

LOGICAL GAMES THEORY MODELS FOR COOPERATIVE LEARNING PRODUCT EVALUATION APPROACH THE TEACHER – REFLECTIVE PRACTITIONER

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Abstract: The study that we propose aims to illustrate the ways in which the teacher can be aware and apply reflective practices in the evaluation of the collaborative learning activities process, by harnessing the logical analysis models proposed by the games theory.

In the following case study we will describe the specific characteristics of these models and the openings to which the pedagogical reflection can focus on, in a logical pattern with educational, theoretical and practical incidents alike.

Keywords: learning through cooperation, reflective practices, games theory patterns in student's evaluation.

1. BACKGROUND:

In a reference book, *How we think*, in 1993, John Dewey described any thinker's reflective practice as a way to consider actively, with perseverance and carefully every belief or supposed form of knowledge in the light of the foundations on which rests on and of the conclusions that points towards them. Over time, Zeichner & Liston, in 1966, in the *Reflective teaching-an introduction study*, propose and illustrate a new teaching class: "reflective teaching" that implies recognition, examination and rumination of the beliefs implications, experiences, attitudes, knowledge and the values of a person, and the opportunities and constraints arising from the social conditions in which the teacher works. In 1977, Valli, in *Listening to other voices- a description of teacher reflection in USA*, describes the reflective teachers by giving us some analytical and strategic benchmarks in order to identify them. The reflective teachers can look back on events to make judgments about them and to modify their behaviour in the light of mastery teaching, of research and ethical knowledge.

The brief historical presentation transmits the message in a clear way, regarding the increasing, nowadays, of the concerns involving the promotion of educational reflective practices and the revealing of a renewed profile of the teacher, seen as a reflective teacher.

Various studies highlight the benefits of teacher's reflective practices listing issues such as: improving the teaching activity, new things learning, advanced problem solving skills, transforming the average teacher into a critical thinker, making decisions based on information, the development and practice of improved organizational skills, the management of change on a personal level, awareness of personal values (that can influence positively or negatively), follow their own advice, the recognition of liberating benefits (stress) and others.

In the second half of last century, Jean Piaget argued the promotion of a active and critical discovery education that leads to "proliferation of pseudo- notions hung on words, without real significance" and that reduces the active characteristic of learning.

School of Geneva has shown that small group learning is the most favourable framework to develop students' intellectual structure.

Learning situations based on cooperation are more efficient than the competitive structured ones; group cooperation doesn't standardize its members' behaviour, but leads to the creation of a social space completed of a task that asks the players to establish a functional interdependence, requiring minimal cognitive conflicts.

Given these premises, learning motivation development is done both by valuing the positive elements of each pupil and by building on this basis, a positive attitude towards learning.

Cooperative learning involves the assumption that the way activities are planned determines the quality of interaction between students. In addition, the results of the activities are the result of interaction between students.

Thus, one of the main elements that have to be created in classroom is the positive interdependence and cooperation. With this element resolved, the cooperation leads to accumulation of positive interactions, as group members encourage and reinforce each other in the learning process. But which are the cooperation valences in the educational area? When you need to accomplish a task, members of a group (students or not) may be in the direction of two trends: an atmosphere of cooperation (when the parties have common goals), or an atmosphere of competition (when the parties feel that purpose of each other is blocked by the achieving of the other's goal).

In the case of cooperation, the member of the group work together to achieve the objectives and the purpose of each member is compatible or complementary with the purposes of the other members.

In the case of competition, members do not share resources, in their efforts there is no coordination and – like Morton Deutsch points out- the members of the group that has a competitive orientation believe that they can achieve their goals only if other members fail in this effort.

That is why cooperative learning followers thought that learning motivation (and learning itself) is profoundly influenced positively by an atmosphere of cooperation. Those who formulated and supported this theory equivalent practice learning are Kurt Lewin, Morton Deutsch and David and Roger Johnson brothers. Morton Deutsch defined and illustrated convincingly "cooperative learning" and placed it into a theory. In this research, he conceptualized the three types of social interdependence in cooperative learning: positive, negative and non-existent

The positive one, encourages the interaction between the persons that work together, stimulating each member's success in achieving common objectives is called "cooperation-based interaction and stimulation".

The negative one is characterized by mutual obstruction of members of a group to achieve a goal, is called “object-based interaction and competition”.

The interaction is absent when members of a group are working independently.

In the learning process, for example, the different types of interaction generate different results. We cannot count on luck, hoping that the students will have the necessary group-work skills, so we have to develop them. Among the basic elements of cooperative learning there are: positive interdependence, direct interaction, individual liability, interpersonal and group skills, processing of group information, guiding principles.

Within each group, the roles that students play can be oriented towards the workload or the maintenance of the group or towards both of them.

For the students to get used to both categories, sometimes, the teacher can distribute specific roles. It draws attention to the insulated roles to make them aware of the need for each role. These roles are: The verifier- checks that everyone understands what is working on; The reader- reads the written materials for the group; the Pathfinder- searches for necessary information from other groups, or, occasionally, from the teacher; the Timer- take care that the group focuses on the task and the work is carried out within the time limit set; the Active Listener- repeats or re-formulates what the others said; the Interrogator- extracts ideas from all members of the group; the Summarizer- draws conclusions from the discussions in a way that makes sense; the Encourager- congratulates, helps and encourages each member of the group; the Materials Responsible- distributes and collects the materials.

Any process of cooperation is characterized by: open and honest communication of relevant information between participants; emphasis on the highlighting the similarities and minimizing the differences between group members; positive attitude of each member of the group to each other and focus on the task.

Moreover, the perspective of playing the roles in a group concerned many researchers both in educational sciences and related fields. One of the representative examples is given by Kenneth Benne and Paul Sheats (cited DeVito, 1988; Gamble&Gamble, 1993); the two authors suggest three categories of roles: the roles of activity, the supporting roles and self-centred or negative roles.

The roles of activities (helping the group to focus better on the achievement of objectives):

- 1) The Initiator requires people to suggest new ideas, objectives, approaches and solutions are the most creative and energetic members of the group;
- 2) The information seeker- question the facts and opinions in order to find relevant information for the problem;
- 3) Opinion Seeker- asks expressing the feelings in order to discover the values that underlie group effort;
- 4) The information Bidder- is a role for an expert, defining a member of the group who provides ideas and suggestions from personal experience and factual data;
- 5) The opinions provider- provides opinions, values and beliefs revealed by their own feelings about what is being discussed;
- 6) The Clarifier/ developer- develops the ideas of others, paraphrases, provides examples and illustrations;
- 7) The Coordinator- is a member that summarizes the ideas;
- 8) The critical evaluator- judges the decisions of the group and proposes solutions which helps to establish the criteria and standards for issued judgements;
- 9) The Energizer- helps the group to involve in major activity;

- 10) The Procedural Technician- helps the group to have access to all the resources, all the materials they need;
- 11) The one that tests the consensus- is a member that controls the agreement that the group reached in order to see if the latter is ready to take a decision;
- 12) The one that notes and registers the ideas, suggestions and the decisions of the group.

The roles of building and supporting of the group:

- 1) The Encourager contributes to group purchases. Persons performing such roles are interactive obedient and they help at rephrasing and clarity;
- 2) They encourages people to feel good and produce valuable judgements; the Goalkeeper (balancing roles) is the one who tries to keep channels of communication open;
- 3) The Harmonizer mediates differences between participants and reconciles misunderstandings and disagreements;
- 4) The person centred on compromise is the one who maintains group cohesion and helps the group to grow; The Observer and the Commentator record the mode in which the group acts and use this recording in order to self-evaluation and group evaluation;
- 5) The person who has the standard position, waits until the group is satisfied with the procedures used and indicates the criteria that will be used to assess the functioning of the group;
- 6) The Trackback- will go with the other members of the group passively accepting the ideas of others and functioning more as a audience than as an active member of the group.

Ineffective roles:

- 1) The Assailant involves attacking others;
- 2) The one that blocks provides negative feedback, is disagreeable and disagrees with everything that others propose in his effort to not let them achieve a result;
- 3) The Recognition Seeker is trying to attract others' attention on its own contribution to the team even if it is less relevant so that the objectives of the group are lost;
- 4) The Help Seeker- the persons that are carrying out such roles have rewarding from the tem activity only if there are encountered their personal needs; they are using the group to find support, advice and guidance;
- 5) The Dominator insists to follow its own path, interrupting others in an effort to control the group;
- 6) The Funny one is the one that appears to be cynical and produce irrelevant or unfit behaviors for group work;
- 7) The Self-confessor is a member who uses other group members like an audience for revealing some personal "feelings" or some "enlightenments" that are unrelated to what is discussed in the group;
- 8) The Dispensable-implies the absence of any contribution of these individuals in the team works; if they are asked about their opinion, they will say that they don't have one.

But identifying, experimenting and playing roles within the group require a deep knowledge of the teacher and his students about the roles they can play. This is possible by using techniques of playing the roles (role playing), techniques detailed by Richard and Patricia Schmuck in eight steps:

- Problem selection;

- Heating (practice);
- Setting the scene by explaining the situation, describing the roles of the participants and explaining the roles of the audience;
- "Enactment";
- Analysis and debate;
- Evaluation;
- Re-enactment of the role play;
- Generalization in classroom's/ group of students' daily life (Schmuck, Schmuck, 1992, p. 103).

2. PRESENTATION OF THE EDUCATIONAL CONTEXT SPECIFIC TO THE CASE STUDY: GAMES THEORY MODELS- REFLECTIVE PRACTICE EXAMPLE

The teacher has to assess the way that students contribute in a working group in order to obtain a final product (e.g. project, portfolio, and so on). By reporting to this educational context, we will describe a games theory model from a statistic perspective, according to which the two participants choose their behaviour strategies simultaneously.

a. STATIC PERSPECTIVE OF GAMES THEORY MODEL

The students who are working in a group are free to divide tasks. There is the possibility that the cooperation and communication made between the students was not optimal.

In this case, some of the students contribute to the achievement of the final product more than their colleagues. In this case, from the games theory perspective, we say that the student adopts the strategy to participate or cooperate with his colleagues to achieve the final product and we denote this strategy with "P". There is also the situation where some students choose not to participate at all to the achieving of the final product, while others prefer not to choose cooperation, but to realize on their own the required product. In this case, we say that the student does not choose the strategy of not participating, denoted by P, implying lack of cooperation with other members of the group, that was constituted for achieving the final product.

The teacher has several options for assessing the group:

- He will either give marks to the students according to how they participated or not at the achievement of the final product; in this case, we say that the student adopted the control strategy (we denote this strategy by C)
- He will either give the same mark for each student in the group; In the latter case, the teacher assesses only how the final product comply with the specific work tasks that were given; we say, in this case, the teacher's strategy is not to control and it will be denoted by NC.

The educational situation is described in the following matrix:

		Student	
		P	NP
Teacher	C	9, 10	8,4
	NC	10, 9	7,10

Figure 1: Matrix of earnings for the proposed games theory model

The matrix in Figure 1 illustrates the following possible educational situations:

- 1) The teacher controls how the student has worked with his colleagues in the group and the student has actively participated in the realization of the final product. In this case, the teacher's gain will be 9 units, because he consumes extra time with specific control actions. On the other hand, the student has a maximum gain of 10 units (that would be his mark) because he actively participated in the realization of the final product and his work was highlighted by teacher's control.
- 2) The teacher controls how the student has worked with his colleagues in the group and the student has not actively participated in the realization of the final product. In this case, the teacher's gain will be 8 units, because he consumes extra time with specific control actions and is unhappy because the student didn't cooperate. On the other hand, the student has a gain of 4 units (which might be his mark) because it has not actively participated in the realization of the final product, this fact being discovered through the teacher's control.
- 3) The teacher doesn't control how the student has worked with his colleagues in the group and the student has actively participated in the realization of the final product. In this case, the teacher's gain will be 10 units because he does not invest effort to control how the student worked with his colleagues in the group and the student fulfilled his tasks. On the other hand, the student has a gain of 9 units because he actively participated in the realization of the final product, but this fact wasn't being discovered through the teacher's control, all the members of the group receiving the same grade.
- 4) The teacher doesn't control how the student has worked with his colleagues in the group and the student has not actively participated in the realization of the final product. In this case, the teacher's gain will be 7 units because he is unhappy because the student didn't cooperate and he didn't control this fact. On the other hand, the student has a gain of 10 units because he didn't actively participate at the realization of the final product and this fact wasn't discovered.

We will solve this mathematical model using relative earnings maximization algorithm. In other words, we will highlight in the matrix the gains that corresponding to the best answer that each game participant has given, compared to the other actor. If there is a cell of the matrix in which both of the gains are underlined, then that combination of gains points out the solution of the problem, the optimum choice of strategies of the two participants in the game. Thus, if the teacher chooses to control how the student has cooperated with his colleagues, then, we observe that the best answer, meaning the greatest gain of the student is 10 units, according to the strategy of active participation at the

achievement of the final product of the group. These gains will be highlighted within the matrix.

		Student	
		P	NP
Teacher	C	9, <u>10</u>	<u>8</u> , 4
	NC	10, 9	7, <u>10</u>

Figure 2: Gains matrix in case the teacher adopts C strategy

If the teacher chooses not control how the student has cooperated with colleagues, then we see that the best answer of the student, meaning the greatest gain is 10 units, corresponding to the not actively participate at the realization of the final product of the group strategy.

		Student	
		P	NP
Teacher	C	9, <u>10</u>	<u>8</u> , 4
	NC	10, 9	7, <u>10</u>

Figure 3: The gains matrix in case the teacher adopts C and NC strategies

If the student participates actively in achieving the final product, then we find that the best response of the teacher is to not control how students in the group have worked.

		Student	
		P	NP
Teacher	C	9, <u>10</u>	8, 4
	NC	<u>10</u> , 9	7, <u>10</u>

Figure 4: The gains matrix if the student adopts P strategy

If the student does not participate actively in achieving the final product, then we find that the best response of the teacher is to control how students have worked within the group.

		Student	
		P	NP
Teacher	C	9, <u>10</u>	<u>8</u> , 4
	NC	<u>10</u> , 9	7, <u>10</u>

Figure 5: The gains matrix if the student adopts P and NP strategies

We note that we have not found the balance in the static perspective of this model because there is no cell of the gains matrix where both gains are underlined. Therefore, we will approach dynamic view of the proposed model, according to which one of the participants announce the strategy he will approach and the other will take the actions that bring maximum gain relative to that strategy.

b. THE DYNAMIC PERSPECTIVE OF GAME THEORY MODEL

From a dynamic perspective, we will consider that the teacher announces its intentions, meaning that the strategy that refers to the way he will assess the students that cooperate in a group set up to realize a project/ portfolio and so on. The main difference between static and dynamic perspective of the proposed model is that at the end of the game all type of strategic behavioural approaches adopted during the course are known by the person who originally announced the decision. In this way, the actor who starts the game can choose "knowingly" that strategy that brings maximum gain and the model described will have solution or balance. In terms of graphics, we will not have a matrix of gains, but a "tree-graph" (Roman, 2000, p.34). In this graph, the nodes are appropriate to the educational situations in which the teacher or the student adopts one of the possible strategies of the proposed model and in correspondence with the personal goals pursued. Likewise, each arc of the graph indicates an action chosen by one participant in the game analysis. On the last row, there are underlined the gains of the participants in the games theory model. We have the following educational situation:

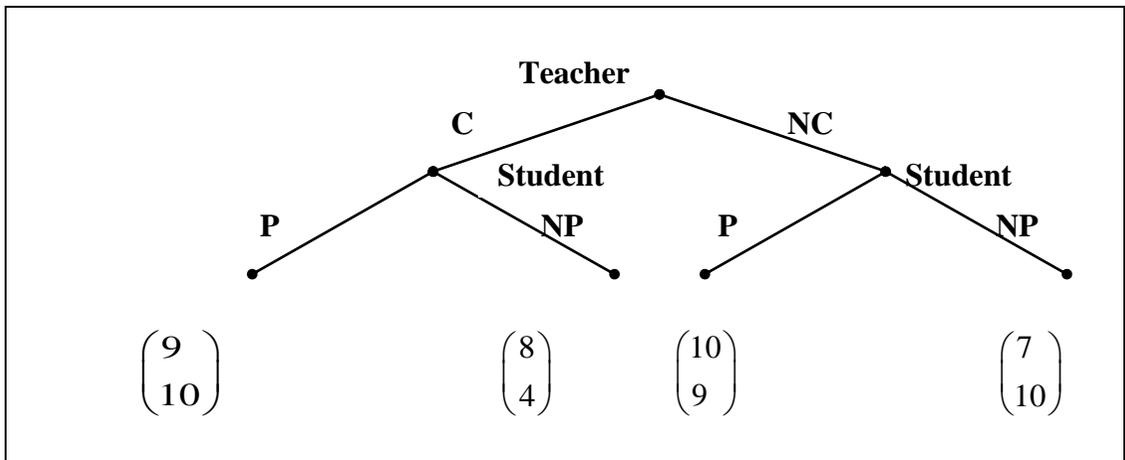


Figure 6: *The dynamic perspective of the proposed games theory model*

We will determine the balance of the proposed model of dynamic perspective, using recursive induction algorithm. If the teacher announces he will control (with subsequent questions) how students cooperated, the student will choose the actively participation at the realization of the final product strategy. (10>4) If the teacher announces that he won't control how students will collaborate, but he is only interested in the final product, then the student will choose not to participate (10>9). The teacher knows how students choose their

strategies and reports their earnings that he would have in relation to each of the possible choices of the student. In other words, the teacher compares the gains specific to the following combinations: (C, P) and (NC, NP). We observe that the biggest gain is where the teacher will control how students cooperate and the student actively participates at the achievement of the final product. ($9 > 7$). We find out that we have obtained a solution for the proposed games theory model. This is given by the combination of strategies (C, P).

Interpretation of the results of the proposed games theory model is the need to communicate the modality for assessing the onset of educational activities.

So, the teacher must notify students that he will control how they will cooperate and the students, knowing this, will be determinate to actively participate in achieving the required final product.

3. CONCLUSIONS:

Promoting cooperative learning in order to develop creative and critical thinking through reflective teachers becomes a strategic priority nowadays.

Ken Robinson's invitation, in reference work on *A World out of mind. Creative education revolution*, to open new gates of reconfiguration of the own potential, in a context of appropriate valuation of each, becomes strategic amendments that we must take into account in order to not end felled by our own educational errors.

All teachers' attention should focus insistently on promoting instructive-educational and evaluative strategies, scientifically based, proven and validated continuously in reflexive educational practices. This affirmation is also supported by the obtained results from solving the games theory model. The transition from static to dynamic perspective in this model led to the obtaining a unique equilibrium of the game. This fact shows that, while maintaining the gains at the same level with the level in the static game, in dynamic approach, there were important changes in the behaviour of the student. So, the unique solution of dynamic game highlights the importance of communication between teacher and student regarding the evaluative practices. Manifestation of a self-reflexive behaviour in order to improve the teaching activity and stimulation of investigational approaches, of expressing and argumentation of the interpretations and personal solutions will stimulate the critical-reflective thinking and the crystallization of some successful analysis strategies, solving and decision-making in educational plan.

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