CAPITALIZATION OF MULTIPLE INTELLIGENCE TYPES DURING THE BIOLOGY DISCIPLINES

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Abstract. The study was conducted on a sample of children at the Lăpuş School with classes I-VIII, using the teaching/learning process of the biology disciplines. A key element in applying the theory of Multiple Intelligence in a classroom is knowing the intelligence profile of children. Differentiated teaching approach was designed based on the predominant types of intelligences. For this purpose we used various methods: questionnaire, observation of children as they are given various tasks, interview, development of projects, role play, the biographical method-personal history of child, analysis of activities' results (compositions, drawings, collages, portfolios), debates in pair-groups, and case studies. In child's profile, (types of) intelligences become qualities that we capitalize in training, designing different teaching approach depending on predominant types of intelligences. The results appeared without delay. After a school's year that we worked differently with the children, they have improved school performance and became more interested in the study of biological disciplines thus arousing their curiosity and respect towards life.

Keywords: children, multiple intelligences, learning style, teaching biology.

INTRODUCTION

In 1983 Howard Gardner [9] developed for the first time the theory of Multiple Intelligences having as starting point the criticism in educational system (which particularly focuses on logical-mathematical and linguistic capabilities). Ten years later, he refined his position, adding elements of experimental research, transferring multiple intelligences from a critical and criticized concept in a starting point of a school practice with individual thrust adhesion [2, 3, 4]. Since then, the practical applications of the theory have increased, the success of "Multiple Intelligences" in school surprising even their intiator. According to the criteria established by specialty research, Gardner has isolated eight intelligences [6, 7].

This intelligence refers to the ability to solve problems and develop products using language. Children with linguistic intelligence prefer to write poetry, letters, compositions, to sustain a debate, to achieve an oral presentation, to ask questions and to take an interview, to create a slogan and create word puzzles that are related to the subject of the lesson [6].

Logical-mathematical intelligence consists in the ability to work with models, categories and relationships, to group, sort and interpret data. Children who have a logical-mathematical intelligence prefer to translate something from a mathematical formula, prefer to use analogies in order to explain things, to define problems and demonstrate them by schemes [5].

The ability to form a mental model of the world as a space, to operate using such a model - that is to solve problems and to develop products using spatial representation and images. Children who have a visual-spatial intelligence draw in order to explain things, get easily oriented in space, get a correct visual perception from several angles.

Musical-rhythmic intelligence is defined by the ability to solve problems and develop products with the help of rhythm and melody. Children who have this type of intelligence show sensitivity to sounds, discern a variety of environmental sounds, create music and rhythm and show rhythmic patterns.

Bodily kinesthetic intelligence refers to the ability to solve problems and develop products by involving muscular movement using motion. Children who have a bodily-kinesthetic intelligence create motion to explain something, control movement, they gladly participate in role play and dance.

Naturalist intelligence is the latest included in Gardner's study and consists in the ability to solve problems and develop products using classification/taxonomy and representations of the environment. Children who have naturalistic intelligence observe, record and classify, describe the changes in the environment, take care of animals, gardens, use magnifying glass or binoculars for observation, draw/photograph objects from nature.

The interpersonal intelligence is defined by the capacity to solve problems and develop products through knowledge and interaction with others. Children with interpersonal intelligence cooperate in groups, show stability and focus on conduct/reasons/attitudes/feelings/moods of others (around him) and use the computer [6].

Intrapersonal intelligence is defined by the ability to solve problems and develop products through self-knowledge. Children with this type of intelligence establish and pursue a goal, keep a diary, describe the qualities of the person who helps them achieve something, express feelings and are aware of certain feelings, they know where to turn if they need help [6].

Multiple intelligence theory expands the horizon of opportunities for learning/assimilating the knowledge beyond conventional methods used in most schools.

The purpose of the work is to identify the types of intelligence and to analyze the effects of didactical scenarios based on these types of intelligence.

MATERIALS AND METHODS

The study was conducted on a sample of 123 children in classes V, VI and VIII - School with classes

I-VIII, the city Lăpuş, during the school year 2008-2009.

A key element in applying the theory of Multiple Intelligences in the classroom consists in determining the intelligence profile for each child [10, 11]. Data collection method was based on questionnaire that was distributed at the beginning of school year. The results were used to identify the type of intelligence. Getting to know the strengths and weaknesses is essential in establishing educational strategies for differentiation and individualization [1, 2, 3], because children will focus on those strategies that match their predominant intelligences.

After having identified the types of intelligence [15], the teaching scenario was designed to use the questionnaire , interview, development projects, role play, biographical method - personal history of the child, analysis of work products (compositions, drawings, posters, collages, portfolios), discussion groups and case studies to allow collecting of information based on the predominant type of intelligence. Children have shown interest in this concept and gave a positive response when differentiated education strategy was used. At the end of school results were compared.

RESULTS

The study allowed us to identify in the tested batches many types of intelligence, some of which are prevalent. Multiple Intelligences theory does not change what was taught, but allows changing the teaching-learning process and allows children to evolve differently.

Figure 1 presents the types of intelligences identified in the studied batches, namely their frequency.

The types of intelligence described in the fifth grade have been verbal-linguistic intelligence 26%, visual-spatial intelligence 23% and naturalistic intelligence 16%. Children in the sixth grade presented bodily-kinesthetic intelligence 23%, followed by verbal-linguistic intelligence 15% and naturalist intelligence 13%. For the children in the eighth grade naturalist intelligence was 15% and the verbal-linguistic intelligence, visual-spatial intelligence bodily- kinesthetic intelligence, interpersonal intelligence and musical-rhythmic intelligence had a frequency equal to 14% (Fig. 1). Children in the eighth grade presented six types of intelligence having a frequency between 14% and 15%. Logical-mathematical intelligence and the intrapersonal intelligence are reduced to a frequency of 5%.

Figure 2 shows the trend of yearly grade average during the school years 2007-2008 and 2008-2009 for children in the sixth grade. After a school year in which teaching activity was carried out in the sense of capitalization of the predominant intelligence types we have noticed an overall grade average increase in biology over grade 7. Benefits of the theory of Multiple Intelligences approach include creating more opportunities for developing the child's talent, obtaining higher child performance and achieving connections between different subject areas.

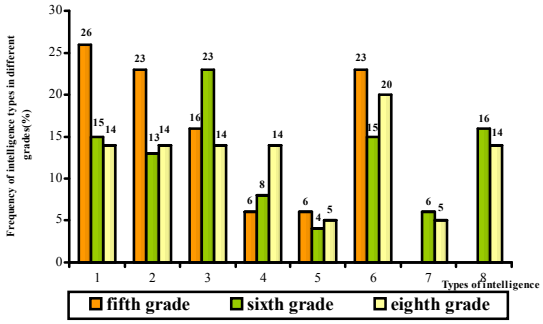

Figure 1. Frequency of types of intelligence found in the tested batches (**1** - verbal-linguistic intelligence; **2** - visual-spatial intelligence; **3** - bodily-kinesthetic intelligence; **4** - interpersonal intelligence; **5** - intrapersonal intelligence; **6** - naturalistic intelligence; **7** - logical-mathematical intelligence; **8** - musical-rhythmic intelligence).

In the case of eighth graders, children with an annual average of 5 - 5.5 in the discipline of biology during the school year 2007-2008 have improved to the annual average of 6.5 and 7 during the school year 2008 - 2009. The ones having yearly grade average of 7.50, 8 and 8.50 improved to grades above 9 during the school year 2008-2009 (Fig. 3).

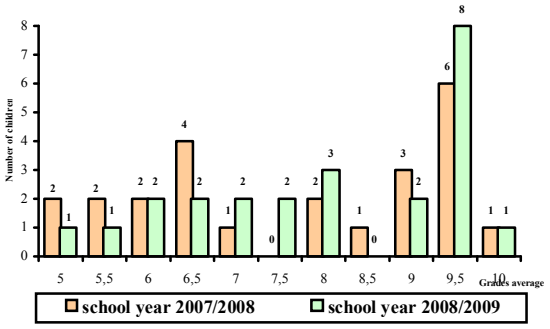

Figure 2. Annual average change during school year 2007-2008 and 2008-2009 for children of sixth grade.

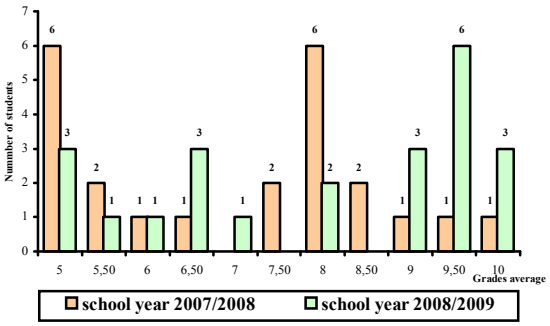

Figure 3. Annual average change during school year 2007-2008 and 2008-2009 for children of eighth grade.

DISCUSIONS

The types of intelligence identified on children from fifth grade were verbal-linguistic intelligence, visual-spatial intelligence and naturalist intelligence. The logical-mathematical intelligence and musical-rhythmic intelligence weren't identified.

In case of studying children from the sixth grade, there were identified all types of intelligence. The bodily-kinesthetic intelligence had a high frequency of 23%. The verbal-linguistic intelligence, visual-spatial intelligence and naturalist intelligences brought closer frequencies. In addition to that, children proved sensibility to sounds and they have a high capacity to work with models. Children from the sixth grade develop the ability to interact with each other because of their self-knowledge.

Children from the eight grade presented all types of intelligences and they also had frequencies between 14-15%. In case of self-knowledge and the capacity of working with models, children presented a low frequency of 5%.

Piaget [10] points out the continuity between the representative systems and the conceptual one. Thanks to Piaget, the period taken into consideration from the point of intelligence development corresponds with the formal operations period (children aged between 11 and 17). In this stage children obtain the capacity of realizing complex mental operations.

Knowing different approaches of the intelligence concepts facilitates the selection of didactic methods [4, 12] and proper assessment tools. Comparing school results over the last two years we notice an increase in child's performance as a result of using the theory of Multiple Intelligences. Overall the yearly average is greater by one point for the subject biology after a school year in which we worked differently with each child, depending on the predominant type of intelligence. There are children for which the grade average significantly increased (even by 2.5 points). These differences encourage their perseverance. Using Multiple Intelligences theory is a step forward. Its applications in biology lessons revitalize the work, releases the teacher and children of curriculum rigidity, allowing a much better adaptation to the reality of today's society.

The attitude toward biology and teacher has changed, arousing the interest of children, curiosity and respect for the environment. The practical importance of the previous approaches could be expressed by sustained involvement of children, developing talent and achieving performance, improving the assessment and making connections between subject areas.

In particular a number of articles have explored the possibility of applying multiple intelligences [14 - 16]. At all levels of schooling, teachers can transform the classes into lessons based on the theory of Multiple Intelligences. Background music, crayons, varied teaching material, active well-chosen methods, Power Point presentations, films, lectures turn dull lessons into attractive and interesting ones [3, 4, 8, 11 - 13]. The biology teacher can lead the school community in numerous practical activities, clubs, environmental education programs, tours, research, communication sessions, portfolios achievements, exhibitions of drawings, photos etc.

It takes time, patience, imagination, creativity and involvement to apply in class the method of Multiple Intelligences theory. There is no unique recipe for it. If we are able to identify in our children those intelligences and we can value them, we would feel more competent and more close to their needs, we would feel that we work well, for our own benefit and theirs.

Garnier [5, 6] claims that there is no such thing as stupid children but only incomprehensible, whose potential has not been yet capitalized. It perfectly fits Descartes words: „it is not enough to have intelligence, you have to use it". Finally we have to accept that we all are different.

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