



DEVELOPMENT OF PUPILS' TRANSFER SKILLS BY MEANS OF HANDS' ON ACTIVITIES WITH ARTISAN MATERIALS IN NATURAL SCIENCES CLASSES

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Abstract: Hands' on activities with artisan materials used in order to realize different practical devices helpful in learning process are one of the most frequently used activity in science classes. Usually, the main strengths of these activities are: a deeper learning, an increased motivation of pupils for actively learning and development of practical skills. The aim of our paper is to find out if using systematically hands' on activities in order to realize different practical devices contribute and develop also pupils' transfer skills such as: communication, interpersonal, planning and problem solving as well as using TIC and media, respectively inquiry and data operating. The target group consists in 51 teachers with rich experience in hands' on activities used in order to realize different practical devices. The inquiry was done by means of a questionnaire based on the list of transfer skills. Results obtained shows that, as teachers answered, hands' on activities provide, on the top of developed skills, planning and problem solving activities, followed by inquiry and data operating and handling abilities. Reduced presence of communication, interpersonal skills, respectively TIC suggest us the need of rethinking of the context for this kind of activities by promoting team work and cooperative learning as well as team documentation activities that might improve the state of the art above mentioned.

Zusammenfassung: Hands' auf Aktivitäten mit handwerklichen Materialien verwendet, um zu erkennen, verschiedene praktische Geräte hilfreich beim Lernen sind eins der am häufigsten verwendeten Tätigkeit in der Wissenschaft Klassen. Normalerweise werden die wichtigsten strengths dieser Aktivitäten sind: ein tieferes Lernen, eine höhere Motivation der Schülerinnen und Schüler aktiv für das Lernen und die Entwicklung von praktischen Fertigkeiten. Das Ziel unserer Arbeit ist, um herauszufinden, ob mit Hilfe systematisch Hände 'auf Aktivitäten, um zu erkennen, verschiedene praktische Geräte beitragen und entwickeln auch Schülerinnen und Schüler "Übertragung Fähigkeiten wie: Kommunikation, zwischenmenschliche, Planung und Problemlösung als auch die Verwendung von TIC und Medien, bzw. Untersuchung und operativen Daten. Die Zielgruppe besteht in 51 Lehrer mit reicher Erfahrung in der Hand "über die Tätigkeiten verwendet werden, um zu erkennen, verschiedene praktische Geräte. Die Untersuchung erfolgte mittels eines Fragebogens auf der Grundlage der Liste der Datenübertragungs-Fähigkeiten. Ergebnisse zeigt, dass, wie Lehrer beantwortet, Hände 'auf Aktivitäten bieten, auf der Spitze der entwickelten Fähigkeiten, Planung und Problemlösung Aktivitäten, gefolgt von der Untersuchung und Daten den Betrieb und die Handhabung Fähigkeiten. Reduzierte Präsenz der Kommunikation, zwischenmenschliche Fähigkeiten, bzw. TIC schlagen uns die Notwendigkeit der Weiterentwicklung der Rahmenbedingungen für diese Art von Aktivitäten durch die Förderung von Teamarbeit und kooperatives Lernen sowie Team-Dokumentation Aktivitäten, die Verbesserung des Standes der Technik die oben erwähnt wurden.

Keywords: transfer skills, hands' on activities, inquiry, sciences

I. Introduction

1. Practical abilities – Concept definition

Currently speaking the word ability is synonymous with aptitude, skill, capacity. The operational sense of the concept refers at acquired abilities that promote accomplishment of different activities: with high precision, rapidity, easily, quantitative and qualitative efficiency, with a reduced consumption of nervous and psychical energy (Șchiopu, 1997, pp. 14).

Abilities may be classified as follow:

- *Base abilities* – consisting in writing, reading and calculus and they are situated at the transition to further more complex acquisitions. There are psychologists who put also in this category the abilities that focused on permanently contact with ITC and media: informatics and media literacy abilities. Also, specialized research literature identify a category of base cognitive-affective abilities focused on curiosity, capacity of identifying and problem solving, creativity, team work capacity, stress resistance capacity, conflict negotiation and solving, decisions taking, communicating etc and that send to transversal competencies;
- *Special abilities* - different for each age group and activity type;
- *High level abilities* - competencies that might be used for a large scale of problems.

Other important categories of abilities:

Social abilities start to be considerate more and more important for any person since they represent a condition for the personal and also professional success. Success persons solve the problems that appear between them and other persons in such a way that their relationship with irrespctive persons will not be affected.

Team work abilities are extremely important for an important category of activities organized and implemented in a classroom context.

Lemeni & Miclea (2004, pp. 154) offer the following classification of transfer abilities and skills:

- **Communication abilities:** express, transmit and interpret knowledge and ideas from different sources. Examples: facilitating the communication and properly expression, offering and receiving feed-back, understanding of verbal, nonverbal and media messages, interview, negotiation, summarizing, presentations, questioning fundament the conversation and public speaking abilities.
- **Interpersonal abilities:** effective interaction with others, influencing, understanding others persons needs. Examples: (active) listening abilities, sensibility to others' needs, support offered, trust granted cooperation, counseling, persuasion, conflicts solving, team work.
- **Planning and problem solving abilities:** needs identification, imagining possible solutions or imagining hypothesis for solving and solutions finding, anticipation of some solving ways/methods, opportunities recognition. Examples: problems identification, strategies design, consequences anticipation, alternatives analysis, aims' identification, needs definition, perseverance, metacognitive monitoring, decision, time and priorities management.
- **NTIC and media using abilities:** using NTIC and digital media as mean and instrument in order to transmit knowledge and information. Examples: processing information by means of software, media, internet etc.
- **Inquiry and data operating:** researching, identifying and exploring knowledge/information sources, selecting and processing information. Examples: resources identification, data and information collection, relevant information identification, critical assessment, hypothesis enouncement and theories building, information synthesis, structuring, categorization etc.
- **Physical abilities:** using of own body and of the instruments in order to solve different tasks. Examples: equipments handling and repair, equipments adaptation, movement coordination, physical effort capacity.

In teaching practice, often, **practical abilities** are the result of some hands' on activities.

2. Learning means

Learning means represent, (Nicula, 1994, pp. 360), “all materials, devices and apparatus that help to transmit and assimilate the didactic information, as well as to register and assess the results obtained”. Learning means were designed in such a way that they can improve the teaching-learning process in all its phases: information' communication (*e.g. materials used to keep the information: audio and video materials*), concepts' building and accurate and rapid understanding' ensuring (*illustrative materials : intuitive materials, copies, small versions, models etc.*), building and exercising the

aptitudes and skills needed during life time (measuring and control *apparatus, different devices, audio and video apparatus etc.*), systematization of knowledge (*images, schemata*), knowledge' correlation with real life (*examples or small versions of different items ,images etc.*) as well as feedback connexion (assessment *machines, didactic soft*), learning' results assessment (*books with subject problems or tests*) and respectively improvement of the ergonomics of teaching learning process by means of rationalization of the effort of both teacher and pupil (*e.g. adequate class furniture, multiple functioning components from physics equipment, means to rationalize the time*) or professional counseling of pupils etc.

Following the author quoted above, the learning means classification may be done by taking into account, as criteria, the presence or the absence of an didactic message. Consequently, the author (Nicula, 1994, pp. 362) shows that the learning means are divided in two big categories:

- learning means that have a didactic message;

- learning means that facilitate messages or information transfer.

In this paper we will refer at the learning means that accomplish both criteria, namely the hands' on made experimental devices realized by pupils in order to evidence facts, phenomena and processes: the balance, periscope, airplane with magnet, the care propelled with a balloon, both with wheels, the box moving on pencils etc.

3. Didactic devices realized by hands' on activities

Curricular documents ask to teachers as being their task to design and to realize didactic materials, in order to attain one of the following aims: repairing or enrichment of didactic equipment existing in a school physics laboratory, supporting the pupils in their learning of a school subject, increasing the pupils' motivation for learning science, development of pupils' creativity, of pupils' practical abilities and also experimental abilities and skills.

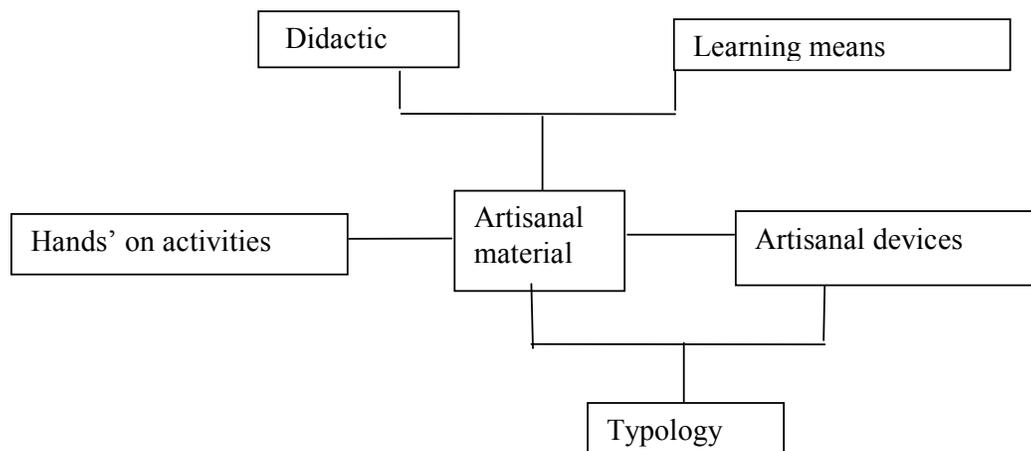


Figure 1. The relationship between artisanal devices and the materials and standardized learning means.

From the cognitive point of view, realization of one and the same didactic artisanal device at different school ages (primary, secondary and upper secondary) contributes to learn knowledge from different levels of difficulty. Thus, at primary level the knowledge is acquired by means of experimental activities are merely *descriptive* ("How is the process occurring, how is the phenomenon involved in the functioning of the device realized?"), at secondary level occurs the *displacement from descriptive to causal* ("Which are the conditions needed in order to occur the evidenced process?" / "When occurs the expected effect?") while at upper secondary level the accent goes on *causal type knowledge* ("Why is occurring the phenomenon?"/ "Which is the *cause* that produce the expected effect?", "How can be explained the producing of the phenomenon?").

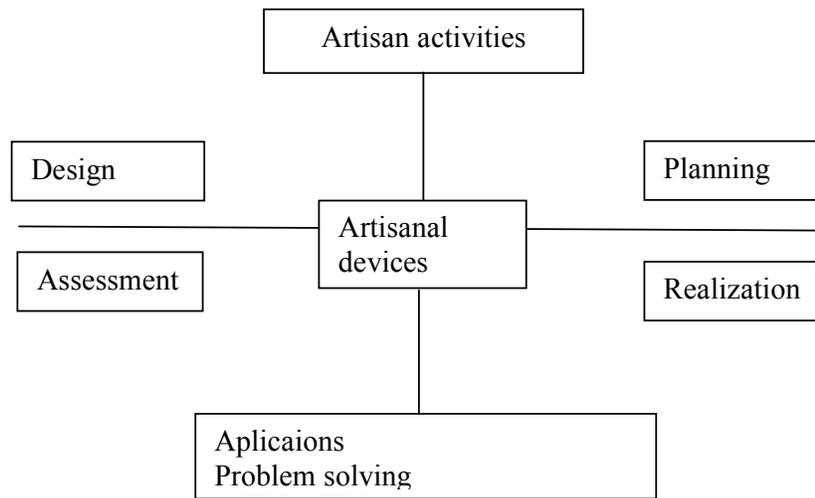


Figure 2. Activities involved in artisanal devices realization

Artisanal apparatus or devices systematically realised by pupils constitute, in time, a “mini” personal laboratory, named sometime "pocket laboratory".

II. Methods

1. Persons involved in research

The empirical research involved 51 persons, science teachers, which organised and implemented together with their pupils, regularly during last 5 years, activities for producing artizanal learning means, as those described above.

2. Research instrument

The research focused on the teachers’ opinion about the role of producing artisanal devices and learning means on the pupils transfer abilities development and respectively on the pupils’ motivation for science learning.

The applied questionnaire was anonymous and asked to the involved persons to assess their accord degree whit the sentence: „Involvement of pupils in artisanal producing of learning means had as effect the development of their:

- communication abilities;
- interpersonal abilities;
- planning and problem solving abilities;
- using NTIC and media abilities;
- inquiry and data operating abilities;
- physical abilities.

These abilities were presented and described to persons involved respecting the classification and exploitations offered by Lemeni & Miclea (2004, p.154).

3. Data collection and analysis

Each person involved in the research had a code associated. Data collection and systematization was realised referring at item level. Data processing was also done per item and hierarchically, as referred to the options „Total accord” and „Total disaccord”.

Table 2. Results obtained

Nr crt		Degree of accord with the sentence: Involvement of the pupils in artisanal producing of learning means develop their:				
		Total accord	Partial accord	Partial disaccord	Total disaccord	Don't know
1.	Communication abilities	12	15	8	6	10
2.	Interpersonal abilities	11	8	9	7	16
3.	Planning and problem solving abilities	24	11	8	6	2
4.	Using NTIC and media abilities	7	10	17	9	8
5.	Inquiry and data operating abilities	14	16	8	7	6
6.	physical abilities	14	15	8	6	10
7.	Other abilities namely: cooperation	0	3	0	0	0

III. Results obtained

The results at item level show that the option „Total accord” concerning the contribution of hands’ on activities with artisanal producing of learning means on the development of transfer abilities is mostly accomplished as regard to the „planning and problem solving abilities”, followed by „inquiry and data operating abilities” respectively „physical abilities”.

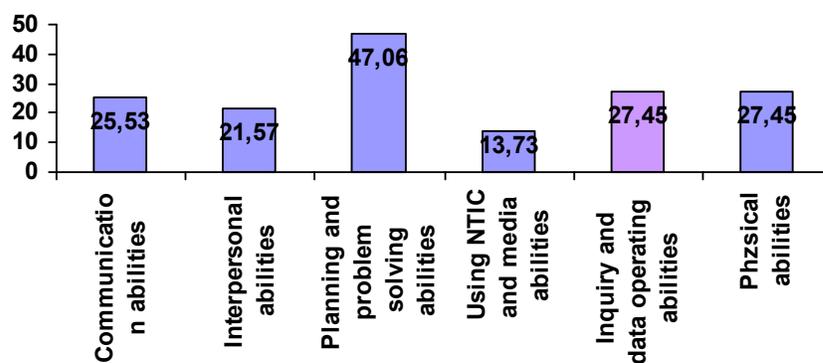


Figure 3. Assessment by „Total accord” of the producing artisanal learning means activities on the pupils’ transfer abilities development

The using NTIC and media abilities get the biggest percentage of opinions type „Total disaccord”, expressed referring the contribution of the artisanal producing of learning means at the development of transfer abilities:

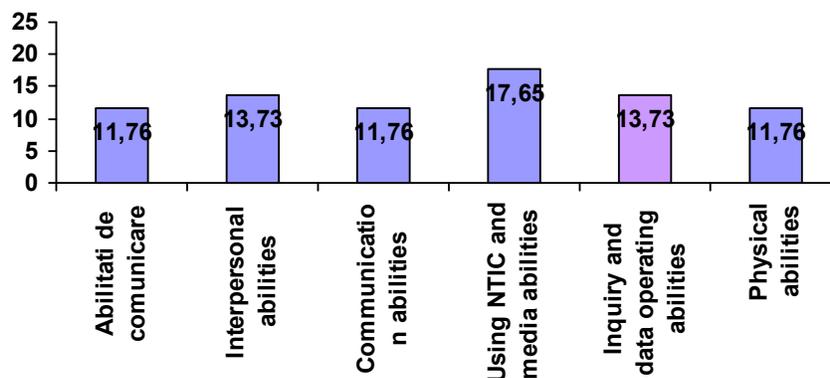


Figure 4. Assessment by Total disaccord of the role of artisanal producing of learning means in hands' on activities on the pupils' transfer abilities development

The persons involved consider that the activities consisting in artisanal producing of learning means/products contribute (accord) mostly to the development of:

- Planning and problem solving abilities;
- Physical abilities;
- Inquiry and data operating abilities.

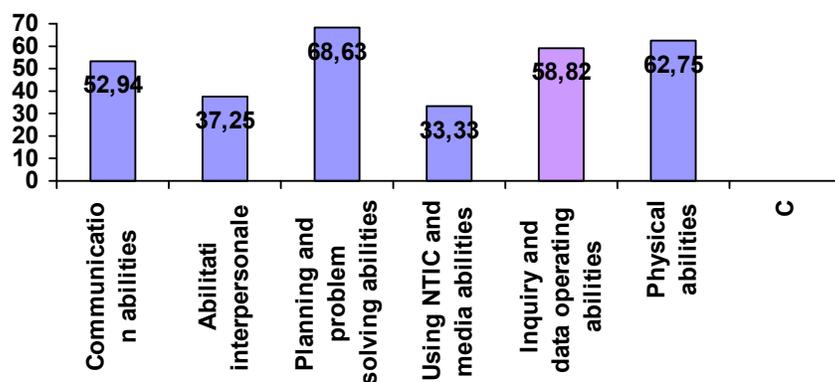


Figure 5. Assessment by Accord of the role of artisanal producing of learning means in hands' on activities on the pupils' transfer abilities development

The persons involved express disaccord concerning the contribution of the hands' on activities of artisanal learning means at the development of using NTIC and media abilities, interpersonal abilities and inquiry and data operating abilities:

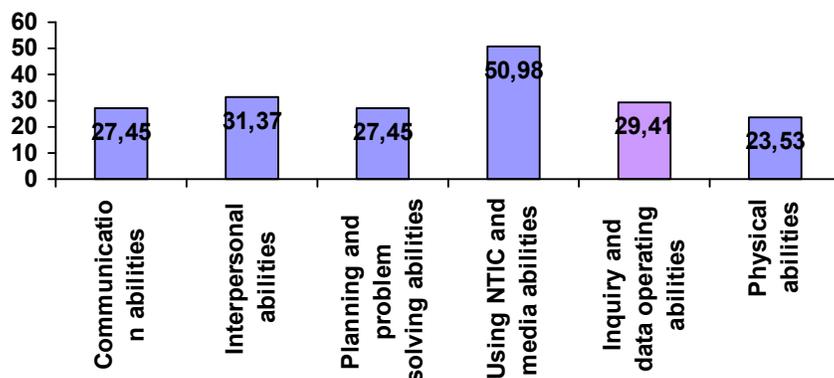


Figure 6. Assessment by Disaccord of the role of artisanal producing of learning means in hands' on activities on the pupils' transfer abilities development

IV Discussion

„Total accord” concerning the contribution of artisanal producing learning means at the development of planning and problem solving abilities represent an expected result because the producing and using of artisanal materials supposes planning, technical problems solving, try and errors in difficulties solving/overcoming, different possible solutions and data interpretation. Teachers involved realised technical files which indicate the materials used in order to produce the final product and also the successively steps needed in producing an artisanal device.

The producing process supposes using of different instruments and, often, good movement coordination, that explain also positioning of physical abilities after the planning abilities.

Somehow surprisingly is the fact that teachers express Total disaccord concerning the contribution of hands' on activities of producing artisanal learning means on the using NTIC and media abilities, because some of them show that they document in producing such devices by using the Internet, where from they took ideas, schemata, images or films. An explanation might be the limited access of some teachers at the Internet, lack of experience in searching information by means of Internet and the existence of some printed books on this topic on the market.

The accord in principle expressed concerning the utility of these activities at the development of inquiry and data operating abilities may be explained by the fact that the artisanal devices realised by this means are often used together with the standardised learning means.

The disaccord expressed concerning the role of these artisanal activities on the interpersonal abilities development may be interpreted by the fact that the vast majority of teachers involved pupils at an individual level in this artisanal producing of some learning means.

V. Conclusion

Artisanal activities, if they are realised systematically, contribute certainly at the development of transfer abilities, mainly of the planning/designing ones, data operating. Also, there is a development of the pupils at movement level.

Our study underline the fact that in artisanal activities of learning means producing the cooperative learning activities also are neglected, even these activities develop communication and interpersonal abilities.

Teachers may stimulate the pupils' curiosity in order to find new devices possible to be practically realised, guiding and supporting them to document by means of Internet and media and by this developing the pupils' abilities.

Consequently, artisanal activities of learning means producing, are very pleasant and motivating activities, develop every day competences and abilities to the pupils involved in such activities.

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