

STRATEGY OF CROSS CURRICULAR CONNECTION AT TECHNOLOGY EDUCATION AS A FACTOR OF MODERN SCHOOL

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Abstract

This contribution deals with the topic of inter-subject planning and connecting in technique and technology and as a factor of modern school by emphasizing the strategies of training-educational work in technique and technology.

In this context the most suitable project task is being regarded as that strategy of training-educational work, in which the development of divergent thinking, creative compatibilities, acquiring, deepening, practicing and using the knowledge in the field of technique, technology, work organization, economics, ergonomics, ecology, informatics and computer science, industrial design, etc. is concerned.

In such a constructed strategy the inter-subject planning and connecting can be represented and the tendency to acquire better knowledge can also be realized, because of the opinion of the constructivists who think that knowledge in its final form can neither be "given" to somebody else, nor it can be "accepted" by somebody else, but it should be rebuilt by everybody with his/her own mental activity and exactly in technique and technology the objective and subjective conditions for such a style and didactic system of training – educational work are being created.

Key words: *school curriculum, cross curricular connection, technology.*

Introduction

Technical education (technique and technology) enables the child to realize, how a man changes nature with the purpose to survive, how he uses technique and technology and information knowledge. "This subject has an extremely great influence on the development of cognitive, educational, motoric and social needs of a child, which he/she can realize only in contact with technique and technology. Its purpose is combined with the needs of society that has under contemporary conditions to take care for its existence. The society will be able to realize this with technological progress on all levels, what will make it possible to include itself in equal terms into European streams and will be comparable with the developed world" (Papotnik, Aberšek, Florjančič, 1996).

"We have to emphasize that technical education is an educational, as well as also training subject in a real sense of meaning, although in no case we do not intend to deteriorate the meaning given to the subject as an educationally – directive, formative one. On the contrary, the subject is – training" (Papotnik, 1988, p. 143).

In technical education (technique, technology) it comes more and more to greater training value, with more required contents, methods and procedures within the project task as a special strategy of training educational work with an emphasized possibility of correlation, integration, cooperation, transfer of knowledge, differentiation and individualization.

In this contribution special emphasis will be given to the project task in which there should be less and less “reproductive activity or working according to dictation, that has not much in common with creative technical activity and problem method of directing the development of divergent thinking” (Papotnik 1992, p. 164) and the project task is for a child exactly the way, how he/she unobtrusively, creatively and kindly steps into the world of technique and technology.

Methodology and Strategy of Research

With strategies we define a predominating orientation of the training – educational process, which can have emphasis on acquirement, using, deepening and practicing an adequate theoretical and practical knowledge, gaining experiences, developing capabilities, skills and working habits.

Orientation is dependent on:

- demands, concerning training – educational contents,
- directions and demands of training – educational programs,
- tasks and aims, as well as connection between theory and practice,
- understanding of the minimum professional competence of an educator and a teacher at considering the curriculum for kindergartens and the curricula for particular subjects,
- levels and qualification quality of teachers,
- creative climate in kindergarten, at school and outside of it.

Table 1. Strategies of training – educational work

Strategy	Description
1. Work task	The contents of work task is combined with the treatment of training - educational contents according to the common and/or “classical” articulation of activities in kindergarten and lessons in primary school. The process is being carried out according to the presented and enclosed technical and technological documentation (e.g. elaborating of windmill in kindergarten and in the first triennium of primary school).
2. Constructional task	This constructional task deals with the problem realization of training - educational process. Creative working process is carried out from life situations, natural laws, technical, technological, physical and economical bases, observations, planning, elaborations, assembling into joints, joint assemblies into final product, controlling of results and testing, evaluating and estimating to the use in practice (e.g. elaboration of water - wheel out of waste plastic bottles and play role with manufactured samples and with the other existing constructional component elements).
3. Disassembling, analyzing, and assembling of technical objects	In this strategy of training - educational work children in kindergarten and pupils at school get to know components and functional relationships between the parts and the whole. They are developing the “capabilities of observing (technical phenomena and devices), imagining (distances, proportions, figures, shapes), understanding technical problems (correct and quick understanding of structure and function of technical device” (Papotnik 1999; 99). For performing a concrete task technical and technological documentation should be prepared (e.g. disassembling analyzing and assembling of the model of a locomotive out of waste return package and realizing the relationship between the parts and the whole).

<p>4. Testing of technological qualities</p>	<p>Testing of mechanical and technological qualities of materials is an indispensable category of technical branch and the task of technical education and culture. Tested are mechanical, chemical, physical and technological qualities of materials. Teaching process is carried out according to logically and fully arranged protocol (e.g. testing of paper material qualities and acquiring of physical experiences about solidity, durability, plasticity, etc.).</p>
<p>5. Project task</p>	<p>Project task is organized "from an ideal design via the elaboration of prototype, technical and technological documentation, realization of serial production to work analysis and evaluation of a product – project" (Papotnik, 1998; 45). Teaching units and /or activities are followed in such a way:</p> <ul style="list-style-type: none"> • planning and development (initiative, outlining of a project), • elaboration of a prototype, • constructing, • work preparation, • excursion (visit), • realization, • work conclusion, • (final phase and evaluation of products).

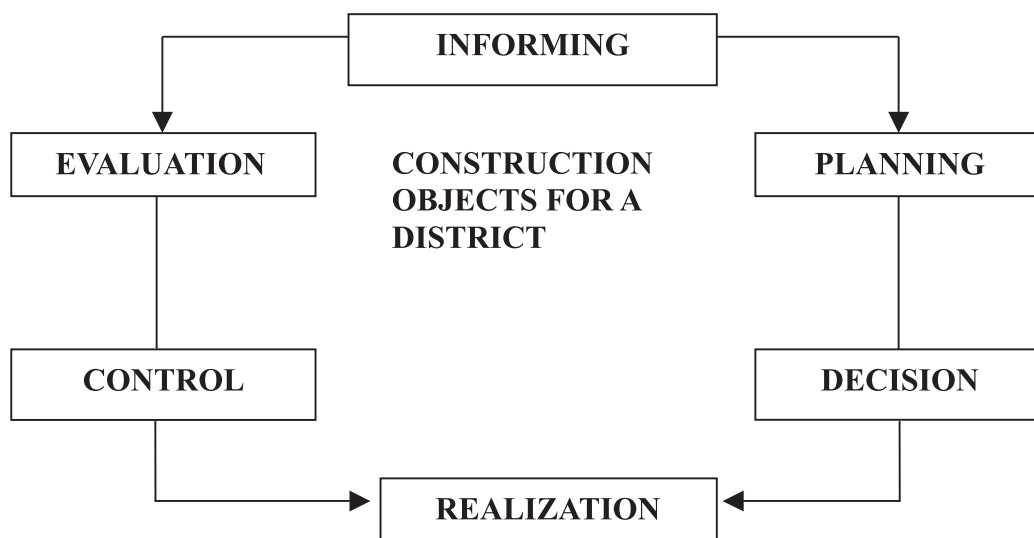


Figure 1. Model of all happenings

Performing the components of the project task in particular classes results from a network plan of activities that are used in introductory lessons, in which an idea for the project task is being developed. In this work is represented the subject matter and then the pupils suggest possible solutions, which should be related to the whole process, i.e. solutions from the idea to the product.

This cycle and/or "the model of all happenings" (Rottluff 1992, p. 25) consists of the following levels, and/or happenings: informing, planning, decisions, realization, control, evaluation.

Mental and creative activities result from the elaboration of a prototype (the first product), which is in the next phase corrected, completed and improved and only then we can begin with the elaboration of the product of the project task. It is necessary to imagine the project work as a possible example in which case the product is used as the means of expression and can be adapted to the catalogues of knowledge, training programs, interests, capabilities of pupils, etc. and on this basis the preparations for training – educational work can be conceived.

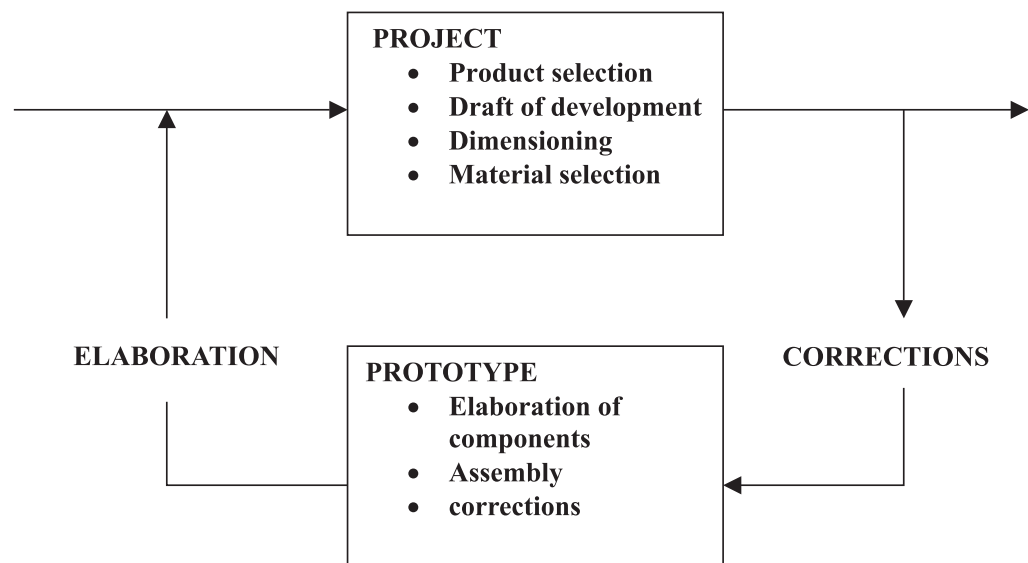


Figure 2. From a prototype to the final project image (product)

Problem Restriction

“Constructivism is explicitly reflected in the framework and volume of a project teaching work, in which on the basis of the project task as a special strategy of training – educational process is being carried out from outline conception via elaboration of a prototype, technical and technological documentation, realization of serial production to the analysis of work, evaluation of work and product, as well as the calculation of project value.” (Papotnik, Slukan, Vrtič 2004, p. 105). Constructivists are of the opinion, that knowledge can neither be “given” to somebody else in its final form, nor be “accepted” from somebody else, but everyone has to rebuild it with his/her own mental activity. Radical constructivists even deny the harmony between our knowledge and objective reality (Marentič Požarnik, 2000, p. 17).

The most important is the principle, that a child constructs his/her knowledge by himself/herself, with his/her own experiences, in which the environment (at school and in life) and the power of experiencing in the process of knowledge acquiring play an important role (Krapše, 1999).

Empirical learning and object teaching (e.g. word compositions, demonstration samples, computer programs and tools) enable the pupils to obtain knowledge’s and to acquire physically – technical experiences, in which they come from concrete perceptions and concepts to ideas and generalization of the essential meaning of subjects, processes, activities, legitimacies and phenomena.

There is a question if we in connection with the activities in the field of technique and

technology in an integral educational system have to do with universal partial gift.

“It is characteristic for universal gift to enrich the above – average results with more or the majority of activities. Psychological theory of correlation is based on common high intelligence and the power of its transfer on different psycho – physical areas. There is much more partial gift and/or talent in the narrower area” (Strmčnik, 1998, p. 18).

We also agree very much with the following statement: “In spite of the fact that partially gifted children are generally proved to be very innovative later in their lifetime and at work, is the common social climate and also school practice with mainly verbal orientation more to the benefit of universal gift than to the children with partial, particularly more practical capabilities” (Strmčnik, 1998, p. 18).

From information to the inclusion into activities

Table 2. Case study

<p>INITIATIVE FORMATION</p> <ol style="list-style-type: none"> 1. Beforehand and simultaneous information giving an inter – subject connection and planning 2. Beforehand and simultaneous motivation for inter – subject connection and planning <p>Definition of the problem: CONSTRUCTING OBJECTS (MODELS) Restriction of the problem: ELABORATION OF ELEMENTS FOR BUILDING THE ENVIRONMENT Project: ELEMENTS OF THE ENVIRONMENT</p> <p>MEETING OF CLASS TEACHERS AND TEACHERS OF VARIOUS SUBJECTS (e.g. technique and technology, technique and natural science, chemistry, biology, physics, housekeeping, geography, history, etc.)</p> <p>PROCEDURE:</p> <ol style="list-style-type: none"> 1. Formation of proposals with the methods of empirical learning 2. Analysis of possibilities: <ul style="list-style-type: none"> - estimation and discussion about the idea. - Detailed proposals for effective and qualitative inter – subject planning and realization of particular activities. - Determination of aims and activities - Determination of concepts and models of learning and teaching. - Agreement on procedure about the realization of aims and all kinds of activities (elaboration of network activity plan within the inter – subject connection, realization and evaluation of the whole project). <p>PROCESS:</p> <ol style="list-style-type: none"> a) Elaboration of project components. b) Acquiring of new knowledge, skills and habits in correlation with the subjects, cooperating in the project. c) Adaption of contents out of curricula of particular subjects and coordination of all activities, connected with the common project – the teaching tool. <p>EVALUATION OF EFFECTS AND RESULTS:</p> <ol style="list-style-type: none"> a) Formation of criteria for the evaluation of the whole project. b) Usage of the elaborated project – the teaching tool at giving lessons and activity realization.
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Conclusion

By all means we can emphasize the fact, that the project task is the most suitable strategy – of inter – subject connection in technique and technology. We have come to the conclusion that it could be characterized as a factor of modern school. Product (model, component, technological collection, demonstrative means of instruction, etc.) is just an expressional instrument which can be adapted to knowledge catalogues, training programs, interests of teachers according to inter – subject planning and connection, didactic concepts and models, learning and teaching, capabilities of pupils, etc.

In conclusion one more idea from the book: “Learning” should be mentioned; the hidden treasure, that is calling our attention to the meaning of science and technology and one – meaning also to need and necessity of using technique and technology in classification plans (also primary schools) is concluded in the following way: “If we are not going to use our utmost efforts in elaboration of this task, then will the countries, that are lacking of necessary conditions for their inclusion into international technological competition, become the areas of poverty, despair and violence, which will not be possible to be abolished by affording help or humanitarian activities” (Delors 1996, p. 65).



Acknowledgement

We gratefully acknowledge the financial support within the project Science Educational Centre for Sustainable Development (SI0039-GAN-00087-E-V1 – Norwegian FM), supported by a grant from Norway through the Norwegian Financial Mechanism.

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