PERSPECTIVES ON OPTIMIZING THE COMPETENCES FORMATION OF ECOLOGIST PROFESSION

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At the level of the university education, the formation of competences specific to the profession of ecologist is acquired within the activities of lectures and seminars coresponding to the school subjects included in the curriculum for the faculty of Ecology and Environment Protection. For knowing the level of formation of competences to the students, in order to optimize the process of their formation, it was carried out an empyrical research based on the methods of interview and questionaire applied by students and discussions between the academic teachers, during the pedagogical experiment (2006-2009). The population sample used in our research comprised the same 50 students in Ecology and Environment Protection. We are considering that, the mode of organizing and carrying out of practical works, by combining activities carried out into the laboratory and outdoor, by combining of frontal activity with that carried out with groups, by using of the most adequate didactical methods, influences the formation of all categories of competences, but this influence depends of the individual particularities and interest's level of the students for the ecologist profession.

Key words: *competences, practical work, students, competent, conscious*

Formation of the future experts on ecology, who have professional competences acording to the description of ocupation groups, namely specialists who have to carry out professional duties which requires high level knowledge in biological sciences, is realized within universities [4].

Thus, within the Faculty of Sciences at the University of Pitesti, the program of studies in Ecology and Environment Protection is aiming at the formation during the three years of studies (day course of lectures) of specialists having competences in the following domains: scientific research in biology, environment protection; food industry; biotechnology; plant protection and phytosanitary quarantine; control of the quality of agricultural and food products [5].

MATERIAL AND METHOD

In the speciality literature there are numerous definitions of the concept "competence", belonging to various pedagogues. J. M. De Ketele (1996) defines the concept of competence in the same integrator vision as X. Roegiers and emphasizes

the three components of a competence, considering that the interdependence between a capacity and an content will lead to the formulation of a specific objective [2,3]: competence = (capacities x content) x situations; competence = specific objective x situations. The same point of view concerning the competence, as an assembly of qualities and capacities required to activate in a domain is found in the paperworks of D. Salade and C. Cucoş. After D. Salade, the competence is identifying with the ability to do something, involving both knowledge, meaning the capacity to do something well, and the result of activity in a domain of work [2]. C. Cucoş consider the competence as all of the abilities and capacities of a which a student is able, in other words his/her potential, the process being influenced by internal and external causes [1].

Aproaching the competence as purpose of the education process, beginning with the 90 of XX century and transition from the education based on knowledge to the education based on competences is emphasized by the New National Curriculum Naţional elaborated in 1998. The competences, mentioned exclusively for high school education, are defined as structured assemblies of knowledges and abilities acquired by learning, which allows identification and solving, in various conditions, of some problems characteristic to a certain domain. The school curricula of all the school subjects, including those of Biology, are stating precisely the two categories of competences: general competences and specific competences.

At the level of the university education, the formation of competences specific to the profession of ecologist is acquired within the activities of lectures and seminars coresponding to the school subjects included in the curriculum for the faculty of Ecology and Environment Protection.

The objectives of our study were as follows:

1. setting off mode of organizing and carrying out of practical works, corresponding for some of the disciplines studied at the Faculty of Ecology and Environment Protection;
2. emphasizing the level of formation of competences to the students in Ecology and Environment Protection, durring the perriod 2006-2009;
3. identification interest′s level of the students for the professional formation.

For knowing the level of formation of competences to the students in Ecology and Environment Protection, in order to optimize the process of their formation, it was carried out an empyrical research based on the methods of interview and questionaire. The interview comprised questions concerning the mode of carrying out the laboratory practical works corresponding for seven disciplines studied at the Faculty (forms of organization, place of carrying on, didactical methods used) and the questionaire comprised a frame for self-evaluation of competences acquired during the first, the second and the third year of university studies. The data obtained from the interview and questionnaires were completed with those obtained from discussions between the academic teachers, about the scientific formation's level of the students and the interest's level for their professional formation, during the pedagogical experiment.

In carrying out the research, we started from the following hypothesis: the mode of organizing and carrying out of practical works, by combining activities carried out into the laboratory and outdoor, by combining of frontal activity with that carried out with groups, by using of the most adequate didactical methods, influences the formation of all categories of competences, but this influence depends of the individual particularities and interest's level of the students for the ecologist profession.

The pedagogical experiment was carried out durring the academic years 2006-2009. The population sample used in our research comprised the same 50 students in Ecology and Environment Protection, in the first year of study in the acadenic year 2006-2007, in the second year of study in the academic year 2007-2008 and in the third

year of study in the academic year 2008 - 2009. It should be mentioned that 30 students in Ecology and Environment Protection have known the pedagogical terminology used in carrying out the research, as they are registered for the psychopedagogical module.

For program of study in Ecology and Environment Protection, the school subjects considered within our research were: First year: General cytology, Biology of Plants, General Chemistry, Adaptations of organisms, Physical geography, Plant ecophysiology, Animal ecophysiology; Second year: Population ecology, Ecotoxicology, Environmental Chimistry Human anatomy, Hydrobiology, Biochemistry, Population genetics; Third year: Climatology and Meteorology, Unpollution Biotechnology in Agriculture, Science of evolution, Ethology, Ecosystems degradation and ecological reconstruction, Environmental Legislation and Homeostasis.

RESULTS AND DISCUSSION

The analysis of answers given by the students revealed the following:

1. The great majority of practical works coresponding to the school subjects considered, are carried out into laboratory. Regarding the mode of organizing the laboratory practical works, were distinguished the following types of activities:

A. Laboratory works in which is not used the laboratory experiment

There are three possibilities of organizing of didactical activity:

a)Laboratory work based on observation. This mode of organizing a didactical activity is applied for majority of laboratory works carried out within this programme of study, at the following school subjects: General cytology, Biology of Plants, Adaptations of organisms, Physical geography, Human anatomy, Hydrobiology and Ethology. As didactical methods are used: observation, model devices, learning by discovery, conversation, demonstration, explanation, PC assisted instruction.

b)Laboratory activity based on practical works. This is used within school subjects such as: General cytology, Biology of Plants, General Chemistry, Ecotoxicology, Environmental Chimistry, Biochemistry, Population genetics, Homeostasis. As didactical methods are also used: observation, demonstration, explanation, conversation.

c)Laboratory work based on demonstration assisted by the computer. It is used in some laboratory works, at the following school subjects: Adaptations of organisms, Physical geography, Human anatomy, Hydrobiology, Population ecology, Population genetics, Climatology and Meteorology, Unpollution Biotechnology in Agriculture, Science of evolution, Ethology and Ecosystems degradation and ecological reconstruction and Environmental Legislation. Together with demonstration are also used: model devices, explanation, observation, heuristic conversation, and exercise.

B. Laboratory works using the laboratory experiment

There are two possibilities of organizing the didactical activity:

a) Laboratory work based on the experiment intended to form motrical abilities. It is carried out sometimes in General Chemistry, Ecotoxicology, Environmental Chimistry, Biochemistry, Plant ecophysiology, Animal ecophysiology. As didactical methods are used: observation, demonstration, conversation, and explanation.

b) Laboratory work based on the experiment differentiated by the working task. It is used within some laboratory works in Ecotoxicology, Environmental Chimistry, Biochemistry, Plant ecophysiology, Animal ecophysiology. As didactical methods are also used: observation, conversation, explanation, and demonstration.

B. Seminar activities carried out into classroom. In the case of Environmental Legislation and Climatology and Meteorology, within seminar activities, the students clarify and systematize for themselves the knowledges transmitted by the professor during the lecture or aquired by individual study, and utilizes the information in a more or less creative manner, in new situations.

In the case of five disciplines studied (General cytology, Biology of Plants Adaptations of organisms, Human anatomy 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: General Chemistry, Physical geography, Plant ecophysiology, Animal ecophysiology, Ecotoxicology, Environmental Chimistry, Biochemistry, Climatology and Meteorology, Unpollution Biotechnology in Agriculture, Ecosystems degradation and ecological reconstruction, Environmental Legislation, Homeostasis 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 Population ecology, Population genetics, Science of evolution, Ethology every student has a different task within his group, and the training task is achieved by co-operation.

2. In the program of studies in Ecology and Environment Protection, within nine analyzed disciplines (Biology of Plant, Environmental Chimistry, Population ecology, Climatology and Meteorology, Hydrobiology,Unpollution Biotechnology in Agriculture, Ecosystems degradation and ecological reconstruction, Physical geography, Ethology) were organized 1-2 outdoor laboratory. The activity with students is carried out frontal and in groups formed from 2-3 students. In those activities, the group of 10-12 students were visited some institutions (The Arges Districtual Museum, Water Works, the Research and Development Institute for Fruit Growing Pitesti-Maracineni, the National Research and Development Institute for Biotechnology in Horticulture - Stefanesti, the Research Station for Agriculture Albota,) or the "Strand" Park, the Trivale forest and the Budeasa lake.

3. Knowing the level of competences formed at the students in Ecology and Environment Protection *(tab.1)*, after three years of study, should be of great importance for the academic staff, as a prerequisite for increasing the quality of their own activity with the students, and for the enhancement of their chances to find jobs according to their qualification.

Table 1

The level of competences specific to profession of ecologist, revealed by the self-evalution of students in Ecology and Environment Protection [2]

Category of competences/ Specific competences	Students from the first year-%	Students from the second year-%	Students from the third year-%
1. Global competences			
1.1. to reflect on the great diversity and variability of the living world;	a – 20.00 b – 50.00 c – 30.00	a – 20.00 b – 48.00 c – 32.00	a – 16.00 b – 50.00 c – 34.00
1.2. to reflect an the impact of new discoveries from the field of biology.	a – 50.00 b – 40.00 c – 10.00	a – 40.00 b – 34.00 c – 26.00	a – 20.00 b – 48.00 c – 32.00
2. Cognitive competences			
2.1. to operate corectly with the concepts, laws and principles specific to the studied school subjects;	a – 32.00 b – 46.00 c – 22.00	a – 20.00 b – 50.00 c – 30.00	a – 10.00 b – 74.00 c – 36.00
3. Procedural competences			
3.1. to use corectly the laboratory equipment and instruments;	a – 12.00 b – 40.00 c – 48.00	a – 10.00 b – 20.00 c – 70.00	a – 6.00 b – 10.00 c – 84.00
3.2. to describe and compare the structure and functions of living organisms / organs/ tissues / cells / cell organelles analized	a – 14.00 b – 48.00 c – 38.00	a – 10.00 b – 52.00 c – 38.00	a – 6.00 b – 56.00 c – 42.00
3.3. to identify and clasify living organisms;	a – 32.00 b – 46.00 c – 22.00	a – 20.00 b – 50.00 c – 30.00	a – 10.00 b – 74.00 c – 36.00
3.4. to process the results obtained following activities carried out into the laboratory, representing them graphically;	a – 14.00 b – 26.00 c – 60.00	a – 12.00 b – 12.00 c – 76.00	a – 4.00 b – 4.00 c – 92.00
3.5. to interprete the results obtained within the laboratory practical work;	a – 12.00 b – 12.00 c – 76.00	a – 6.00 b – 14.00 c – 80.00	a – 2.00 b – 6.00 c – 92.00
4. Attitudinal - behavioral competences			
4.1. to assume responsibilities concerning their own professional development;	a – 12.00 b – 34.00 c – 54.00	a – 10.00 b – 30.00 c – 60.00	a – 6.00 b – 26.00 c – 68.00
4.2. to adopt a flexible attitudine in relationship established within the students group.	a – 24.00 b – 46.00 c – 30.00	a – 20.00 b – 48.00 c – 32.00	a – 16.00 b – 50.00 c – 34.00

a – competent to a lower extent; b – competent to some extent; c – competent to a higher extent.

4. Analysing the data obtained from discussions between the academic teachers, , it can be identified four types of students *(tab.2)*.

Table 2

The scientific formation and interest levels of the students

Types of students	Students from the 1st year (%)	Students from the 2nd year (%)	Students from the 3rd year (%)
very well prepared students, hard-working and interested in professional training	14.00	22.00	22.00
well prepared students, perseverent and interested in professional training	34.00	32.00	32.00
satisfactory prepared students, inconsistent and little interested in professional training	38.00	36.00	40.00
unsatisfactory prepared students, unresponsive and disinterested in professional training	14.00	10.00	6.00

CONCLUSIONS

Analysing the mode of carrying out the laboratory practical works and the frame for students self-evaluation, we consider that the use of some modalities of organizing the practical works, has contributed to the formation to a great extent of the procedural competences to the most students (the percentages ranging between 48.00% and 72.00%, for the students in the 1st year of study, between 68.00% and 80.00%, for those in the 2nd year of study, and between 80.00% and 92.00%, for those in the 3rd year of study), and to some extent of the cognitive and any procedural competences (the percentages being of 46.00% from the students in the 1st year of study, 50.00% from those in the 2nd year of study, and 56.00% from those in the 3rd year of study). Analysing the frame for students self-evaluation and the data obtained from discussions between the academic teachers, we identified three groups of students: *unconscious and uncompetent* (2% from the students in the 1st year of study); *conscious and uncompetent* (12% from the students in the 1st year of study, 10% from those in the 2nd year of study and 6% from those in the 3rd year of study); *conscious and competent* (86% from the students in the 1st year of study, 90% from those in the 2nd year of study and 94% from those in the 3rd year of study). The interest's level for the ecologist profession increased in the case of 9 students from the 2nd year of study and of 2 students from the 3rd year of study, all of them becoming competent students. Thus, we consider that the formation of all categories of competences depends also the individual particularities and interest's level of the students for the ecologist profession. For optimizing the formation of global competences and to adopt a flexible attitude competences is needed the use personal reflection and modification of the working groups composition.

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