered:

- child development
- safety
- fun element
- interaction with the world of reality and fantasy
- element of discovery and practice
- versatility of usage.

Using mechanisms

Investigating the mechanism for your toy. Start by using a construction kit, either LEGO or FISCHER TECHNICK, to model your ideas. Record your findings on an A3 sheet. Develop your ideas using freehand sketches and any appropriate soft modeling.

Your solution must involve an INPUT – either:

- a pull
- a push
- a turn

and at least one OUTLET.

Designing your toy

Begin with initial design ideas. Sketch a number of designs for your toy on one sheet of A3 paper. Develop ONE idea, including full details of mechanisms etc.

The children during this activity also...

- followed instructions and make replicas of the models depicted on them.
- set out to make particular models.
- observed different toys from the market.

Assessment

Assessment is recognised as an integral part of the learning process through which all pupils develop a critical awareness of their own work. The assessment of pupils' project work is carried out using a range of criteria:

- a. research and investigation skills
- b. skills associated with exploring ideas
- c. skills associated with developing ideas
- d. communications skills, graphical etc.
- e. realisation skills, modeling and making
- f. evaluation skills
- g. attitudes: pupil enthusiasm etc.

During their work, pupils are involved in the process of assessing their own project. This positive involvement is regarded as being a formative and encouraging experience which enables them to consider their own way of working and how to consciously improve individual strategies. 'End of project assessment/debriefing' sessions are utilised as a way of achieving pupils' self assessment.