

A Game to Support Childrens' Expression and Socialization Considering their Cultural Background

Marcos Alexandre Rose Silva, Junia Coutinho Anacleto, David Buzatto

Federal University of São Carlos. Washigton Luis KM 235, São Carlos, São Paulo, Brazil.

{marcos_silva, junia, david_buzatto}@dc.ufscar.br

Abstract— This paper describes *Contexteller*, a collaborative educational system for storytelling that supports teachers in configuring and adapting stories to match children's cultural background, by means of exploiting common sense knowledge. This game is meant to support teachers to interact with students with different social and cultural backgrounds, allowing her/him to create stories according to the students' cultural reality, expressed in their common sense knowledge, and consequently enabling them to get interested in helping the development of the story. This cultural sensitive storytelling environment intends to promote a closer contact between teacher and students and among students themselves giving them a computer tool to help children to freely express their thoughts, desires and to support them to cooperative work with teachers what is desirable for their intellectual and cognitive development. Contextualization and the narrative are supported by the OMCS-Br common sense knowledge base, which gives to the teacher some resources to perform an activity according to the pedagogical goals

Keywords— Storytelling Game, Culture, Common Sense, Free Expression, Computer Supported Collaborative Learning (CSCL).

I. INTRODUCTION

Games and storytelling serve an important role in children's development [17]. Computers are increasingly present in the children's world [21]. Therefore, why not to use them to support children in educational context?

Educational environment is very important to the children's quality of life, because this environment influences intellectual and socio-cultural growth so that they can expand their social, interpersonal, cognitive and linguistic skills. The quality of relationships established at school, especially at the elementary school, can affect their learning and development. Because of that, the relationship among students and between students and teachers is very important. According to Benford *et al.*, [2] collaboration is also other important skill for young children to learn. These skills should be learned during childhood. In Brazil and in other emergent countries teaching those skills at school is still a challenge.

Another skill that is important in education is to know how to live and to communicate with different people because each person has his own culture, values and socio-cultural reality. These abilities are part of fundamental educational objectives because when children participate actively in their class, they

cooperate with the teacher and other students, building their own knowledge [8]. On the other hand, activities to promote work in group can rarely occur spontaneously [8] so that teachers and students need to have activities and tools to support this new way of studying. Because of that, an educational computer narrative game to help teachers to work collaboratively with their students through a cultural sensitive storytelling environment is presented here. Consequently it can enable students to "see" their self-portrait and get interested in cooperating with the teacher and other students to collaboratively develop the story, as co-authors.

Teachers during the stories can also monitor the children's learning process for elaborating their experiences, being able to support them and mediate whenever necessary, promoting a safe and healthy student's development. The free expression is one of the main goals of the game, once it is very important for children's social, emotional and cognitive development.

Several projects have explored the use of narrative games in order to support the learning process [12] [20] [19] [3] among others, but almost all of them present a game with fixed set of characters, their characteristics, scenarios and themes to the storytelling. Because of this, teachers need to adapt their classes to the rules of the games, if they want to use these games.

They also do not consider students' culture and knowledge. Some researchers Papert [15], Vygotsky [22], Freire [10] have described that when children identify the relation between what they are learning and their reality, they feel themselves more interest. In short, they can identify that the semantic of the words is significant to their life, because it is close to their reality.

II. NARRATIVE GAMES

According to Piaget [17], games are directly related to the child's development. There are several types of games and each one of them has characteristics that help the child's physical and mental growth. Overall, games can be classified as [18]: recreational, cooperative, educational and narrative.

In narrative games, stories are not only understood by people; but they are also experienced in narrative processes that turn people into active characters [14], because they participate in the story, telling facts, events, and all the details necessary for the story.

Collaborative storytelling enables people to be attentive and interested in what is happening in the story in order to understand it and consequently to contribute to it. That attention and concern to understand what other people say allow them to become closer once they are interested in what people has to say, even indirectly [14].

Fantasy in narrative games allow people, especially children, to feel safe to express themselves, to talk about situations that occur in their lives because they believe that what happens in fantasy has little or even no consequence in real life. Therefore children often think that it is easier and safer to express themselves through characters; they feel less threatened to express hostility in the story because they express their emotions, joy, sadness, anger and euphoria through their characters that act in accordance to people's emotion.

According to Oaklander [14] children do things, behave and move in their fanciful world in the same way in their real world. Because of that narrative games for their free expression and support to try experiences are useful.

Narrative games may help children to express, and the teacher to have the opportunity to observe the children's behavior throughout the story, also permitting a genuine contact among them.

In this context this paper presents Contextteller a storyteller environment contextualized by common sense knowledge and it intends to support teachers on telling stories collaboratively with students according their pedagogical objective.

This game has been developed for children from 8 to 12. According to Piaget [17] in this phase the children are in the stage called Operational Concrete Thought. In this stage child has great interest in games and finds new ways to play and to work collaboratively.

They also have facilities to build and to maintain friendships using computers; they usually interact with one another virtually. These are important features for a computer game that allows people to tell stories collaboratively.

In this phase children develop academic instruments such as reading, writing and basic math, and they are able to give attention. Thus, children have the capacity to read the story being told, to help to write it, i.e., to participate in building the story and to get attentive to the whole story [17].

During Operational Concrete children are willing to make friends and want to participate and interact with other children's game. Therefore, there are great chances that children can be interested in participating and interacting with the story being told collaboratively.

A. Contextteller

Contextteller is a narrative game inspired in Role-Playing Game – RPG [4]. In this type of game there are participants and the master, who usually is the most experienced player and his task is to present the story to the group, with characters, their characteristics, scenarios; in short, the necessary descriptions to compose an adventure with puzzles, situations and conflicts that require choices by other participants, who are the players.

These players are not just spectators; they contribute actively in the story, through their characters that choose paths and take own decisions, and most of the time not foreseen by the master, contributing to the spontaneous and unexpected development of the story. The master can interfere in the narration, describing the scenarios, the characteristics, the objects that appear in the narrative environment and proposing situations so that the characters can interact. In the context work the master is the teacher who introduces the story and intervenes collaboratively with the players. The players are the students, the co-authors of the narrative.

Figure 1 shows the interface available for players. This interface allows the players to see their card (I), their dice (II), and the text area (III), which allows the master to read all the messages sent to students and master during the composition of the collaborative story. In area (IV), the card, with another color and size, represents the master of the game, and area (V) shows to other characters' card.



Figure 1. The interface of the Narrative Game

The dice (II), which is part of the RPG, shows the players and the master whether a particular action is possible, or not [18]. For example, to raise any object it is necessary to have the value of the Force element equal or greater than the value of the object weight. This weight is defined by value of the dice thrown by the player. Thus, the player can raise the object if the value of the Force is equal to N and the value of the dice is from 1 to N. If the value of the dice exceeds N such action will not be possible because the value of the weight of the object is more than the value of the Force element.

In this narrative game each player chooses a card that represents a character (I) and throughout his/her character the player acts, speaks, thinks and decides the character's attitudes. The card refers to a way of playing RPG, in which the players around of table present their cards to the other participants. Through the characters represented by these cards they build a story, from the scenario already defined by the master [9]. During the story, the master can interfere describing a new scenario and new situations so that the characters can decide how to act.

The card has some RPG elements, such as: Magic, Force and Experience. These elements are considered to be one of

the rules existing in RPG. This rule avoids many discussions that could occur during the story. For example, knowing what is the strongest or most powerful character. The values of the elements are numbers to be considered in some situations. For example, a character with Force equal 5 is more likely to survive a crash than a character with Force equal 2.

The master attributes the value of the Experience when the character achieves a particular goal stipulated during the development of the story, in short, dynamically. This card element stimulates the student to play carefully, to want to confront and to overcome the challenges.

This game uses numbers to represent the values of Power, Magic and Experience elements, and also uses plus and minus signs to change the value. Because, Piaget [17] describes that children from 8 to 12 years old have Serial Sorting relationship because they can range from the highest to the lowest value. But it is difficult for them to understand something presented in abstract form. Through the numbers, children can understand the values of those elements. Children also can compare the values with other players.

These three elements together (Power, Magic and Experience) with the master's narration provide competition to the game, even indirectly. According to Crawford [7] conflict is an important characteristic of the game. He reports that there is no game without conflict, even when there is not direct competition among the players. The master can offer advantages to more experienced players, for example, when it is necessary to choose between two paths to be taken in a story. So, the teacher can allow the player, with the highest value of experience to choose between the two paths. This value can also add advantages to other the character's card elements.

According to Bittencourt *et al.*, [4], Claraparedo [6] and Crawford [7], fantasy, challenges and obstacles described by the master and players during the game motivate them to play, because in narrative games, players are curious to get to know the details and are willing to participate in an entire story to achieve the goal proposed by the master. On the other hand, students can feel themselves more interest when they identify the relation between what they are seeing on the content of the story and their reality. In short, they can identify that the content is significant to their life, because it is close to their reality.

Because of this, Contexteller can also help children to notice familiarity with the characters, their characteristics and plot of the story. Therefore, this gives the teacher computer support through contextualized information so that he/she can create and tell stories. This support is provided by common sense that represents cultural aspects of the students' community.

Common sense is a set of facts known by most people living in a particular culture, "covering a great part of everyday human experience, knowledge of spatial, physical, social and psychological aspects. In short, common sense is the knowledge shared by most people in a particular culture (Anacleto, 2006).

Students can identify themselves with the story when they observe that it is closer to their reality, i.e., what happens in the story is or can be similar to their way of living. Contexteller intends to support students feel themselves

sufficiently closer to interact with the environment throughout contextualized story. Explain better, through stories, which consider the culture, the values, the beliefs, in short, the players' common sense, can allow the players to identify themselves with the story language, characters and scenarios. Because of this allows them to identify mean in the story, then they can have greater interest in participating in it.

The game proposed in this paper, uses the common sense knowledge obtained by the Open Mind Common Sense in Brazil Project (OMCS-Br), developed by the Advanced Interaction Laboratory (LIA) at UFSCar in collaboration with Media Lab from Massachusetts Institute of Technology (MIT)

OMCS-Br project has been collected common sense of a general public through a web site. Common sense is then processed and stored in a knowledge base as a semantic network called ConceptNet where the nodes represents concepts and they are connected through arcs that represent relations according to the Marvin Minsky's knowledge model [13]. This base intends to reflect a basic knowledge structure near human cognitive structure.

OMCS-Br project web site can be accessed by anyone through <http://www.sensocomum.ufscar.br>. After entering, the person can register and have access to various activities and themes available in this site. One of the themes available is about Children's Universe, which allows people to talk about situations, objects and characters existing in the Children's Universe, such as Folklore, Fairy Tale, among others.

In the narrative game the common sense base can support the master in the characters' definition, and also at the story contextualization considering cultural aspects of the students' community, promoting what can be called "just-in-time" context-aware sensible stories [1].

Bruckman [5] has investigated the community support for constructionist learning. According to her, constructionism works better when it is situated in a supportive community context. Real as well as virtual places can help create a supportive context for human activity and social interaction. Because of this, Contexteller supports teachers on defining the initial context and the content of the game design considering the community's knowledge where students live. The content being collaboratively generated here is considered as part of the interface design.

The initial context represents the scenario setup with objects, scripts, characters, their characteristics, actions and abilities that are going to compose the stories initially. The content of the story has been built collaboratively by the players and master. Therefore, the objective of this game is also to give computer support to the master so that s/he can get some help from contextualized information. This help can be both in the initial phase, i.e., composing the scenario and characters to be presented and in other phases, such as: adapting this scenario according to the ongoing story and its sequence during the collaborative storytelling, focusing the master's goals on the narrative and that group of students.

B. Setsps to create a story at Contexteller

At the Contexteller there are six steps to support teachers to create it.

First, some information about the teacher is stored, such as: name, state, city, among others. Throughout this data it is possible to identify which teacher has created the game.

Second, it is defined which students are going to participate, their names, states and school education are some important information. The teacher can identify which students played and how each student told the story. Therefore, the teacher can observe children's behaviour, evolution and growth, for example, comparing children's attitude to the first and last stories.

When the teacher registers his students before creating a story, he takes into consideration who are those students in order to define the characters and the plot. After the registers Contexteller gets the students' state and filters the common sense base considering the knowledge collected from the desired profile in order to contextualize the game content for the target group.

Step three, the teacher needs to choose one between two options: Creating a new game or Choosing an existing game. If the teacher chooses the second option he/she can use another game that he/she or another teacher created.

Step four is shown in Figure 2. In this stage the teacher needs to define six characters: one represents her/him and the others represent students. Number 6 is usually used in RPG of cards [9] and according to Díaz-Aguado [8] six is the ideal number to work collaboratively.

According to Benford *et al.*, [2] educational research has found that working in pairs or small groups can have beneficial effects on learning and development, particularly in early years and primary education. 5 players also facilitate the teacher to monitor the whole story that is being told by the players (students). If the number of players has been greater than 5, the teacher can face difficulties in reading all the messages, in interacting appropriately during the story and in observing the development and behaviour of each character.

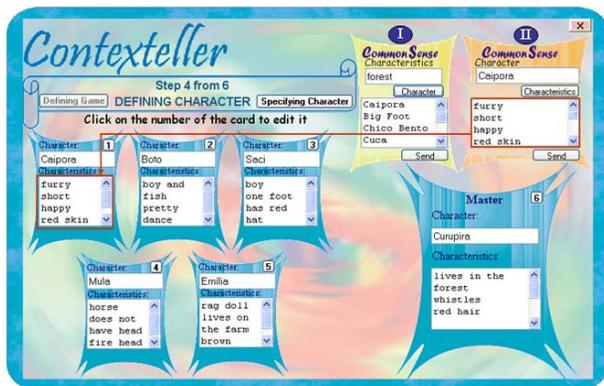


Figure 2. Defining Characters

There are two common sense cards to support teachers to define the characters' names and characteristics.

In the first card (I), the teacher types a characteristic and searches the common sense knowledge base to obtain the characters' names. For instance, if he/she wants to tell a story about forest and know which characters are related to the

forest are taking into account, considering the student's knowledge and culture, he/she can type this place on the card. Through the common sense knowledge base the following characters can be seen: Caipora, Chico Bento, Cuca, Saci-Pererê, Iara, Curupira (from the Brazilian folklore), Big Foot, Joãozinho e Maria, Robin Hood, Elves, among others.

In the second card (II), it is possible to obtain the characters' characteristics when the characters' names are written on the card. For example, some characteristics coming up from Caipora's character are: furry, short, happy, red skin, cares; she likes forest and rides a wild pig, etc. The teacher can join this information, which students know about, with the story to define characters and their characteristics.

Figure 3 illustrates the Fifth step in which the teacher needs to define the values for Magic and Force, and find an image to represent each character.



Figure 3. Specifying Character

Step six, it is necessary to define a subject and a title for the story (Figure 4). In this step the teacher uses common sense through a card from which he/she can get specific information of a word typed on the card, such as: CapableOf, DefinedAs, DesireOf, MotivationOf, PartOf. For example, if the teacher is going to tell a story about forest and wants to know what students think about what exists in a forest, he/she can type "forest" on the card and select "PartOf" option, then get some data, such as: characters, characteristics, animals and other things that students believe there are in a forest.

After these steps, the game is created. Students need to identify themselves to see the title and description of the story created for them, and the teacher's name. Then, students choose a character to participate, in a similar interface shown in Figure 2, after they can change the image (similar Figure 3).

This feature allows the student to express himself not only through the story but also through the image. He can choose an image that makes his character sad, joyful, angry and so on. These emotions and their expressions can be a feature considered by the teacher when observing and developing the story.

During the stories the teacher can also get support from common sense knowledge using a card with the same options as that of the common sense card illustrated in step 6. Figure 5

shows a situation where the teacher has described a Caipora's attitude to protect nature. The teacher, before typing this text, inserted on the card the word "protect" and selected the "DefinedAs" option to know what the students know about it. He/she obtained some information, such as: taking care, nurse, cherish, cradle, attend, lap, etc.

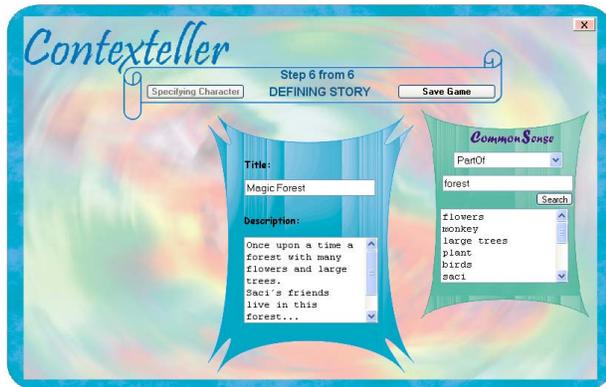


Figure 4. Defining Story

This information supports the teacher during story because he/she can see some data that represent students' language and expression and can use them to describe something. For example, the teacher can change the sentence "Caipora is protecting of the forest" by "Caipora is taking care of the forest".



Figure 5. Teachers' interface

There are many characters that live in the forest but children, in a specify region, know that Caipora has this characteristic. If the teacher obtains this information through common sense, he/she can tell the story considering the students' reality and describe the actions in a familiar way.

On the teacher's interface there are three different characteristics than those of students', such as: (I) Freeing dice – allows the teacher to through his/her dice and to free the students' dice; (II) Increasing or decreasing the experience' value of each character; and (III) common sense card – which

teacher gets information that represent students' cultural knowledge during story.

On the other hand, it is important to explain that the objective of the card is to help the teacher to find out what students know about a story or even about events, causes and consequences. Therefore, the teacher uses this information to tell the story, i.e., story definition and sequence. Because of that, players can feel connected to the characters, characteristics, scenarios and language of the story which the teacher defined using common sense knowledge help.

Therefore, Contexteller does not teach common sense to the teacher but gives him/her a cultural feedback and help him/her to find out what the students' knowledge is about the stories, facts and actions in order to tell the narrative according to the pedagogical goal proposed. It is necessary to clarify that there is no intention on teaching common sense, once it is a kind of knowledge acquired into the community, informally. Common sense was already proven to be a good way to contextualize the learning action considering the learners' culture and reality.

III. CONCLUSIONS

This paper has described Contexteller, an environment for online collaborative storytelling where the players jointly develop a story under the master's supervision. This game is meant to support a teacher to interact with students which have different social and cultural backgrounds, considering these backgrounds before and during the storytelling. Through this contextualized computer game also intends to investigate the use of children's social awareness in relationship to environment, their cultural heritage and cultural roots to tell stories.

Contexteller, a storytelling environment contextualized by Common Sense knowledge intends to support teachers on defining the initial context and the content of the game's design considering students' reality and culture. Because of this, Contexteller gives computational support to the master to get help from contextualized information, both in the initial phase, i.e., the composition of the initial scenario and definition of characters and then during the narrative development, suggesting actions, objects or scenarios based on suggestions coming from common sense, to script the story in real time. Students have the opportunity to be closer to the contextualized stories, and consequently it allows them to participate and express themselves.

The teacher gets suggestions from the common sense to define the story and its sequence. This game also allows teachers and their students work together. For example, the master defines a characters' profile that represents their role in the work group. Therefore, during the story, he can consider this profile. For instance, the master asks a specific character a favour and he knows throughout the profile that character has some difficulties to perform the task. Therefore, he/she can observe how the character solves the problem, either asking others for help or solving it in a different way.

The master observes how this character is doing his work. If that character does it differently from his profile, the master asks other characters to think about that attitude. The master can also search on the common sense card what the character's

abilities are. In short, through common sense the master has contextualized information so that he/she can define and tell the stories with the students' participation. Because of that, students can learn to do anything cooperating with each other.

Through Contexteller, students can also learn to express, to help and to be helped because they need to tell their stories, to help their friends to achieve an objective, and to know that they also need aid to achieve their objectives. Because of this, each student can observe that her/his character is important to tell the story, encouraging him/her to work together.

Finally, the master can observe how the student leads his character to interact with the others and he/she also can monitor the student's learning process through the stories, and master is able to support them and intervene whenever necessary, promoting a safe and healthy student's development.

The stories created are products of the Contexteller software. Teacher can use these products to generate different material, such as: a book, allowing the students to take their stories home, to show them to their families and friends; to print the stories so students can draw and paint their drawing, etc. When the students have a product that they are co-author on creating that, they can feel proud of themselves and motivate to participate on other stories creation.

ACKNOWLEDGMENT

We thank FAPESP, CNPq and CAPES for partial financial support to this research. We also thank all the collaborators of the Brazilian Open Mind Common Sense Project who have been building the common sense knowledge base considered in this research.

REFERENCES

- [1] Anacleto, J. C.; Lieberman H.; Tsutsumi, M.; Neris, V.P.A.; Carvalho, A.F.P.; Espinosa, J.; Zem-Mascarenhas, S. "Can common sense uncover cultural differences in computer applications?" In: BRAMER, M. (Org.). *Artificial intelligence in theory and practice - WCC 2006*. Berlin: S-V, 2006. v.217, p1-10.
- [2] Benford, S.; Bederson, B. B.; Akesson, K.; Bayon, V.; Druin, A.; Hansson, P.; Hourcade, J. P.; Ingram, R.; Neale, H.; O'Malley, C.; Simsarian, K. T.; Stanton, D.; Sundblad, Y. Taxén, G. "Designing Storytelling Technologies to Encourage Collaboration Between Young Children." In: *Conference on Human Factors in Computing Systems*, 2000, pp. 556-563.
- [3] BioWare. "Neverwinter Nights". <http://nwn.bioware.com/>. July 2008.
- [4] Bittencourt, R. J.; Giraffa, L. M. M. "A utilização dos Role-Playing Games Digitais no Processo de Ensino-Aprendizagem". *Technical Reports Series*, Number 031, September 2003.
- [5] Bruckman, A. "Community Support for Constructionist Learning" In: *Computer Supported Cooperative Work: The Journal of Collaborative Computing*, Springer Netherlands, vol. 7, 1998, pp. 47-86.
- [6] Claraparedo, E. "Funcional Education". SP: Comp. Nacional, 1958, 5 ed., 302p.
- [7] Crawford, C. "The Art of Computer Game Design. Washigton State University". 1982, 90p.
- [8] Diaz-Aguado, M. J. D. "Educação Intercultural e Aprendizagem Cooperativa". Porto: Editora Porto, 2003.
- [9] Fernandes, V. R. "What is RPG?". *RPG - Dragon Magazine Brazil*, n. 123, 2008.
- [10] Freire, Paulo Reglus Neves. *Pedagogia da autonomia: saberes necessários à prática educativa*. 31 ed. Rio de Janeiro: Paz e Terra, 1996.
- [11] Järvinen, A.; Heliö, S.; Mäyrä, F. "Communication and Community in Digital Entertainment Services. Prestudy Research Report, 2002.
- [12] Lopes, L. M. C.; Klimick, C.; Casanova, M. A. "Relato de uma experiência de Sistema Híbrido no Ensino Fundamental: Projeto Aulativa". *Revista Brasileira de Aprendizagem Aberta e a Distância*, Janeiro 2003, São Paulo.
- [13] Minsky, M: 'The society of mind', Simon & Schuster 1987.
- [14] Oaklander, V. "Windows to Our Children: A Gestalt Therapy Approach to Children and Adolescents". *Gestalt Journal Press*, 1988, 335p.
- [15] Papert, S. *Mindstorms: Children, Computers, and Powerful Ideas*. Basic Books: New York, 1980. 230 p.
- [16] Pastoreau, M. "Dicionário das cores do nosso tempo". Lisboa: Editorial Estampa, 1997, 188p.
- [17] Piaget, J. "Judgement and Reasoning in the Child". Richmond, VA, U.S.A.: Littlefield Adams, 1999, 268p.
- [18] Silva, M. A. R.; Anacleto, J. C. A Narrative Game Culturally Contextualized by Common Sense Modeled as a Semantic Network. In: *WSWEd@SBIE - Workshop on Semantic Web and Education*, Fortaleza, Brazil, 2008.
- [19] The Education Arcade. "Revolution". Disponível em: <http://www.educationarcade.org/node/357>, July 2008.
- [20] Tobaldini, M. A.; Brancher, J. D. "Um RPG Educacional Computadorizado e Missões Contextualizadas com seus Ambientes". In: *Anais do XV Seminário de Computação*, Novembro 2006, pp. 85-96.
- [21] Weib, S. A.; Müller, W. "Learning with Interactive Stories". In: *20th World Computer Congress*, 2008, Sptember 2008. 8p.
- [22] Wertsch, J. V. "Vygotsky and the Social Formation of Mind". 1988.