

## THE MAXIMIZATION OF STUDENTS' PROFESSIONAL TRAINING FROM THE FACULTIES OF HORTICULTURE AND ECOLOGY

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*Taking into consideration the fact that the formation of abilities for observation and profound thorough study of knowledge by experimentation have a great importance for gaining actively and consciously the notions and concepts of horticulture and ecology, the study carried out by us was aiming at revealing the methods, informative materials and forms of organizing the indoor and outdoor laboratory activities. These activities are: laboratory in which the training is focused on the research activities, laboratory in which the training is focused on the practical activities and laboratory based on conversation and explanation. In the case of nine disciplines analyzed, the indoor laboratory activities are combining with only 1-2 outdoor laboratory activities. Also, within the indoor laboratory of the five analyzed disciplines are using exclusively heuristic methods. We consider that maximization of students' professional training can be achieved through a more frequently outdoor laboratory activities, as well as, using working in groups.*

**Key words:** indoor laboratory, outdoor laboratory, didactical methods, scientific and informative materials, forms of organizing the activities

One of the specific principles emphasized into The Strategy of the Higher Education in Romania for the period 2002-2010 is the stimulation of student's individual thinking and less of their information storage capacity. Therefore, at present, in the educational practice there is the tendency to promote the active-participative and interactive methods, to increase the importance of learning by discovery, promoter of the heuristic methods and those at learning by research, as well as the tendency to focus on the pragmatism orientation of the methodology, with emphasis on the large scale use of the practical-applicative methods. The teacher must use a diversified and flexible methodology. Also, he must combine the activities carried out in faculty, within the laboratory, with outdoor activities of teaching and learning. For any didactical activity, the teacher select from the methodological register only those methods considered to be, at a certain moment, the most efficient for reaching the aim and established objectives [1, 2, 4]. The didactical method is "an essential way for carrying out an instructive action", showing "how should to proceed, how to teach and how to learn, how to teach other people to learn [1]. In the present time is thought that the active and interactive learning, specific to the modern instruction, is favouring the formation

of intellectual and action abilities, which are preserved during the entire life. The concrete knowledge of nature cannot be realized only theoretically, by talking to the students about the plant and animal world, or about biological processes and phenomena. Thus, under the supervision of the teacher, within the laboratory of biology or within the nature, the student must to explore, reconstruct, rediscover and recreate the scientific truth, gaining by its own efforts what the human knowledge accumulated about surrounding world.

Within the activities in laboratory or within outdoor activities, the students clarify, complete and systematize for themselves the knowledges transmitted by the professor during the lecture or aquired by individual study, apply these knowledges, investigates and utilizes the information in a more or less creative manner, in new situations. Also, they “are gaining abilities and practical skills for research and investigation, as well as the ability for the correct interpretation of the data obtained from experimental activities” [3].

## MATERIAL AND METHOD

Taking into consideration the fact that the formation of abilities for observation and profound thorough study of knowledge by experimentation have a great importance for gaining actively and consciously the notions and concepts of horticulture and ecology, the study carried out by us was aiming at revealing the mode in which is carried out the professional training of students from the Faculties of Horticulture and Ecology.

The objectives of our study were as follows:

1. setting off the methods, forms of organizing the activities and the scientific and informative materials used within the laboratory activities for students, corresponding for some of the disciplines studied at the Faculty of Horticulture and the Faculty of Ecology;
2. setting off the methods, forms of organizing the activities and the scientific and informative materials used within the outdoor activities, corresponding for the same disciplines studied at the Faculties of Horticulture and Ecology;

The method used in our study was based on questioning. The questionnaire for the students in the third year of academic studies, from the Faculties of Horticulture and Ecology contain questions concerning the forms for organizing the activity, methods and the scientific and informative materials, used within the laboratory activities and within the outdoor activities, corresponding for nine disciplines studied at the Faculty of Horticulture and the Faculty of Ecology. The data obtained from the questionnaires were completed with those obtained from discussions between the students in the third year of academic studies, from the Faculties of Horticulture and Ecology, registered for the psycho-pedagogical modulus, during the academic year 2007-2008.

Our study started from the hypothesis that the combination of the indoor activities, within laboratory, with outdoor activities, as well as, the using of a different didactical methods, scientific and informative materials, and form of organization, according to the the content of the discipline and to the learning possibilities of the students, is favoring the better understanding of the new knowledges.

For the students from Faculty of Horticulture, the disciplines chosen as subjects in the questionnaires were the following: a) for the first academic year: Pedology, Systematic botany, Biochemistry; b) for the second academic year: Entomology,

Phytopathology, Plant physiology; c) for the third academic year: Fruit Growing, Flowerculture, Viticulture.

For the students from Faculty of Ecology, the disciplines chosen as subjects in the questionnaires were the following: a) for the first academic year: Biology of Plants, Plant ecophysiology, Animal ecophysiology, Biomonitoring; b) for the second academic year: Hydrobiology, Microbiology, Ecotoxicology; c) for the third academic year: Science of evolution, Ethology.

There have been questioned 20 students from the Faculty of Horticulture and 50 students from the Faculty of Ecology, respectively.

## RESULTS AND DISCUSSIONS

The analysis of the answers given by the students from the two groups which were surveyed, revealed that:

1. The indoor laboratory work activity is carried out in groups of 2-4 students. In the Faculty of Horticulture, within each group are solved the same task, in the case of eight disciplines studied, or different tasks, in the case of one disciplines studied (Plant physiology), in accordance with the notions received within the previous course for that discipline. In the case of disciplines such as: Systematic botany, Entomology, Phytopathology, Fruit Growing, Flowerculture, Viticulture, every student within a group is studying the biological material and carrying on drawings, individually and independently. In the case of disciplines such as: Pedology, Biochemistry, Plant physiology, and sometimes, Fruit Growing, Flowerculture, Viticulture, every student has the same task or a different task within his group, but they are co-operating to answer the teacher's questions.

In the Faculty of Ecology, within each group are solved the same task, in the case of five disciplines studied, or different tasks, in the case of four disciplines studied (Plant ecophysiology, Biomonitoring, Ecotoxicology and General microbiology), in accordance with the notions received within the previous course for that discipline. In the case of Biology of Plants and Hydrobiology, every student within a group is studying the biological material and carrying on drawings, individually and independently. In the case of disciplines such as: Plant ecophysiology, Animal ecophysiology, Biomonitoring Microbiology and Ecotoxicology, and sometimes, Hydrobiology every student has the same task or a different task within his group, but they are co-operating to answer the teacher's questions. In the case of Science of evolution, Ethology every student has a different task within his group, and the training task is achieved by co-operation.

2. The outdoor laboratory activity is carried out in groups of 3-4 students. In the Faculty of Horticulture, within five analyzed disciplines were organized 1-2 outdoor laboratory. Within each group, every student is solving the same task, regarding to tree disciplines studied (Fruit Growing, Flowerculture, Viticulture), or different tasks, regarding to two disciplines studied (Pedology, Systematic botany). In the Faculty of Ecology, within four analyzed disciplines were organized 1-2 outdoor laboratory. Within each group, every student is solving the same task, in

the case of Hydrobiology, or different tasks, in the case Biology of Plant. Also, there were organized outdoor activities within two disciplines studied (Biomonitoring and Ethology). In those activities, the group of 10-12 students were visited some institutions (The Arges Districtual Museum, Water Works) or the Trivale forest and the Budeasa lake.

3. The student's answers in the questionnaires revealed that the scientific and informative materials used within the analyzed horticultural disciplines are as follows: written texts and protocols (77.77%); written texts and drawings representing certain aspects which must be analyzed, and other resources (55.55%); images from Internet (88.88%). In the case of ecological disciplines are used: written texts and protocols (77.77%); written texts, drawings and other resources (22.2%); images from Internet (100%).

4. For assuring the success of learning for the students, the teacher should to select the methods (*tab.1*) depending on the content of the discipline which must be taught in a laboratory activities, the abstractization level of the new knowledge, as well as to adapt them to the individual particularities of the students.

Table 1

**The didactical methods and procedures used within the indoor laboratory activities**

| Disciplines   | Didactical methods and procedures used  |
|---|---|
| Disciplines studied in the Faculty of Horticulture  |   |
| Systematic botany<br>Entomology<br>Phytopathology<br>Fruit Growing<br>Flowerculture<br>Viticulture    | Macroscopically and microscopically observation, observation by using magnifier, demonstration on the biological material, demonstration at the microscope, demonstration by drawing, modeling, demonstration by using audio-visual equipment, learning by inductive, deductive and by analogy discovery, explanation, heuristic conversation, problem solving, exercise, practical work and working in group (Fruit Growing, Flowerculture, Viticulture) |
| Plant physiology<br>Pedology<br>Biochemistry  | Laboratory experiment, practical work, macroscopically observation, conversation, , explanation, learning by inductive and deductive discovery, demonstration by using audio-visual equipment, debate, working in group   |
| Disciplines studied in the Faculty of Horticulture  |   |
| Biology of Plants<br>Hydrobiology   | macroscopically observation, observation by using magnifier, microscopically observation, demonstration on the biological material, learning by inductive, deductive and by analogy discovery, demonstration at the microscope, modeling, demonstration by using audio-visual equipment, heuristic conversation, explanation  |
| Plant ecophysiology<br>Biomonitoring<br>Ecotoxicology<br>Animal ecophysiology<br>General microbiology | Laboratory experiment, practical work, macroscopically observation, heuristic conversation, explanation, demonstration on the biological material (Animal ecophysiology), learning by inductive and deductive discovery, demonstration by using audio-visual equipment, debate, working in group  |
| Science of evolution<br>Ethology  | conversation, explanation, demonstration by using audio-visual equipment, learning by inductive deductive and by analogy discovery, problem solving, observation, working in group  |

5. The didactical methods and procedures used within the horticulture outdoor laboratory activities are practical work, macroscopically observation,

demonstration on the biological material, conversation and explanation. Within the hydrobiology outdoor laboratory there are used macroscopically observation, demonstration on the biological material, explanation and conversation. Within the Biomonitoring and Ethology outdoor activities there are used conversation, macroscopically observation, explanation and debate.

By analysing the results of our research, it can be observed that the activities carried on in the indoor laboratories, can be classified on groups as follows:

a) activities in which every student within a group is solving the same task, individually and independently. The principals methods used in these laboratories are observation, demonstration, modeling, explanation, learning by discovery, heuristic conversation, problem solving and exercise. This mode of organizing the activity is applied for disciplines such as: Systematic botany, Entomology, Phytopathology, Fruit Growing, Flowerculture, Viticulture, Biology of Plants and Hydrobiology.

b) activities in which every student has a different task within his group, and the training task is achieved by co-operation. Each student is participating to the interpretation of the investigation results and the graphical representation of these is done jointly by the group as a whole. The principals methods used in these laboratories are: laboratory experiment, practical works, observation, conversation, explanation, learning by discovery, demonstration by using audio-visual equipment, debate, working in group. This mode of organizing the activity is applied for disciplines such as: Pedology, Biochemistry, Plant physiology, Plant ecophysiology, Animal ecophysiology, Biomonitoring Microbiology and Ecotoxicology, and sometimes, Fruit Growing, Flowerculture, Viticulture, Hydrobiology.

c) activities in which every student has the same task or a different task within his group, but they are co-operating to answer the teacher's questions. The principals methods used in these laboratories are conversation, debate and problem solving. This mode of organizing the activity is applied for disciplines such as: Science of evolution and Ethology.

The activities carried on in the outdoor laboratories, can be classified on groups as follows:

a) activities in which every student within a group is solving the same task, individually and independently. In this case of disciplines such as: Fruit Growing, Flowerculture, Viticulture, the students are doing the same practical works. Referring to Hydrobiology, the students are studying the same species of animals within an ecosystem.

b) activities in which every student has a different task within his group, and the training task is achieved by co-operation. This mode of organizing the activity is applied for disciplines such as: Pedology, Systematic botany, Biology of Plant. In this case, for example, the students are studying different species of plants within an ecosystem.

c) activities in which the students are visiting institutions. Referring to Biomonitoring and Ethology laboratories, the principals methods used are conversation, macroscopically observation and explantion.

The written texts and protocols used for doing experiment within the horticulture and ecology laboratory activities (77.77%) are stimulating the practical styles of learning. The written texts and drawings representing certain aspects which must be analyzed, and other resources used within the horticulture laboratory activities (55.55%) and ecology laboratory activities (50%), and also, the images from Internet (100%) are stimulating the visual styles of learning.

## CONCLUSIONS

By analysing the results of our research, it can be observed that the horticulture and ecology laboratories, can be classified on groups as follows:

- indoor and outdoor laboratory in which the training is focussed on the research activities, partially guided by the teacher, carried on individually and independently or within a group. In this laboratories are used the heuristic methods and the written texts, protocols, drawings and images from Internet. These activities are stimulating the practical and/or visual styles of learning;
- indoor and outdoor laboratory in which the training is focussed on the practical activities, partially guided by the teacher, carried on individually and independently or within a group. In this laboratories are used the practical-applicative methods, the written texts and protocols These activities are stimulating the practical and/or visual styles of learning;
- indoor and outdoor laboratory based on conversation, explanation, debate, that are stimulated auditory styles of learning.

In the case of 9 out of 18 analyzed disciplines, the indoor laboratory activities are combined with only 1-2 outdoor laboratory activities. Also, within the indoor laboratory of three horticultural disciplines and two ecological disciplines are using exclusively individual activities and heuristic methods of teaching.

We consider that the improvement of the students' professional training from the Faculties of Horticulture and Ecology can be achieved by more frequently outdoor laboratory activities, as well as, by correlating heuristic methods with practical-applicative ones and by the alternation individual activity with group activity moments.

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