

ACTIVE LEARNING - THE CONDITION OF OBTAINING QUANTIFIABLE SCHOOL RESULTS IN NATIONAL EVALUATION TESTS

IOANA-MARIA CÂMPEAN^{1*}, OLGA CHIȘ²

ABSTRACT. Our research analyses in detail significant aspects that are specific to active learning with the purpose of optimizing school performance in primary school. In this respect, the scientific approach follows the current methodological directions the main focus of the specialist's being the interest in activation and participatory strategies. The work depicts learning aspects in the following subjects: Romanian, Mathematics and Science, following a heuristic approach, a discovery- and problem-based learning, in teaching and in the acquiring of the specific content. The main focus was to observe to what degree the use of these teaching strategies can lead to obtaining superior school results that are quantifiable in National Testing.

Keywords: *active learning, discovery-based learning, heuristic approach, problem-based learning, National Tests.*

ZUSAMMENFASSUNG. Aktives Lernen-Voraussetzung für das Erhalten Quantifizierbarer Schulergebnisse in nationalen Evaluationstests. Das aktive Lernen stellt eine Herausforderung und einen Aufruf zur Selbstreflexion aufseiten der Interessierten dar, die Anteil an die Innovation und Effizientisierung des didaktischen Vorgehens nehmen. Das Syntagma *aktive Belehrung* wurde sich durch die Stärkung der positiven

¹ "Nicolae Bălcescu" Highschool, Cluj-Napoca, Romania. *Corresponding author.
Email: ioanamariacampean@gmail.com.

² Department of Educational Sciences, Faculty of Psychology and Educational Sciences, Babeș-Bolyai University, Cluj-Napoca, Romania.

Rolle von der sozialen Dimension im Falle vom Lernen verschrieben. In der Theorie und Praxis der heutigen Didaktik kennt das Problem der aktiven Belehrung neue, komplexe, interdisziplinäre wissenschaftliche Ansätze, die von Argumenten unterstützt werden, die eine aktive und nachdenkliche Teilnahme von dem Schüler an Lern- und Bewertungsverfahren erfordern.

***Schlüsselwörter:** aktives Lernen, entdeckendes Lernen, das heuristische Verfahren, problemorientiertes Lernen, Nationale Prüfungen.*

1. Introduction

In the theory and practice of the contemporary Didactics, the problem of active teaching follows new, complex and interdisciplinary scientific approaches that require an active and reflective participation of the pupil in the learning and evaluation process. From this perspective the pupils become active participants in their own training, exceeding, through their personal effort the level of empirical, partial, incomplete knowledge that is limitative and sometimes even wrong, succeeding in building and modelling their own personality in a favourable direction and in a positive way (M. Bocoș, 2013). The role of the teacher is to make the pupils responsible, to help them in their development, help them develop their personality and trust their own strengths. Educators adapt their educational speech on the basis of cultivating a new understanding in their pupils, one that is based on their own life experiences that pushes them to take an active part in the suggested activities, with the purpose of reaching the stated educational objectives.

Cognitive and constructive theories are considered fundamental in the process of active learning. The training process is very well carried out when the learning experiences start from the pupils' basic needs and expectations. As long as the pupils get the chance to reflect upon their

own experiences, they discover that ideas develop further in terms of influence and complexity and they learn to acquire superior abilities with the purpose of integrating new pieces of information. One of the most important roles of a teacher is to encourage this learning and self-reflection process.

The contemporary direction of the Romanian school is guided by some landmarks such as: "decentralization/ autonomy, accessibility, creativity, flexibility, quality and performance" (V. Chiş, 2005). The modern school imperatively requires the development of active and efficient educational structures that could be rendered permanent, offering the individual the necessary support in learning throughout their entire life.

The education law in force clearly sets up the educational finality: "shaping competence, viewed as a functional and transferable ensemble of knowledge, skills/abilities and aptitudes", all being necessary in one's one development and fulfilment, in the ability to integrate in the society, to develop interpersonal communication skills, to form conceptions about the world and life based on humanistic and scientific knowledge and on the national as well as the universal culture.

The curricular reform begun in the 90's, proposes a rethinking of the educational plans, of the school programmers and course books, incites the reorganization of the national curriculum from a European perspective and the integration of learning experiences into complex cognitive structures (M. Bocoş, D. Jucan, 2008). Starting from this premise, the process naturally led to the necessity of content correlation as a result of the intersection of different disciplinary areas. As a result the primary school curriculum sets as a goal the physical, socio-emotional and cognitive development of language and communication, as well as the development of learning capacities and attitudes, providing bridges for the development of the eight key competencies. Starting with 1998, within the space of the new curricula the term of "integrated teaching" is imposed. Learning and teaching are viewed in a holistic approach, having as purpose the reflection of reality and more precisely, an interactive reality.

Integrated teaching doesn't have as a reference just a single subject of study, but a homogenous theme that is common to several disciplines. The success of such an activity depends on the structuring degree of the projected content, always following the desired finalities, as well as on the result of combining the natural process of transmitting and acquiring information with the rigorous mental structures of the learning process. Integrated teaching targets the activation that leads to the pupils' articulation of "the reflective, logical, critical, imaginative, evaluative and creative thinking processes" (M. Bocoș, 2013).

2. General Research Coordinates

The aim of the present pedagogical experiment is to study the advantages and the limits of the heuristic approach, of the discovery- and problem-based learning in achieving high quantifiable school results in National Testing, in primary schools.

The general objectives of the research are:

1. Achieving high quantifiable school results in National Testing;
2. Optimization of the learning process in Romanian language and Mathematics and Science subjects;
3. Increase the pupils' active and conscious involvement in the process of acquiring new knowledge;

In order to be able to postulate the research hypothesis, our starting point was the following researched question:

Which are the coordinates of the heuristic approach, of the discovery- and problem-based learning in achieving quantifiable school results in National Testing, in primary schools?

Looking for answers to these questions, the research hypothesis was identified:

Achieving active learning by promoting the heuristic approach, discovery- and problem-based learning when studying for the subjects of Romanian, Mathematics and Science in the 3rd and 4th grade, contributes to a significant *improvement* of quantifiable school results in National Testing.

Thus, the *research variables* can be identified as follows:

- The independent value: - the valorisation of active learning by promoting the heuristic approach, discovery- and problem-based learning when studying for the subjects of Romanian, Mathematics and Science in the 3rd and 4th grade.
- The dependent variable: - the quality of the quantifiable school results in National Testing.

The research took place over a period of 2 school years, on an experimental group of 90 pupils, part of "Nicolae Bălcescu" High school, in Cluj-Napoca, and on a control group that included 132 attending the following schools from Cluj-Napoca: "Avram Iancu" Theoretical Highschool, "Emil Racoviță" Theoretical Highschool, "Gheorghe Șincai" Theoretical Highschool and "Ioan Bob" Secondary School.

The selection of the control group was carried out starting from the potential of these indices to valorise the interactive connections of the didactical methods and strategies (primarily the heuristic approach, the discovery- and problem-based learning). The research methods applied in the investigation, as well as the instruments that have been used, are presented in the table no.1.

Table1. *Research methods and instruments used*

Research Method	Research instrument
Didactical experiment	Didactical activities
The method of systematic observation	Observation sheet Psych pedagogical characterization sheet
The Quiz Method	My own drawn-up quiz
The method of analysing the activity results	The results of the pupils' activities

The statistical analysis of data	Microsoft Office Excel IBM SPSS Software
The method of curricular and legislation research	Legal documents currently in force
The method of testing and written try-outs	Standardized tests My own drawn-up quiz
Methods of measuring research data	Diagrams T Student Testing
The method of organizing, presenting and research data processing	Tables Diagrams
The method of verifying the statistical hypothesis	IBM SPSS Software

The pedagogical experiment went through 4 different stages:

- **the preparation stage** - in which the specific conditions of the carrying out of the experiment are being established and the strategy applied in the experiment is being indicated. This stage has coincided with the running, evaluation and interpretation of the tests within the National Testing in May 2015.

- **the formative stage** of the experiment - which consists of the actual carrying out of the experiment, this being a stage that takes place over a longer period of time, because the issuing of results doesn't represent an immediate consequence. The pedagogical research was carried out throughout a period of two school years: 2015-2016 and 2016-2017.

A relevant group of activities were made through applying the heuristic strategies in the study of Romanian language and literature, mathematics and sciences, in the third and fourth experimental classes

For example, in Romanian language and literature, activities were carried out on thematic areas such as the literary text; the lyrics; the book - the reading journal; the word - the meaning of the words; the oral and written narrative of fragments; composition based on given words; quotes; suspension points, etc.

- **the post-test stage** - which consists in registering and measuring the results of the experiment. In this stage the control group pupils, as well as the ones in the experimental group, were subjected to the final examination.

- **the retesting or remote verification stage** is carried out within a certain time frame. In our case this stage took place after one month and the durability of the knowledge acquired by our pupils confirmed, once again, the research hypothesis.

The carrying out of the formative experiment compresses the didactical activities that have taken place in the experimental classes. The teaching and learning activities have been influenced by the independent variable proposed, which represented the whole formative pedagogical assessment.

The dynamic of the school performance throughout the assessment targeted the pupils' evolution, school performance being quantified based on the continuous formative evaluation.

The comparative analysis, throughout the assessment, has been carried out by comparing the experimental and the control group, by using the criteria of class average, a vertical analysis being drawn. At the same time a horizontal analysis has been achieved by comparing school performance tendencies within the experimental group.

The post-test stage coincided with the running, evaluation and interpretation of the tests within the National Testing in May 2017. The analysis of the post-test stage and its comparison with the other results are relevant for the evolution of the experimental and control groups. This comparative analysis allows us to establish the significant differences between the results achieved by the two groups and their relation to the efficiency of the methods used in the formative period, therefore confirming our hypothesis.

The retest stage registered a difference of 1.25 points in favour of the results achieved by the experimental group in Romanian (Fig.1) and 0.38 points in Mathematics (Fig.2).

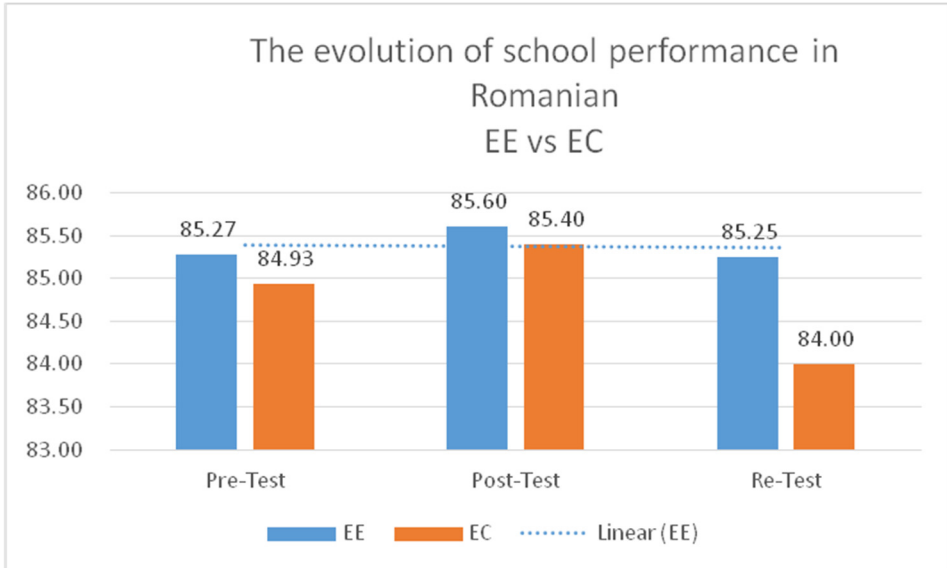


Fig. 1. *The evolution of school performance in Romanian (test scores)*

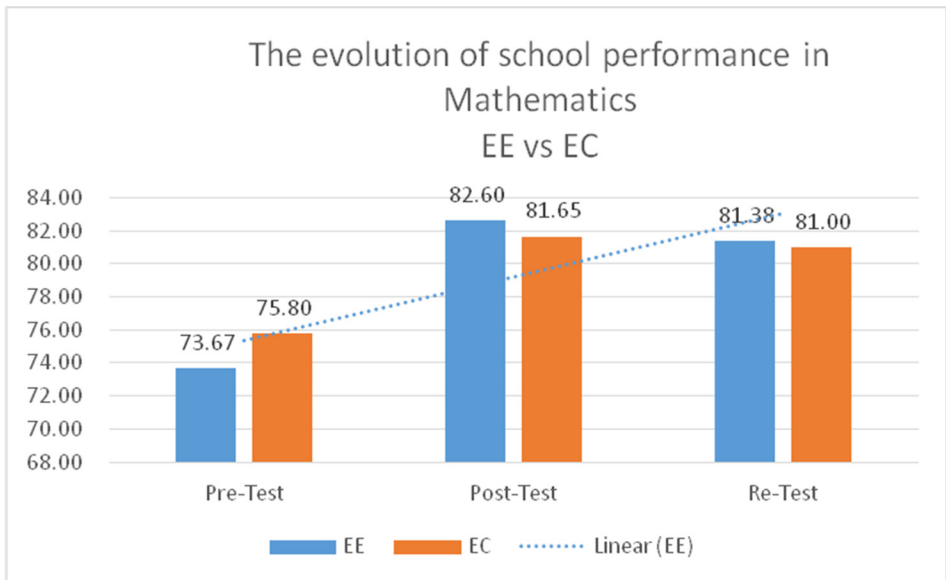


Fig. 2. *The evolution of school performance in Mathematics (test scores)*

3. Conclusions

The quantitative and qualitative comparative analysis of the achieved results of the experimental and control group, allows us to draw the following conclusions:

1.In the post-test and retest stage the average of the experimental groups is significantly higher in comparison with the control group.

2.The performance of the pupils in the experimental group is superior to the results achieved by the pupils in the control group, due to the heuristic approach, the discovery- and problem-based learning in teaching Romanian, Mathematics and Science.

3.The results achieved by the experimental group during retesting, prove the long-lasting acquisitions achieved through active learning.

4.Teaching the content from the perspective of active learning give pupils the chance to become key players in their own intellectual development, while taking upon themselves roles and responsibilities.

The formative experiment represents the central part of pedagogical research, a stage addressing the experimental intervention, in accordance with the intervention project. The experiment's data processing and interpretation, based on the elaborated hypothesis, allow us to draw the following conclusions:

1. Systematic use of the heuristic approach, of the discovery-based learning and problem-solving learning, significantly influence the formation and development of the competencies that are specific to the Romanian subject, namely the ability to receive an oral message, the ability to express oneself orally, the ability to receive a written message (reading/perusing), the ability to express oneself in writing.

2. Systematic use of the heuristic approach, of the discovery-based learning and problem-solving learning, significantly influence the formation and development of the competencies that are specific to Mathematics, namely knowing and using the concepts that are specific to

Mathematics and that are applicable to every-day life and the development of exploration/investigation capacities as well as problem-solving abilities.

3. Systematic use of the heuristic approach, of the discovery-based learning and problem-solving learning, significantly influence the formation and development of the competencies that are specific to Science, namely understanding and using, when communicating, terms and concepts that are specific to Natural Sciences, developing experimenting and exploration/investigation capacities and abilities, while using specific instruments.

4. Systematic use of the heuristic approach, of the discovery-based learning and problem-solving learning, significantly influence the efficiency of the didactical activities' management.

The research that has been carried out proved, through its registered results, that the heuristic approach, the discovery-based learning and problem-solving learning, presented in the teaching-learning process, significantly improve the quantifiable results of pupils in National Testing. At the same time it has been shown that the benefits of such an approach have not been reduced to the cognitive level, but have been sensed in terms of motivation and emotion, behaviour and attitude. The success of didactical activities has been measured through the implication of the pupils in the proposed tasks and through the durability of the acquired knowledge. The dynamics of the classes led to the setting of a lively atmosphere and a motivating environment, thus contributing to the creation of an efficient learning style, the pupils developing their own active style of intellectual work.

The general conclusions of this active and integrated teaching and learning research prove without a doubt that the heuristic approach, discovery- and problem-based learning contribute significantly to the improvement of school performance, while bringing a plus in terms of the motivational-affective and the behavioural-attitude component.

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