MODERN STRATEGIES FOR TEACHING ENVIRONMENTAL PROTECTION IN HIGH SCHOOLS

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Abstract. *This paper brings up for discussion the issue of developing high-school students' ecological and climate change attitudes and behaviors, from the perspective of raising their awareness concerning the effects upon the environment. Teaching modules on Environmental Protection aims at educating the younger generations in the spirit of care for our natural environment, through direct and responsible involvement in actions that have the effect of promoting a sustainable and healthy life style. The objectives of education for environmental protection may be accomplished through the usage of modern didactic strategies, centered on student and their involvement in building his or her own knowledge. Our longitudinal study was elaborated along two school years, from 2018 to 2020, and involved one high-school having the environmental protection profile from the district of Arad. A number of 48 students attending 10th and 11th grades were included in this study. The methods of research employed there were the psycho-pedagogical experiment and the questionnaire-based inquiry. The research instrument we used was a questionnaire to measure the students' learning satisfaction and motivation. The experimental intervention included an educational program based on active and interactive strategies, preponderantly modern, which included case studies, projects, and didactic experiments, methods based on investigation, documentation visits and a large scale of complementary evaluation methods. The results of this study highlighted significant differences between pre and post-experimental results: the students' results at school have consistently improved after their involvement in the experimental program. Also, there was great progress in the area of their learning motivation, as students mentioned having a higher level of satisfaction when studying the modules on Environmental Protection. The study comes to reinforce the modern theories regarding the importance of using quality didactic strategies in order to successfully accomplish the educational objectives and empower the students' intrinsic motivation.*

Key words: *environmental protection, teaching-learning modern strategies, learning motivation*

INTRODUCTION

Teaching modules on Environmental Protection in technical profile high-schools aims at enabling students to acquire a system of knowledge, a type of action, a way to relate to reality and think, in order to build professional competence and responsibility, as well as qualification in the field of activity corresponding to the profile of training offered by the high-school they attend. The Romanian educational system provides to its subjects the possibility to approach a certain level of general knowledge, as well as specialty information, in a way that allows the accomplishment of professional training at various levels.

The teaching of technical disciplines differentiates itself according to style and content in comparing to other subjects. When teaching technical disciplines, there are no compulsory textbooks, instead there is a need for talent, for "didactic mastery" to elaborate a support documentation for the instructional-educational process and also for teaching creativity when applying didactic strategies. Specialty (technical) culture, together with the IT training will become an integral part within the general knowledge of each person, which dictates the necessity of teaching their basic elements in schools (VIŞAN,2000).

Attitude towards nature is primarily a question of education and culture. The man is born and lives in his natural environment; he depends on the other elements of biosphere with

which he can and should build relationships based on harmony and respect towards the particularities specific to the kingdom or species they belong to. As a member of nature, the man should know and obey its laws, in order to avoid a conflict he would lose for sure. Through in-school and extra-school activities, the student becomes aware of the fact that the environment is a living mechanism that has its special complexity, on whose integration and good functioning the whole human activity depends.

The programs and contents of Environmental Protection modules approach the interrelation between man and his environment, and also the complex issue of ecological education in a manner which is both systemic and interdisciplinary, as deals not only with the relationship between the living and the environment, plus the way in which man transforms nature, but also challenges the students to discover the complexity of those relations, types of physical, chemical and biological pollution, their disastrous consequences upon the living world and, what is most important, includes the discovery of methods of prevention and depollution of environment using modern technologies. By attending specific school and extra-school activities, the student has to become aware of the fact that the environment is a living mechanism, with a special complexity, and the entire human activity depends on its integrity and well-functioning. As the actual society needs people who can distinguish themselves based on what they know and also on what they are able to do, the improvement of relationships between man and environment may be accomplished only through practical activities done during the technological lab hours and merged practical instruction, along the years of study. From the emotional and attitudinal point of view, we aim at forming positive character traits, such as respect, admiration, care, appreciation, compassion – which are meant to strengthen the student's relationship with nature.

MATERIAL AND METHODS

The proposed research aims at reaching two essential objectives:

- To measure the impact of using active participative and interactive methods upon the school results registered at the Environment Protection modules;
- To identify the degree of learning satisfaction and intrinsic motivation, before and after the experimental intervention.

From the procedure perspective, our longitudinal study covered two school years, from 2018 to 2020, and took place at a high-school having the environmental protection profile in the district of Arad. A number of 48 students from 10th and 11th grades were included in the study. 43.7% of those are males (N=21), and 56.25% females (N=27), the minimum age was 16 years old and the maximum age was 18 years old. The experiment, which was implemented in order to improve school results, the degree of learning satisfaction and motivation comprises three distinct stages:

- *The pre-test stage* took place during the period September - October 2018 – May 2020 and it was meant to establish the level of school success for students from 10th and 11th grades, and also to measure the degree of satisfaction and learning motivation in technical schools, especially regarding the modules of Environment Protection. Each student was therefore requested to complete 2 evaluation tests and a questionnaire for satisfaction and motivation, containing closed and semi-open questions.
- *The stage of experimental intervention* was accomplished during the school years 2018-2019 and 2019-2020 and it aimed at organizing and implementing, at the level of the experimental sample, of a formative teaching-learning program, based on using active-participative and interactive methods. The following methods were mostly used: didactic experiments, didactic visits, computer-assisted instruction, discovery learning, case study, project, play role,

investigation. Also, three main types of classes were employed: technical-practical instruction classes, lab classes and the class during visit and trip. Through these activating didactic strategies, we also had in mind to improve the level of satisfaction and learning motivation for the modules of Environmental Protection, leaving from the premise that each student's active involvement will increase the interest for the subject, by increasing satisfaction concerning the acquired knowledge, formed capacities and obtained results.

- *The post-test stage* took place at the end of the experimental intervention, along May-June 2019, May-June 2020, and had the purposes of measuring the degree of satisfaction and learning motivation at the end of school year, analyzing school documents in order to determine the level of school efficiency for each students and identifying the significant differences that were registered in connection to the dependent variables, by comparing the initial and final level for each grade, in order to witness the progress inside the group.

RESULTS AND DISCUSSION

In order to prove the existence of some statistically significant differences between pre-test and post-test, we resorted to the calculus of value of *test t for pair samples* and to identify the statistical significance of its value. The results are displayed in Table 1.

Table 1.

The significance of differences in means for the experimental group scores in pre-test and post-test stages

Dependent variables	Phases	No. of students	Mean	Mean difference	t value	p significance
School achievement	Pretest	48	7,33	-1,08	**-2,01**	**p < 0,05**
	Post-test	48	8,41			
Learning satisfaction andmotivation	Pretest	48	7,5	-1,3	**-2,2**	**p < 0,05**
	Pos-ttest	48	8,8			

When we refer to the level of school success, we witness the existence of some differences that are strongly significant between the means obtained during the pre-test and post-test stages, for the group where we applied the improvement program, indicating the fact that after the experimental intervention was applied, there was some significant improvement on the level of school efficiency obtained by students ($t = -2.01$; $p < 0.05$). Thus, we may conclude that the results in the post-test reflect the plus-value of the psycho-pedagogical intervention, based on active-participative and interactive methods. Modern, exciting methods, based on multimedia means, which involve direct implication, have positive effects upon approaching the learning tasks. The opportunity given to students to solve learning tasks by using attractive didactic materials, multimedia means, learning activities organized in a dynamic manner, together with the positive modern climate created within the interactive teaching-learning activities, we find they bring their contribution to a significant increasing in students' school results.

In our opinion, the differences in school efficiency obtained when teaching the modules in Environmental Protection, during the two experimental stages, may be referred also to the improvement of satisfaction and of intrinsic learning motivation, a variable which influences in a good way, according to actual studies, the techniques for processing information, which after that converge towards an improvement in learning and, implicitly, of school efficiency, mirrored by grades. When we compare the results in post-test with those in pre-test, we notice the existence of some significant differences in favor of the level of learning satisfaction and motivation for the modules of Environmental Protection ($t = -2.2$; $p < 0.05$). The psycho-

pedagogical study program of ameliorative intervention, which was based on active and interactive methods, has proved its efficiency, also from the emotional and attitudinal point of view, as students felt a larger satisfaction during learning activities and tasks specific to the subject, and proved some greater curiosity and desire to learn. These results allows us to recommend these strategies, within optimal combinations with traditional methods and means. The obtained results are in agreement with the modern theories of learning, which show that students learn better when they actively participate, involve, and make immediate use of knowledge and various applications (DULAMĂ, 2008; NILSON, 2010; PETTY, 2007).

CONCLUSIONS

The scientific and psycho-pedagogical conclusions follow the elaboration of experimental design and also the results of the accomplished research. The study of *Environmental Protection in high-schools with technological profile*, significantly enlarges the capacity to study the environment and helps the students to understand, through exploration and observation, the mechanisms of functioning and making full use of its value. The reform of Romanian educational system underlines the placing of student in the heart of any instructive-educational methods, by emphasizing differentiation and individualization, which can be optimally accomplished by using active and interactive strategies. Modern didactic strategies, based on multimedia means and active participative and interactive methodologies, contribute to the expression of independent and creative personalities, through their flexible, interesting context, which invites to curiosity and implication (OPREA, 2006; TOTH 2001). When the didactic activity uses combined traditional and modern, active and interactive methods, improvements may occur at the internal level (satisfaction, motivation), and also at the external level (school results). The study brings a contribution to the modern theories regarding the importance of quality of didactic strategies in successfully accomplishing the educational objectives and improving students' satisfaction and intrinsic motivation.

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