

Ergonomics and usability of children interfaces: *Spore*®, the case study

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Abstract. This study supports itself in ergonomic concepts and usability criteria by prioritizing the identification and correction of problems found during the interaction of children with projected interfaces for them and left from the cognitive, interactional and interfacial difficulties caused by the excesses of color, elements and animation in sites and games, between them the difficulty of recognition of the information during the interaction with the elements of grid of the interface. The results of the methodology had proven that 78.38% of the 37 children got so absorbed by the game and forgot to fulfill their tasks, at least partially, and that the application of the supported ergonomic beddings in usability criteria is imperative. It is relevant to point out that the projectual activity of the game is centered in the user, the child, whose behavior is distinct and particular. Points that had been disclosed that had passed unobserved by the involved adults in this project, and that they had displayed the unappropriateness of some screens of the *Spore*® to the etária band due to the ambiguity of the game, besides, the children had been sensible to the clarity in some screens and had passed for unnecessary situations of stress.

Keywords: ergonomics, usability, IHC, children, games

1. Introduction

This study is turned on the importance of the application of the ergonomic concepts in children interfaces by prioritizing the identification and correction of problems found during interacting, supported by usability criteria. Design of the interactive products has the premise to adapt for the better communication and human interaction. The problems - or noises - suspected are interfacials, cognitives and interactional. This study analyzed the ergonomics and the usability of an interface of entertainment centered in the user, the child, and took for study object an existing game already in the Market, the *Spore*®, directed for 10 year old children, that makes possible for the user to originate a being and to make it evolve from the cellular phase until the species are development. In this appreciation the graphical interface of the game, the clickable areas of the screen, the mechanisms of aid, the disposal and amount of information, and still

the interatividade options that the game offers had been enclosed. The perceived problems were:

- The need of all projectual activity of the software to be centered in the user, whose behavior is distinct and particular;
- The existence of ergonomic noises in surplus in the communication “child-task-machine” in interfaces directed towards the infantile public - these cognitive noises, Interactionals and Interfacials in the ergonomics and the usability of the screens, caused the excess in color, elements and animation that made it difficult to focus and exhausting for the user.
- The difficulty of memorizing and recognizing the information from the elements of the interface grid.

The hypothesis: the excess of ergonomic noises makes the learning of the software difficult, it disperses the users attention and makes him forget to execute the tasks, due to the excess of interface commands. This study justifies itself for the relevance that these interfaces fulfill its objectives and

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they do not deviate the user of the initial focus; the expressive number of children that plays games and the amount of studies on the lowermost subject, if compared with the number and research on websites. The experience of the children must be efficient, pleasant and satisfactory. A decrease of interest of 24,32% of the children for the game could be evidenced after facing the problems of usability interface. Application of methods in children raised 261 negative comments and 41 positives on the game, being that 41.46% of the positive comments mentioned that the main actions of the game (to paint, to create and to talk), of where if concludes that the children had been motivated for the actions and, after noticing the difficulties imposed by the interface, had disappointments. They lost time trying to decide usability impediments - and complained about this. The results showed that the attention of the user could be affected by the excess in ergonomic noises that difficulties the learning of the software, dispersed and makes with that it leaves to execute the tasks, absorbed in the excess of commands of the interface. The children had surpassed impediments of the Spore® for the promise of pleasure in playing.

2. Methods

The selected methods and techniques had objectified to know the user and its interaction with Spore®, its habits and values, to perceive and to understand its reactions without intervening with the results, interpreted in an impartial way. They had been selected to validate this research: the Heuristical Evaluation - Bastien & Scapin [8], Nielsen [9] and Shneidermann [4]; the Cooperative Evaluation - Monk [3], Structuralized Interviews - Moraes [2] and Scale of Evaluation - Sommer and 15 Sommer [14], Jordan [12]. To construct the Evaluation Scale, the application of the Test of Understanding was necessary - Formiga [6]. according to the teachings of Chapanis [1] the independent variable had been the environment of the game, its commands, controls and answers; the dependents had been the reactions and the behavior of the user in the interaction; the controlled ones, the age group, experience with electronic interfaces, the inexperience with the Spore®, scholarship and partner-cultural level. The citizens of the research were children of 9 to 11 years old, pupils of basic education (5th and 6th gradings of American education), with compatible ability to the rated band in computer science, Internet and games and that they

were inexperienced in the use of the Spore®. The premise was to be a typical sample to reflect habits and attitudes of real users of the product. The research was made in two units of the QI College, both in the city of Rio de Janeiro. The same terminal was used in all the techniques of this research, one notebook MacBook Pro, with processor 2,4 GHz Intel the 2 Cores Duo with 4GB of memory, with the Spore® installed in it, and chosen team for use offline. The choice of the terminal pondered the graphical platform, the amount of colors and the resolution of the screen. The study was not focused in the operational system and if it abided by the experience of the users with the game. He was registered for writings, notations and photos, with assent of the children and their responsible ones. The identity of the children was preserved.

2.1. Heuristic evaluation

The objective was to get seeming of specialists in usability, beyond being a method of simple, efficient research and of low cost. The heuristical principles developed by Nielsen and Molich [9], added to the "Golden Rules" of Schneiderman [4] and to the criteria of Bastien and Scapin [8] had been selected to guide the heuristical ones. A test was carried through pilot, with a specialist in usability and evaluation made with other four. The pilot test confirmed the effectiveness of the method and pointed with respect to the reformularization of some points of checklist. The results had not been used in this study. The environments duly had been prepared for the technique.

Figure 1

Rooms prepared for Heuristical Evaluation



2.2. Structured interviews

Preece [10] believes that the children have more arisen creativity of what adult and that to involve them and to understand its understanding of world she guides the solution of products directed toward them. According with this reasoning the interview, structuralized and individual, was chosen and made in two parts: on questions to the former experience of

the users, applied before initiating on activity with the game and questions to the game, with the still recent interaction in the mind of the child. The pilot test was carried through with five children, confirmed the effectiveness of the method and the results had not been used in this study.

2.3. Cooperative evaluation

The objective technique to the problems faced in the interaction, where using and designers evaluates the system together. The users were encouraged to display its opinions while they use sistem and to take off the doubts that could appear. This technique showed itself simple and excellent, especially with children: low cost and offers feedback spontaneous and faithful. The Cooperative Evaluation was made with 37 children and the pilot test carried through with others five children, confirmed its effectiveness and the results had not been used in this study. It was asked to each one of the children if photos could be taken off, did not identifying them, that the school already had authorization of the responsible ones. All the children had the right to decide if they would like or not to participate. The participants had 5min for the adaptation to the interface. Finished this time, four cards had been given to the participant, each one with a group of tasks to be fulfilled for the user. The chosen tasks had been foward in the specific part of studied software, feasible and described in simple language. The election of the tasks, guided by Barnum [5], used the following criteria: first impressions, on to the appearance and the sensations that the interface provoked, the easiness of the use, the most frequent tasks and the tasks you criticize, and generally less frequent.

2.4. Evaluation scale

The technique was applied individually, to the end of the cooperative evaluation, and allowed to quantify subjective reactions of the users during the interaction with the product. In accordance with Sommer and Sommer [14] scales represent a series steps commanded in fixed intervals, used as base of measure to quantify subjective experiences and to provide numerical values that make possible the comparison between groups or individuals. Jordan [12] adds that the evaluation scale measures the easiness or difficulty of interaction with a product and in sequence uses a number of fixed alternatives of answers, that consider the force of a feeling in relation the determined

object of research, - increasing or decreasing - and that, when a questionnaire of fixed answers is applied to measure how much a product is pleasant of quantitative form, they must be offered to the participants a range of possibilities on possible answers to express its feelings in relation to the product. The evaluation scale allowed to survey the extension quantitatively of how much the users had approved the game and, for its validation, it was imperative the use of simple language and vocabulary in relation to the children. Evaluation Scale was strongly inspired in SUS (System Usability Scale) and in it made an adaptation to the light of Sommer and Sommer [14], that they observe that children usually does not make verbal evaluations and suggest the use of facial expressions instead. They had been enclosed emoticons, popular between the public-target, to illustrate these concepts and to measure the emotions of the user, through the representation of 5 expressions, of the most satisfied to the least satisfied, in a language that could be easily comprehended by the child universe. This instrument is adjusted to the user in question and reports the reaction provoked with a bigger aim of what with speech, assuming that the infantile public has less elastic subjective verbalization. The pilot test of Evaluation Scale was carried through with five children, confirmed the effectiveness of the method and the results had not been used in this study. For the production of the scale was made necessary the application of the Test of Understanding [6] in 30 other children, preceded for a test pilot with others 10 children.

2.5. Compreention test

Formiga [6] places that the objective of the understanding test is to realize the real agreement of the receiver when observing the symbol. The used procedure was to distinguish two groups from five emoticons each, two variants for each one of the five referring ones. The groups of emoticons are widely used in the MSN for the children who participate of the clipping of this research, as can be evidenced during the application of the test.

3. Results

3.1. Heuristic evaluation

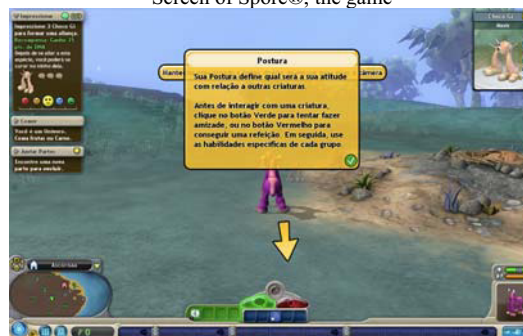
Markopoulos [13] comments that the heuristical evaluation of products whose users are children must

have its focus extended beyond the usability, or of knowledge established of design. The experience of the appraisers with infantile universe can offer valuable insights regarding as the children if they ahead hold of definitive circumstances or to identify points that can cause problems for the children. In accordance with Isbister & Schaffer, [7], Nielsen differentiates the specialists in two categories: “single experts” and “double experts”. “Single experts” have experience in usability or the field in question (in the case, Games), whereas “double experts” has knowledge in both the fields. This research, illuminated for Laitinen [11], used practical the weekly one to play games as principle to classify “double expertise” of the appraisers. Nielsen (1993) apud Isbister & Schaffer [7] made a study in which appraisers “double experts”, had found 60 percent of the usability problems while “single experts” had found only 22 percent. Laitinen [11], that it classifies “double experts” specialists in usability who play weekly, proved in article in the Journal of Usability Studies (JUS) not to exist relevance significant statistics enters the number of problems found for specialists players or not. This affirmation if applies at least in games of adventure. The fact not to have necessity of the professional to be “double expert” does not mean that this expertise either useless. To understand as and which specific experience the using search helps to understand the level of excellence is or not an usability problem. Expertise of the professionals who had participated of the evaluation, all with knowledge technic and theoretic, experience and refined look in usability, had made of these opinion formers qualified informers for this technique. The heuristical evaluations were made individually. Three of them had been made with specialists “double experts”, as much in usability how much in games and one with a specialist only in usability, “single expert”. No difference in the evaluation of the specialists was perceived, independent of expertise of them. The extracted results of the Heuristical Evaluation had been:

1. The information presentation: The totality of the specialists agrees that the information are difficult to understand and exhaust the focus of task, compelling the user to make complete and constant sweepings of the interface and that the navigation elements are difficult to be identified. Does not seem to have a grid the prominence given to the main information is inadequate, the messages appear in different areas in the screen, overlapped and, even so it has visual feedback through the “state of interaction” (mouse to over), in some cases it is not possible to know if what

it is selected it is the object or its angle of visualization.

Figure 2
Screen of Spore®, the game



2. Feedback of the system: The system supplies feedback in located messages and defined in inconsistent way, with inappropriated position, size and area. A projected system for children must ponder the impatience characteristic of this phase, that it insistently yearns for instantaneous answers. The specialists had been unanimous evaluating the Spore® reply time that, when was not bigger of the expected time, did not give return to the user.
3. Visibility: Although the game constantly presents messages on the objectives, many information are distributed in some parts of the screen at the same time and it makes difficult the agreement of the game. Moreover, the users can follow their performance in the screen, even they must discover before what he serves for what! that means that the interface is confused and brings desorientation instead of intuition. The information regarding the progress are not clear, the example of the bars of health and hunger, that is equivalent the “life” in the game, and had not been perceived with easiness.
4. Menus: the choices are not commanded naturally and the rules of the game are not clear. Imperfections in the organizacional structure in the relation of the icons and buttons without apparent functionality exist mainly. Related and interdependent fields appear the same in level, what makes difficult the perception of the screen and sometimes is not in the correct position or respecting the hierarchy.
5. Control and freedom: Some screens of the game are not optional, as the film and the screen of creation. The user should be able to opt between “jump” or not some parts of the game. The orientation carried through for the game force the users.
6. Consistency: The game presented some problems in this question, the example of the menu structure, that does not obey the same in all the screens and elements, and have not

hierarchy accordance with the concept of “grouping and distinction by the format”. Nor all the elements have tags for identification, a great tool for the public which it destines. 7. Errors: Messages of error appear in different places on screen, pretending to be “instructions” and just for little time for reading. “You do not have mouth” was an error message difficult for being recognized, and that goes against to the selected heuristics. About the errors prevention, the system does not inform the users when they are close to commit serious errors or, when informs, the messages are confusing and appear after the committed error. 8. Memorization: seriously compromised during the interaction. 9. Structure of the Paragraphs: The paragraphs are very extensive and with unnecessary complexity, particularly on help menu. 10. Understanding: The texts, difficult to understand in the first Reading, covered by informal terms or little meaningful. Errors of translation had been perceived, serious lack when if dirige to that they are still in phase of grammar rules sedimentation. The writing of dialogue boxes showed itself inconsistent. Messages with hostile language exists and the visual language of the game was perceived as violent. The iconographic codification is inappropriated and some icons loose the pregnance inside the context of the interface. Elements that holds different forms should be clearly to be distinct and contrasting. 11. Organization: Imperfections in the organizational structure, mainly in the relation of screens, icons, buttons and other elements without apparent functionality. An organized screen, whose relation between the elements are functional and appropriate is inviting, in contrast of others that makes the user has extra work when having that to learn the use on each screen. Children are well less perseverantes than the adults in this case. 12. Access: The game makes use of the resources as fade out to remove messages of the screen, but it does not have how to guarantee that the user has had time enough to read or to have only perceived it of glance and if to feel impotent for having lost something that was perhaps important. 13. Quality: The illustrations were all considerate as low quality. 14. Adequacy: The specialists agree that the tasks of the game, in the studied period of training, do not seem in accord to the age range that is destined. In the phase of the observed game, the option for different forms to fulfill a task was also not offered. 15. Positioning: It must have one better space relation enters objects of the interface. 16. Icons: Gratuitous icons in the interface exist and that they would have to be simpler and schematical and to

encourage the visual cohesion - the difference between the selected icon and excessively would have to be clearer. 17. Colors: The specialists had found problems in the use of colors, illustrated by the commentaries: ... “There’s an important cognitive conflict of colors, the green bar of health of both the creatures who will be in the battle (who is of who)”.... “The green that indicates the life, would have to move red when the personage will be dying (or when will be losing the fight)”...

Figure 3

Screen that illustrates some of the mentioned problems



18. Help and documentation: the aid presented for the game is not concise and confuses instead of guiding. It presents many topics, with complex paragraphs, long and extreme, and it does not make illustrations that fits. This rank is especially true to if dealing with a game, specially a game for children.

From 45 pointed problems, 24.44% had been classified as Very Serious, 64.44% Serious and 11.11% as a Minor Problems of Usability. About the target of the found problems, 73.33% had been had as Global and 28.89% as Local. The considered most serious problems of the game had been: The game doesn’t offer vital instructions for the user; The game does not teach the user how to play; The game presents overlapping grouping problems; The game does not allow the user to actually control actions; The messages compel the users instead of only guiding them; The elements are of difficult decoding; The icons of the buttons “to save” and “to leave” are difficult to recognize; The game has speech of difficult understanding; The tags of the elements are different from the relation in some cases; To find the Help - and to leave it - were difficult. It was consensus that, even so the concept of the game is very interesting, the imperfections and usability problems compromise its acceptance, continued use and playability.

3.2. Structured interviews

First part: questions about the children expertise with electronic interfaces, before the interaction. 1. Do you like games in general? Of the 37 participants of the research, 94.59% answered that like games a lot. 2. What you most like in a game? The words “action” and “adventure” were the ones that the most answers. The percentile representation pointed that 29.73% of the 37 children believe that what more matters stops in a game is the action, 24.32% the “playability”, 21.62% the scenes, 13.51% appropriated adventure and 10.81% the personages of the game. 3. Which were the ones that you prefer? Four categories had been understood: adventure, violence, entertainment and sports. The Spore®, was classified as a game of adventure, with 40,54% of the preference. “Violence” had 24.32% of preference while “Entertainment” and “Sports” had 18.92% and 16.22% of the answers respectively. 4. Reason? The category “Action and adventure”, 37.84%; “Scene”, with 32,43%; “Challenges”, responsible for 18,92%; E the category “Entertainment”, with 10,81% of the opinions. 5. How much time do you use to to play a game? The average of time of the 37 respondents was 2h58min for interaction - almost 3h - not necessarily of interaction with the same game. 6. How many times per week do you play games? It measured the general frequency of computers use to play games as 5 times per week. The limitation of schedule is imposed by then parents, otherwise this time would be bigger and that, during time allowed for producing evidence in the school, this time tends to be reduced - despite under protests. 7. Do you already knew Spore®? Amongst the participants, 89.19% did not know the Spore®. The others had only seen the packing at the stores. 8. The game provokes you interest, in a generalized manner? When observing the layer and being presented to the initial screen of the game, 100% of the respondents affirmed to have had its interest awakened for the game.

Second part: questions about the interface of the Spore, after the interaction. 9. Describes the elements that you can remember. Four main categories amongst the answers could have been perceived. They had been: “Scene, responsible for 40,54%, “Creatures”, with 35,14%, “Creation”, with 13,51% and “Buttons “to save” and “to leave” had 10.81%. 10. Did you feel the lack of some element in the screen? Nothing it lacked on screen for 27,03% of the children. 72.97% had given important suggestions with its answers. 11. Some element bothered

you in the screen? For 54,0% not. From the total of the children 16.2% had perceived the red edge, that indicates the pressing need of feeding or health, as the most bothering moment of the game and 13.51% of the children that had perceived the red edge, had given to notorious signals of anguish and discomfort: ... “When everything turned red in return, in the hour to die” ... “I had fear” ... “I felt something bad on my bally, something strange” ... Of the 37 children, 8.11% said be frankly bothered with the lack of option to command the game at some moments. The commands (control knobs) had been pointed by 18,92% of the children, who had not perceived them or they had not known how to use them. 12. What did you not understand on screen? 18.92% did not understand essential functions to play. Of the total, 24.32% said to have understood everything. Of these children, 10.8% of the respondents had contradictions when affirming not to have been confused in the reply of the next question (“Were you confused at some moment?”) while they said had not understood important stages, 5.40% said not have been confused in the game on the next question: ... “I did not understand what I was making” ... /... “I found the screen confused” ... “I didn’t know where to look at first” ... 13. Did you feel confused at some moment? Of 100% of the children, 35.14% said have been not confused in any moment of the interaction. Of the children, 29.73% said have been confused in the game in general. Of these children, 13.51% were confused especially in the creation phase: ... “ Yes, I was a quite confused... There were many places and moments that I did not know what I was making” ... 14. Did you feel tired playing? None of the participants of this research said to have been tired. 15. Did you have difficulty to read something? In this question 83.78% of the children they had no difficulties to read the texts presented for the interface. The 16,22% made commentaries related to the size and the kern of the source. 16. Did you learn to play? 2,70% said “No, I didn’t” while 35,14% said “So, so... Maybe if I have more time” ... and 62,16% leaned how to play. 17. If you learned, it was by the “Help” or just trying”? 29.73% used aid, 62.16% to have played for attempt/error and 8.11% to have done on both ways. 18. Did you forget some of the tasks? Among 37 children, 21.62% he affirmed have not forgotten to fulfill the tasks. In the other hand, 78.38%, said to have been so absorbed in the game that had forgotten to fulfill the tasks: ... “I was very focused, killing my enemies. I forget everything when I’m playing. It is like “to dive inside there, knows? ” ... 19. Do you plan to play Spore® again? From 37 answers,

21.05% said isn't certain if wants to to play again and 2.70% said that doesn't want to play it again. 75.68% remains had affirmed that yes, they will go to play the Spore® again.

3.3. Cooperative evaluation

Children had found 25 problems grouped in categories for similarity and made 261 commentaries negative and 41 positives on game, being that 41.46% of the positive commentaries had mentioned the main actions to it of the game (paint, create and talk), what makes possible to conclude that the children had been motivated for the actions and, after will perceive the difficulties imposed by the interface, they were disappointed. Amongst the negatives, the most evident problem was *"the game doesn't teach the user how to create"*, perceived for 81,08% of the children, who had made 44 negative commentaries on this stage, basic for the game. *"the game doesn't teach the user how to play"* was pointed by 75,68% of the universe, with 32 negative commentaries and followed for *"the participants had difficulty in recognizing the mouth"*, perceived for 56,76% of the children. The cooperative evaluation disclosed points that had passed unobserved by the adults involved in this project, and had disclosed the inappropriation of some screens to the age range, displayed the ambiguity of the game, that works with the attachment of the children to their creatures (or creatures of their friends) that they have to kill later to fulfill objectives and to survive. Children had shown very sensibility to the clarity and also to the edges of the interface, on an increasing and blinking red at the tension moments, when the life of the creatures was threatened. They had lost time solving usability impediments - and had complained of this! The parents limits their interaction time and seems natural that they wants to go directly to the adventure! The time question was imperative for the children.

3.4. Evaluation scale

Efficient to quantify the children reactions when their interacting with Spore® and which made possible to take off the following reflections: 1. This game left me...: "unsatisfied" and "very unsatisfied" they had 2,70% index each. With 48,6% of answers "very satisfied" and 45.9% of "satisfied" to play the shows that Spore® brought satisfaction to the children, fact evidenced when adding these two numbers and to get 94.5% of approval. 2. When I tried to understand

everything written, I was...: "satisfied" got 51,4% of choices, while 13.5% if said very "satisfied". "Neutral" got 18,9% of choices. This question was the one that presented most "unsatisfied" answers, with the percentual of 13,5% and, if 2.70% of answers "very unsatisfied" were added, then it reaches the biggest results of insatisfaction of the technique, with 16,2% of result. 3. The easiness to learn how to play the Spore™ left me...: More than the half of the answers, 54.1%, was "very satisfied", 27.0% was "satisfied", "neutral" 8.1%, "little satisfied" 8.1% and 2.7% were "very unsatisfied". 4. When I wanted to find what I needed, I was...: The majority, 40.5% of the children, was "Very Satisfied" when searching what it needed in the interface, 35.1% was "Satisfied", 18.9% had pointed with respect to the neutrality and 5.4% were "little satisfied". 5. The easiness to fulfill the tasks of the cards left me...: the biggest amount of "neutral" answers, 29.73%, was the question on the easiness to fulfill the tasks of the cards, all tasks were not only feasible, but premise for the continuity of the game - and this question had equal number of "Very Satisfied" answers. The majority of the answers was "Satisfied", with 37,84% of the results. 6. When using the "Help" I was...: This question presented "Satisfied", with 51,40% of the options, as of the majority, whereas 29.70% were "Very Satisfied", 13.5% were "neutral", "Unsatisfied" 2.70% and "Very Unsatisfied" 2.70%. 7. When I was trying to make everything what I wanted in the game, I felt...: The majority of the children, 48.6% was "Very Satisfied", 37.8% of them said to have been "Satisfied", 5.4% Neutral and 8.1% were "Unsatisfied". 8. If I had to play more, I would feel...: 89.2% said that would be "Very Satisfied", while 5.4% said that would be "Satisfied" and others 5.4% Neutral. This was the biggest "Very Satisfied" quantity of answers, and, if the two first values would be added, the satisfaction in playing more was of 94,6%. 9. To participate on a research like that left me...: 67.6% showed "Very Satisfied", 29.7% "Satisfied" and 2.7% "Very Unsatisfied". Added the two first values, the approval level of the game was of 97,3%.

3.5. Teste de compreensão

The method was essential for validate of the evaluation scale: the children needs to understand the meaning of the symbol to validate its election. Three judges, all usability experts, had collaborated with the test, whose judgment was impartial and pragmat-

ic. The chosen symbols had gotten expressive averages of understandability.

4. Discussion

Although some problems mentioned by the children are verified, the technique demonstrated that 45.35% of the children were very satisfied with the interaction and that 35.74% had been satisfied. The percentage of neutrality was 11.11%, of little satisfied 4.2% and 1.8% were very unsatisfied with the Spore®. Of the 25 problems recognized for the children and categorized by similarity, the main ones had been: “The game doesn’t teach the user to create” (81.08%); “The game doesn’t teach the user how to play” (75.68%) and “Difficulty in recognizing the mouth” (56.76%).

Figura 4 and Figure 5
Children affected by the problems related



5. Conclusion

Points had been disclosed had been unobserved by the adults involved, and displayed the inappropriation of some Spore® screens from the proposed age range, as the ambiguity of the game, that works with the attachment of the children to the creatures and later it makes with that they have that to kill them or to die. The children had been sensible to the clarity in some screens and distressed with the interface edges, when increasing reds at tension moments, when the creatures lives were threatened. It is responsibility of the developers project interactive environments for child-

ren taking in account the stage of development of the child, and have the usability as indispensable tool to prevent situations of stress, of which the children should be preserved. Design of interfaces based on ergonomic principles, centered in the user of the system, is an indispensable tool to potentiate the “child-computer interaction”.

References

- [1] A. Chapanis, Human Factors in Systems Engineering. John Wiley & Sons, US, 1996.
- [2] A. Moraes, Thesis. Ergonomic diagnosis of the communicational process of the man-machine system of transition of data; rank of work of the digitizer in informatizados terminals of data entry. Volume II. UFRJ – ECO, Rio de Janeiro, 1992.
- [3] A. Monk, P. Wright, J. Haber, L. Davenport, Improving Your Human-Computer Interface: a Practical Technique. Prentice Hall International Ltd., UK, 1993.
- [4] B. Schneiderman, Designing the User Interface: Strategies for Effective Human-Computer Interaction. Addison-Wesley Longman, Inc. US, 1997
- [5] C. Barnum, Usability Testing and Research. Pearson Education Inc. US, 2001.
- [6] E. Formiga, Informacional ergonomics: compreensibilidade of symbols for signalling of public hospitals and units of health in Rio De Janeiro, PUC, Rio de Janeiro, 2002.
- [7] K. Isbister, N. Schaffer. Game Usability: Advice from the experts for advancing the player experience. Elsevier, US, 2008.
- [8] J. Bastien and D. Scapin, Ergonomic Criteria for the Evaluation of Human-Computer Interfaces, Rapport de Recherche N. 156, INRIA, France, 1991.
- [9] J. Nielsen, R. L. Molich, Usability Inspection Methods. John Wiley and Sons. US, 1994.
- [10] J. Preece; Y. Rogers; H. Sharp. Design de Interação: Além da Interação Humano-Computador. Bookman US, 2005.
- [11] S. Laitinen. Do usability expert evaluation and test provide novel and useful data for game development? Journal os Usability Studies – Issue 2, vol 1, 64-75), 2006.
- [12] P. Jordan, Designing Pleasurable Products. An introduction to new human factors. Boca Raton, US, 2002.
- [13] P. Markopoulos, et al. Evaluating Children’s Interactive Products: Principles and Practices for Interactions Designers. Elsevier, Inc. US, 2008.
- [14] R. Sommer, B. Sommer, A Practical Guide to Behavioral Research: Tools and Techniques. Oxford University Press, Inc., US, 2002.