THE IMPORTANCE OF INNOVATIVE TEACHING METHODS IN ENHANCING THE QUALITY OF TEACHING

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ABSTRACT

This article is intended to give basic information about teaching by various specific methods and ways. The most essential aim of education is enhancing the quality of teaching that is completely crucial today. There are many important and innovative teaching methods that can be utilized in teaching and learning. These methods are emphasized on students´ active participation, preparation and work. In this paper, the main information is given about some of these methods, for example problem – based learning, didactic games, methods "how to express the idea with a pencil" (mind maps, tasks), discussion (brainstorming, Philips 66, Hobo), brainstorming, heuristic method. Also, these methods are being used by learners, students and school children in order to improve their knowledge on different subjects.

Key words: Innovative teaching methods, activity, inductive methods, approaches, teaching technologies.

I. INTRODUCTION

Today our initial and global problem is that school physics seems to be very difficult on learning information. Students contrast that physics instruction utilizes to a lot of formalism, mathematics. Secondly, school physics plays a key role for recruitment of people for science and technological professions. Teaching and learning physics or science at schools in many countries is still characterized by the chalk-talk method (Dvořák 2008). Lecturing as a method of teaching school science was known as one of the less interesting methods (Maňák 2003). Science education research recomended some teaching strategies that are more effective for demonstrating comprehension of science. Results of research in science education and cognition psychology defined that students learn most beneficially in interactive classrooms in which students actively participate in dialog among themselves and with the teacher while manipulating experimental materials (Wickoff 1999).

Student-centered methods contain a great number of various instructional methods, for example: project-based learning, problem-based learning, just-in-time teaching, discussion methods. All these methods are inductive, based on constructivist approach. Constructivism was studied by Nezvalova (Nezvalova 2007a). In the constructivist approach the present instructive teaching practice is completed by chosen learning problems through creating adequate learning environment. It is significant to know that knowing is not closed, it is forming – it constructs itself individually and in terms of social relationships. Learning is an active process, it realizes in multidimensional relationships. From this perspective the learning process is primarily the matter of construction, learning individuals enter as a co-creators of learning process (Nezvalova 2007b). Students construct their knowledge, activity and motivation are important.

The problem is that teachers in the Czech Republic have not experience with varieties of inductive methods and have not skills to apply these methods in their classrooms. The evaluation of the projects shows that students are most of all interested in interactive teaching strategies and experimental laboratory tasks. The use of interactive teaching methods in physics lessons is not very common. Several interactive teaching methods were chosen and used by in-service teachers and pre-service teachers in physics teaching at high schools in the Czech Republic (Olomouc, Skuteč). Properties of the methods will be discussed in the next part of this paper.

Project-Based Learning.

Project-based learning (PBL) – the most common method. It is an instructional methodology in which students learn important skills by doing actual projects. More about project -based learning will be find in Holubova (2008).

The acquisition and structuring of knowledge in PBL is thought to work through the following cognitive effects (Schmidt, 1993):

• initial analysis of the problem and activation of prior knowledge through small-group discussion,
• elaboration on prior knowledge and active processing of new information,
• restructuring of knowledge, construction of a semantic network,
• social knowledge construction,
• learning in context.

Problem-Based Learning

Problem based learning is often referred to as a form of inquiry-based learning (IBL), which describes an environment in which learning is driven by a process of inquiry owned by the student. The problem can be presented in various forms – question, task, experiment. Some theories suggest that learning occurs as students collaboratively engage with concepts in meaningful problem solving. In this view, knowledge is seen as a tool for thinking and for enabling learners to participate in meaningful activity.

Consensus Decision-Making

Consensus is a group decision - making process, the resolution is the general agreement. We can find a simple structure of each consensus process:

• discussion of the item - getting information about the topic and identifying opinions,
• formation of a proposal,
• call for consensus,
• identification and addressing of concerns,
• modification of the proposal.

The teacher plays various roles – the teacher is a facilitator, a timekeeper, a vibe watch (he is monitoring the emotional climate), a note taker. To be successful with the consensus making, some guiding principles must be applied - inclusiveness, accountability, facilitation, shared control, commitment to implementation. Magic happens when everyone is in agreement.

Brainstorming

Brainstorming is a group creativity technique designed to generate a large number of ideas for the solution of a problem. In 1953 the method was popularized by Alex Faickney Osborn in a book called Applied Imagination. Osborn proposed that groups could double their creative output with brainstorming. The most important outcome of brainstorming is improving team work. Some disadvantages of brainstorming, for example not feeling free to present unusual ideas, were eliminated by electronic brainstorming. The aim of brainstorming is to generate a great number of ideas. The teacher has to create a criticism-free environment, to present the problem and organize the discussion. It must be clear, how to measure progress and success, the way for evaluation of the process. The solution of brainstorming must be clear for all.

Mind Map

Mind maps help avoid linearly thinking, the problems are solved more creatively. You can use a sheet of paper and the central idea is written in the middle of the paper. Then you can add new ideas using words,

combine them, add a structure. It is a visual method, there are a lot of possibilities, how to create a mind map. Later on you can modify the information.

Heuristic Methodology

The heuristic method of learning is based on learning by discovering, on constructivism and on active interaction of teachers and pupils. An outcome based on the heuristic Method, in the Czech Republic very popular, are the activities of young debrouillards. The common axes of their philosophy are: use of scientific process, leader guided creativity, use of cheap and non-sophisticated materials. The method includes entertaining activities to stimulate the kids´ exposure to the scientific phenomena they meet in the everyday environment, to develop the child´s curiosity and analytic mind, to have training effects on the family, scholar and social

scales. The Heureka project is running in the Czech Republic for more than twelve years. Seminars and workshops for teachers are organized, materials and worksheets for interested teachers are prepared.

Interactive methods mentioned above were used as teaching methods in physics teaching at high schools in Olomouc and Skuteč (Czech Republic). Methodology materials for teachers and worksheets for students were prepared by the pre-service teacher and our research team. Recommended methods were attached to the materials. Methods that were recommended for use: heuristic method, brainstorming, mind map, Phillips 66, project-based learning and problem-based learning, black box, consensus. The topics according the kinematics and dynamics

of the mass point and an object were tested. The methodology materials for teachers contain the list of equipment, the method, exercises and tasks, information how to organize the lesson, the needed time for the activity. List of tested physics lessons:

Kinematics of the mass point (Velocity, uniform motion, The trajectory of uniformly

accelerated motion, Free fall, Acceleration of gravity), Dynamics of the mass point (Newton´s First law, Newton´s Third law), The principle of conservation of linear momentum, Inclined plane.

II. METHODOLOGY

Teaching and effective learning require the use of appropriate pedagogic and methodological methods. Time has changed for traditional teaching "using a piece of chalk". Though we can't deny the attributes and advantages of this method in particular situations, but we should emphasize the great importance it has for every teacher, encouraging being a participant. While Kolbi sets the pupil in the center of learning, by evaluating his participation in the learning process as very important in creating his experience in learning. Silcock and Brundert established pupil centered teaching as an approach where the teacher is a facilitator and guidance of the learning process towards teaching where the teacher has control of everything in order to achieve the lesson aims. One of the most common class activities which in fact is the fundament of all learning and educational activities is the communication among teachers and pupils. It is fulfilled in many ways throughout the whole of the lesson time and it directly or indirectly implies all the pupils. It aims to improve the teaching quality. The techniques of asking questions which are included in the interactive teaching context are the recommended modules. Teachers should be open to the pupils' involvement in all stages of the lesson process. The teacher leads and organizes, whereas the pupil is involved everywhere. The teacher should intertwine learning with topics and projects which assure a massive pupils' participation. Pupils should be given the chance to get involved in working with pedagogical means of school texts. This task concentrates them in thinking and

studying and the teacher makes them active to improve the scientific level in their subject. Also, the teachers should consider stimulating the feeling of self – confidence to the pupils, which is something to be appreciated.

Qualitative methods of pedagogical research were used in our research. Observation was the first of them. We monitored the lessons where interactive teaching methods were used. The lessons were realised by one pre-service teacher and three in-service teachers. The second method was an interview with all interested teachers. We discussed their teaching and their opinion with the new methodology. The interviewer used a semi-structured approach, with a set of fixed questions. Much of the interviews was open, with the teachers encouraged to talk freely. So there was a place for open discussion. The evaluation of all lessons was focused on these three main questions: 1.how to prepare the lessons, 2. kids´ activity and 3. difficultness of the method. Each method was marked with the mark 1, 2 or 3. The best mark 1 was obtained if the method was leading to active students´ work, to communication, and team work. Very important was if the method could be used in all parts of the lesson.

III. RESULTS

The next part of this paper summarizes the outcomes of our interviews with interested teachers and our own observations in classes during the lessons. Interested teachers marked the methods as we can see in tables 1 to 7.

Heuristic Method.

Based on the teacher´s idea, if he is able to find a problem were students can do their own research and find out the new principle. Untraditional equipment is needed. The method is based on the experimental activity of students.

Evaluation: Very useful, this method really improved the activity of students. This method is an important tool for teaching and learning. The method is difficult. It is necessary to prepare the lesson very carefully.

Table 1. Heuristic method

Indicator	Mark 1	Mark 2,3
Activity	1	
Communication	1	
Difficultness of the method		2
Team work	1	
Part of the lesson	2	

Black Box

A simple method if we can use data from an experiment. For example: in one of our tasks during an experiment the motion of an object was studied - the trajectory and time were measured. The data were plot in a graph and students had to find the mathematic model – the function for the velocity of the object.

Evaluation – the method initiated the students´ activity. The main problem of this method was, how to find the mathematic model, the function. It was very difficult for our students.

Table 2. Black box.

Indicator	Mark 1	Mark 2,3
Acivity	1	
Communication	1	
Difficultness of the method		3

Team work	1	
Part of the lesson		2

Problem Based Method – Paradoxa.

The velocity of a rain drop was calculated. The result of the calculation was the number 200 m/s. The task was to explain the real situation. There are a lot of problems and paradoxa that can be discussed in high school physics. They can be used in various parts of the lesson.

Evaluation – a very useful and active method. Some of the problems can be very difficult. A problem for one student must not be a problem for another one. The assistance of the teacher was needed. Very interesting is the method when tasks are formulated by students themselves. Methods when tasks from textbooks are solved are boring and uninteresting for our students. When students formulate the tasks themselves, it is more interesting for them and students are very active. Evaluation demanding, but interesting. The main problem of this activity – students are able to think out the tasks but they do not solve them in a right way. This method can be applied even if the topic of the lesson was comprehended.

Didactic Game.

It is a problem, how to find interesting didactic games for high school students. We can find very simple games and very complicated games too. They can be very difficult for students so as for teachers to prepare the game. Time by time it is useful to play some games. Two types of games were tested, a puzzle and how to get a millionaire. Evaluation – the lesson with games was interesting, the students were active. Disadvantages – the teacher must prepare the questions for the game, it is time consuming. Time consuming is also to play the games in the lesson. For the future we recommend to play games with GPS sensors.

Mind Map.

Worldwide very popular, in the Czech Republic used very rarely. Students were asked to put down a mind map according to acceleration. The students were not successful in this activity. Evaluation – a great problem, students never worked with a mind map. A deeper instruction was necessary. Teachers did not know how to work, prepare and evaluate the mind maps. Further activities are organized to improve the knowledge about the method.

IV. DISCUSSIONS

Nowadays, the outstanding achievements in all fields of sciences, in technique and technology as well as in other fields of human development, are constantly inflicting more and more profound changes in the organization of the teaching processes, in order to make it perfect as well as to ensure easier ways for students to acquire knowledge, skills and wants. Such changes are aiming to prepare younger generations to be capable of facing 21st century challenges as well as to be skilled and competitive to the labour market. In order to make use of the contemporary teaching methods to all levels of education, changes began to take place into the organization of classes, the application of new teaching techniques and interactive methods, etc. However, great changes took place in the forms of organizing the teaching activities. Effective teaching in a certain classroom depends, firstly, on the teachers' skills to maintain and raise the interest of the students in what is being taught. Engagement of communities to bring changes in education is considerable; millions of Euros have been spent to train and qualify teachers in order to further develop their capacities as well as to integrate them in the global currents of education. The fact that, in all societies of the world, education is a challenge requiring approaching

and reproaching in order to find the most adequate ways for the education of younger generations who will have the fates of the countries of the globe as a whole in the future, cannot be disputed.

Teachers are maintaining the course to progress being even supported by the curricular changes the Albanian state has foreseen. These changes require adequate application of the New Curricula as well as permanent professional development for teachers in order to contribute into increasing quality in the field of education.

Respectively, they entail changes into the roles of teachers and students by means of participation of the communities into the life of the school as well as the interaction of many other education factors.

Students' creativity is to be detected and made use of by creative teachers who should enhance such values even by getting out of books and traditional methods, by further developing the students' creative imagination and making them understand that there are too many options to resolve a problem, so students should consider them deeply and make use of all the potential choices.

Today, the use of new technologies in teaching increases its quality that is really important in our education system. Technological development in the world is progressing with the speed of light compared to the developments in education which are progressing very slowly. The main commitment of education and its compound elements is to get rid of the ignorance and to disperse the light of knowledge. The interest and the involvement of both the society and the individuals should be in a higher level than they actually are.

CONCLUSION

In our research several interactive teaching methods were explored. The findings of in service teachers so as pre-service teachers are the same. Interactive teaching methods can help us to teach science for understanding. But it is necessary to change the role and position of the teacher in the classroom. The physics teacher in the 21st century have to be a classroom manager. The teacher has to be an expert not only in physics but also in pedagogical science. Traditional teaching methods are not effective. The goal of the initiative is to apply new methods based on the constructivist learning theory. The learning and teaching process is more effective, when students can construct their knowledge by their own.

According to the report Learning for the 21st Century, today's education system faces irrelevance unless we bridge the gap between how students live and how they learn. A growing number of initiatives can be seen in our schools, but the majority are concentrated only on project-based teaching and learning. For our teachers it is the most important interactive method. Another wide spread method is the heuristic teaching problems of education in the 21st century method. Other variations of interactive methods are not used. Teachers complain that they do not know the methodology of these methods and that they have not enough time to teach in the new way. At our department pre-service teachers are taught these new methods and its methodology and in-service teachers are invited to seminars and workshops where they get informed about the methodology. It is necessary to prepare more instructional materials for teachers in service teachers complain that it is time consuming for them to prepare a lesson with interactive methods. The research has shown that interactive teaching methods can improve the quality of teaching. The main problem is how to get more interested and skilled in-service teachers. Our further activities will be concentrated not only on our university students and pre-service teachers but also on in-service teachers to improve their knowledge about the methods mentioned above.

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