

## THE (IN)DICA-SUS GAME: A STRATEGY OF GAME-BASED LEARNING ON THE UNIFIED HEALTH SYSTEM

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**ABSTRACT:** This article questions whether educational gaming technology used in learning about the Unified Health System (SUS) benefits imagination, fun, spontaneity and reflection in the training of health professionals. The objectives were to develop the (IN)DICA-SUS board game, centered on the dialog between health policies and play; to analyze the components of fun, pleasure, formative aspects of learning, the emotions and the game tactics in the development of the (IN)DICA-SUS game; and to identify indicator variables for playability in educational technologies for health. This was exploratory, descriptive research with a quantitative and qualitative approach, of the case study type. Test matches were undertaken with 160 participants, involving the administration of a questionnaire, participant observation, content analysis and the Pearson statistical test. The indicator variables for the playability of the educational technologies for health include the pleasure and tension in the game. The (IN)DICA-SUS game brings together inventive and sharing characteristics to optimize multiple learning and goes beyond teaching about the Unified Health System, although it starts from that.

**DESCRIPTORS:** Professional education in public health. Learning. Nursing education.

## JOGO (IN)DICA-SUS: ESTRATÉGIA LÚDICA NA APRENDIZAGEM SOBRE O SISTEMA ÚNICO DE SAÚDE

**RESUMO:** Questiona-se que tecnologia lúdico-educativa no aprendizado sobre o Sistema Único de Saúde favorece a imaginação, a descontração, a espontaneidade e a reflexão na formação de profissionais de saúde. Os objetivos foram desenvolver o jogo de tabuleiro (IN)DICA-SUS, centrado no diálogo das políticas de saúde com o lúdico; analisar os componentes da descontração, do prazer, de aspectos formativos da aprendizagem, as emoções e as táticas do jogo no desenvolvimento do (IN)DICA-SUS; Identificar variáveis indicativas da ludicidade em tecnologias educativas para a saúde. Pesquisa exploratória, descritiva, abordagem quantitativa e qualitativa, do tipo estudo de caso. Realizaram-se partidas testes com 160 participantes, com aplicação de questionário, observação participante, análise de conteúdo e teste estatístico Pearson. As variáveis indicativas da ludicidade de tecnologias educativas para a saúde incluem o prazer e a tensão no jogo. O (IN)DICA-SUS integra o caráter inventivo e de partilha como potencial para aprendizados múltiplos, para além do ensino do Sistema Único de Saúde, ainda que partindo-se dele.

**DESCRIPTORIOS:** Educação profissional em saúde pública. Aprendizagem. Educação em enfermagem.

## JUEGO (IN)DICA-SUS: ESTRATEGIA LÚDICA EN EL APRENDIZAJE SOBRE EL SISTEMA ÚNICO DE SALUD

**RESUMEN:** Es cuestionable que tecnología lúdico-educativa en el aprendizaje acerca de SUS favorece la imaginación, relajación, espontaneidad y reflexión en la formación de los profesionales de la salud. Los objetivos fueron desarrollar el juego (IN)DICA-SUS centrado en diálogo sobre políticas de salud con los juguetones; analizar componentes de relajación, placer, aspectos formativos, emociones y tácticas del desarrollo del (IN)DICA-SUS; identificar las variables indicativas de lo lúdico en tecnologías educativas para la salud. *Enfoque exploratorio, descriptivo, cuantitativo y cualitativo, estudio de caso. Las pruebas se realizaron con partidas testes de 180 participantes, cuestionarios, observación participante, análisis de contenido y prueba estadística de Pearson. Las variables indicativas de ludicidad de tecnologías de educación para la salud incluyen placer y tensión en el juego. El (IN)DICA-SUS integra carácter inventivo, imaginativo e de intercambio como potencial para la formación; contemplase aprendizaje múltiple y el ensino del SUS, a partir de él.*

**DESCRIPTORIOS:** Educación en salud pública profesional. Aprendizaje. Educación en enfermería.

## INTRODUCTION

In the face of the changes stipulated in the National Curricular Guidelines (DCN) for courses in the health care area, consistent with the principles of the Unified Health Service (SUS), it is necessary to invest in the human potential for reinvention, which is inherent to creative processes.<sup>1,2</sup> The challenges presented in training critical and reflexive health professionals lead to an urgent need to investigate different means of facilitating learning processes, making them less disciplinarian of the irreverent spirit which is important for the entertainment of subjects who are thinking, alive, sensitive and active in the construction of a more egalitarian society.<sup>3,4</sup>

In a possible meeting between gaming and education, it may be asked whether educating for the autonomy of subjects based in the dynamics of the game is possible, without curbing its libertarian, spontaneous and insubordinate character. Put differently, when one finds in a gaming activity an environment which is propitious to learning, such as fun and pleasure, at what point is it that disciplinary power, so characteristic of educational processes, may imprison the game in its most irreverent points, that is, its frivolity and spontaneity? When a game is proposed as an educational activity, principally in training institutions, the voluntary character which is intrinsic to games is inevitably submitted to the learning objectives, there being a tendency to reduce it to a teaching instrument or technique.

Various experiments and knowledges have related the use of gaming as a form of facilitating learning, including the recommendations for adapting it better to the objectives of the study or objectives of the study or activity.<sup>5-10</sup> The systematic reviews on the issue have made efforts to measure games' effects on the educational or clinical goals,<sup>5-7</sup> with little attention being given to what happens to the game's characteristics in the educational environment which is intrinsic to training processes, which makes dialog incompatible between critical, inventive education and gaming.<sup>11</sup> That is, few reflections from the health area question how the libertarian characteristics of play behave in the excessively controlled environment of formal education.<sup>12-14</sup>

It is also necessary to analyze what happens to the irreverent, free, unproductive and inventive character of the game when this is used as an educational tool or instrument. Will the game not be negatively affected, when it is adapted to educa-

tional requirements, restricted to the objectives of learning content? Is an interface possible between a liberating, critical pedagogy and the emancipatory features of play,<sup>12-17</sup> as authentic elements in subjects' recreation? It can be seen that putting matters in these terms permits a different perspective for reflection on the concepts and paradigms which guide the game dynamics and the educational activity, without subordinating one to the other, in search of interfaces capable of maximizing the exercising of human freedom.

On being subordinated to any interest other than its own, the game may lose its insubordinacy - which is what best defines it as a principle - to the purposes of utility and production.<sup>12-13,15-17</sup>

What is in play here, entering into the spirit of challenge and the seeking which that term implies, is to find a valid way for education to be able to have the free characteristics of play, as a possibility for transcendence of the human. Any educational character which is sought through play needs to cultivate, as far as possible, a disinterested link between the game and the education.

As a summary of the concept of gaming in human culture, many authors have converged, in reporting it as a free, conscious, frivolous activity, not undertaken for money, exterior to daily life, while intensely absorbing the player. Play occurs in delimited spaces and times, following specified rules which are accepted among the participants, in an environment of enthusiasm which may be festive or sacred, amidst tension and pleasure, ambiguously. Repetition, situations of choice, subject-specific terminology, and the transience between what is serious and banal are spoken of as characteristics which are inherent to the game.<sup>12,15-17</sup>

In the ambit of the breadth of the dialog between play and education, this study asks whether it is possible to develop game-based-learning technology for teaching about the SUS which benefits imagination, fun, spontaneity, and reflection in the training of health professionals. In order to respond to this question, this research had the following objectives: a) to develop the *(IN)DICA-SUS* board game, centered on the dialog between health policies and play; b) to analyze the components of relaxation, of pleasure, of the formative aspects of learning, of the emotions and game tactics involved in developing the *(IN)DICA-SUS* game; c) to identify indicator variables for playability in educational technologies for health. The study is a subproject of the research project "Re-creating: art, play and educational technologies in health",

financed by the National Council for Scientific and Technological Development.<sup>18</sup>

## METHODOLOGY

### Type of study

This research is exploratory and descriptive, with a quantitative and qualitative approach (mixed methods), and is of the case study type, with triangulation of methods.<sup>19-21</sup> An exploratory study was carried out for adapting the rules, the cards, and the board for (IN)DICA-SUS, based on the game 'Perfil', produced by the Brazilian toy company 'Grow'. The descriptive focus analyzed fun, pleasure, the formative aspects of learning, and the emotions and the game tactics in the conception, development and improvement of the (IN)DICA-SUS game. Case studies were made of the test games for identifying the relational characteristics of the game which strengthen its formative, creative, reflexive and free character for the education of health professionals.<sup>21</sup>

The case study is an appropriate investigative strategy for surveying, describing and analyzing the relationships, the phenomena, or the episodes in question, which are useful for generating knowledge about the significant characteristics of events, clarifying factors which influence specific processes, or permitting the detailed examination of relationships.<sup>21</sup> Accordingly, the case study technique was used for the objective of identifying the players' behaviors, the perceptions and gestures which suggested fun, pleasure, and formative aspects of learning, emotions and tactics developed during the games using the (IN)DICA-SUS board game. Each game was treated as a single unit for analysis, followed by the others, until the game is perfected, these being multiple and sequenced case studies.<sup>22</sup>

Mixed methods research combines quantitative and qualitative approaches in the same investigation with the aim of dialectically complementing the recurrences and intensity of the phenomena. This type of research is recommended to maximize the strength of the results originating from different techniques, supported by the discussions of the complexity of the context and systematic approach.<sup>20-21</sup> In building the (IN)DICA-SUS game, the quantitative and qualitative methods complement each other to summarize the indicator variables for playability in educational technologies for health, capable of being used

both in the construction of questionnaires and in the adoption of pedagogical strategies mediated by the game.

### The study's setting and subjects

The study was undertaken in the University of Brasília (UnB) and the Federal University of Minas Gerais (UFMG). The subjects were the lecturers, the students and the scientific initiation bursary students from the undergraduate courses in the area of health and those invited who were willing to participate in the tests. The sample of respondents to the questionnaire was by convenience, in view of the applied and specific character of the research.<sup>19</sup> The sampling of the cases was of the contrast-deepening type,<sup>22</sup> in which each test made up one unit or 'corpus' of the study. An analytical deepening of the specific phenomena in each match was made, along with comparison between the groups in search of the self-explanatory character of the game. The criteria for the number of tests was the progressive strengthening of the inventiveness and critical reflection observed in the players during the matches.

### Instrument and data collection

The development of the (IN)DICA-SUS game occurred in steps of adaptations and successive test matches, until a finalized version was obtained which could be self-administered like any other board game. Data collection was supported by free observation of the matches, the filling out of the questionnaire by the players, and the records made in a field diary by the research team. In the exploratory stage, the elaboration of the board game was started by defining the rules, adapting them to the aims of the (IN)DICA-SUS game, that is, to provide a ludic environment for learning about Brazilian Health Policy. Once the rules had been adjusted, the cards were elaborated with the hints for guessing the content on the SUS, based on topics addressed in the Management of the Health System and Services course in the UFMG's undergraduate course in Nursing.

Three modes of tests were used for developing the board game: a) consultation groups; b) specific groups; c) improvement groups. The tests with consultation groups corresponded to the phase of the game's development, which at that point was still incipient, in which ideas for its construction were exchanged between the researchers, the lecturers and the team of scientific

initiation bursary students. Following this, in the phase of tests with specific groups, matches took place with different groups, with the aim of checking the game's components: the board, the understanding of the rules, the cards and principally the game dynamics, including how long the matches took. In the final stage, that of finalization, with the game more developed, including graphically, a quantitative study was made of the spontaneity, fun, pleasure, and the formative components of the learning and of the emotions in the game, so as to understand the best way of placing it in the educational setting.

A semi-open questionnaire was developed to study the playability of games in the educational context in the final tests for perfecting the *(IN)DICA-SUS* game. Using a matrix, and based on the literature, the dimensions, concepts and variables were constructed for the definition of the items. Fun and pleasure (dependent variables) made up the instrument's two closed questions, using the Likert scale.<sup>19-20,23-26</sup> A pilot stage was held with seven matches and 183 participants, followed by content analysis for extracting the empirical categories based on responses to the questionnaire, with reviewing of the instrument's variables and items. The final version of the collection instrument resulted in 12 open items and two closed ones.

The instrument's dimensions and variables were: a) player profile (sex, schooling, age, profession, affinity for board games, study habits); b) formative components of the learning (perception of the learning, self-assessment, understanding of the concepts, learning by association, active participation, previous knowledge, theory-practice contextualization, reconstruction of ways of understanding the SUS); c) emotions and attitudes during the game (motivation for study, tension in the game, desire to win, lack of interest in the game); d) game tactics (understanding of the rules, quality of the hints and cards; understanding the board; reinvention in the game).

In the data collection stage, eight test matches took place for the development of the *(IN)DICA-SUS* game: two in the consultation groups, three with specific groups and three with the finalization group, involving a total of 160 players (four scientific initiation students, two professors, 92 undergraduate nursing students from the UFMG, 12 final year students from other areas of the UnB, 26 final year students in Nursing and 24 in Medicine from the UnB). Of these participants, 94 students responded to the printed questionnaire

(44 nursing UFMG; 26 nursing UnB; 24 medicine UnB) in the classroom, immediately after the matches, during the Health System Management (UFMG), Community Health (Nursing/UnB) and Health Services Administration and Organization (Medicine/UnB) courses. The average time taken for the players to respond to the questionnaire was 15 minutes, which facilitated the filling out of the questions.

### Analysis of data and ethical aspects

Content analysis was undertaken, a set of techniques which investigates the communication processes in delimited contexts, so as to investigate the playability of the *(IN)DICA-SUS* game.<sup>21</sup> The empirical categories were extracted from the responses to the open questions using a codification sheet containing columns with the dimensions, the predefined variables and the responses which explained them. The responses which evidenced the respective predefined variable were compiled and systematized in simple and percentual frequencies. During the process of floating analysis of the material, categories emerged which were not observed in the initial predefinition of variables, resulting in the redefinition of the same.

The responses to the questionnaires were analyzed independently by two researchers with later conferral and adjustment of the data.<sup>27</sup> For the two metric variables, the Pearson statistical test was carried out so as to gauge the correlation and decide about the best definition of the dependent variable, adopting the value of 0.30 ( $p=0.05$ ) as a reference.<sup>24</sup> Triangulation of the methods was then undertaken to confirm the dimensions and the indicator variables for playability in educational technology for health.

The research was approved by the UFMG's Research Ethics Committee (decision ETIC 0323.0.203.000-10) and by the Ethics Committee of the Federal District's Health Department (CEP/SES-DF 193/11). All the research's subjects signed the Terms of Free and Informed Consent.

## RESULTS

### *(IN)DICA-SUS: health policies in the play environment*

In the exploratory stage, the initial changes made in the *(IN)DICA-SUS* game, in relation to the game *Perfil 4*, were the name of the pedagogical

game, the classification of the hints related to the SUS (SUS-Thing, SUS-Actors, SUS-Place and SUS-Time), the number of hints contained on each card, and the inclusion of the pedagogic objective and the rule about helping colleagues during the game (Picture 1). The number of hints on each card was reduced, being restricted to ten, so as to maintain the game's momentum. The matches lasted, on average, 1 hour thirty minutes, including time spent reading the rules. The redefinition of the types of cards consisted of the substitution of the category 'SUS-Thing' with 'Thing'; of 'SUS-Actors' with 'People'; of 'SUS-Place' with 'Place' and 'SUS-Time' with 'Year' (Figure 1). The aim was to facilitate understanding of the concepts and guidelines ('SUS-Thing'); of the spaces for discussion and production (SUS-Place), of the social movements and institutions ('SUS-Actors') and the historical landmarks in health policy in Brazil ('SUS-Time').

The participant observation and the records in the field diary indicated the need to improve the playability of the educational technology: a) the rules, the cards and the boards need to be self-explanatory; b) the seduction of the game begins when one opens the box, therefore the quality of the appearance is an important element; c) the more one changes the game away from the original rules, the greater the risk of losing its element of fun; d) the interface with the theory content, in order to remain light-hearted, needs to be permeated with humor and/or fantasy; e) the participation or supervision of the lecturer in the game inhibited the students' fun; f) the reinvention of the rules is inherent to the game; g) the more the players reinvent the rules, the more the group's integration and active participation is strengthened; and g) the game flows better in places where there are no noise restrictions.

**Picture 1 – Comparison between the rules of the games *Perfil 4* and (IN)DICA-SUS**

Rules	<i>Perfil 4</i>	(IN)DICA-SUS
The game	There are 390 new cards with people, places, things and years for you to test your deductive capacity. The fewer hints you use, the more points you win!	(IN)DICA-SUS is a pedagogic game which addresses the content of the management and policies of the Unified Health System (SUS). The dynamic of the proposal consists of reading the 'hints' to the participants on topics related to the SUS, stimulating the players to take risks on the concepts, the places, the times and the social actors who make up public health policy in Brazil, according to the rules described below.
Components	390 cards each with 20 hints about general knowledge; six pawns; 20 red cards; one yellow card; five blue cards, one board.	50 Cards with hints about the running of the SUS; six pawns; 10 red cards; one blue card; five green cards; one board.
Pedagogical objective	None	To promote teaching-learning sessions about the management of the SUS for undergraduate students in the area of health and interested people in general, mediated by the emotion, creativity, fun, involvement, motivation and active participation stimulated by the game.
Objective of the game	To be the first player or team to move their respective pawn to the space marked 'END'.	To be the first player or team to move their respective pawn to the space marked 'END' on the board, after helping colleagues in the game.
How to play	<ol style="list-style-type: none"> <li>1. The players decide among themselves who shall start the game, who shall also be the facilitator. The facilitator takes the first card from the pile and tells the players what category it belongs to (<i>Perfil 4</i>: thing, place, person or year; (IN)DICA-SUS: SUS-Thing; SUS-Place; SUS-Time or SUS-Actors), placing the yellow card on the respective house on the board.</li> <li>2. The player sitting to the facilitator's left chooses a number between 1 and 20 (in <i>Perfil 4</i>) or 1 and 10 (in (IN)DICA-SUS), and, next, places a red card on the house on the board with the same number.</li> <li>3. The facilitator reads out loud the hint for the number chosen by the player.</li> <li>4. After the reading of the hint, the player who chose it has the right to venture a guess regarding the identity of the card, saying out loud who or what is referred to in it. Should the player not want to venture a guess, she simply gives her turn to the player sitting on her left.</li> </ol>	

**The fun, pleasure, emotions and formative components of learning in the game.**

The respondents to the questionnaire were undergraduate students of nursing (70-74.4%) and medicine (24-25.5%), female (71-75.5%) and male (23-24.5%), between 21 and 30 years old (77-82%) or younger (15-17%). Undergraduate students stated that they had the habit of individual study (37-39.4%), participative techniques (23-25.5%) or group discussions (14-14.9%). The majority like board games (84-89.4%), motivated by relaxation, interaction, the stimulating dynamics, happiness, fun or childhood experiences. There were some who did not like games (10-10.6%) as they considered them to be long or boring, or did not have the habit, or felt anxious. The participants stated that they often or always had fun or pleasure during games (mean: 4.2 fun; 4.0 pleasure); that they sometimes became tense, and rarely bored (mean: 2.8 tense; 3.6 bored). There was a correlation between pleasure and fun in the game (0.55;  $p=0.000$ ) and between a pleasurable experience and a boring one (0.495;  $p=0.001$ ).

Regarding the formative components of learning, four of the nine variables initially proposed were confirmed with some groupings of meaning. The term 'perception of learning' was incorporated into the self-assessment variable. The categories extracted from the students' responses confirmed learning by association (29-31%), the self-assessment/perception of learning (25-27%), the understanding of concepts (21-22%), active participation (18-19%) and others (14-15%) as encouraging learning. On the other hand, previous knowledge, theory-practice contextualization and modes of understanding the SUS, which had been initially expected, were not evidenced in the players' responses.



**Figure 1 - (IN)DICA-SUS game and its components**

The emotions and feelings experienced during the games emerged in the categories 'desire and pleasure of winning' (65-69%), 'lack of interest in the game/desire to stop playing (26-28%) and motivation to study (15-16%)'. New categories emerged from the results - 'ambiguity in feelings of pleasure and tension' (46-49%) and 'worries/frustration in the game' (14-15%). Most of the feelings to do with abandoning the game/lack of interest in the game, or worry due to not knowing the content of the cards were present in the accounts from the students at the UnB (26-69%), because the contents of the cards did not totally reflect the contents of the courses run at the UnB. This was not the case for the students at the UFMG, which is where the game originated. The game's tactics were satisfactory for the players, who considered that the dynamics facilitated learning (92-97%), that the rules were easy to understand (82-87%), that the content of the cards was good quality (92-98%) although difficult at the same time (72-77%). The students stated that they reinvented the rules during the game in practically all the responses (93-98%). Picture 2 shows some categories and statements from Nursing students (N) and Medical students (M).

**Picture 2 - Empirical categories and statements from the (IN)DICA-SUS players**

Empirical studies	Examples of statements
Learning by association	<i>Helped by making us think and even make an effort to give the right answer (N40). Helped because it motivated me to remember what I had learnt about the SUS, and introduced me to new terms and departments of the SUS (M24).</i>
Understanding concepts	<i>Helped because I nearly died laughing at things I didn't know, and I learnt a lot at the same time (N13). I learnt in an enjoyable way about a topic which, theoretically, in my opinion, is not pleasurable (M15).</i>
Self-assessment/ Perception of learning	<i>I could see that I need to study a little more (N3). I saw that the SUS is a complex system, full of actors, and that we need to understand this health system better in order to have the right to quality health (M24).</i>

Empirical studies	Examples of statements
Interaction/Group discussion/ Active participation	<i>I felt the teamwork in a way. The people at the same level of knowledge managed to understand each other very well and make the activity pleasurable (N1).</i> <i>It was fun, the interaction with my colleagues was good and, at times, tiring (N5).</i>
Desire and pleasure in winning	<i>Happiness in getting it right and moving ahead of my colleagues. [...] great happiness at my colleagues' mistakes (N6).</i> <i>I was proud most of the time because of knowing the subject material (N20).</i> <i>Winning, because we got more and more enthusiastic (N4).</i>
Ambiguity in feelings of pleasure and tension	<i>I felt tense at the same time as I felt relaxed (N7).</i> <i>Anxiety, anguish, happiness (N15).</i> <i>I wanted to win because of the emotion of the game. I didn't want to abandon the game, but there were times when I was indifferent (N5).</i>
Lack of interest in the game/ Desire to abandon the game	<i>I wanted to stop playing and study everything all over again, as I felt like I didn't know anything (N33).</i> <i>I think I felt like quitting the game, as the subject doesn't interest me (M4).</i> <i>Abandon the game, I have a lot to study, I didn't want to lose time (M17).</i>
Motivation for study	<i>I wrote down hints and answers which I didn't know, so I could study them more (N12).</i> <i>During the game, how much I know about the SUS became clear, which motivated me to find out more about the subject (M8).</i> <i>I left wanting to study more and play again (N3).</i>
Worry/Frustration	<i>I often felt ashamed because of not knowing the answer to some questions (N7).</i> <i>Frustration when I thought I was right, but was wrong (N14).</i>
Reinventing the Game	<i>Yes. We only used the easier cards (M18).</i> <i>Yes. We controlled the time for answering in (N10).</i> <i>We weren't so strict with the answers (M5).</i>

From the observations and records in the field diaries about the matches, it was ascertained that: a) ignorance of the contents of the cards was a demotivating factor; b) other forms of symbolic play took place around the board, such as joking, private codes, gestures and metaphors; c) the enthusiasm increased as victory became imminent; d) not everybody was equally involved in the match; e) rewards, even if symbolic, helped motivate the students; and f) the affinity for board games, the profile of the students and the matching of course content with card content influence the quality of participation.

The triangulation of the results of the quantitative and qualitative stages defined the pleasure and the tension in the game as variable dependents which indicate the playability of educational technologies for health. The independent dimensions and variables confirmed are: a) player profile (sex, schooling, age, profession, liking of board games, study habits); b) formative components of learning (learning by association, perception of learning/self-assessment, understanding of concepts, interaction/group discussion/active participation); c) emotions and attitudes in the game (desire and pleasure in winning, motivation to study, ambiguity in feelings of pleasure and tension in the game, lack of interest/desire to abandon the game, worry/frustration); and d) game tactics (understanding rules, quality of cards, clarity of the board, reinvention in the game).

## DISCUSSION

Attention to detail in the construction of a game which reduces the need for further explanations, and which can be modified by the players was central in the development of the (IN)DICA SUS game for awakening involvement and abstraction in the participants. As was seen in the observations of the test matches, aspects such as the graphical appearance of the game, the easy understanding of the rules, cards and game dynamics were priority for the development of this game-based-learning technology. Studies investigating the user experience in games have enumerated immersion, interaction, challenge, fun, control and player skills as making up the experience.<sup>25</sup> It is recommended that a game should not demand special skills of the participant, who should have sufficient information to start playing without having to read lengthy texts or excessive explanations about the rules – which can demotivate the player.

When constructing an educational technology set in the irreverent characteristics of play and not restricted to the purposes of utilitarian production, it is necessary to pay attention to those results which show the influence of the teaching on the libertarian potential. This phenomenon was observed in all the stages of the development of the (IN)DICA-SUS game, that is, in the inhibitory

character of the participation of the professor in the matches, in the students' demotivation when faced with the difficulty of the hints, or in the frustration of the players in not knowing the answers to the cards. At all times in the investigation and amongst the complementarity of the information, a more horizontal dialog was sought between the approach to the SUS in the disciplines in the area of health and in maintaining the inventive characteristics of the game. It was seen that the play, the environment for reflexive creativity, needs to be constantly repositioned in the educational context so as to strengthen its emancipatory potential.<sup>11-17</sup>

The profile of the players and the context in which the matches occur are characteristics which influenced the assessment of the playability, of the formative components of the learning, of the emotions in the matches and of the tactics of the *(IN)DICA-SUS* game. One may analyze the greater interest aroused in those who have or had agreeable experiences with games, whether in the present or in childhood, as a psychological factor proper to the experience of playing in human development.<sup>28</sup> The tension between the subjection to rules and renunciation of impulsive action as a requirement for access to pleasure is part of the meaning of the toy and the game in childhood, with repercussions for human development. The psychological and historical-cultural development of how people deal with desire, moving on from the instinctive need for immediate realization to a unit of contrasts between desire and control, includes the experience of playing in childhood and in life. Hence, the rule as an integral part of the game is, at the same time, a factor of submission and subversion of what is real, ambiguously, itself constituting an object of desire.<sup>28-29</sup> Such aspects became clear in the results, especially in the redefinition of the dependent indicator variables for playability in educational technology for health, which better incorporate the dialectical forces which constitute it.<sup>15-17,28-29</sup>

The lack of interest in the games, created by the players' ignorance of the areas covered in the cards, or by their considering the experience to be irrelevant, may be explained in theories of motivation for learning<sup>30</sup> and in the interpretation of the symbolic game.<sup>31</sup> The ARCS (Attention, Relevance, Confidence, Satisfaction) analytical model which is used both in assessment of games and in the production of interactive educational technologies, brings together four categories for motivation in learning processes: attention, relevance, confi-

dence and satisfaction.<sup>30</sup> From this perspective, it is a pedagogical strategy which produces positive expectations of success and recognition, which are motivational factors intrinsic to learning.

The characteristic of immersion, on the other hand, inherent to the game, arouses not only positive feelings, but also negative emotions, such as anxiety and discomfort.<sup>32</sup>

The unit of opposites was also present in the assessments of the *(IN)DICA-SUS* game as a facilitator of learning. Learning by association, the grasping of concepts, self-assessment and motivation for studying amidst the ambiguity in the feelings of pleasure and tension in the game, in which euphoria or desire to abandon the game are close feelings, were reported. The dialectical constitution itself of play in human development was confirmed, in which pleasure and tension are driving forces of the participative involvement required in the game.<sup>15-17,28-30</sup>

The non-confirmation of variables which are close to formal education, such as previous knowledge, theory-practice contextualization, and ways of understanding the SUS are good examples of the irreverence of the game on the bonds of the teaching process. In the dialog between health policies and the spontaneity of play, the content-oriented expectations of traditional education excel. With the development of educational technology, the exercise was rescued from the disruption, and the multiple meanings of the game for education.

## CONCLUSION

The development of the *(IN)DICA-SUS* game included the relevancy of the inventive, imaginative and sharing characteristics as potential for the autonomy of reflexive subjects, setting multiple learnings and going beyond teaching about the SUS, although starting with this. The learning sought for health professionals through gaming covers the plural aspects of human development, such as group interaction, active participation, capacity for self-reflection, the motivation for study and the desire to win, which are necessary for the construction of juster and democratic societies, in which the concept of health transcends the absence of illness. The predominance of the game over any other aim apart from itself was understood, this requiring an environment free of restrictions, intrinsic to gaming culture, grounded in happiness, in sharing, in celebration and in involvement.

The dimensions and variables indicating the



playability of educational technology for health identified in the study guide the construction of evaluative questionnaires and pedagogic strategies directed at imagination, fun, spontaneity, and critical-reflexive training of health professionals. As limitations of the study, one can indicate the need for quantitative investigations, with a sampling plan, multivariate and inferential analysis, so as to validate the factors significantly associated with pleasure and tension in the game.

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