

THE COOPERATIVE LEARNING IN LIFE SKILLS TEACHING AND IN THE MATHEMATICAL LABORATORY: A PRECIOUS TOOL OF RECIPROCITY

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Abstract

Many psycho – pedagogic theory sustain the utility of the cooperative learning in teaching. In this job, after analyzing some theoretical bases of this methodology, its flexibility and its tall educational value are analyzed, also setting great attention to the role of the teacher and what the teacher must do for increasing the effectiveness of this technique. The contemporary Life skills model, of Constructivism Social Constructivism matrix, revalues a lot this strategy of teaching. Also in mathematics teaching and, particularly, in the "mathematical laboratories", the jobs in small groups seems to have a protagonist role. It proposes, finally, the description of a mathematical laboratory activity of algebraic matter, performed in class. In it the cooperative learning is placed side by side to the "mathematical discussion", very appreciated in literature, and to other didactic strategies. The effectiveness of experiences of this type seems to show the validity of complex didactic strategies, provided that is opportunely, projected, controlled, realized, analyzed.

Keywords: *cooperative, reciprocity, laboratory, discussion, methodology, skill.*

1. Cooperative learning: basic theory

1.1 Introduction

The cooperative learning is one consolidated teaching methodology that consists of hanging in small groups (from two to four people) reciprocally helping and feeling jointly liable of the mutual help.

I like to describe this methodology through a metaphor.

Italo Calvino (1986) says that someone asked to Marko Polo what pits the stone that held up the bridge and he responded whether to hold up the bridge was not the single stone, but the curved line that they form.

It's this the principle on which the cooperative learning founds it. The purposes of this method are both the improvement cognitive (what the principal purpose is of any didactic action), that the human and esteem's growth of the pupils.

We find the premises of these concepts in the Russian psychology and, particularly, in the jobs of Vygotsky (1939).

According to these theories, the learning is a social trial: the acquisition of the knowledge happens through the social construction before and, subsequently, through the progressive transfer of the external social activity, through signs, to the inside control; an example of this trial is the learning of the language before is listened and included and, only in a second moment, acquired.

The thought that is acquired by the cooperative learning is always superior, for value, to the sum of the thoughts of the single ones.

To optimize this trial is necessary that in class a positive climate is established. The teacher should hold a democratic attitude, sincere, from positive leader, should be a point of available reference to the active listening and the help and should hold a director attitude of the activity, whose actors are the students.

The teacher is an organizer of communicative situations for the learning.

The second element of the theory of Vygotsky is the socialized learning in the zone of next development. The Zone of the next development is the potential development of each individual that can be determined only through the problem solving. The Purpose of the educator is to contemplate well the didactic proposal in the zone of next development and to organize with attention the helps and the reflection. As it regards the cooperative learning, it is important, to such intention, to create, sometimes, heterogeneous groups for level, in which every pupil puts to the light his/her peculiarities to help the group's job, and sometimes homogeneous groups for level, in which the assignment pushes all the members of the group to work in his/her own zone of next development.

The advantages of this methodology are, according to M. Castoldi (2010):

- **Positive interdependence:** once reached the purpose, it is not possible to attribute to an only person how much has been realized. It exists, in fact, an interdependence of objectives.
- **It promotes the development of social ability.**
- **It allows the evaluation** and the personal debriefing and of group both of the abilities that of the competences acquired.

1.2 The role of the teacher.

Which are the operations that a teacher must develop for preparing and introducing a cooperative learning activity to the class and particularly an activity that contemplates the acquisition of specific abilities and/or skills?

- After having analyzed the annual planning and the ministerial indications, he/she creates a *problematic situation* that contemplates to the attainment of determined transversal and disciplinary competences;
- He/she prepares an index book volute in which different competences are express that the pupils should reach and the different levels of learning;

- It programs in detail the activity and it deals him with the combination of the teams and the possible recombination during the activities;
- He/ She introduces with clarity the job to the class, he/she assigns a task to every team and to every student a role;
- It observes with attention the job in carrying out and takes notes that allow him to appraise;
- At the end of the activity, he/she analyzes the results and coordinates the presentation to the class of the jobs of each team;
- He/She invites the students to analyze the trials and the finished progress and he does the same;
- He/she defines corrective indications and improves of the proposed activities.

1.3 The cooperative learning in the Life skills teaching and, in general, in the didactics of the mathematics.

Skill points out the ability of the student to mobilize and to integrate cognitive and affective resources to resolve an unpublished problems, not reducing solutions of routine, that introduce him/her in real contexts through effective and efficient performance, according to formality ethically and socially sharing. (The Boterf, 2000; Pellerey 2004)

From this definition, we understand that, to stimulate the pupils to the acquisition of the life skills, the teachers have to propose them a problematic situation. (about the real life) and to create a human environment that amplifies the resources of each student.

The cooperative learning is a powerful tool both for a Life skills teaching (constructive) and for the contextual teaching models. Each group reproduces a small community that deal with a problematic situation, thanks to the team's job.

If the proposed problem is scientific, the group can be compared to a real community of scientists in whom each individual brings own contribution that derives from the personal human, cultural, social and professional experience.

1.4 The cooperative learning's educational value.

As Math and Science teacher at middle school, I firmly believe that didactics effectiveness must make reference to more models of teaching and must use manifold methodologies.

Between them, the cooperative learning occupies a position of relief: the team, in which the pupils have called to work, in fact, are image of the communities in which, as adults, we are kept to report us for cultural motives, human and above all professional.

It never needs to forget that teacher is an educator that must have in mind an ideal of man and woman which desires that his/her students aspire, this is the goal of educational action.

The teacher that chooses the cooperative learning in daily didactics, doesn't want only that his/her pupils learn with the help of their contemporaries, but also to build an equitable and collaborative

society, distant from the individualism and from the unhealthy competition, where each student succeeds in expressing peculiarities to the best, to make them available to everybody.

2. The mathematic lesson: the cooperative learning as integrated methodology in a more complex teaching.

2.1 The daily didactic

In the daily didactic of the mathematics, I have always used to combine manifold didactic methodologies. Following I propose an example of complex didactic experimentation that I have applied in the daily didactics and that has given me a lot of professional satisfactions. I propose it because methodology of the cooperative learning (G.I. Group Investigation) has a fundamental role in it.

This protocol has been reproduced, even if not faithfully, from some colleagues that collaborate with me and it have also given me for them a positive feedback.

The proposed delivery is not drawn by the real world, therefore an example of didactics cannot be considered "Life skills teaching".

Nevertheless, besides the objectives related to the mathematics, the experimentation has the purpose to develop precious transversal competences as the ability to work in heterogeneous group and "learn to learn."

The class has been turned into a real Math laboratory to clarify the pupil for the things you treat put back the definition proposed in the CURRICULI UMI 2001 - 2003-2004, produced from Italian Mathematical Union (U.M.I.) in the project curricular Mathematics for the citizen, on its way in 2000

"a series of transversal methodological indications, based certainly on the use of tools, technological and not, but mainly finalized to the construction of mathematical meanings. (...) The environment of the laboratory of mathematics is somehow assimilating to that of the Renaissance shop. "

This definition underline the necessity of exchanging with others mutual ideas that is the base of the cooperative learning.

The mathematical discussion, that follows the activities of group, is not only a precious moment of exchange of the gotten results, but also an occasion for the teacher to drive the debate, so that the knowledge is institutionalized and possible errors and misconceptions are corrected.

The mathematical discussion can metaphorically be described as one "polyphony of articulated voices on a mathematical object (concept, procedure, theory...), orchestrated by the teacher". (M.G. Bartolini Bussi, M. Boni 1995)

1.2 Regulation of the activities.

It is necessary to preventively discipline activities of cooperative learning and Math's discussion through the elaboration of shared rules and the following exposure in the classroom.

The class that has affected the following experimentation has elaborated the list of rules that I bring following.

The rules have been exposed in class and are been written both in Italian (mother Language) that in English (Language of the science).

Math's workshop

1. Small group/ partners

- Work together
- Voice level 2
- Don't bother others
- Stay on task
- Math conversations only
- Don't talk to teacher while he's working w/sm group

2. All

- Take care of materials
- Be kind, safe and honest

Math talk

- Explain your thinking or show your thinking

“This is my solution /strategy ...”

- Explain why you agree with another student

“I agree with... because..”

- Explain because you disagree with another student

“I disagree because...”

- Go beyond

“This make me think that...”

Extend the ideas of another and link or connect it to other things

- Ask good questions:

“Why did you ...”

“How did you ...”

“Could you have ...?”

“How can it be that?”

“What if ...”

3. A class experimentations

3.1 Description

Title of the experimentation: Ask yourself why.

Objective of the experimentation: The experimentation is set as the purpose to educate students to the mathematical discussion and the solid reasoning of his/her own theses. Aim, besides, to make to understand to the boys the sense of the literal calculation and the importance of the generalizations in mathematics.

School and involved class: Class IIIB. Secondary School of first degree "Galileo Ferraris" - Livorno F.is, Vercelli, Italy

Period and duration of the experimentation: The experimentation has asked for 4 hours of job in the days 20-21 March 2014

Mathematician's subjects: Mathematical argument as background for Euclidean demonstrations
Prerequisite:

- Operations in N , in Q^+ and Q^-
- Literal calculus
- Equations

The assignment was born from the observation of a pupil. He has noticed that, in problem resolvable by an equation of first degree, assigned by the teacher there was an error: an odd number was given as sum of two equal numbers. The teacher has gathered this stimulus to assign a new task:

"Why the sum of two equal numbers is always an equal number?"

The teacher ask them to reflect at home on this assignment.

He plans an activity of cooperative learning for the following day and a mathematical discussion about the gotten results. This activity has big potentialities for the development of mathematical competences thanks to the mutual exchange inside the group and to the discussion of the results by the whole class under the guide of the teacher.

For many pupils, in this phase of their growth, could result very difficult to pass from a particular case to a solid general rule.

3.2 Phases of the experimentation

- **The assignment**

The assignment picks up the stimulus of the pupil to make to reflect the students on an important mathematic thematic, departing from a challenging situation.

- **Personal reflection**

Through the invitation to the personal reflection on the assignment, the teacher hope that the pupils mobilize their personal resources and that even they begin to document better respect to some theme treated during the lessons, or, at least, that they find some questions to propose during the job of group.

- **Activity of cooperative learning**

This activity sets the objective to use the group as amplifier of the individual resources. The group has besides the purpose to increase collaboration among equal, respect of other people's opinions and the individual motivation. The groups created by the teacher are heterogeneous.

- **Mathematical discussion**

The purposes of the discussion are, from the point of view of the teacher, to bring out the good results of each group, to correct possible errors and misconceptions, to institutionalize the knowledge, also setting the attention on the specific lexicon.

- **Debriefing**

The teacher asks students to make a budget of the developed job and as this would be been able to be improved.

4. Conclusions

The cooperative learning methodology has a high didactic and educational value and is reconciled well both with the ultramodern Life skills teaching and with the concept of mathematical laboratory.

It's important, however to combine this methodology to other didactic strategies that increase the effectiveness of the teaching and put them to know to disposition of the whole class group.

As it regards the mathematical laboratory, it is very important the mathematical discussion that follows the team's jobs; only in this way the acquired knowledge can be institutionalized and the errors and the misconceptions can be correct. It's essential to elaborate previously with the group class the shared rules that help the students to make the job most fruitful and to respect the times of the assignment, that must preventively be established at the teacher.

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