
PhD THESIS

PROBLEMATIZATION

A modern didactic method applied in Pomiculture

(SUMMARY OF Ph.D. THESIS)

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INTRODUCTION

Contemporary society is experiencing large-scale changes that pose a serious challenge to people who have the task of preparing students for the 21st century. One of the problems faced by university teachers is to prepare future graduates to be successful and productive, preferably in an entrepreneurial spirit, for a future that can not be predicted in detail. It is impossible to accurately predict what route current students will take when they finish college and enter the labor market. In any field it would work, we can hardly imagine what kind of new concerns will arise.

Currently, information is being propagated at extraordinary speed due to technological (r)evolution. More and more people think that in the coming years, everything we know today will be just a small part of the future knowledge base. Moreover, the researchers appreciate that most of the things we know today are valid for a maximum of ten years, after which they become inaccurate or outdated, and it is absolutely necessary to update them periodically. In 1998, in the United States it was believed that 25% of the trades of the next century did not exist at that time, and those that existed and survive in the first part of the next century will be considerably different. To work efficiently in the future world, in step with technological progress, new knowledge, skills and new perspectives will often be needed (Steele et al., 1998).

The complexity of contemporary world issues and the life of the community influence the issues and academic activities. The mutations and developments we are witnessing in the field of university education call for the necessity of building a coherent academic didactics and strongly anchored in academic realities.

The main directions of the renewal of teaching practices in university education are (Marinescu, 2009):

- reconsidering the relationship between the educated and the educator by shifting the increasing interest of the subject into the educational relation and using the potential of the subject in the context of teaching and learning;
- the transformation of university didactics into a systematic approach focused on the theoretical and practical-training skills of those who learn;
 - increasing the interest of educators in modernizing and improving the working methodology and adapting it to the requirements of a modern education;
 - developing the communication skills between teachers and students, as well as their creativity, depending on the particularities and specifics of the student groups;
 - consistently opening up to the top research in the field, internationally, and correlating their content with the data highlighted by the generalization of the teaching experience at the faculties of our university.

Starting from the problems confronting our contemporary society, described briefly above, we appreciate that the theme of this PhD thesis is very current and important from a scientific and practical point of view. Identifying modern teaching and learning methods and techniques that are tailored to the needs of the economic

and social environment will support students' assimilation of knowledge and practical skills more easily, will facilitate their integration into the labor market, but will bring important benefits to the economic and social environment, by providing graduates better trained both theoretically and practically, shortening periods of accommodation and integration into the workplace and able to respond to complex and current challenges. And this will support the technological transfer between academia and the economic and social environment, one of the basic approaches of contemporary society.

Of all these methods and techniques, the problematization seems to be one of the most important, especially in view of the fact that it is creating the most diverse problem situations that are evaluated and solved, but also because it is able to consolidate the cognitive structures, to stimulate the introspective and innovative spirit, to form an active and participative work style, to cultivate the responsibility and the courage in assuming a personal opinion of the students.

Of course, this method can be used more successfully in a university with a strong practical and applicative character, where problem situations can easily be identified, they come from a natural environment, can be analyzed and practically solved, developing concrete skills which will be useful in the future work of graduates.

Being an experimental method at this time, which needs to be implemented and analyzed within a limited time horizon, we can not track the impact of its application in all horticultural areas at the same time. Thus, has been chosen for the study the **Pomiculture**, one of the most important horticultural areas, considered as a priority by the European Commission experts for the current financial exercise (2014-2020), which allocates important resources for research and development in the field.

In so far as the results obtained will bring an important added value in the preparation of the students, the method will be easily taken over by all the other horticultural domains, and then extended to the agricultural, zootechnical and veterinary fields, being an academic didactic and methodological brand of itself.

THE STRUCTURE OF THE THESIS

The work is structured in two sections, the first one outlining the current stage of knowledge (the theoretical foundations of the study on problematization, respectively the challenges of an old and important horticultural field, but not endorsed to European standards), and the second one the practical research on the studied subject.

The first part of the paper, *Current Stage of Knowledge*, contains three chapters presenting the theoretical aspects related to Pomiculture (the science in which the research was carried out), the teaching methodology used in the university system, as well as the aspects related to the way that the purchases for students are structured and assessed.

In **Chapter I, Pomiculture, branch of agricultural sciences**, a short history of Pomiculture is presented as a branch of Horticulture with an important economic and social weight. It has evolved over time from a simple occupation to a concrete and complicated science, with links to disciplines such as botany, plant breeding, biochemistry, agrochemistry, genetics etc. As a subject of study, Pomiculture is divided into two areas: General Pomiculture, which includes taxonomy, biology, ecology and technology common to all fruit trees varieties and Special Pomiculture (Pomology), with a pronounced practical character, which studies the biological particularities of fruit trees and bushes varieties. Although the importance of Pomiculture and the long tradition of cultivating fruit trees and bushes in the remote past is well known, still, Romanian Pomiculture is far removed from European standards (Baciu, 2005).

Studying these aspects, it has emerged that the use of modern methods applied in the teaching of Pomiculture, as is the problematization, will lead in the medium and long term to the formation of high-class specialists able to restore the hierarchy of European values, especially through research, development and technology transfer. Considering the high development potential of our country and the prioritization of this European Commission's horticultural funding for the 2014-2020 programmatic period, through structural funds, we believe that the applied approach proposed by this PhD thesis will contribute to the lifting Romanian fruit growing to the European standards we intend to.

Chapter II, Didactic Methodology in Higher Education, contains a series of terminological specifications of the concept of method. Studying the authors mentioned above, it results that the method, as a concept, is characterized by a series of specific terms: modalities, directions, strategies, techniques, procedures, operations etc. Moreover, understanding the method as "*a function between the theoretical, logical-formal plan (theories, principles) and the practical one, of the concrete action (procedures, techniques), allows an ordering of the notions with the methodological significance*". A clear conclusion of this chapter is that, according to the principles of participatory management, the teaching-learning-evaluation process should be centered on the student rather than on the teacher.

Student-centered learning is based on an education philosophy that emphasizes the outcomes of learning processes, focuses more on the learning process than on the teaching process. In a student-centered approach, we are interested in how they are changed by the experiences they face through the learning process and, especially, what they are able to undertake as a result of the learning process. Students are actively involved in the learning process. Various sources of information are used, coming from many sources, and the contents of the courses are adapted and modified to meet students' needs.

Teachers need to change their way of thinking, shifting the emphasis from what they do, as teachers, towards what students have to do to learn effectively. Student-centered learning does not use a single method but involves the use of an extensive

range of methods, some of which may take the form of traditional teaching. The teacher adopts different roles, depending on the pedagogical methods used. One of the fundamental principles of student-centered learning is the recognition of the need to start from previous educational purchases. The stronger the link between new knowledge or skills and previous purchases, the more effective and more solid the new learning process will be.

Problematization is often regarded as one of the most important methods of modern didactics, because it produces a number of valuable instructive-educational effects. It can be used in all situations where problem situations can be created, to be solved by research and discovery of new truths. The teacher does not communicate the students standardized, ready-made knowledge, but he puts them in a research situation to find solutions to the problem they are facing. In conclusion, "*problem-solving is an active-participative, formative and heuristic method, which can lead to independent activity, to train and develop intellectual capacities – imagination and logical thinking, investigation and exploration of productive and creative capacities, by formulating hypotheses, various solutions (application). It contributes to the transformation of the student into the subject of education, in the process of acquiring new knowledge, creating the opportunity to mobilize the resources of the personality and to bring satisfaction on all its plans: cognitive, affective, aesthetic and actional. A problem-based didactic activity increases the efficiency of learning*" (Bocoş, 2002).

In an absolutely natural continuation, **Chapter III, Evaluation and Structure of Student Procurement**, describes ways to evaluate students according to the student-centered approach to learning, trying to answer the concrete question "*How should we act to learn students to work more easily, with more enthusiasm and satisfaction, but with less effort?*" Successful advantages are presented both by teachers and students, as well as by the higher education institutions, regarding the use of student-centered learning methods. Methods of teaching and learning as well as student assessment are also suggested, both iteratively, programmatically, but also using modern methods of information technology. At the end of the chapter, the role of the teacher in the realization of the student centered education is outlined, and therefore in the use of the problematization, with the aim of dynamizing the students in order to solve the problems, finding solutions using the problematization, documentation and scientific investigation, their involvement in the realization of research, development, innovation and technology transfer projects.

The second part of the work focuses on the presentation of five studies, which validate the use of problematization as an applied didactic method in Pomiculture. Thus, **Chapter IV, Material and Method. The design of experimental research**, establishes general working hypotheses, the purpose and objectives of experimental research, experimental design, the educational design of discovery learning during the Pomiculture classes and respectively the educational design of problem learning during the Pomology classes.

The aim of the experimental research is to implement the problematization as a current didactic method in the activity of the teachers and the students at the Pomiculture disciplines, through an active and interactive involvement in their own learning and training, through cooperation and competition, selective updating and restructuring of previous acquisitions, through reflective speculations, experiments, data collections, interpretations, analyzes and syntheses.

In order to achieve the proposed goal, the following specific objectives have been set:

O1: studying the way in which, in the opinion of students, interpersonal relationships of cooperation and competition in the academic area influence the school results to students;

O2: analyzing students' attitudes and interests towards Pomiculture disciplines;

O3: analyzing the influence of self-esteem on students' academic performances;

O4: analyzing the links between students' "practical", "visual" and "auditory" learning styles and their academic performance;

O5: comparing the academic results between the students who have taught the Pomiculture disciplines using the problematization and those of the students to whom the teaching was done by traditional methods.

For the experimental organizational design of research, as we have stated since the beginning of the pedagogical experiment (Vac, 2016), *the subjects* included in the study were divided into *four samples* (two in each year of study) consisting of 20 students at the Faculty of Horticulture at the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca. From each year of study a group of students represented the experimental group, and another group of students represented the control group. Practical work was taught by a single teacher. In the third year the practical works of General Pomiculture were handed over, and in the fourth year the practical works of Pomology.

The working methods used were: experiment and administration of questionnaires. The way of administration, processing and interpretation of questionnaires fulfilled the criteria of research in psychology.

The cooperation and competition questionnaire was designed according to sociological requirements, and most items were built with closed responses. Some questions have also been asked to explain the argument for a particular answer.

The research aimed at the inventory of students' opinions on: teaching methods; cooperation and competition in Romanian university education; the influence of attitudes, interests and self-esteem on academic achievements; comparing the results by recording the marks obtained in the studied Pomiculture discipline.

In the applicative spirit of discovery learning and problematization learning, two concrete lessons were presented, which essentially implement the principles of the two concepts (the educational design of discovery learning, respectively the educational design of problematization learning) during the General Pomiculture III

year classes (*Garnishing branches in the seed species – apple and pears*), respectively Pomology IV year classes (*Recognition of Pear Varieties*) (Mitre, 2008).

The first study (Chapter V of the paper) surprised at how interpersonal relationships between students, cooperation and competition influence the learning process and school performance.

A first conclusion of this study is that the most respondents acknowledge that interpersonal relationships, based equally on competition and cooperation, lead to optimal academic results and that in the Romanian university education system interpersonal relations between students are equally based on cooperation and competition. As far as school results are concerned, students do not prefer competition instead of cooperation. A relatively coherent conception of cooperation can be noted: it has positive effects on the perfection of students' personality, especially from a social point of view, because they cultivate communication skills and team spirit.

Under the terms of cooperative learning, roles attributed to students are: receiver, transmitter, moderator, listener, leader, analyst, organizer, coordinator. However, the experimental group has a number of activities that are attributed to students ("I write", "I ask advice", "I ask questions", "I explain", "I accept information") that contribute to the development of students' abilities to understand the other's cognitive perspective, and emotionally to express their attachment, the other's helping behavior ("support", "patience", "kindness").

Among the disadvantages of cooperation, students highlight the ones at the cognitive level, because there are theories of information, but it is also noted the diminishing of the involvement in the learning process and the individual responsibility ("some students do not contribute anything", "you cannot be noticed", "not everyone does their work in the group"). However, the students' preference for cooperation is explained by the benefits of this form of social interaction: a more effective and profound learning based on the exchange of opinions, intercognition, valorisation of communication skills, assuming group responsibility, cultivating friendship, solidarity, forming team spirit. Thus, the students consider cooperation to be more entertaining than competition, the cooperation being, in the opinion of the majority of respondents, the one that determines a positive self-image.

Concerning competition, most students consider as "true" the statement "*Competition is building strong personalities*", but they are against the statement: "*Competition is more productive than cooperation, because it leads to higher performances*". Even if for some respondents the competition leads to higher performances, being an important motivating factor in the learning process, and at the same time directly proportional to individual and group progress, it can also have negative effects from the point of view of interpersonal relations, aspects of personality or character of individuals.

The competition largely contributes, according to the respondents, to defining the competitive spirit and sense of responsibility, stimulating creativity and self-

knowledge and self-assessment. On the other hand, it can affect communication skills and positive feelings towards other colleagues, it can change attitudes towards learning and tolerance. The most common forms of competition in horticultural education are projects, tests, examinations, aptitude tests, and as a form of reward can be mentioned diplomas, prizes, big grades, scholarships, money, a good self image, popularity or leadership position etc. Respondents believe in the "constructive competition", which contributes to progress, but only with equal treatment, fair arbitration, honest competition, reward performance, and when combining with cooperation.

Students think they get the best results if they work through small group cooperation but compete with other groups of the year. Therefore, the recipe of success seems to consist in cooperation within the groups and the competition between them. Thus, the two processes could balance and stimulate each other, generate motivation and school progress, higher performances and successful projects.

In conclusion, we consider it necessary to restructure the didactic actions by a complementary approach between the two concepts (not competitive) in order to optimize the instructive-educational process and increase the efficiency in different educational or research contexts.

Universities, according to the opinions of those present in the present study, have the task of forming people with team spirit, who are also good competitors in any field.

Concluding, in the context of cooperative and competitive modeling problematization, the roles of the teacher gain new valences, overcoming their traditional role as a lecturer or expositor during classroom classes, or dialogue during seminar classes (Johnson and Johnson, 1989 and 1991). In this sense, problematization develops a series of increased competences, both at the teacher's level and at the level of the student: learning skills and superior capacities at the level of the individual: orientation, communication, diplomacy, altruism, self-refinement, team spirit, responsibility, analysis and synthesis; mediation and conflict management; higher professional development; capacity building for research, development, innovation and technology transfer; highlighting the need and potential at team level: both in professional and social life, success is a team attribute and is directly proportional to the maturity of understanding this point.

The **second study (Chapter VI)** followed the students' attitudes and interests towards the fruit trees disciplines. A questionnaire composed of five questions was used, to which 37 third-year students responded.

It has been found that Pomiculture is the preferred discipline of more than half of the students.

The majority of students – over two thirds in the control group and more than three quarters in the experimental group – are interested in the "largely" or "to a great

extent" of fruit trees disciplines. The two responses were chosen more frequently in the experimental group.

The main factors that help students effectively learn the specific content of fruit trees disciplines are teacher and interactive teaching – problematization. For both factors, "largely" and "strongly" responses were chosen more frequently in the control group than in the experimental group.

The purpose of the **third study (Chapter VII)** is to pursue the influence of self-esteem on students' academic performances.

36 of third-year students responded to the Self-Esteem Scale.

The linear correlation coefficients of the scale scores with the students' scores in the knowledge test administered after the experiment were calculated. It was found that Self-esteem does not correlate significantly with students' performances.

The **fourth study (Chapter VII)** aimed at identifying the links between the practical, visual and auditory learning styles and the students' academic performances in the 3rd and 4th years of the Faculty of Horticulture (Vac, 2016).

It has been found that practical, visual and auditory learning styles don't affect students' academic performances.

The last study (Chapter VIII) was designed to look at how the type of teaching influences the learning process and school performance at students. In each year of study, the control group was taught in the "classic" manner, while the experimental group, the same course was taught interactively. Traditional teaching methods in the form of didactic exposure, didactic conversation, demonstration and exercise were used in the control group. According to this type of teaching, "theoretical knowledge is considered more important than any other type of educational acquisition" (Cerghit, 1997). The experimental group used modern teaching methods such as algorithmization, modeling, problematization, scheduled training, case study, discovery learning.

School performance was measured by knowledge tests. For each year of study, two knowledge tests were built: an initial test and a final test. Test scores could be between 0 (in the absence of correct answers) and 10 (when all answers are correct). The tests were developed by the teachers from the Faculty of Horticulture, they targeted the content of the specialized disciplines and items were formed by questions with open answers.

After conducting this study, we can draw the following conclusions:

- the differences found between the two groups in the test scores 2 are not influenced by the differences in the level of training between the two groups before the start of the experiment (preparation being measured by test 1);
- the level of student training (measured by the scores in test 2) was better in the experimental group than in the control group.

General Conclusions

The most important conclusion that can be drawn from the development and interpretation of the experiments included in this doctoral thesis is that the level of student training, measured in all group tests, was better in the experimental group than in the control group, which leads to the assessment that **Problematization**, as a didactic method, can significantly contribute to the increase of students' academic achievements, constituting an important basis for the accumulation of the skills and abilities necessary for their easier integration into the labor market, respectively in the economic and social environment.

On the other hand, the application of this method in the learning process brings teachers closer to students, increases student participation in class / seminar / laboratory classes, makes learning and teaching more enjoyable and more effective, helps to prevent abandonment and personality modeling students.

Last but not least, the simulated problem situations in the teaching-learning process are taken from real life situations and, to the extent that they are carefully selected and responsive to societal needs and challenges, the accumulated experiences and solutions identified can returns to society with benefits, doubling the benefits of using this teaching method.

At the same time, through this type of relationship with society, teacher-student-society, a series of conclusions can be drawn regarding the need to correlate university curricula with the labor market, to capitalize on the university's work and its results for the benefit of society; to increase its competitiveness in the economic and social environment in order to assert itself as an entrepreneurial university.

Recomandations

Problematization, as a didactic method, must be implemented with care and responsibility as it directly affects the personality of the student, his abilities and qualities as a future professional on the labor market. All problem situations must be carefully and responsibly selected, then professionally applied so that the results are the ones expected. One of the conditions for success is for teachers to master all these skills and practical professional experiences, as well as pedagogical and psychological qualities that attract students, stimulate their curiosity and desire to learn, provide them with a viable alternative to the current superficial challenges and to transmit not only a luggage of knowledge (more or less significant) but also a high level of moral, cultural and entrepreneurial education.

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