INTERACTIVE TEACHING-LEARNING METHODS IN THE INTERDISCIPLINARY APPROACH OF NATURAL SCIENCES FROM THE MENTOR-TEACHER'S PERSPECTIVE

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Abstract
Interactivity involves learning through communication, it produces a confrontation of ideas, opinions and arguments, it creates learning situations centred on the children's availability and willingness to cooperate, on the mutual influence within classes.
Learning based on active methods represents a new trend for teachers and a new way of life for students. By means of active-participatory methods, the student is able to work with his/her colleagues so as to ensure the smooth running of the training process.
The mentor-teacher's perspective on the interactive approach to the teaching process is one of great interest, the proof being the concern of the people within the Ministry of Education, Research, Youth and Sport - an order of Minister - who proposed a methodology for the Establishment of the Mentor-Teachers' Body to coordinate the internship for filling a teaching position. This methodology is developed under the provisions of Articles 248, 247, 236, 262, 241 of the National Education Law no. 1/2011.
The research hypothesis: The use of interactive methods by mentor-teachers in their activity with the students / trainees will lead to the improvement of the students' learning activity in order to achieve the expected results, the lessons becoming thus more appealing.

Keywords: interactive methods, mentors, education, teaching process.

1. INTRODUCTION

The prerequisite of progressiviste education, in Jean Piaget's opinion, is to provide a diverse methodology based on the combination of the learning and independent work activities with the cooperation, group learning and interdependent work activities.
From the multitude of teaching methods we focused on the interactive ones because they are the modern ways of stimulating learning and personal development since early ages, they are teaching tools that foster interchange of ideas, experiences, and knowledge.
The implementation of certain modern teaching tools involves a set of skills and availability from the teacher: receptivity to novelty, teaching style adaptation, mobilisation, desire for self-improvement, reflective and modern thinking, creativity, intelligence to accept novelty and flexibility in the way of thinking. The teacher whose vision we want to capture is the mentor, the one who works with the students / trainees.

2. MATERIAL AND METHOD

We started from the following hypothesis: *the use of interactive methods by mentor-teachers in their activity with the students / trainees will lead to the improvement of the students' learning activity in order to achieve the expected results, the lessons becoming thus more appealing.*
The research began, as it was natural, with a documentation stage. We decided to use the questionnaire as a research method, we researched the methods of creating a questionnaire and we finally decided to use a questionnaire with several types of questions: closed questions with a single answer and with multiple choice, open questions with free answers or in which the answer is a numeric value, questions which imply a ranking, etc. (See Annex).

After creating the questionnaire we distributed the materials to be filled in by peers (mentor-teachers) in primary and secondary education. We distributed 41 questionnaires and received 38 questionnaires filled in.
In our research we focused on the mentor-teachers of Argeş County high schools. Nevertheless, we found out that the number of mentor-teachers working in high schools is relatively small for the result of the research to be a viable one. Therefore (even if we are teachers of biology and we teach in high schools), we expanded the research area and we turned to the mentor-teachers from both secondary and primary education. The respondent mentors work in school units such as: "Ion C. Brătianu" National College, "Zinca Golescu" National College, "Alexandru Odobescu" National College, "Mihai Viteazul" Vocational High School, School no. 3, School no. 5, School no. 11, School no. 19, and also in major institutions of our County: Children's Palace and Argeş County School Inspectorate.

3. RESULTS AND DISCUSSIONS

We focused on a scientific research that is fundamental, elementary, that is to say it approaches a general issue, not one applied, designated from the start to solve practical problems. Even if the benefits of the fundamental research are not immediately visible and long-term, it often leads to important practical applications.
The questionnaire that we created and applied to the mentor-teachers in Argeş County contains ten questions by which we aimed at achieving the first three objectives of the research:

a) knowing the mentor's options regarding the use of the teaching methods in the teaching activity;

b) highlighting the main types of teaching methods used by mentor-teachers;

c) highlighting the positive aspects from the mentors' activity with the students / trainees regarding the use of methods that promote interactive learning – examples of good practice, as well as negative ones in order to be eliminated;

The information collected, analysed and interpreted in this stage of the research provided an image of the concepts and practices used by the mentor-teachers from Argeş County while working with the students / trainees. These are the initial data required to achieve the fourth objective of the research:

d) development, based on the conclusions achieved, of some records containing the advantages / disadvantages of using interactive methods in working with the students / trainees as compared to using other methods.

The aim of the first question in the questionnaire was to determine how many of the colleagues surveyed work or worked as mentor-teachers, or have coordinated over time the students' activity during their teaching practice.
Thirty-seven of the thirty-eight colleagues who were kind enough to answer the questions in the questionnaire on the interactive methods from the mentor-teacher's perspective work or have worked as mentor-teachers, or have coordinated over time the students' activity during their teaching practice.
The second question aimed to establish the school level in which our colleagues who filled out the questionnaires carry out their activity.
We have distributed 41 questionnaires, but only 38 were filled out by our colleagues. Among those who have spent a few minutes on the survey we proposed, 25 are teachers working in high schools (24 are active teachers, two of them working in middle schools as well, and one teacher is retired), 10 of them teach in middle schools and 3 of them are primary school teachers / tutors.
The third question of the questionnaire aimed to find out which is a teacher's greatest quality in the mentor-teachers' opinion. Our colleagues' answers were the following:

- 7 of our colleagues (all high school teachers) felt that a teacher's greatest quality is *(scientific and methodical) professional competence;*

- 6 of them have chosen *the teaching vocation (four of them are high school teachers and two are middle school teachers);*
- 6 of them considered the greatest quality of a teacher as *pedagogical tact* (3 of them are high school teachers, one is a middle school teacher and two are teachers in primary school);
- 5 of them have chosen *adaptability* (4 of our colleagues are middle school teachers, and the fifth is a high school teacher);
- 3 of our high school colleagues have chosen the *teacher's capacity to make himself/herself understood;*
- 3 colleagues mentioned *empathy* as major quality of a teacher (2 of them teach both in high schools and in middle schools, and one is a primary school teacher / tutor);
- 2 mentors have chosen *patience;*
- the following qualities received only one vote: *communication, altruism, severe kindness, accessibility of information, spirit of observation, seriousness.*

The choice of a certain quality – the greatest – for the teachers in the Romanian education system, was actually accompanied, in only a few cases (21 out of 38), by arguments.

Thus, those who have opted for scientific competence mentioned that it "*is an attribute that represents the prerequisite for achieving an excellent professional level*", but without being enough as such. Students easily notice the uncertainty of the poorly trained teacher and hence the mismanagement of the class and, of course, the underperforming at school. Thus, the scientific and psychological-pedagogical competence ensures authority, requires respect, and motivates the student to enjoy learning.

Pedagogical tact was chosen because, as our colleagues say, if you have this quality, you can adapt to any situation created by the pupils. Pedagogical vocation was not forgotten either, because most of those who filled out the questionnaires emphasised that you cannot be a teacher / primary school teacher if you do not love children, if you are not able to support them and help them and to keep them the right path.

The teacher must also be unselfish. *"As a messenger of certain social values, of a life ideal, the teacher leads the students gradually, step by step, towards preparing them for the current and future tasks. They have to know the students and teach them, with all their love, not only scientific information, but also life-related information!"*

Table 1. Numerical distribution of the mentor-teachers' options in Argeş County regarding the importance that the beginner teacher must assign to some aspects of the teaching activity

Aspects of teaching	Mentors who granted grade 7	Mentors who granted grade 6	Mentors who granted grade 5	Mentors who granted grade 4	Mentors who granted grade 3	Mentors who granted grade 2	Mentors who granted grade 1
Relationships with the students	9	4	3	13	2	1	6
Accuracy of the scientific content	26	3	1	1	3	4	0
Use of traditional methods	6	7	6	3	5	9	2
Use of interactive methods	7	13	5	10	3	0	0
Ability to select and insert the material during the lesson	12	6	8	2	8	2	0
Self-assessment	8	15	5	5	2	0	3
Teaching strategy planning	14	9	6	3	1	2	1

Regardless of the most important quality assigned to the Romanian school teacher by each of the mentors surveyed, all our colleagues have pointed out that it takes more than one quality to be an efficient teacher, it takes a set of skills.
The next question in the survey aims to capture the mentors' view on the importance that the beginner teacher must allocate to some aspects of teaching.
If we carefully analyse table 1, we see that the relationships with the students are considered to be very important by 23,68% of the mentor-teachers, and 34.21% have assigned grade 4 on a 1-7 scale. It is true that there are peers (15.78%) who do not consider the relationships with the students as very important as compared to the other issues mentioned in the questionnaire, the proof being grade 1 they granted.
The second issue concerned is the accuracy of the scientific content. The percentages are more than convincing, in that 68.42% of the mentor-teachers granted the highest grade to this criterion, while grade 1 was not granted by any of the respondents (Figure 1).

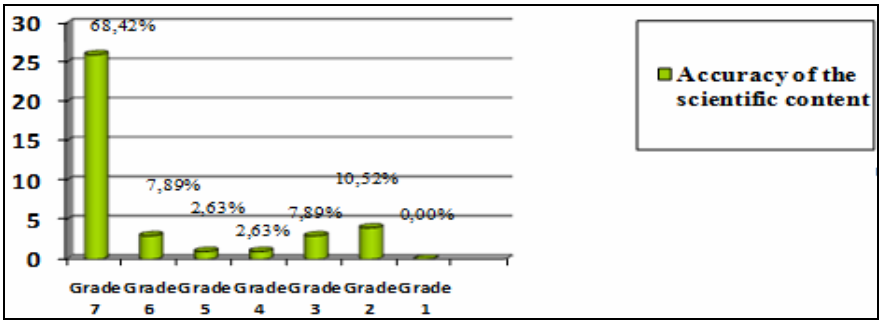

Figure 1. Percentage distribution of the grades granted by the mentor-teachers to the criterion of accuracy of the scientific content

The third aspect of the teaching activity pursued in question number 4 refers to the importance attached to the use of the traditional teaching methods, and the fourth aspect refers to the use of the interactive methods in the teaching process. If we make a comparison of the two situations, the graphs show that the modern, interactive teaching methods are preferred in the teaching activity rather than the traditional ones. The traditional methods have been granted both grade 2 and grade 1, while the modern methods only received high scores and very high scores (Figure 2).

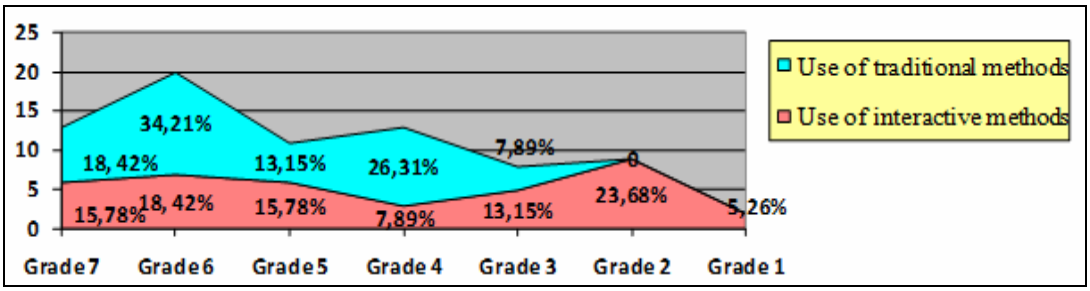

Figure 2. Percentage distribution of the grades granted by mentor-teachers to the criteria of use of traditional methods and use of interactive methods

The ability to select and insert the educational material during the lesson is another aspect of the teaching activity that has accumulated a huge percentage of grades 7 and, just as in the case of the scientific content accuracy criterion, it has not received any grade 1.
Self-assessment is another aspect of the teaching activity that has received high grades (more than 50% of the teachers assigned grades 6 and 7) (Figure 3).

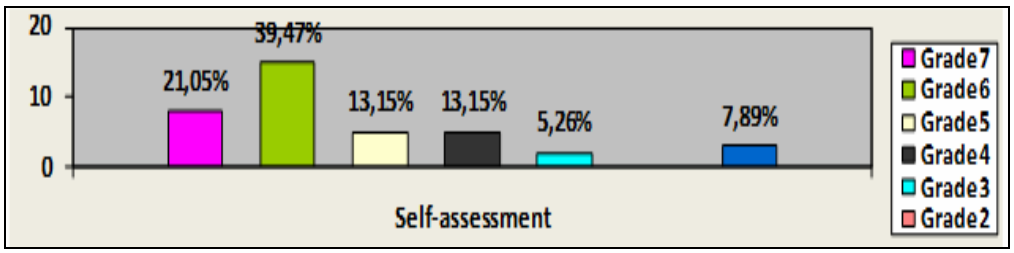

Figure 3. Percentage distribution of the grades granted by mentor-teachers for the self-assessment criterion

The fifth question of the questionnaire aimed at finding out how our peer mentors assess the need for interactive methods in the lesson. Although we offered four possible answers, the respondents chose only two of them, mentioning that they are either necessary or very necessary. It is interesting to notice that the percentage is 50% for each choice.

The next question asks the mentor-teachers in which of the types of lessons they advise the beginner teachers to use interactive teaching-learning methods (Figure 4). The majority opted for the mixed lesson (27%), followed by the abilities and skills training lesson (22%) and that of communicating new knowledge (21%). There were fewer proposals for the review lesson (17%) and for the knowledge assessment lesson (13%). It is worth mentioning that there were 8 colleagues (of out 38) who have chosen all the variants of lessons proposed as being suitable for the application of the interactive teaching methods.

Figure 4. Percentage distribution of the mentor-teachers' options regarding the type of lesson in which the interactive methods are used

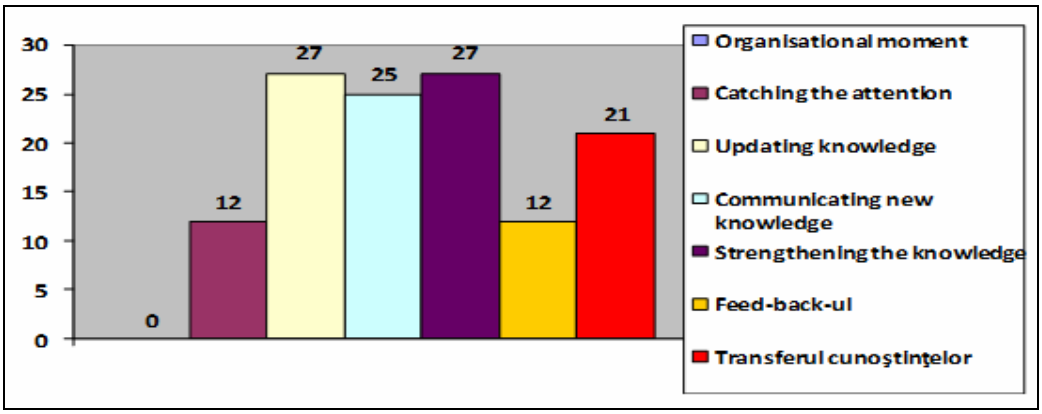

Figure 5. Numerical distribution of the mentor-teachers' choices regarding the moment of the lesson in which the interactive methods are used

The seventh question of the questionnaire aims at finding out at what point during the lesson the use of the interactive teaching-learning methods is appropriate. We offered the following choices of answer: the organisational moment, catching the attention, updating knowledge from the previous lesson, communicating new knowledge, strengthening the knowledge, feed-back and transfer of knowledge. Most of our peers have opted for *strengthening the knowledge* and for *updating the*

knowledge (27 out of 38), while *communicating new knowledge* was ranked second (25 out of 38). The *transfer of knowledge* was ranked third with 21 votes, while the other criteria received 12 votes each: *catching the attention* and *feed-back*. The organisational moment was not chosen by any of our peers (Figure 5).

With the help of the eight question of the questionnaire applied, we aimed at identifying which are the main interactive methods used by our peer mentors in the teaching-learning activity (the participants were asked to choose three methods, the most used during the demonstrative lessons and not only, out of 27 options proposed). Given that we surveyed mentors from primary and secondary education, it was expected that the methods indicated may vary depending on the level at which they perform their activity.Our peers from primary education have indicated as frequently used interactive methods the teaching game (about which they said it makes the lesson more fun), the gallery tour and the thinking hats method.For secondary schools and high schools, however, the teaching game and the gallery tour were mentioned only by a few colleagues, there occurring other methods specific to adolescent age, such as: heuristic conversation, brainstorming, group discussion, problem solving, etc (Figure 6).The choice of the heuristic conversation was argued by most of those who opted for it. Most of our high schools peers believe that this method, which consists of a series of questions designed to guide the students' thinking in order to discover new knowledge, helps students to recall the previously learned knowledge, to reflect, to make connections, all leading to the discovery of new knowledge.Brainstorming (storm of ideas) is a method that is especially applied in high school and it allows students to express themselves freely, contributing to the formation and development of their imagination, creativity, scientific language, personality traits (spontaneity, courage to express a point of view), interpersonal relationships by valuing everyone's ideas (and therefore by understanding the qualities of others).

Among the methods used in high school, the debate could not have been left out, the debate in the meaning of a thorough discussion of controversial issues, often remaining open, aiming at influencing beliefs, attitudes and behaviour of participants.

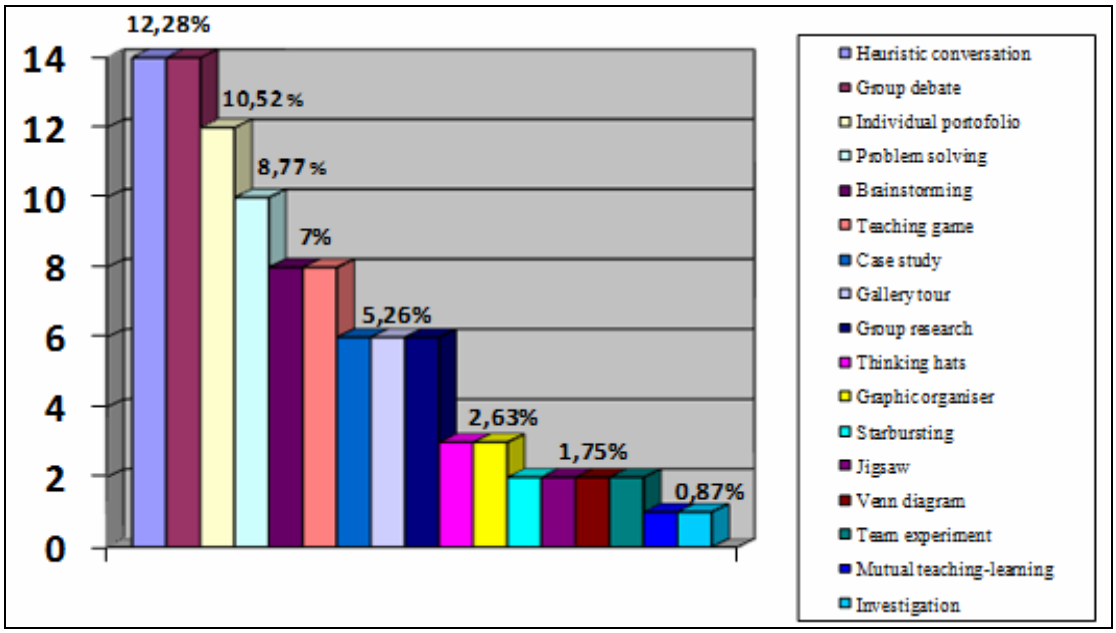

Figure 6. Percentage distribution of mentor-teachers' options regarding the choice of the interactive teaching methods

Over 50% of the mentor-teachers felt that the students are highly stimulated by using interactive methods and the rest of the teachers felt that the influence of the modern interactive methods on students is high. Out of the 17 teachers who felt that the interactive methods greatly stimulate students, 16 are from high schools (Figure 7).

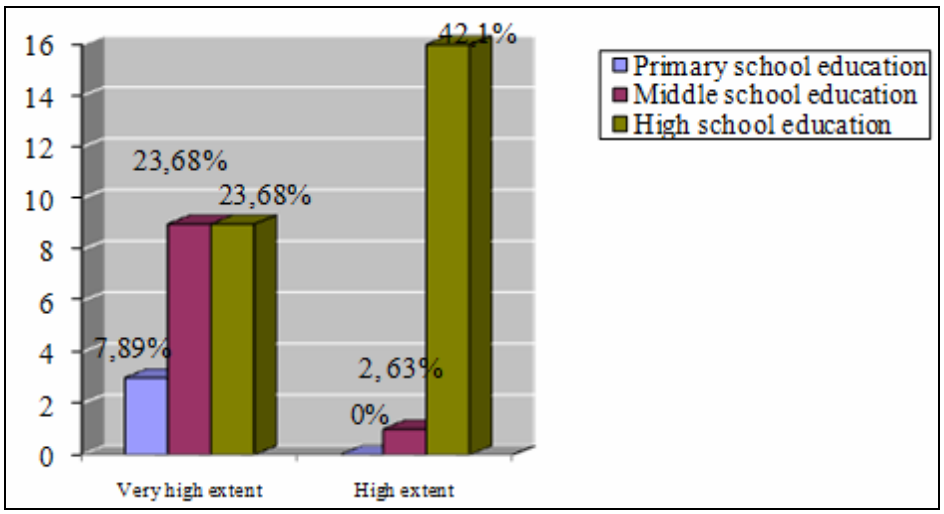

Figure 7. Percentage distribution of the mentor-teachers' options regarding the extent to which the students are motivated when the teaching-learning activity uses interactive methods

In the last question of the questionnaire, the mentors are asked to indicate at least five advantages and at least five disadvantages of using interactive teaching-learning methods versus using traditional methods (Table 2).

Table 2. Advantages and disadvantages of using interactive teaching-learning methods versus using traditional method

Advantages	Disadvantages
They stimulate group cohesion (cooperation between pupils);	The discussion can slip into uninteresting topics (unrelated to the lesson);
There is no downtime occur;	There may be disturbances during the lesson;
They have wide applicability;	Time consuming;
They stimulate creativity;	The results are unexpected;
Students take part in their own development;	Students are unmanageable;
Students lead the discussion towards what interests them;	The teacher may be put in situations which he/she does not know how to handle;
There is much dialogue, in the detriment of te monologue;	They require high costs for providing the necessary resources;
The teacher can easily apply the feed-back;	It is difficult to determine the contribution of each student because not all students get involved;
They develop critical thinking;	They cannot be applied to any lesson, on any subject;
They help organise and systematise knowledge;	The curriculum puts pressure on the teachers, so that they cannot afford to use interactive methods;
They offer assessment in favour of the student;	Monotony, repetition may occur;
They capitalise the student's own previous experience;	Some details may be ignored, as a result there may occur errors in learning;
They develop motivation for learning;	Often students do not have any notes in their notebooks;
They develop the capacity of deliberation, of responsibility;	There may be the risk of remaining behind the schedule;
They are attractive to the students.	They require experience from the teacher.

4. CONCLUSIONS

The data collected as a result of applying the questionnaires on 38 mentor-teachers in Argeş County entitle us to say that the hypothesis we started from was verified.

However, the data of this survey cannot be considered particularly complex because we only aimed at finding out the mentor-teacher's point of view. Therefore we believe that one of the limitations of our research is that we did not use a sample of students who were undergoing the teaching practice or a sample of beginner teachers, so that the information gathered from the two groups (mentor-teachers – students / trainees) could be correlated. The research also included a small number of subjects, but we hope and wish to continue this survey in order to confirm the above and to add other necessary conclusions. These data can be provided to the Argeş County School Inspectorate, which, by means of the Mentor-Teachers' Body, that is currently being established, can disseminate the information to all the mentor-teachers in our county. This way one will be able to propose measures to help mentor-teachers, who, in their turn, can help the young teachers integrate more easily in the teaching activity.

We conclude by emphasising that the teacher's creative behaviour is actually one of the factors that ensure the development of the students' creative potential. Teaching, as a creative process, implies the teacher as a mediator between the student and the world around him/her. He/she must not only organise the space and the activity, but also participate with the students in developing knowledge and stimulate collaborative interaction between the students.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

Bocoş, M. (2007) Didactica disciplinelor pedagogice. Un cadru constructivist (Didactics of pedagogical teaching subjects. A constructivist framework), 2nd edition, revised, Paralela 45 Publishing House, Piteşti;

Cerghit, I. (2002) Sisteme de instruire alternative şi complementare. Struncturi, stiluri, strategii (Alternative and complementary training system. Struncturi, styles, strategies), Aramis Publishing House, Bucharest;

De Landsheere, V. (1992) L'éducation et la formation, PUF, Paris.

Ezechil, L. (2009) Ghidul mentorului (Mentor's guide), Paralela 45 Publishing House, Piteşti;

Ionescu M., Radu I., (1995) Didactica modernă (Modern didactics), Dacia Publishing House, Cluj-Napoca;

Iucu R. (2001) Instruirea şcolară (School training), Polirom Publishing House, Iaşi;

Joița, E. şi colab., (2003) Pedagogie şi elemente de psihologie şcolară (Pedagogy and school psychology elements), Arves Publishing House, Craiova;

Lăscoiu M. E**.** (2009) *Practica pedagogică, modalitate de formare a competențelor practice specifice carierei didactice (*Teaching practice, method of creating practical skills specific to the teaching career) published in the Journal of Research in Education Sciences. Timisoara. Available at: http://www.rcsedu.info;

Oprea, C. L. (2009) Strategii didactice interactive. Repere teoretice şi practice (Interactive teaching strategies. Theoretical and practical landmarks), E.D.P., R.A., Bucharest;

Pânişoară I. O. (2006) Comunicarea eficientă (Effective communication), 3rd edition, Polirom Publishing House, Iaşi;

Păun, E. (1998) Şcoala - o abordare sociopedagogică (School - a socio-pedagogical approach), Polirom Publishing House, Iaşi;

Petruța, G. P. (2008) Clustering technique – applications within Biology and Horticulture lessons, in Lucrări Ştiințifice (Scientific Papers), year LI, vol. 1 (51), Horticulture series. "Ion Ionescu de la Brad" Publishing House. Iaşi;

Petruța, G. P. (2007) Methodological aspects of the use of combined empirio-sociocentric and empirio-psychocentric models of education within the Biology lessons, in Lucrări Ştiințifice (Scientific Papers), year L, vol. 1 (50), Horticulture series. "Ion Ionescu de la Brad" Publishing House. Iaşi;

Petruța, G. P. (2007) The importance of choosing for a certain teaching model in order to activize the pupils at the Biology lessons, in Scientific Bulletin Studies and Researches, Series primary and preschool education, no. 1, vol. II. Publisher University of Piteşti. Piteşti;

Petruța, G. P. (2009) Didactica Biologiei (Didactics of biology), in Quality in education – a pragmatic approach. Caled 2. Coordinator Liliana Ezechil. Publisher University of Piteşti. Piteşti;

Potolea, D., Carp, D. (2008) Calitatea programelor de formare continuă a cadrelor didactice; concepție şi practice (Quality of further training programmes for teachers; concept and practice), Universității Publishinh House, Bucharest;

Văideanu, G. (1988) Educația la frontiera dintre milenii (Education at the border of millennia), Politică Publishing House, Bucharest.

ANNEX. Questionnaire for teachers who work (worked) as mentors in the teaching practice

TEACHING-LEARNING INTERACTIVE METHODS FROM THE MENTOR-TEACHER'S PERSPECTIVE

In recent years the education system has undergone numerous transformations, and the issues related to mentoring have become increasingly important. The first projects focusing on mentoring (UNISCHOOL and then PRESETT) were initiated in 1994 by British Council Romania, and in April 2000 the National Association of Mentors was set up, an association that supports the young teachers by developing the mentoring activity in Romania.

In this respect we want to conduct a research in Argeş County and we kindly ask you to provide us with some answers that require your involvement and sincerity. Thank you!

1. **Do you/ did you work as a mentor-teacher?**

□ Yes □ No

2. **What level do you teach?**

□ Primary school □ Middle school □ High school

3. **What is the most important quality of a teacher and why?**

……

4. **What do you think is the importance that a beginner teacher should give to the following class-related aspects? Fill in the box with a number varying from 1-7 depending on your opinion!**

□ Relationships with the students
□ Accuracy of scientific content
□ Use of traditional methods
□ Use of interactive methods
□Ability to select and insert educational material during the lesson
□ Self-assessment
□ Educational strategy planning

5. **How do you assess the use of interactive teaching-learning methods during the lesson?**

□ Very little necessary □ Little necessary □ Necessary □ Highly necessary

6. **In which of the lesson types do you advise beginner teachers to use interactive teaching-learning methods?**

□ Communication of new knowledge lesson
□ Abilities and skills training lesson
□ Review and systematisation lesson
□ Checking and assessment of learning results lesson
□ Mixed lesson

7. **At what time during the lesson do you apply interactive teaching-learning methods and why?**

□ Organisational moment
□ Catching the attention
□ Updating the knowledge from the previous lesson
□ Communication of new knowledge
□ Strengthening the acquired knowledge
□ Feed-back
□ Transfer of knowledge

……

8. **Which of interactive teaching-learning methods that you know do you use most frequently in demonstrative lessons? Mark with an X three choices at most and bring arguments!**

□ Reciprocal teaching – Palinscar;
□ Jigsaw method;
□Observed interaction method (Fishbowl);
□ The cube;
□ Pyramid method;
□ Heuristic conversation;
□ Group debate and discussion;
□ Group problem-solving;
□ Teaching game;
□ Case study;
□ Graphic organiser method;
□ Comics;
□ Poster;
□ Gallery tour;
□ Categorisation;
□ Individual portfolio;
□ Group portfolio;
□ Investigation;
□ Brainstorming;
□ Phillips 6/6;
□ Starbursting;
□ Thinking hats – Edward de Bono;
□ Group focus technique;
□ Four corners;
□ Group research topic or project;
□ Team experiment;
□Venn diagram
□Others

……..……...

9. **Are the pupils stimulated when the teacher uses interactive teaching-learning methods?**

□ To a very small extent □ To a small extent
□ To a great extent □ To a very great extent

10. **Indicate at least five advantages and at least five disadvantages of using interactive teaching-learning methods as compared to using traditional methods.**

……..……...