GAMES THEORY AND EDUCATIONAL DECISIONS IN THE BLENDED LEARNING SYSTEM

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***Abstract**: The proposed study presents an application of the games theory explaining, based on a preponderant mathematically support, a possible situation in the communication between teacher and student. This study is divided into four parts. The first chapter presents pedagogical notes referring to the teacher-student communication. The second chapter describes the structural elements of a games theory model. The third chapter contains an application of the games theory, aiming to demonstrate, theoretically, the way an agreement teacher-student can be reached, the decisions they will take for learning: classical course or blended learning course. In the last part, dedicated to conclusions, the study highlights the importance of such interdisciplinary research in order to improve the teacher-student communication.*

Keywords: methods of game theory models, reflective game, evaluative strategies.

I. COMMUNICATION AND EDUCATIONAL DECISION VERSUS THE DIVERSITY OF THE LEARNING OFFERS IN THE BLENDED LEARNING SYSTEM

Pedagogy and social psychology are interested in the full semantics of the communicative behavior revealed by considering the psychological, cognitive and social variables. Each situation is an unique communication and the transmitter is a "creator" providing through his message, a set of information depending on his

vision about the communication object, on the cognitive structures, on his representations concerning the communication situation and on the interlocutor, his social status, and not least, the prejudices and stereotypes that will determine the nature of the relationship with the interlocutor.

For Jean-Claude Abric (2002, pp. 15-32), communication means "all processes for the exchange of information and meanings between persons in a given social situation." The analysis of the relational communication phenomena sets a few benchmarks for the analysis of the teaching communication. Relevant in this context are the implications of the communication variables enabled in the educational / formative decision action: communication involves a number of relations between the communication partners trying to influence each other; it always has a purpose, a goal, an intentionality that may be expressed or implied; it is a social act, voluntarily or involuntarily, consciously or not; it is not limited to the verbal expression; it is an interaction process directly influenced by its social and cultural context, functioning as a circular system forced to a continuous adaptation. The core element of this adjustment is the feed-back.

L Iacob (1998, p 190) offers one of the most explicit definitions of the didactical communication, as a case of the general human communication. The author highlights the following characteristics of the didactic communication "it is a communication instrument directly involved in supporting a systematic process of learning."

Assuming that the training aims to induce changes at the individual, group or social level, training offers supposing the easiest or rather the most difficult intervention have to be identified. The pedagogical decision highlighting the pathways to an anticipated success is not an easy one. We underline that, in itself, there is no *good* or *bad* method: there is only a **proper** or **improper** method for concrete training conditions. We also want to stress the tendency to reinforce the effects of the training sessions through follow-up sessions (*follow-up*) aimed to strengthen the new skills and to support trainees' motivation to continue the (self) training. Teacher and students (in a meta-assessing process of the training program preparation) are captured in communication processes focusing the strategy negotiation for the optimal didactical interaction, guaranteeing the learning success and the full completion of the training modules, regardless of the formula in which they are delivered. **The decision** means the option for an action course ignoring the possible others; there is a decision-making process **only** if there are more possibilities for the alternative action way. Obviously, trainer and trainees have permanently to make decisions. The formative process cannot be defined in equivocalness way: during its deployment, surprises and unexpected elements appear inevitably. We do not insist on decision-making ways - they are favorite subjects of various management schoolbooks. We only wish to emphasize that the decision repertoire of teachers and students is extremely rich. Moreover: many current decisions have to be taken according more to affective and not to rational factors. The analysis of the decision process between the options concerning the specificity of the training offer provides information about the need to identify specific pedagogical and negotiation strategies in order to properly motivate students and influencing them to effectively participate to the teacher's learning offer. In the

decision-making process blockages can occur caused by: blurred individual values, blurred personal and organizational goals, lack of problem-solving ability, diminished creativity and minimal influence in the organization or at the trainees' level. Realizing these potential obstacles, teachers can enhance the teaching communication by activating the following instances of an effective management of the didactical interaction:

- **Attention management** - the ability to clearly communicate goals and to focus the efforts in order to achieve them. It is very important for the trainer to be obeyed and followed by the trainees, not by shame or fear, but as recognition of his authority as an expert and as a result of the concrete power exercise.
- **Meanings management** - the ability to create and communicate meanings aimed to be acquired and used by the trainees. Trainer's interventions should be clear, specific and the meanings and acceptations of the terms used must be explained. As in the previous competition area, it is crucial for the trainer to master the communication methodology (verbal and nonverbal paraverbal).
- **Trust management** - the ability to be consistent in complex and dilemmatic circumstances, enabling the manager (leader) be a real support for the trainees. Trust should be mutual and **authenticity** should become a *"modus vivendi":* in training situations, being authentic is more important than being right.

II. GAME THEORY – FEATURES

Problems solved through the method of the game theory represent another approach of the communication relations between teacher and student, with **positive consequences on the improvement of their communication.**

The game theory is a science explaining, through mathematical models and solving algorithms, several styles of decisions making, in, by assumptions, well-defined contexts. The game involves the existence of participating actors, called **players**. They are considered to be rational, meaning that they are seeking to maximize their **earning.** This earning is contextualized in a certain relationship, defined by the fact that each player take into account the behavior and decisions of the other player. It is about the **game rules**, consisting in the players' actions (movements), which are nothing but an embodiment of the decisions each of them made, depending on the intended objective and the other player's behavior.

Roman (2000) affirms that the timing of the players' actions allows identifying static games and dynamic games. "The static game is that game where players make their decisions simultaneously and the game ends after that. The dynamic game is that game where players decisions are sequential, meaning that they are evolving over time "(Roman, 2000, p 6, [1]).

Given the characteristics of a model (game) in the game theory, applications for different educational contexts can be build, where players are the teacher and the student, each of them pursuing a certain objective (called gain), he wants to optimize (by maximizing the gain) compared with the other's actions.

III. CASE STUDY:

Cooperation game between teacher and student concerning the learning ways of the course units: exclusively classical learning, based on the lecture notes or combined with digital resources, like blended-learning. It is a cooperation game: "the players communicate freely before making decisions and can make promises (to be respected) before making decisions." (Roman, 2000, p 6).

We will analyse the game from a static perspective; players are teacher and student.

Description of the problem

We assume that the participants' **strategies** are the same, namely **the preference for two types of learning: the classical one (C), specific to a face-to-face course and the blended-learning. (BL)**

Player' gains are:

For the student:

Hypothesis 1 – The student wants to be trained based only on the teacher's courses and the teacher's addressing strategy is the classic course type. In this situation, the student's gain is the fact that he is attending the course in progress and he understands the course content based on explanations. We will consider that this gain is supported by at least two possible motivational mobiles, conventionally assessed as 2 value units.

Hypothesis 2- If the teacher imposes the blended-learning and the student wishes to be trained only on the teacher's courses, there is a conflict of strategies. Each one's gain will be 2 value unit, because, even if the student is attending the course, he is discontent of the fact that he cannot deepen his learning through blended-learning approach; on the other hand, even if the teacher wants a blended-learning approach, he is unhappy that this type of learning is achieved with a student interested in only a classic course.

Hypothesis 3 - If the student wants a blended-learning and if the teacher has the same strategy, the student's gain is bigger than in the traditional courses, because the knowledge benefits are higher: the possibility to communicate with the teacher 24 hours per day, the settlement of a dialogue aimed to improve the understanding of some concrete and punctual problems/cognitive aspects, the access to other needed information sources in order to solve the tasks, the feedback the student receives from the teacher. We will consider the student's gain as 4 motivational - value units.

Hypothesis 4 - The student wants a blended-learning training and the teacher tackles a classic course. In this case, the student's gain is lower than for hypothesis 3, because, even if he is interested to obtain during the course as much information as possible, the communication with the teacher takes place only done during the attended course. We will consider that the student's gain will be 3 motivational - value units.

For the teacher:

Hypothesis 5 - The teacher wishes to deliver the training only through the classical course and the student accepts it. In this case, the teacher's gain will be 2

motivational - value units: the teacher is satisfied, because he is delivering the course to a student interested in such an approach.

Hypothesis 6 - If the teacher wants a blended-learning training and the student agrees this learning style, the teacher's gain will be increased compared to the other situation. In this context, the teacher can always communicate with the student, he can explained course information based on the dialogue established with a student wanting to learn through such an approach. The teacher's gain is 4 motivational - value units.

Hypothesis 7 - If there is a conflict between student and teacher, the teacher's gain is 1 motivational values unit, because the teacher presents the course content in a way that the student does not agree; therefore their dialogue cannot be set and the student is only observing the rules.

The game matrix

The game is described by the following matrix:

		STUDENT	
	Strategies	C	BL
TEACHER	C	2,2	1,1
	BL	1,1	4,4

Figure 1: Matrix game

Game solution

The solution to such a game can be found through the algorithm of the best payer's answer, because it takes in consideration the other participant's actions. This answer will every time be highlighted in the matrix. If the result is a matrix cell in which both gains will be highlighted, it means that the balance of the game was found.

There are following possible scenarios:

If the teacher is adopting the strategy C, corresponding to the first line of the matrix, the best answer for the student will be given by the strategy C (because 2 is greater than 1).

		STUDENT	
	Strategies	C	BL
TEACHER	C	2,2	1,1
	BL	1,1	4,4

Figure 2: The Matrix structure, after the adoption by the professor of strategy C

If the teacher adopts the strategy BL, corresponding to the second line of the matrix, the best answer for the student will be given by the BL strategy (because 4 is greater than 1).

		STUDENT	
	Strategies	C	BL
TEACHER	C	2,2	1,1
	BL	1,1	4,4

Figure 3: The Matrix structure, after the adoption by Professor BL strategy

If the student prefers strategy C, corresponding to the first column of the matrix, the best answer for the teacher will be given by the strategy C (because 2 is greater than 1).

		STUDENT	
	Strategies	C	BL
TEACHER	C	2,2	1,1
	BL	1,1	4,4

Figure 4: The Matrix structure, after adoption by the student of strategy C

If the student prefers the BL strategy, corresponding to the second column of the matrix, the best answer for the teacher will be given by the BL strategy (because 4 is greater than 1).

		STUDENT	
	Strategies	C	BL
TEACHER	C	2,2	1,1
	BL	1,1	4,4

Figure 5: The Matrix structure, after adoption by the student CON strategy

We note that *there are two solutions to this problem, corresponding to the situations where both players are agreeing the training preferences.* We can say that both teacher and student reach a **cooperative solution.**

It is interesting to determine the probability that each of the two parties wants to adopt one of the two training styles. Therefore we will scribe with "p" the probability that the student adopts the strategy C (only classical training) and with "1-p" the probability to adopt the strategy BL (blended-learning training). We, also, will note with "q" the probability that the teacher adopts the strategy C, and with "1-q" the probability that the teacher adopts the BL strategy. We know that there is a gains equality of each player, regardless the adopted strategy, thus there is a game balance, called solution in mixed strategies. This balance is due to the possibilities: ((p 1 - p), (q, q 1)) it east (3/4, 1/4) respectively (3/4, 1/4). The solution in the mixed strategies indicates that *both teacher and student are seeking, with a higher probability (3/4) to have a classical training, rather than the combined training.*

In order to find a unique game solution, we will approach the situation in *a dynamic perspective*. In this case, the interpretation is as follows: in the first lesson, the teacher, respectively the student shall express their choices (classical training or blended learning).

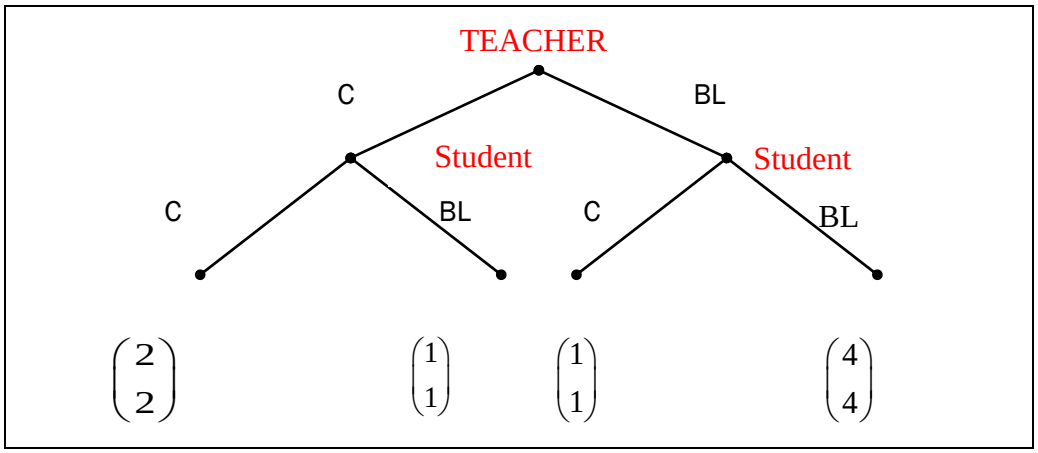

Figure 6: The game description from a dynamic perspective

We will determine the solution for the game built from a dynamic perspective:

- if the teacher announces that he will deliver only a classic course, it is better for the student if he prefers the same type of learning (because 2 is greater than 1)
- if the teacher announces that he will deliver a blended-learning course, then it is better for the student if he prefers the same type of learning (because 4 is greater than 1)

Knowing this, the teacher will note that his corresponding gains will be: 2 units and, respectively, 4 satisfaction units. Obviously, he will choose the solution maximizing the gain: the strategies combination (BL, BL).

In this case, *the solution is unique and it consists in the selection, by each one of the two actors, of the blended-learning course.*

IV. Conclusions

Most of the educational problems proposed to be solved by appealing to the specific methods of the game theory are dealing now with models corresponding to several simulation situations and less to events occurring in the real life.

The game presented in this case study is simulating a real situation of communication between teacher and student. The dynamic perspective of the described game emphasizes the importance to present at the beginning the teaching styles and the advantages offered by the blended-learning, compared with the classical one.

The proposed research provides important information on some variables involved in the teaching process, on which there is less reflection. That's why we are proposing modalities to make it more effective, appealing to a reflective game, whose ain can be extended, through educational explanations, to a brighter perspective, related to the personal and relational development of all participating actors.

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