Game Memocon, To Teach the Importance of Concentration in Learning Process

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ABSTRACT

Memory and concentration are key factors in the learning process, both in academic training as in the rest of life. Whether to remember the study material for a test, to remind significant events in a work meeting, or just to exercise the mind and accelerate the process of understanding the world and building knowledge, to use it later in problem solutions and to make decisions. This research shows the design process of a game to reinforce concentration and a test the game in order to check the importance of concentration in the learning and collecting of information process, highlighting the limitations and factors that interfere in its development.

INTRODUCTION

Concentration and memory are key factors in the learning process, principally in academic training, but also in all areas of life: with good concentration, people can obtain more memory; and more efficient learning processes. Whether to remember the study material for a test, to remind significant events in a work meeting, or just to exercise the mind and accelerate the process of understanding of each person, to have elements in decision making processes, in work, in personal and team results, in negotiation, among others, concentration is critical to obtain good results.

It is common that in various situations, persons remind superfluous data, but forget the important things. This happens for a simple reason: humans tend to remember more, things that get their attention for a particular variable or characteristic, and usually pay more attention to that things that are interesting, allowing them to be easily remembered.

What is interesting about concentration, is that allows a greater memorization of the incorporated data. Thus, concentration and the ability to memorize are closely linked, and the first leads to increase the second, making it necessary to its improvement, because in it will result in a better learning level and useful knowledge for take decisions and solve problems.

Therefore, it is necessary to teach the importance of these two factors: concentration and memory, through the design of a management game that, in an educational and enjoyable way, allows participants to identify concentration and memory as two key aspects of the learning process, and also will help to diagnosis how are this factors in participants.

CONCENTRATION AND MEMORY

CONCENTRATION

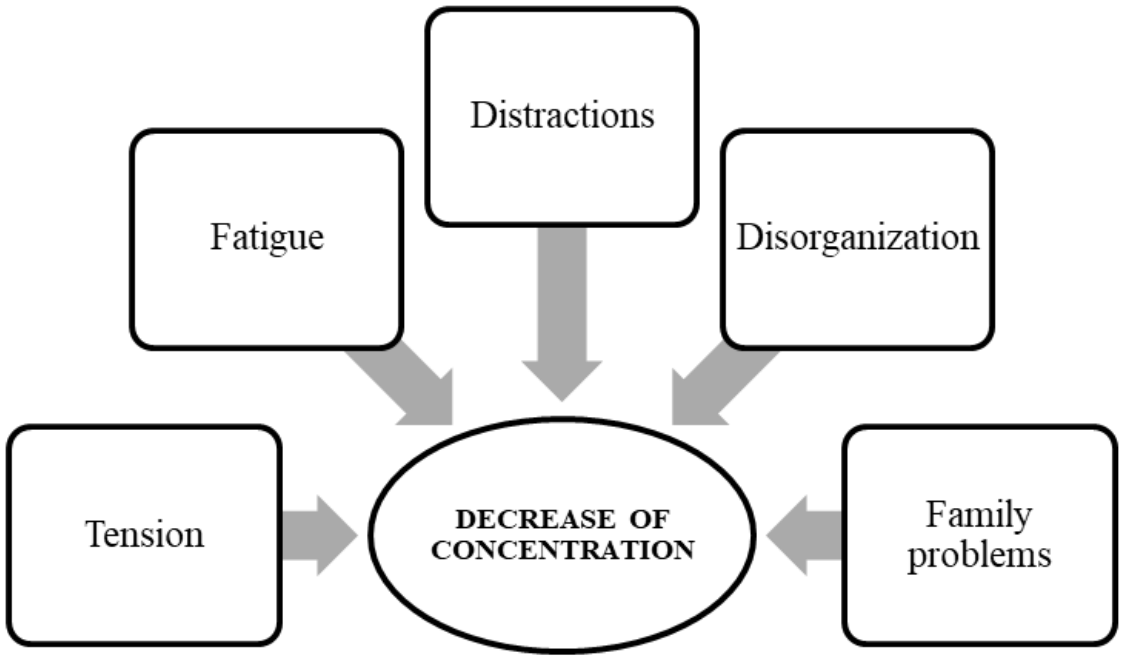
It's the mind's ability to control, direct and sustain attention. It plays an important role in the study, especially in the processes of reading, writing, reasoning, etc. (Batlle, 2009).

There are two types of concentration, involuntary and voluntary. Involuntary concentration is characterized by the presence of objects that act on the senses for the first time, they are very novel. The involuntary concentration usually is determined by the mood of the person. At some point in life, the same object may be the cause of concentration, depending on the interests, needs and abilities of the individual (Psicopedagogía, 2012). For example, a person who has a special interest in painting will focus more quickly on the details of a work of art than other person, to which painting is not their interest.

Voluntary concentration is the conscious activity of the person towards a concrete goal. When human beings make use of the voluntary concentration is because the stimuli perceived by their brain were already known and are related to past experiences. For example, when a student is ready to study a new math chapter focuses primarily on the knowledge acquired in previous chapters and courses, and then continue with what it's new to him/her (Psicopedagogía, 2012).

Some factors that decrease concentration are shown in exhibit 1:

EXHIBIT 1
FACTORS THAT DECREASE CONCENTRATION



Tension. When the human being has the need to concentrate its attention on a specific activity, requires an adequate neuromuscular tension. But if that neuromuscular tension exceeds normal limits to which it is accustomed, neuromuscular tension then becomes a factor that will significantly decrease its power of concentration and ability to understand.

Fatigue. Is the excess of activities in which the body is affected notoriously by physical and psychological factors. Neuromuscular tension increases and the person is unable to concentrate despite having had some rest. Both the physical and psychological fatigue can be overcome with a good rest and a proper management of personal activities.

Distractions. The presence of different objects to the activity being performed decreases the ability to concentrate.

Disorganization. Not keeping the study or work area neat discourages and at the same time hinders concentration.

Family problems. Nervous tension for various personal difficulties will be diverting attention to other thoughts, and obviously tension will increase and motivation will be negative.

STUDY OF MEMORY

Memory has been, throughout history, one of the faculties that have attracted the man the most. Aristotle dealt with it in a treaty called "Of memory and reminiscence", defining it as: “The presence in the spirit of the image, as a copy of the object whose image is; and the part of the soul that belongs to memory, is the very beginning of the sensitivity by which we perceive the notion of time” (Atkinson and Shiffrin, 1991).

Aristotelian concern was gathered by scholasticism and has come until nowadays, when memory is identified with learning, making an emphasis more or less in its temporal dimension.

It should be noted, moreover, that the study of memory has come from quantitative methodologies that have been concerned about measurement and have ignored the study of what happens in the black box of the brain; so, speaking of inputs (entered data) and outputs (retained and later recalled data).

This first dimension of the studies was initiated by Hermann Ebbinghaus, whose book “On memory” (1855), consigns the first experimental studies and a series of methods that would later be perfected: the method of memorization, of recognition and of savings (Martínez, 1994).

Other authors of diverse theoretical currents have dealt with this field of study. Among them it is worth to mention Bartlett, who in contrast to Ebbinghaus makes studies in the natural area and explains phenomena from concepts such as integrated schemes in high-level structures, being considered by this as the precursor of cognitive psychology in the study of memory.

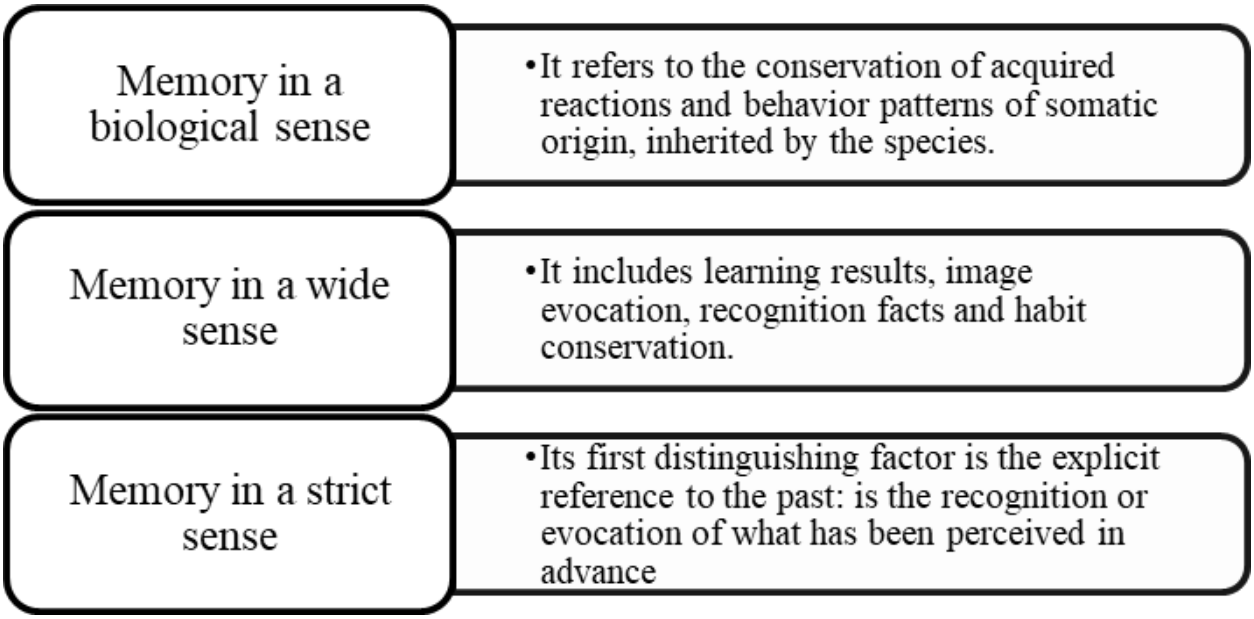
Another approach is made by Freud (1925), who using the repression mechanism explains why we forget certain facts and not others, and at the same time making it clear that the information is not lost but it moves to another area of the mind that has more difficult access, staying there and coming out to light only if the conflict that is linked with it gets resolved.

Oblivion (antonym of memory) produces changes in the memorized material, not only in the amount of information that endures but in the way it incorporates various schemes, acquiring a new meaning and structure. This approach, of cognitive nature and that properly begins in the sixties, is divided in two phases: the first, focused on distinguishing the "memory stores" (Broadbent, Atkinson and Shiffrin), the second, from around 1975, which gives a theoretical shift, and in research methodology, focusing on the processes involved in the more or less permanent retention of information.

In the last years it has been searched for a more general conception about information processing and works have appeared that complement or refute previous ideas.

Authors as Piaget and Inhelder (Martínez, 1994) define memory as "the gathering of encoded information produced by perceptual and conceptual assimilation processes", which involve a temporal dimension and distinguish three types of memory:

EXHIBIT 2
TYPES OF MEMORY



In a wide sense, memory includes habits with two aspects: the reproduction of an organized set of sensorimotor schemes and, prior to that, the recognition of perceptual evidence. It is also considered in this type of memory the conservation of the schemes acquired by the subject which are constituted in operations. In the strict sense, memory only deals with particular situations, processes or objects that are chained to the past of the subject, what doesn't happen with the memory related to the schemes and habits, which can be put into action without this relationship with the past.

For cognitivist theory, memory is the one who organizes, integrates and structures their learning through schemes, and for this requires a processing system that basically consists of three structures: sensorial or peripheral registration; working memory, short-term or primary; and long-term memory (Martínez, 1994).

SENSORIAL OR PERIPHERAL REGISTRATION: The memorization process, internal to the subject, must start by stimulation provided by the environment and that affects or impacts the receptor organs: the senses. This stimulus remains in them only long enough to transmit the signal to the system that performs its conceptual representation, the second structure.

Sensorial registration represents the entrance to the system (input), and refers to the perceptions that constitute an interpretive analysis of data and not the initial sensation.

WORKING MEMORY, SHORT-TERM OR PRIMARY: It's a bit longer than the previous structure (a few seconds), and it brings the memories that long-term memory keeps: for this reason it also has been called running memory or conscious memory. It is also the gateway to the long-term memory; even some authors claim that both memories don't constitute different structures but only one that operates in two different ways, depending on requirements.

For Atkinson and Shiffrin (1991), short-term memory has a capacity of seven chunks (Miller) or information units, and intervenes for a very short span in retention.

LONG-TERM MEMORY: This memory exists for all sensorial modalities and for other types of affective or conceptual information. According to Gagné, most of the theories affirm that the long-term memory is permanent, and the inability to remember something is due to the difficulty of locating information (Martínez, 1994). This memory remains inactive until the appearance of a given task that makes necessary its activation, returning information to the short-term memory, where responses are generated.

Information (learning content) can be declarative, procedural and critical, what comes to determine how to retain and retrieve memory. Declarative information refers to variable propositions (knowing what); procedural to specific algorithms (knowing how); and critical to more general processes (knowing why and when) (Beltrán, 1992).

METHODOLOGY

The methodology proposed by Gomez (2010) is used for the design of a game with educational purposes, some other games have been designed with the proposed methodology in topics as decision making process (Rojas, Londoño and Alis, 2017), trust (Londoño and Rojas, 2015), leadership (Botero, 2011), communication (Rojas, Londoño and Valencia, 2014), and some others. It is composed by 10 fundamental steps:

1. Identify the theme of the game;
2. Establish the game purpose;
3. Identify the instructional objectives of the game;
4. Identify and define general concepts of the theme;
5. Select candidate techniques;
6. Select the appropriate technique(s) according to characterization;
7. Incorporate specific knowledge to the game;
8. Develop the initial tests;
9. Develop the final version of the game;
10. Elaborate an evaluation inquest.

Exhibit 3 shows the steps of the methodology applied for the design of the game ***Memocon:***

EXHIBIT 3
DESIGN OF THE GAME MEMOCON

Theme	Concentration and memory as key factors in learning process.
Purpose	Help to develop concentration and memory skills in participants Check the importance of concentration and memory in learning and collect information, highlighting the limitations and factors that interfere in its development.
Instructional Objectives	• Identify the existence of several factors that interfere with concentration, which hinder the process of memorization of information, thus affecting the learning process and knowledge generation. • Identify the different ways of data memorization (short-term and long-term) and how that data is stored to be used later for decision making. • Highlight the need to improve concentration and memory capacity, as key stages for learning process and key tools for decision making and problem solving.
Candidate techniques	Role game and (2) Observation race [5].
Select appropriate technique	An evaluation of the candidate techniques is done; following the methodology proposed by Gomez (2010), to determine which technique fits better to the necessities of the game ***Memocon***. The technique of Observation race is chosen.
Initial test	To verify the compliance of the game objectives, preliminary tests are performed, with which failures are detected and subsequently the final version of the game is corrected and refined. An initial test was applied in a group of 8 persons and a survey was made. Participants made suggestions on some aspects of the game, which will be incorporated in the final version. In general, as a result of the initial test, people assured that the game complies with the objectives, is fun and easy to play.
Evaluation Inquest	In order to obtain suggestions from participants, an inquest is applied. Participants evaluate the game and suggest possible changes. By the answers of participants is possible to identify if the instructional objectives of the game are achieved.

INCORPORATION OF SPECIFIC KNOWLEDGE

According to the technique chosen "observation race", the main objective of the game is to overcome obstacles by developing skills. For the case of ***Memocon*** game, the goal is to pass the tests imposed developing concentration skills.

Basically the game ***Memocon*** consists of 3 stations: Initial Station, Middle Station and Final Station; in which participants will have to pass a test or develop a specific activity at each station.

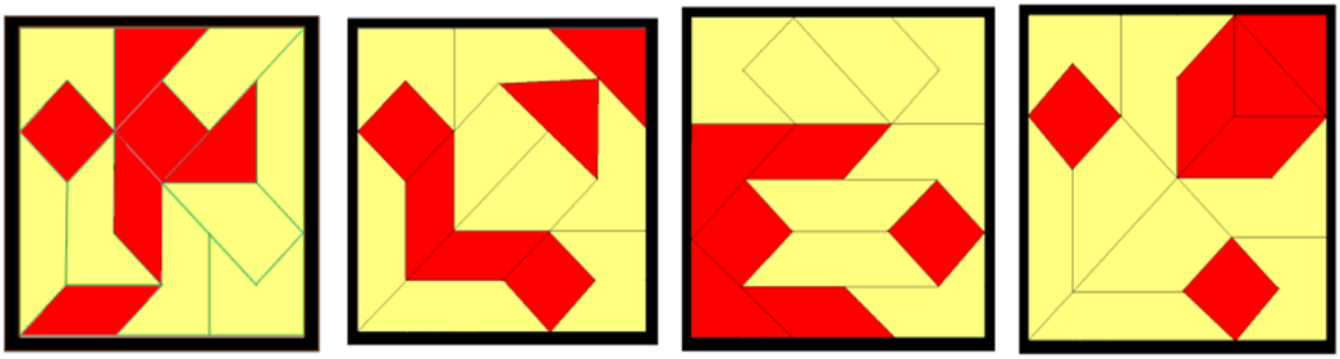
Before starting the game, it is necessary to form teams of 4 persons, who will face the tests by relays, that is, one at a time.

Participants must define from the beginning the order of participation. While a person is performing the tests, the rest of the team just wait and only can help to pass the test in the Middle Station.

Initial Station:

At this station, participant must memorize a picture displayed on a board. Exhibit 4 shows some figures that may be shown to participants. Participant is the only persons that see a figure (random) which must memorize.

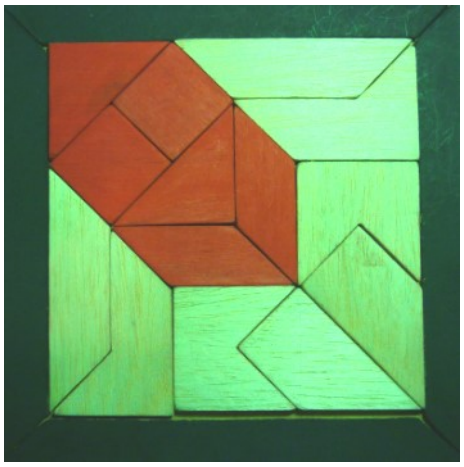
EXHIBIT 4
FIGURES SHOWN AT THE INITIAL STATION OF MEMOCON GAME



Middle Station: At this station, with the help of the team, participant must solve a mathematical skill test, which will be selected at random from a set of cards that will be presented to the team. When they find the answer to the test, only the participant who is currently doing the rout, can approach to the referee and tell the correct answer, referee will decide if the result is correct, otherwise, the participant must return with the team and keep looking for the right answer. Until the referee says that the answer given by the participant is correct, the participant can't advance to the Final Station.

Final Station: At this station, participant must reproduce the image memorized at the Initial Station in a puzzle board. The puzzle consists of 14 geometric pieces, of which 6 pieces have a color (red) and the other 8 pieces have a different color (yellow) as shown in Exhibit 5.

EXHIBIT 5
MEMOCON GAME PUZZLE BOARD



- The route should be done by relays, one person at a time.
- Next participant is unable to start the route until last participant finishes the test of the Final Station. The referee will give the signal to the next participant when this happens.
- In case that participant can't reproduce in the puzzle board of Final Station the image he memorized at the Initial Station, must go back to the Initial Station and restart the route.
- Wins the participant who performs the route and overcomes all the tests in the shortest time.
- Referees are the only ones allowed to say when to advance to the next station and when the route finishes.
- The referees will change the images at the Initial Station (one image per participant), they will confirm the answer at

the Middle Station and disassemble the puzzle board when each participant has completed the route.

RESULTS AND CONCLUSIONS

The designed game *Memocon* was initially applied in a pilot session to 8 persons in 2 teams of 4 each, they were postgraduate students of Universidad Nacional de Colombia and they were selected randomly. In this first test session was intended to get some results that allow refining the game, in order to standardize and leave it ready to be played in future sessions.

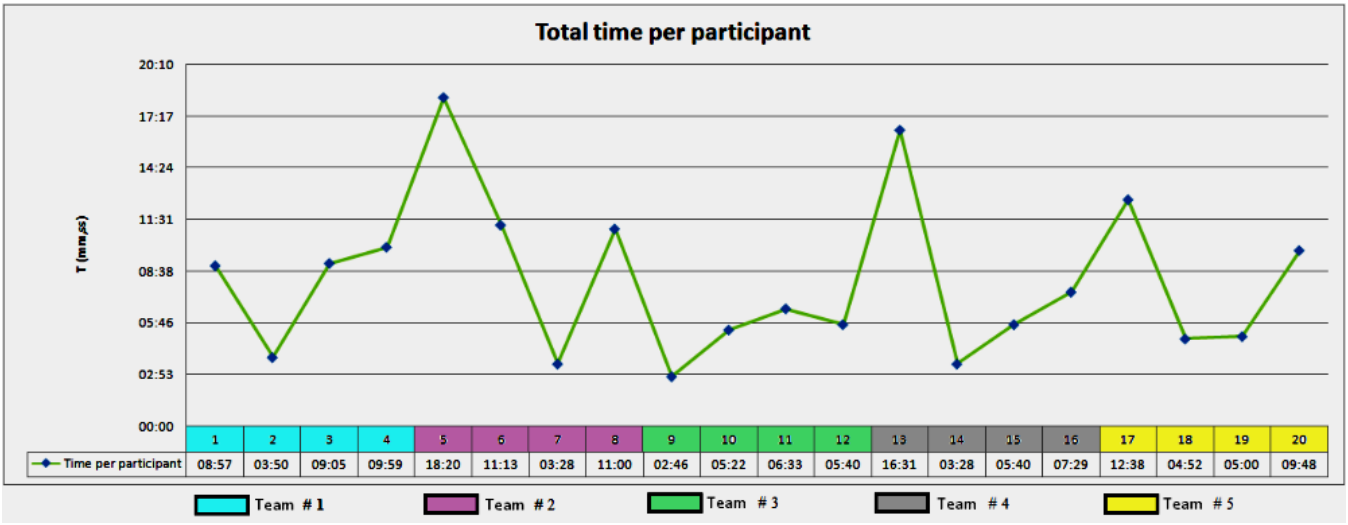
Results of first test allowed to make some adjustments as follows:

- In the middle station there were various tests, including mathematics, logic, reasoning and puzzles; but complexity of those tests was variable and made the times required to develop them also variable, so it was decided to leave only one type of test, mathematics, to standardize complexity and duration of the station.
- The middle test could be done optionally with the help of the team, meaning that the player who was making the route decided whether the team helped or not in the middle test. According to pilot results, it was decided that team's participation at this station was mandatory, as it would allow to measure whether groups affect the process of memorization and concentration of people, and also to give dynamics to the game.

After implementing the resulting changes from pilot session, the game was applied in a group of 20 students of the graduated programs at the National University of Colombia, in Medellin.

Five teams of four persons each were formed. There was a team of only women (Team # 1) and a team of only men (Team # 3), the other three teams were mixed. Exhibit 6 shows the initial times that each participant took to complete the board:

EXHIBIT 6
TOTAL TIME PER PARTICIPANT MEASURED IN MM:SS



Participant # 9, made the whole tour of the game in the shortest time (2':46"), making him the winner of the game. Participant # 5 was who took more time to complete the tour, (18':20").

Exhibit 7 shows the times obtained by each team during the game, where team's time is equal to the addition of individual times of participants from each team, being team # 3 (male) the team that finished the game in less time (20':21") and team # 2 (mixed) which took more time to finish the game (44':01").

EXHIBIT 7
TOTAL TIMES PER TEAM

Team	Gender	Time	Average per team
1	Female	**31:51**	
2	Mixed	**44:01**	
3	Male	**20:21**	**32:20**
4	Mixed	**33:08**	
5	Mixed	**32:18**	

Analyzing the individual times in mixed teams (Team # 2, Team # 4 Team # 5), the winners by team were men (players # 7, # 14 and # 18). In general, men had a better performance in this game and apparently have a greater development of concentration

and memorization skills.

Most people (a total of 9 participants), completed the game using a single tour, which means, they could memorize the displayed image at the initial station in a single attempt and reproduced it in the puzzle board at the final station.

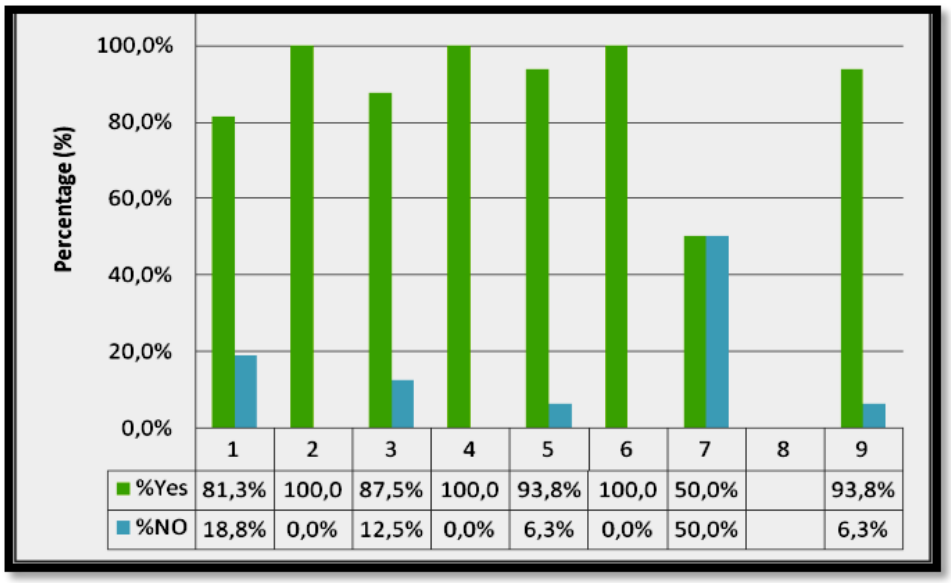
8 of the 20 participants needed to make 2 tours to finish the game and 3 participants required 3 tours. There was a person who did not finish the game (did not armed the figure at station 3).

After the game session, participants were asked to fill a survey in order to get feedback from the experience. The survey sought to answer the following questions:

1. Do you consider dynamics of the game Memocon adequate?
2. Does the game Memocon contribute to the development of the proposed management skills (memory and concentration)?
3. Was the middle test (Middle station) a distracting factor to achieve the goal?
4. Did the team contribute positively to the development of the game?
5. Was the game Memocon funny?
6. Were the game rules clear from the beginning?
7. Was it easy to play?
8. What would you change to the game?
9. Do you consider that the name and logo of the game are adequate? Why?

Exhibit 8 shows the consolidated results of the survey:

EXHIBIT 8
RESULTS OF THE SURVEY OF THE GAME MEMOCON



	1	2	3	4	5	6	7	8	9
%Yes	81,3%	100,0	87,5%	100,0	93,8%	100,0	50,0%		93,8%
%NO	18,8%	0,0%	12,5%	0,0%	6,3%	0,0%	50,0%		6,3%

In conclusion, more than 81.3% of participants consider that the game achieved its objective, dynamics of the game was adequate and all participants feel that the game contributes to the development of the proposed management skills.

In questions for the middle station of the game, 87.5% of participants consider that it was a distracting factor and all of them affirm that the team contributed favorably to overcome this station. For most of the participants (93.8%), the game seemed fun and everyone had clear the rules of the game from the beginning.

On difficulty of game, opinions were divided, because half of the participants think it is easy to play and for the other half it seemed difficult.

Some of the recommendations and/or suggested changes to the game were:

- Decrease the difficulty of mathematical tests of the middle station (6 persons).
- Another material, such as acrylic, for the pieces of the puzzle board at the final station (1 person).

Finally, according to results of the session and the survey, it can be concluded that the game fulfilled the objectives set for it, in terms of design, theme, dynamics and level of fun.

Management games, become potential and innovative tools for students, work groups, employees and employers who, in a participatory way (learning by doing), need to develop skills for its use in different environments of everyday life.

For future work, more game sessions with different types of groups, will be done, in order to obtain more data and conclude on the development of memory and concentration skills on people and whether gender (male or female) determines the level of development of these skills.

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