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Synopsis

Children start to develop social skills involving technology with their peers at the same age as they develop culturally associated behavior. This is done through interaction with technology at daycare facilities. Culture in technology shows to effect user efficiency when the game mechanics present traits related to the user's cultural orientation. Roleplaying, in relation to serious games, is measured as a cultural preference for those of individualistic orientation. However, this study states that roleplaying is a cultural trait that is preferred both by individualistic and collectivistic behavioral orientations, when using game characters to simulate self-appraisal and group appraisal.

By signing this document, each member of the group confirms participation on equal terms in the process of writing the project. Thus, each member of the group is responsible for the all contents in the project.

Cultural Persuasion Team Performance Strategies in Serious Roleplaying Video Game for Children

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Indhold

Abstract

Children's technological edification within daycare facilities starts between ages zero to six in Denmark and Brazil. This is also the period where children start to acknowledge and interact with their peer group. They imitate the cultural behavior observed from adults in order to learn and perform social behavior with their peers. However, persuasion technology is more commonly represented in western individualistic cultures, such as the Danish, than it is in collectivistic cultures such as Brazil. If the subject is not research, it will make it impossible to reach optimal user efficiency, based on performance and error rate.

Initial Problem Description

Persuasive Technology (PT) is used to affect behavior, feelings or thoughts of it is users [6]. Cultural persuasion, such as individualistic and collectivistic, have been shown to positively affect perceived healthy eating, attitude towards smoking and memorizing content efficiency [14][11][2]. However, PT is more commonly represented as western individualistic culture, than collectivistic culture. . Hence, a need for cultural user-friendly systems exists. A possible method for this is to use a *Team Performance strategy* (TPS) in the narrative of a serious roleplaying game. TPS is based on the concept that collectivists tend to be more effective in group situations, due to primarily being focused on in-group goals. Individualistic cultures are more effective when working towards individual goals. Designing interaction with individualistic and collectivistic narration is a rather new method of targeting users of a serious video game. *Smoke?* [11] is a persuasive serious game study, showing that collectivists had a positive change in attitude behavior when helping or taking advice from non-player characters (NPC). Individualists had better response with main characters (MC). In their research, they design multiple collectivistic approaches to be implemented in serious games. However, as the study combines all the design techniques and measures the overall influence, it is uncertain how one of these design techniques could have benefited the user's change in attitude towards smoking, including TPS. When using a TPS-based method to design the narrative of a serious roleplaying game, it would help to estimate the influence of that specific method, regarding individualistic and collectivistic behavior.

Can cultural persuasive roleplaying, using a team performance strategy, effect performance in serious video game for children?

Individualists are described as having lesser involvement with other individuals than themselves and their immediate family, focusing more on one's individual interests than those of the group. Furthermore, the individualist tends to be self-motivated and goal oriented, finding motivation through guilt and loss of self-respect. [9][19]

Collectivists are from an early age integrated into strong cohesive *in*-groups, whose welfare is of high concern. Separation can even lead to anxiety. The group's interests outweigh the individual's, as the individual will strive to be a good group representative, by attributing with the individual's assets to benefit the group harmony. Collectivists tempt to use loss of face and shame as typical motivators [9][18][19].

Using participatory design allows for the user of a PT to influence the development phase of designing digital artefacts, such as the appearances of in-game characters in video games. When designing serious games for a target group, a participatory approach has been shown to greatly influence the chances of creating a successful serious game [20][15][16]. By this, it is meant that it presents learning content without being overly entertaining, as the learning goal can then be more easily forgotten. The TPS model uses in-game characters and environments to represent individualistic and collectivistic game mechanics, as fictional game characters can have cultural affordances for collectivistic and individualistic societies [11]. For this, the Content, Design, Prototype and Experience (CDPE) framework was designed for the study, as an extension to the DPE [10] framework. These are used when working within serious learning content that is outside the designers' expertise. The CDPE framework uses a participatory approach, in which the designer collaborates with a content expert to define the learning content in the game mechanics. Basted on this, prototype tests are designed for the targeted players, in order to gather feedback which could help inform the designer.

Background Research

Persuasive technology cultural values are a broad mapping of dimensions defined by anthropologists and cross-country psychologists [9][18][19], that reflects on how people in groups or individuals can be measured to be of a cultural orientation. The cultural orientation describes a set of rules of how to be and behave in relation to others and our environment, how we encompass beliefs and values, and governs expected behavior [21]. Persuasive technology is designed for changing the attitude and behavior of its users through interaction with computer systems. Culturally persuasive technology is a design technique mainly used in the past decade [6], that can influence the behavior of its users by persuading them by presenting traits of their cultural orientation, as an extension of the technology [21]. In games, the designer must attempt to involve or construct the rules and mechanics of the game, based on the user's cultural preferences, such as team work (collectivism) or individual goals (individualism) [10].

Khaled et al. [11], Mandryk et al. [14] and Ariffin [2] determine their participants' cultural *status* using pre-surveys and interviews, determining if they are of collectivistic or individualistic orientation. Applying their cultural status in a PT has been shown to benefit attitude behavior towards healthy eating, smoking and

university students' content knowledge of internet security [11][14][5]. In all cases, by placing the user within their culturally modified PT *version*, which are designed to be either collectivistic and individualistic. Khaled et al. [11] use five collectivistic behavior design techniques for serious games (harmony, group opinion, monitoring, team performance and disestablishing), as an opposite to their individualistic determinations based on western technology. By designing these behaviors in the narration and interaction with in-game characters, participants showed positive change in their *intention to quit smoking* and *resistance to smoking*. An observation when using these techniques, was that Individualistic cultures showed less involvement with and emotional dependence on NPC's, and instead focused primarily on the effects for the main character, which was roleplayed by the user. The collective context emphasizes involvement with and emotional dependence on NPC's, showing positive attitude change when being exposed to the MC's friends and family [11]. As all of the design techniques were implemented in one version, it is impossible to determine how much the techniques contributed individually.

The *Team Performance Strategy* (TPS) is a method used to identify individuals' behavior when working within a group. TPS identifies self-appraisal as an individualistic method of motivating the individualists and group appraisal for collectivists [11][14]. Mandryk et al. [14] define self- and group appraisal as a credibility support strategy, where self-appraisal allows for individuals to appraise their own performance, whereas group appraisal targets individuals who are motivated by appraisal of the collective performance of their group.

Roleplaying Simulating Collectivistic and Individualistic Behavior

Having a game version that allows for individual MC's and one with a shared MC (where control of the main character is shared between the players), would be an example of a TPS using self- and group appraisal. Roleplaying is a primary task support strategy for PT, that allows for the user to take part in simulated situations, such as controlling the MC to interact with and help out NPC's [11][14]. Roleplaying lets players in a collaborative serious game have an artefact that is more closely related to themselves than other players [13][20]. Having individual MC's can be used to give self-appraisal to the targeted individual, whereas having a shared MC would give appraisal to individuals identifying themselves as being part of a group.

Figure 1. A scene from Smoke?, where a main character persuades the user to have a healthy perceived smoking behavior by relating to the wellbeing of the main characters family (NPC's)

Ariffin et al. [2] determine that the self-appraisal method is also suitable for the collectivistic Malaysian culture. This was determined through efficiency tests of performance time, error rate and preferences based on content related pre- and post-tests from Malaysian university students on the subject of internet security. Self-appraisal, when used as a collectivistic method in a serious game, was shown to benefit the learning efficiency, based on performance times and error rates. Hence, it is unclear to whether self-appraisal is an individualistic method, as determined by Khaled et al. [11], or a collectivistic method, as determined by Ariffin [2]. Mandryk et al. [14] use an online pre- and post-survey with a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) focused on the perceived benefits of eating healthy. The participants' perceived attitude towards healthy eating behavior in relation to their cultural orientation, gender and age were measured. Mandryk et al. [14] identify roleplaying as a perceived determinant of self-efficacy, in this case meaning the participants' belief in their individual capability to adopt and maintain healthy eating from individual feedback, rather than collective-based feedback. However, Khaled et al. [11] use roleplaying as both a individualistic and collectivistic strategy, giving either personal feedback or group-based feedback based on the individual's behavior and performance. Hence, it is unclear whether PT using TPS by self- and group appraisal in a roleplaying serious video game will influence the efficiency and attitude towards a collectivistic or individualistic preference. The efficiency in this study is measured by *performance time* and *error rate*.

The Age of Peer Groups

Cultural orientation is the collective process of environment and behavior reflected over time. Cultural measures are usually performed on individuals that have reached adulthood. Hence, measuring cultural orientation on children is difficult, as they might still be in the process of developing their own behavioral characteristics, such as having individualistic or collectivistic bias [7]. However, Psychologist H. Schaffer [17] explains that the first indications of children working collaboratively and developing social skills by exercising team work (collectivistic behavior) and cultural cues, can be traced back to as early as their second year. Vertical and horizontal relations are used within children's psychology to determine the difference between adult and peer relations. The vertical relations are the relations a child has with a person of higher power and greater knowledge than the child, such as parents and teachers. The horizontal relations are those of peers with equal social skills, such as children. When children reach age three, the time spent with adults is surpassed by the time spent with the child's peer group [4]. It is in this period the child uses the skills and knowledge passed down from the vertical relations, when interacting with their horizontal relations [17]. This is furthermore shown in Figure 4.

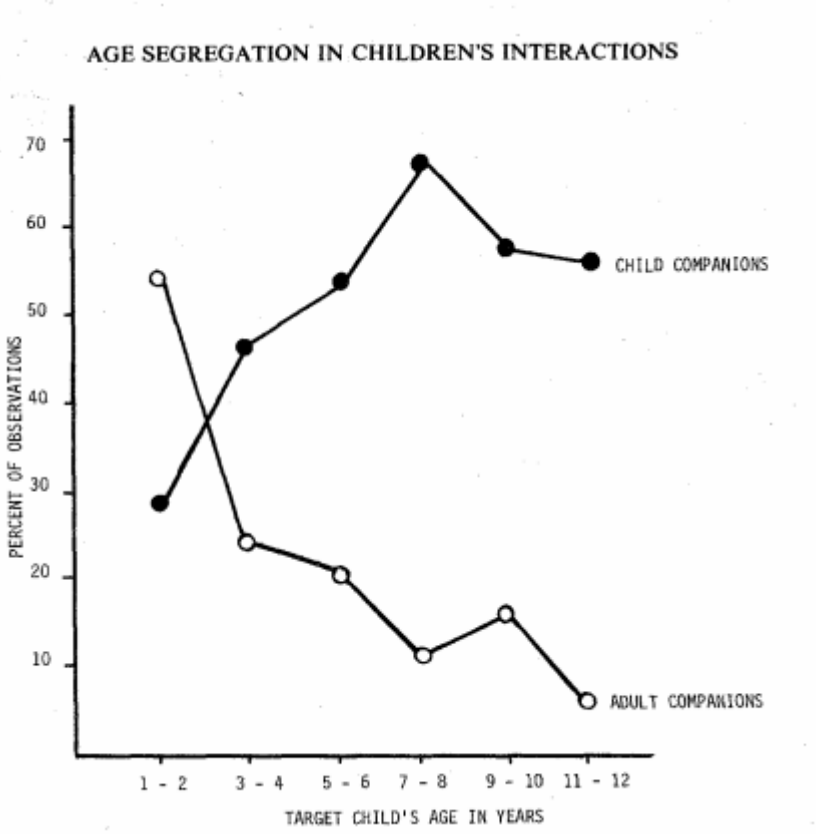


Figure 2. Developmental changes in children's companionship with adults and other children. [4]

Collectivistic societies are stated to help develop collective oriented behavior from early childhood [9], and the adopted behaviour from their vertical relations should show in the child's cultural behavior when interacting with its horizontal relations, which would differ from those of a more individualistic origin. Denmark and Brazil are two countries that are described as being opposites in relation to Hofstede's [9] collectivistic and individualistic domains. Here, Denmark is considered highly individualistic, whereas Brazil is highly collectivistic. This would mean that Danish people should have a larger affordance if MC's are individual represented and closely participant-related, and having NPC's give self-appraisal feedback. Brazilians would perform better as a group if they played with a shared MC, having NPC's give group appraisal-based feedback.

Participatory Design with Children

Participatory design is used to make optimally fitting designs between technology and its users in interaction design [12][20]. Developing a serious game using PD can benefit motivation and performance within reaching an understanding of the content [12][15]. PD is applied differently when working with people that lack knowledge in the technical aspects of the design process, such as children and indigenous communities. This restricts the involvement of users when co-designing an appliance of the technology. Collaborating with the potential user during the design of a given technology is to have a 'user- centered design', meaning users are involved or consulted during the design process, most commonly as evaluators [16]. Participatory design is a subset of this, representing cases where there is more than one category of individuals involved. Within participatory design, Read [16] defines three degrees of participation, 'informant design'; assuming that the domain expert's contribution is largely limited to informing the design experts, so that the design is mostly realized by the design experts. 'Balanced design'; there is an equal partnership between domain and design experts, allowing for optimal distribution of labor in informing and realizing the ideas. 'Facilitated design'; putting the design expert in a facilitating role, having the domain expert take the lead in both initiating and realizing the ideas generated.

Having children collaborating in a participatory design of a serious game can be difficult, as children can struggle with fulfilling their own learning goals, mainly due to lack of content knowledge and game design literacy [34]. Many studies suggest that children should function more as informants who provide input in specific parts of the design process, such as character and object representation [10][15][20]. Learning goals and content should rather be designed by or in collaboration with an educator or expert thereof. Having children serve as informants can provide user experience feedback from prototypes, collaboratively designed by content expert and game designer, to conceptualize into the learning, storytelling and gameplay design, forming a final user interface to be tested.

PARTICIPATORY DESIGN WITH CONTENT EXPERT

A successful serious game design prioritizes pedagogical theory, domain content and game design to be key features. Ferdig [5] states that learning objectives are designed using a thorough combination of domain content and pedagogical practices, followed up by a world, character and narrative design that represents the learning goal, and finally focus on designing a suitable user interface [5]. Large concerns within the research community when designing a serious game, is the incongruence between pedagogical theories of structuring learning goals and combining it with the obtained content knowledge [20]. Designers need to be able to couple domain content (indigenous community knowledge) with the game mechanics (interacting with community members as NPC's) and have domain content familiarity, or knowledge thereof, and game design literacy. For the designer to be able to represent content in a PT, they would need to require an expertise within the 'serious' domain of serious games, such as healthy eating or smoking behaviour. Therefore, it would be preferable to have a content expert involved in the design process, to assure that the pedagogical theory is in sync with the learning goal.

Figure 3. Members of the Huin Kuin indigenous community, located in the Amazonian rainforest of South America.

A limitation in current serious game design frameworks is that they don't apply or acknowledge a content expert to be involved as a participant in the design process [10][5]. This provides an obstacle when working with content in a domain where the game designer has no literacy and has difficulty accessing the knowledge.

An example of this would be the intangible cultural heritage of indigenous communities. This study domain uses an inventorying outline from UNESCO [23] to obtain tribe knowledge in domain subjects such as oral traditions and expressions, performing arts, social practices, knowledge and practices about nature and the universe and traditional craftmanship. This is obtained through qualitative measures such as interviews with member representatives, as content experts in their communities' cultural heritage, who currently are the only available source to gather the content from. For this type of content to be represented in a serious game design, a tribe member would collaborate in a participatory design with the designer. However, as the tribe representative are very limited in what they can contribute to in game design ideas and general understanding in state of the art technology, their involvement would be of the informant type of participation. Hence, the tribe will not be able to realize their ideas, as they have no knowledge in game design, but like the example with children, they can participate as informants, helping the design expert to realize their knowledge as content in the game design [15].

Serious Games

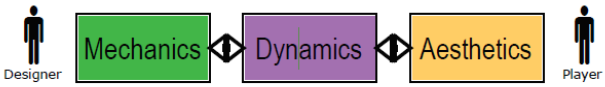
The primary objective of serious games is having an educational content rather than entertainment. The game would like its players to achieve a learning goal from playing. However, in serious games there is no conflict between education and entertainment, but rather an overlap of the two types of content's tools complement each other to benefit the learning outcome [13]. Serious games are most commonly defined as a constructivist concept. Consequently, a person learns best when constructing ideas and relationships based on the activity they are performing, rather than learning from a person of authority. They allow for a player to gain experience and reflect more on their own perception of how and what they learn, which can be related to their own life. Furthermore, cooperative learning design proves to promote achievement in social studies for memory and motor tasks [8]. A common challenge in creating a serious game design that allows for the player to maintain interest in playing, is peeling the icing off an entertaining video game cake and laying it over the liver of learning, as the user will probably be able to tell the difference if not. The entertainment applied in serious games should include a motivational element of fun in the learning process. This could be the feeling of learning something new or a matter of voluntary interest in the game, that can give a sensation of wanting to repeat the game activity [20. P 111-114, 132-143].

The game content or topic can have influence in the intensity of entertainment. For instance, a surgical or a military preparation simulation game should probably not be entertaining, but would demand more precise and clear instructions, as the educative content could end up meaning the difference between life or death [20. *p.40-42*]. For preliminary school and infantile education, there is a higher demand of having a grasping entertainment feature, as the focus of children fluctuates more, and they demand a purpose of interest to extend their span of concentration [15]. A design technique used for creating a voluntary interest in

developing a serious game, is to allow the children to participate in the design of artefacts and generally serve as informants in a participatory design.

THE DPE FRAMEWORK

Ferdig [5] developed the unified DPE model to help design serious games. The DPE model is an extended model of the *Mechanics*, *Dynamics* and *Aesthetics (MDA)* framework [10], used for a participatory serious game design. The MDA framework shares user experience and/or design of aesthetics (visual cues) with the designer, to help form the mechanics of the game. The DPE also incorporates *the Heart of Serious Games* framework [5], which declares that domain content, learning theory and game design should be a trifactor for a successful serious game. The DPE model allows for an extended participatory design that involves user experience in the design of a serious game, in the conditions of learning, storytelling, gameplay and user experience. Each design iteration goes through a design phase in which the designer adjusts their prototype based on the feedback from the previous phases. Play phase; the targeted user plays through the game protoype. Experience phase; the targeted user gains experience from playing the game and shares information about the experience with the designer. [5]. The three models are shown in Figure 4 and 5.



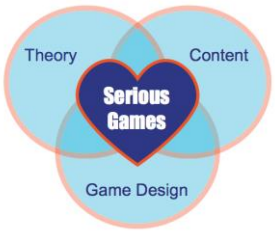


Figure 4: The Heart of Serious Games considers theory, content and game design the main concepts needed to create a successful serious game. The MDA frameworks takes a participatory design approach, having the designer create the game mechanics, letting the player be involved in testing the dynamics of the game and having the player select the aesthetics [5].

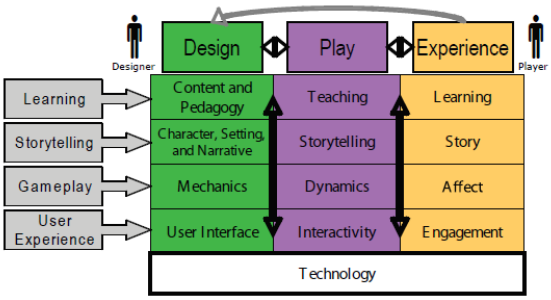


Figure 5: The Design, Play, Experience framework uses input collected from four layers of a serious game design (learning, storytelling, gameplay and user experience). The designer creates a design outline from the layers, which is then used to construct a prototype, which the player can play and gain experience with, from which the feedback can be re-applied in the design[5].

Final Problem

Children's technological edification within daycare facilities, starts between ages zero to six in Denmark and Brazil. This is also the period were children start to acknowledge and interact with their peer group, exhibiting the cultural behavior adopted from adults to develop and improve social behavior with their peers. Persuasion technology affects positive behavior on adults, by customizing the technology to target the users' cultural orientation, such as individualistic and collectivistic behavior traits. However, persuasion technology is more commonly represented in western individualistic cultures, such as the Danish, than it is in collectivistic cultures, such as Brazil. This could cause for a loss of potential user efficiency (performance and error rate) if the subject is not researched. Serious games targeting users' cultural orientation can affect the users' behavior, by using roleplay game mechanics to simulate individualistic and/or collectivistic behavior. The *Team Performance Strategy* uses individualistic and collectivistic roleplay simulations in serious games to design group- or self-appraisal based user feedback, which should affect user efficiency. A reason for the low amount of studies in persuasion technology involving children, is that designing technology for children is difficult. This is due to children demanding an elevated level of entertainment to stay focused on the objective of the technology, such as the learning content of a serious game. Using a participatory design approach has been shown to increase the chances of creating a serious game that reaches the appropriate entertainment level and understands the learning goal. The DPE framework uses a participatory design approach, involving the player in the design process. However, it does not include a content expert to validate whether the inherent knowledge is represented correctly. Therefore, an expanded version of the DPE framework is developed for serious game designs, using both a content expert and a user as informative design

participants. This research will investigate team Performance Strategies in serious video games for children, looking at how Danish and Brazilian children perform in self- and group appraisal based simulated roleplay settings [11].

H1a: *"Collectivistic group-appraisal simulated roleplaying in serious games shows greater performance from Brazilian than Danish children."*

H1b: *"Individualistic self-appraisal simulated roleplaying in serious games shows greater performance from Brazilian than Danish children."*

H2: *"Children collaborating as informants in a participatory design for serious games, perform better than non-informant participants"*

METHOD

The evaluation is meant to show if individualistic and collectivistic game versions can enhance efficiency, measured as performance and error rate in a serious game for children aged 3 to 6. 59 children are divided into groups of nationality, where 21 Brazilian children participate as informants in the design process of the game. By volunteering for the design of character and background visualizations as part of a participatory design meant to create NPC's and shared or individual MC's, familiarization and empathy towards game artefacts should improve in the participants. This provokes an interest that can lengthen the attention span or the sensation of wanting to repeat the activity of the game. It indulges to further explore the interactions in the game, such as NPC dialogue [13][20]. A control group of 19 Brazilians and 21 Danish children will not participate in the design. As the Danish children did not participate in the design, this could possibly influence the performance measures of self- and group appraisal, which would likely benefit the Brasilian students involved in the participatory design. A group of non-participatory Brazilian children will only participate in the experiment as a control group.

Hence, there are three categorizations of participants being *Participatory Collectivistic Brazilians, non-participatory Individualistic Danish* and a control group of *non-participatory Brazilians*. Each categorization is representing their respective cultural fitting from their countries description and will be separated into two different playthrough sequence 3-person groups. Half of each categorization will first play the collectivistic game version and then the individualistic game version, where the other half will go the other way around

as seen in Figure “not there yet”. The game will be played on a laptop PC with a shared optical mouse as controller. The objectives of the game are to help solve tasks given by NPC representative tribe members of the Huin Kuin tribe. When completing a task, the NPC’s of the game will either give self-appraisal to a Individual MC by addressing the player by name, or it will give a group appraisal to a shared MC addressing the work of the individual operant of the controller as a benefactor to the group’s performance. The study takes a mixed method approach, gathering *performance time*, *error rate* and *preferred game condition* (individual or collective) to show a quantitative representation of the children efficiency (performance time and error rate), when being exposed to self- or group appraisal. Pre- and -Post semi-structured interviews where used to identify pre- existing and progression in knowledge of the content, interest in the activity and opinions of the conditions. following UNESCO’s inventorying itemizer of indigenous communities [23], Pre-work and informative design using semi-structured interviews with three shaman representatives of the Indigenous Huin Kuin tribe was used to obtain content for the game narrative.

Design

The DPE Framework only involves players and designers as participants, as it subdivides the content into subcategories within the learning layer, as in the Heart of Serious Games framework. For this study, the DPE framework will be altered to include a content expert working as an informant participant. The content given from an expert on a given subject or domain, is to be included in all the condition layers of the DPE model, instead of only in the design phase. By doing this, the designer can ensure that the learning context is included when interacting with the player, in order to enhance the chances of creating a successful serious game. A re-interpretation of the condition layers is presented in Figure 6.

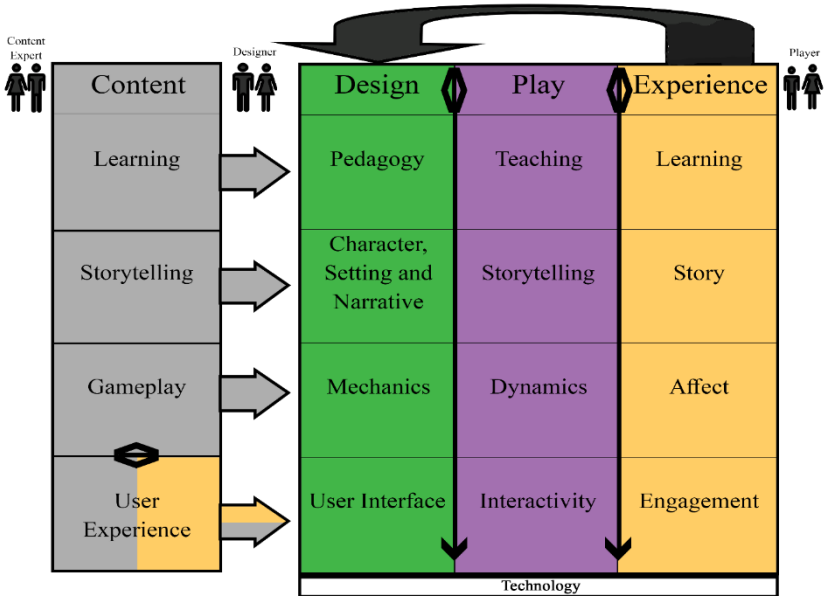


Figure 6: The CDPE framework

The CDPE Framework

The CDPE framework is based on a four-step procedure. 1st phase: Designer and content expert collaborate to make a teaching plan which could improve the learning experience of the player. 2nd phase: Designer and content expert design an outline for character, world and narrative design, for the player to interact with and give feedback on. 3rd phase: The mechanics of the game are iteratively redesigned to reflect the knowledge gained from the feedback on the learning content and the story, in order to test the game mechanics. 4th phase: The total knowledge gathered from the previous three phases, based on the game experience, are introduced to the content expert, in order to establish a prototype user interface and measure the effect on the team perforance of the participants.

Learning

The designer involves the content expert, in order to involve the learning content in the pedagogical learning theory, which should result in the possibility to learn when playing the game. In this phase, the designer and the context expert can define their instructional design techniques, such as Blooms Taxonomy on Teaching and Learning (cognitive, psychomotor and affective learning) [1], and assert the content, which could be math, history or any other subject. This study uses a cognitive learning technique to measure the experience of collectivistic and individualistic practices. Having the learner as the center of attention and acquiring knowledge through multiple modalities, such as text, pictures and sounds, is considered cognitivism within pedagogical learning. This should enable the player to apply past learning when identifying and analyzing problems. The learning is achieved by connecting symbols in a meaningful and memorable way [8]. This approach will be used when connecting the learning content with the PD game design, using the CDPE framework.

Storytelling

The designer and content expert create an outline for a setting with characters and a narrative that applies the content and learning technique. This outline could be defined by identifying content and learning within people, animals, locations and the environment. The designer constructs interactions and choices that the player can make within the game, such as NPC dialogue, guiding the player through tasks, in order to help teach the learning goal. The focus for this study will be on the NPC response to completing a task within the storyline, related to the players cultural orientation.

Gameplay

The play layer is broken down into mechanics, dynamics and affects. The mechanics define the limitations or rules of what the player can do and what challenges they will face within the learning goal. An example could be which objects and characters in the game environment the player can interact with. The dynamics are the influence of player interactions within these rules, such as how the game gives feedback to the user when interacting with objects or NPC's. The affects are the players emotions or experiences are derived from the interactions, such as receiving self-appraisal or group appraisal from an NPC by completing a quest objective by delivering an item [6]. The content expert will help design the challenges of the game to involve the learning content and define the expected learning goal.

User Experience

This is the deepest and final layer in the framework. It is an overall interface design, encompassing everything that the user sees, hears and interacts with. It combines the game play, storytelling and learning experience into the overall interface design. The content expert will have a look at the information gathered from the experience gained from each prototype play test, to develop a final interface prototype to be play tested by the player.

Indigenous Tribe Knowledge as Game Content

For this study, the content used to create a narrative in a children serious game will be provided by three Shaman members of the indigenous Huin Kuin community of the Amazon jungle. The members will volunteer as informants and participate in the design by sharing their knowledge of the community with the children from an Brazilian off-school facility. As the members lack drawing skills and are purely an oral society, as described by UNESCO [23], their involvement and collaborative work as informants would contribute through semi-structured interviews. The information provided by the members contributes to the learning goal, and game artefacts are created in relation to the content given by the Huin Kuin tribe.

Identification and characteristics of the Huin Kuin Shaman

The following information was collected using UNESCO's suggested outline of inventorying information in intangible cultural heritage for indigenous communities [23]. Two paragraphs of the outline were used to identify content to use for content in the game design:

1. Identification of the element

1.1. Name of the element, as used by community or group concerned;

1.2. Short, maximally informative title (including indication of domain(s));

1.3. Community(ies) concerned;

1.4. Physical location(s) of element;

1.5. Short description.

2. Characteristics of the element

2.1. Associated tangible elements;

2.2. Associated intangible elements;

2.3. Language(s), register(s), speech level(s) involved

By interviewing and recording instances of tangible and intangible shamanic elements using UNESCO's method of gathering and representing indigeneous tribe knowledge, the representational values are structured as followings:

1.1. Shamanism: The element selected is the Huin Kuin community and the characteristics will be taken from shamanism. During a one-month period, with one week in the community, followed by three weeks of traveling with three Shaman representatives, bound to perform rituals in local Brazilian communities.

1.2. Indigenous shamanic social relations and folklore: The main objective of a Huin Kuin Shaman is maintaining harmony by communicating with the tribe members when the balance is broken. There are furthermore distinct functions of a Huin Kuin Shaman in the domains of music, medicine, crafting and agriculture.

1.3. Huin Kuin tribe: There are approximately 800 members in the Huin Kuin community, with 38 being Shamans.

1.4. The Amazonian jungle: The tribe is located close to the Peruvian border of the south American rainforest.

1.5. Medicine, music and harmony objects: Objects representing a daily work task for shamanic representatives, such as herbal plants, music instruments used by the community, and tools to complete labor tasks for the community, such as a hammer or a paddle.

2.1. Spirit animals and folklore: Beliefs such as the concept of animals having a spirit that represents the emotional state of the animal. Only Shamans can visualize and commute with the spirit animals. Furthermore, folklore of how fire was brought to the community with the help of spirit animals, is shown in the appendix.

2.2. Native Huin Kuin songs: The Huin Kuin community have the tradition of dressing in colorful costumes and performing traditional songs at ceremonial events. The songs contain origin stories of the community and general beliefs.

The following definition of shamanism was defined by Maspan, the second-eldest Shaman representative of the tribe:

"To become a Shaman, one must be able to see the spirits of the animals that live in the jungle, which can occur at any given moment, but usually after 10 years of age. The first responsibility of the Shaman members is to obtain knowledge of recognizing herbs and learning how to apply them for medicinal use. The second responsibility is to find a second responsibility that can contribute to the community, such as music, crafts, fishing or general labor. A Shaman also functions as a spiritual guide for the other members, if they have questions of personal frustration, joy or doubt, the Shamans are to provide a response in reflection of their

cultural values and how they portrait the universe. One of the Shamans is selected by the other Shamans to become a Hachici, whose responsibility i is to work as judge, jury and disciplinary enforcer in case of a conflict within the community. There has never been a murder within the tribe, but there is an occasional incident of theft and beggaring behavior that usually resolves in community work. The passing on of knowledge is purely oral, as there is no written language. However, they do use symbolism in arts and crafts to portray different animals of the Amazonian jungle."

A daily task of a tribe Shaman is going to be the characteristic element chosen to function as content for a game narrative. For this, three shamanic representatives of the Huin Kuin tribe were selected, giving their classification of what their responsibility as a Shaman is to the community. This is defined as what elements and traditions have key value to the community and how a shaman is represented in these. A brief description of demographic and occupational information on the three shamanic representatives is shown In Table 1. As I was told by someone familiar with the community, the Huin Kuin community does not share the common interest in keeping count of age, so ages will be approximations of how old each member would estimate themselves being.

	Demography	Shamanic Responsibility
Maspan	*Maspan is +60 years old and head medicinal Shaman. She is the third eldest member. She lives outside the community, alone, by the river, where she produces medicine.*	*Maspan is responsible for teaching Shamans the art of Huin Kuin herbology, and is acknowledged as one of the wisest members of the community.*
Sian	*Sian is a +30 year old musical Shaman. He is "married" to his wife Ului, with whom he shares the child Toru. He is also apprentice to Maspan. Sian lives in the main village with his child and wife.*	*Sian teaches the young members of the community how to play instruments. He is personally responsible for playing guitar at ceremonial gatherings, rituals and/or other festivities.*
Villian	*Villian is +40 years old and Hachici (disciplinary enforcer) Shaman of the community. Villian lives in the main village with his wife and two children.*	*Villian is in charge of solving conflicts between members of the tribe, from minor complaints over another member to accusations of theft. There can be only one Hachici, until he/she becomes too old or dies.*

Table 1 The findings of shamanic responsibilities for the Huin Kuin community and their demographic descriptions

In a semi structured interview with the three shaman representatives and the translator Cesar, who is familiarized with the community and has done research with Maspan in herbal medicine, an agreement was made not to video record the interviews. They did, however, allow for audio recordings of the interviews, with the premise that the interviews would be carried out during private rituals. The Shamans were to describe their responsibilities as a Shaman, what a good day would be like, and why and what a bad day would consist of. A mutual understanding of the concepts good and bad was established before the interview.

Figure 7. Left: A picture of Maspan grinding medicinal herbs. Right: A picture of Sian being interviewed in the jungle

For Maspan, a good day would consist of a healthy community and playful spirits. A bad day would be if the community was ill or if she couldn't find the right medicinal plants. Sian explained that a good day would be with his family and friends, and explained that sometimes the children forget or lose their instruments to get out of class, which could make a day bad. Villian considered observing the community working for each other as a good day, and that he dislikes when people tell him that they can't find their items such as accessories or cooking materials, usually due to misplacement. A common statement from all three, was that the animal spirits could help to guide oneself away from a dreadful day or experience. When they help guide the members of the community, the Shamans would seek guidance from the spirit animals. Based on the results of the semi-structured interview, a game narrative and plot were designed to represent a common day, including tasks and possible obstacles for a Shaman representative of the Huin Kuin community. In the game narrative, the users explore the Huin Kuin tribe, as they meet the three Shamans, helping them with their defined task (music, medicine and maintaining order), by collecting items related to their task. It was decided with the tribe members that the children should create their own representation of a spirit animal, related to their folklore and a general description of spirit animals. The in-game music is based on samples of

traditional native songs recorded at rituals. The participatory design and development will be described in the following chapter.

PARTICIPATORY HUIN KUIN GAME DESIGN

Practices of PD in culture was used to develop an educational game, using indigenous knowledge of the Huin Kuin tribe, as learning content for Brazilian and Danish students. The main design decisions for the functionality and interface were: a) to include easy and unambiguous tasks, b) to support collaboration between children, c) to switch between all roles during the game, d) to use engaging elements such as playful colors, animations and audio feedback (Figure?). The Brazilian children in a off-school facility of Sao Carlos would participate as informants to negotiate the visual representational values of the tribe knowledge content and ensure that the tasks were doable for children to comprehend.

	Draw	Environment	Select	Movement
Design	*Shamanic representation of Spirit animals and folklore of the Huin Kuin tribe, explained oral for the children.*	*Pictures of the Huin Kuin villgae and, shaman representatives and jungle environment are printet in colerless paper editions.*	*Drawings and colorized pictures are randomized and presented in groups of individual and collective work.*	*Selecting movement controller option between optical mouse and click, keyboard or both.*
Task	*The Children are handed paper, pencils and pens to draw individual character representation of spirit animals. Followed by a group session of three children to collective draw a representation.*	*Children are handed pencils and pens to colorize the colorless picture editions, one each and one as a group.*	*The children are handed six golden stickers, to place on their preferred colorized picture and drawing (three for each category)*	*The children are playing an Collective MC in a prototype version of the scene movement. They are split into groups of three, with 2 minutes of playing time for each controller option, in a randomized order.*

Experience	*The drawings of spirit animals are to function as MC's in the game. All drawings are collected, to be evaluated in the Select workshop.*	*The colorized pictures are to function as background and NPC's. All colorized pictures are collected, to be evaluated in the Select workshop.*	*The colorized pictures and drawings with the most golden stickers are selected for the game design.*	*though post semi structured interview, the optical mouse was selected as the preferred method of control. Due to it being the easiest to share and most efficient.*

Table 2 shows the participatory design framework, using the shamanic content in the domain frameworks Draw, Environment, select and movement. for each domain there is a design, task and experience procedure.

For educative games, PD can help counter the difficulties that lies in creating a motivational and engaging game, that portray domain knowledge and pedagogical principles. Allowing the children of a Brazilian off-school facility to renegotiate the indigenous knowledge and co-design the characters, backgrounds and narrative would benefactor the chances of building a successful game to be tested. 21 children ages 3-6, were given consent to participate in the design, 7 volunteer workers and 10 parents were present during the duration of the design. The PD lasted five weeks, consisting of four workshops: *Draw*, *environment*, *select*, *movement*), as shown in Table 2.

Draw

The participatory design started with a Draw workshop, here the children were assigned the task to draw in groups of three, their idea of a spirit animal. Previous to the workshops, parents and volunteers were informed of the design outline and that they were to act as facilitators, not imposing their own ideas on the children. A scripted and translated folklore story called "The bird who stole the fire"[appendix] were read by the volunteers or parents to the children, before drawing. Following the reading, the volunteers and parents had information cards with descriptive phrases for spirit animals that they could use, such as "Spirit animals looks like the emotion of the animal they are in". Each group would then draw one spirit animal each, and one as a group. This would then be part of a collaborative selection process and work as in-game main characters and individualistic artefact. The day's activity took place inside the off-school facility, using materials such as paper, pencils, pens that were provided to each group table. The groups workstation would be available for 6 hours, where the children could come and go as they pleased. When they felt they were done, they would hand in the drawing to a volunteer or parent.

Figure 8. picture showing the Brazilian children working on drawing individual interpretations of spirit animals.

Environment

in the second workshop the background and portray of the game characters was selected through a discussion session, were I had chosen a variety of images of the Huin Kuin tribe and its environment. The day would then start with an orientation session, explaining the original pictures and what they represent, such as “This is Maspans home at the lake where she crafts her medicine”. This would then be translated for the children as they would be handed colorless prints of the pictures and NPC characters for them to colorize in their groups. The groups workstation was available for 6 hours and the children would hand in the colorized pictures to a volunteer or parent. There were discussions and arguments over whom in the group were to paint what picture, with a large affiliation towards drawing the NPC characters, rather than the background environment. Six children weren’t present the workshop day, so some groups were reassigned, and the children did the exercise the following day per request.

Figure 9. A colorless picture of the Amazonian rainforest to be colored by the Brazilian children in the workshop.

SELECT

The third workshop was a selection process to narrow down the preferred Main character, background and NPC design to be used in the game. The children would select which of all the drawn and colorized representations they preferred. Each child would enter the workspace inside the facility, where all the drawings and pictures were presented with drawings on one side and colorizations on the other. The children would then be handed ten gold stars to assign 5 on the drawings and 5 on the colorizations. The pictures would be randomized in order after each turn. From this the background, NPC's and spirit animals with most gold stars would be designed into the game graphics followed by some graphics brushing and rendering for them to be implemented in the game.

Figure 10. A picture of a drawn interpretation of a spirit animal

Figure 11. shows a picture of a children colorized paper of the Amazonian rainforest.

Movement

In the last workshop they would decide if they preferred a mouse-pad, keyboard or optical-mouse as their controller to navigate in the game. First the group would sit and navigate game characters around using each controller for 2 minutes per member. Secondly the volunteer or parent present would ask the children to discuss what controller they would use for a second time. When they have decided the children, whom wanted to try again, would have the opportunity but it would be explained that it is not mandatory, however almost all had a second try. Each child was then asked which controller they preferred as a group controller, were the optical-mouse was largely preferred due to its ease in passing the controller to the other members.

Huin Kuin Quest

Content	Design	Prototype	Experience
Learning: *The game content is a cognitivist approach to Huin Kuin shamanic knowledge. Showing a problem based activity from a shamanic responsibility of Medicin, Music and Harmony. The content is used in a treasure hunt task for the participants to solve, by collecting game objects relating to the correct shamanic NPC description. Such as finding and picking up lost instruments and returning it to the music shaman.*	**Pedagogy:** *The collectivistic game version lets the player select individual MC's, collaboratively designed with children to illustrated spirit animals. Where in the collectivistic version, the group continues the game with an also collaboratively designed shared MC.*	**Teaching:** *As the game progresses, the player will be get cues of where to find attributes that the shaman NPC would need. Returning attributes to NPC's help members of the community to play music, do labor tasks such as cooking and sailing, or producing medicine to heal the "minor" ill tribe members.*	**Learning:** *The designated learning goal is for the children to understand that a shaman can have multiple assignments in relation to their shamanic classification. By correctly classifying a work task with a shamanic representative, the player indicate that they have identified differences in shamanic responsibilities. If wrongly classifying an attribute, shows the player have not understood the learning objective.*

Table 3. Structure of the Huin Kuin game, following the procedure of the content, design, prototype and experience framework, using the shamanic content when designing the learning goal, pedagogy, teaching and learning experience of a serious game.

Storytelling: *The game tells the story of how three shamanic representatives, have lost attributes related to their shamanic description. By interacting with a shaman NPC, they player will receive information to what shaman classification they are commuting with and what problem they would like to solve, for them to continue with their daily work*	**Narrative, Setting and Character:** *From the PD workshops, the user interface was developed with the player preferred NPC's (Maspan, Sian and Villian), MC's (Cicu, Cacu, kuku) and Backgrounds showing different community locations (Maspans house, Jungle, city center). The content and learning theory is then*	**Storytelling:** *The game uses a voice narration, from local members of the Brazilian or Danish children's community. The game also shows a text box narrative, for a volunteer or parent facilitator to retell a task, if the objective is not clear for the participants. The storyline is user selective, meaning the player chooses the task completion sequence.*	**Story:** *Maspan needs to find herbal objects for her to produce Huin Kuin medicine, to heal a group of tribe members in a boat. Sian need the players to help find instruments that the animals of the jungle have stolen. Villian needs to restore harmony by locating different tools used for labor work, that the community members have lost.*

Table 4. Structure of the Huin Kuin game, following the procedure of the content, design, prototype and experience framework, using the shamanic content when designing the Storytelling content, narrative, a prototype of the storytelling and experience thereof.

Gameplay: *The player first enters an entry set-up game scene. here the player gets introduced to the concept of spirit animals and receives a brief description of the Huin Kuin community, by the Maspan NPC. They then are instructed to the 'map' scene, where they travel to three task solving scenes in a user selective order. The win criteria is fulfilled by completing all tasks,*	**Mechanics:** *The player collects and returns artifacts, that the NPC's are missing. The main character can only be controlled one at a time, using optical mouse and click, as preferred control option by the children. There are four dialogue options for each NPC. Accept task, ask about task, ask about NPC, decline task.*	**Dynamics:** *Returning artifacts to the corresponding NPC will result in appraisal to either the individual player operating his/her individual MC or to the group through a shared MC. Wrongly identifying a artifact with an NPC will be categorized as and error. The NPC would inform of player of that the artifact is not theirs and again respond through self- and group appraisal for their commitment.*	**Affect:** *By receiving appraisal in relation to the players cultural orientation, should cause motivation to individual players team performance, resulting in an overall better* efficiency *(performance and error rate).*

Table 5. Structure of the Huin Kuin game, following the procedure of the content, design, prototype and experience framework, using the shamanic content when designing the gameplay design, game mechanics to simulate the targeted behavior and the user affect.

User Experience: *From the participatory design designs of user informed NPC's, individual- and shared MC's and background illustrations was created on paper and graphically rendered for the serious video game. The user then plays through a storyline co-created with the Huin Kuin tribe, to experience the daily tasks of a shamanic representative.*	**User Interface:** *The user interface involves* *- global inventory menu to store game artifacts* *- scene centered MC, to be operated by a single participant.* *- background image representing Huin Kuin environments, where only part of the image is shown in the full screen image, for the player to explore the environment.* *- NPC and MC dialogue text box, scripting the voice over narrative.* *- 'sign' objects for the player to move out from and into a scene.* *- Background music playing recorded sessions of original Huin Kuin songs used at rituals.*	**Interactivity:** *The player goes through 5 different game scenes, by clicking on the screen in the direction the player wants to move (360 degrees direction on a 2d plane). The player goes through a 'map' scene, showing clickable location nametags, to move between the shamanic task scenes. For each shamanic scene the group will face a task of collecting game object artifacts by clicking and adding them to an inventory menu, from which they can drag and drop onto NPC Shamanic representative. Solving a task will result in the NPC giving self- or group appraisal, depending on the game version.*	**Engagement:** *Using cultural oriented NPC and MC dialogue should result in the player being more engaged in the activity and showing a overall better team* efficiency.
Technology: Laptop PC with optical mouse			

Table 6. structure of the Huin Kuin game, following the procedure of The content, design, prototype and experience framework, using the shamanic content when designing the preferable user experience, user interface, interactivity and engagement fitting a serious game for laptops.

EXPERIMENT

PROCEDURE

Three children enter the experiment room, where they receive instructions of the task by an adult of authority facilitator, and a presentation of the game by the experiment conductor. The facilitator is instructed to read aloud the dialogue response options and to only interfere if the children are asking for assistance. When the children finish the task, the facilitator follows a semi-structured interview narrative, asking questions regarding their team performance experience. An experiment conductor is present in the backend of the room, observing and scripting behavioral notes and responses from the game experience and semi-structured interview. Receive self- or groups appraisal. The experimental set-up is shown in Figure 13 & 14

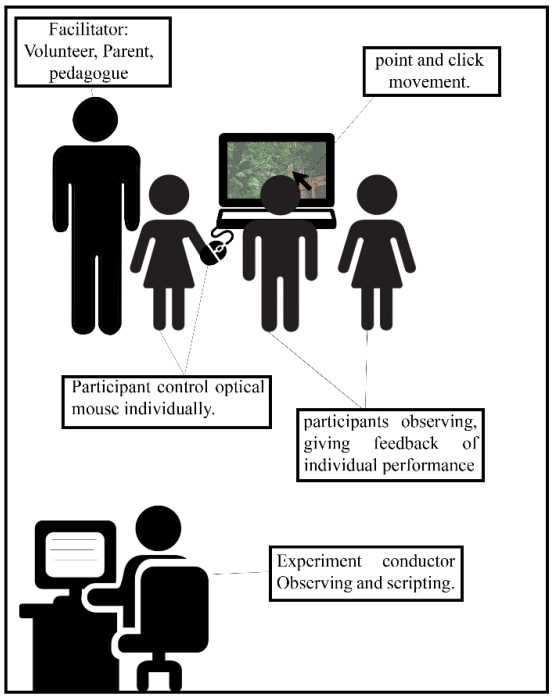


Figure 13. Test design set-up of the experiment

Figure 12. picture of the experiment being conducted, having the children play the huin kuin game, with a facilitator present.

Measures

The game has three task objectives, each having four triggers of either self- or group appraisal, depending on the game version. In the individual version there are four triggers for each participant, whereas in the collective version it is up to the individuals of the ingroup to decide who controls the MC. Hence, the appraisal triggers in the collectivistic version will give a collective appraisal, giving positive reinforcement to all the members of the group and not just the participant controlling the MC. The triggers are happening when the participant controlling the MC, clicks on a Shamanic tribe member NPC which is explained further on. An example of a cue is illustrated in Figure 14.

Figure 14. an example of a self- and group appraisal cue, triggered in the game by the users interaction.

A narrative structure was developed to define how the game process will represent the individual and collectivistic versions of using self- and group appraisal. The games experimental design framework is shown in Figure 15. The framework shows how the players will progress in the game, being exposed to mechanics of self- and group appraisal.

First the game starts with the experiment conductor initiating either the individualistic or collectivistic version. By choosing the individualistic version, the players will need to explore the game entry scene with the shared MC, to each discover and select a spirit animal (individual MC) by clicking on it. For the participants to identify themselves with a roleplaying character, the players will type in their individual names in a text box using a keyboard with the help of the facilitator. This is so the NPC's can direct their feedback to an individual member of the group. The collectivistic version does not have the option of selecting roleplaying characters, but will instead proceed with a shared MC. From the entry scene the players will proceed to the map scene. Here the player can select between three task scenes, by exploring the map. For the individualistic version, each task scene is represented by one of the three spirit animals instead of the shared MC, where the collectivistic version continues with a shared MC. When entering a task scene, the players will have to locate and click on the shaman NPC representing the scene domain environment, such as Maspans scene being her house by the river. When clicking on a NPC, a text box will appear scripting the narrative that is being played by a voice-over in the participants language (Portuguese and Danish), so that the facilitator can read and help the children if the task is unclear. Following an introductory description of the task, a dialogue box is shown on the screen for the children to select if they will accept or decline the task. By declining the children will continue exploring until they accept. It is possible for the player to leave the task scene and enter the map scene at any time (except when instigating a dialogue with NPC). When the participants accept the task, they will receive self- or group appraisal for deciding to help the shaman. From these three game objectives relating to the task will present themselves in the game scenes, for the user to find and collect, by clicking on the objects to store them in the inventory menu. When an item is found, the children will have to find out to whom of the NPC's the item Is belonging to. The user opens the inventory menu by putting the cursor in the top of the screen and delivers an object to a NPC by dragging the object from the inventory menu onto the NPC. an error instance is measured for every time the

participants drags a incorrect object onto a NPC. The game ends when the users have completed all the tasks of the game.

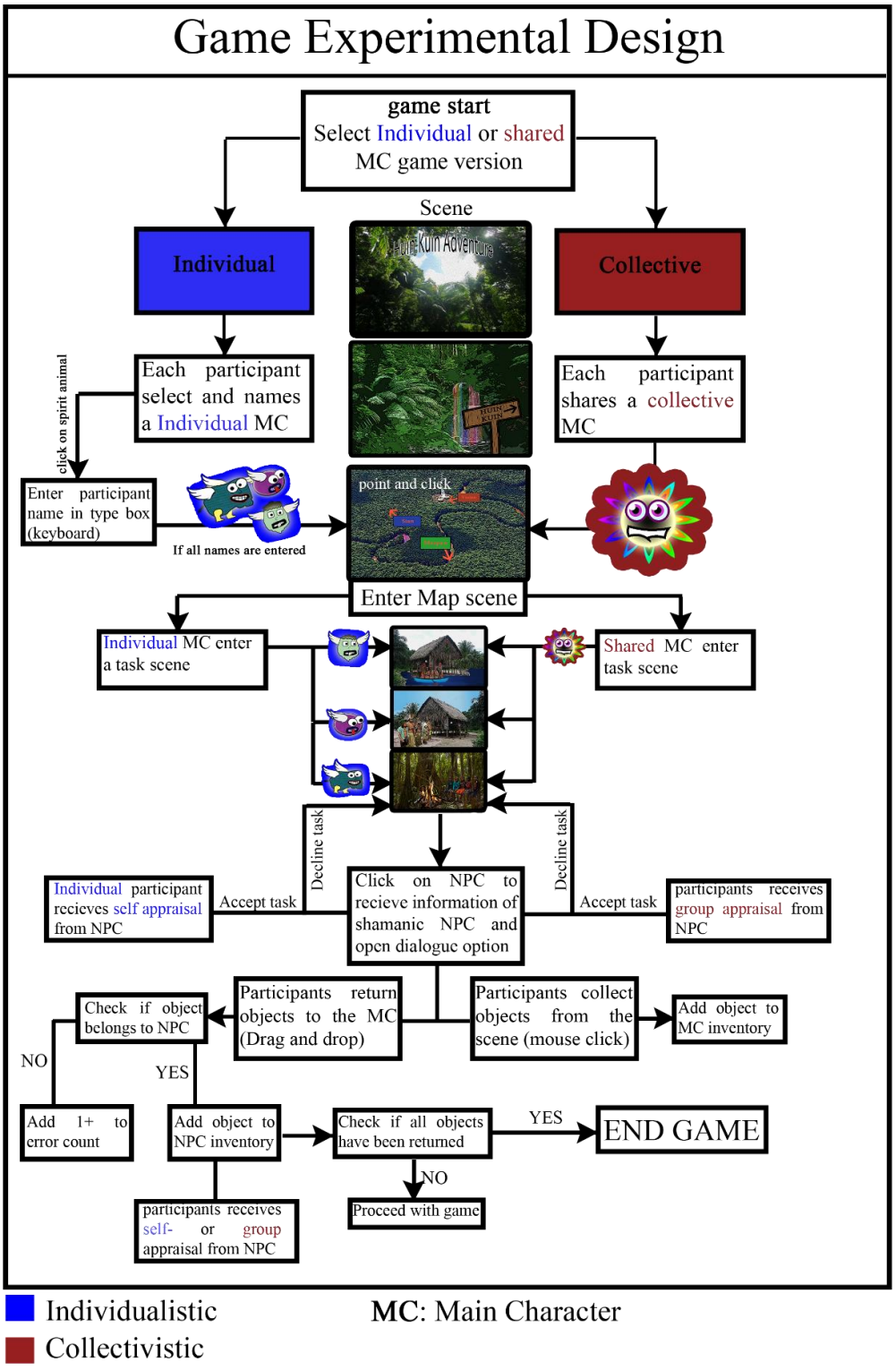


Figure 15. The experimental steps within the Huin Kuin game narration, showing the users possible actions and their collective and individual mechanic, in a top to bottom process line.

In a post-test semi-structured interview, the participants were to identify their preferred condition, where the results show that only eight children out of Forty-two preferred collectivism, whereas thirty-eight participants preferred individualism. The quantitative measures in the experiment design should indicate the efficiency (performance and error rate) of having a cultural oriented simulated roleplaying.

Table 4 shows the result of a two-way Anova test, comparing Danish that did not participate in the design process and the Brazilians that participated. The test measures *performance* and *error rate*, by the effect of individualistic and collectivistic *Team performance strategies*. For each condition (*individualism time performance*, *collectivism error*, *individualism Error*, *collectivism error*), the difference in performance time and error rate is measured between test groups, using a two-way ANOVA test (alpha: 0.05). In this experiment the Brazilian students had significant better performance time in the collectivism variable, both Results of two-way ANOVA test in collectivists and individualists team performnace efficacy, between non-participatory Brazilian and non-participatory Danish children, measured in completion time (minutes) and Error significant difference with the Brazilian students outperforming the Danish (*p*: 0.016), whereas the first trial had no significant difference (*p*: 0.077).

Variable	Trial	Brazil		Denmark		*F*	*p*
		Mean	SD	Mean	SD		
IndP	1	22.43	0.0018	28.39	0.0015	7.01	0.0772
	2	18.27	0.0025	25.41	0.0018	23.33	**0.0169***
ColP	1	14.38	0.001	23.03	0.0016	26.39	**0.0143***
	2	12.30	0.0007	16.26	0.0007	19.79	**0.0211***
IndE	1	1.75	1.238	2.33	0.577	2.45	0.215
	2	0.66	0.577	0.5	0.577	0.18	0.702
ColE	1	5	2	4.5	1.29	0.27	0.637
	2	4.25	1.5	2	1	12.79	**0.0374***

IndP: Individualism time performance
ColP: Collectivism time performance
IndE: Individualism error efficiency
ColE: Collectivism error efficiency

Table 7. Results of two-way ANOVA test in collectivists and individualists team performnace efficacy, between non-participatory Brazilian and non-participatory Danish children, measured in completion time (minutes) and Error

Table 5 shows the result of a two-way Anova test, comparing Danish and Brazilian children that did not participate in the design process. The test measures *performance* and *error rate*, by the effect of individualistic and collectivistic *Team performance strategies*. The affect is significant at the p<0.05 level. There was no significant difference between the two countries, however, under the collectivistic condition the Danish had significant less errors (p: 0.0374).

Variable	Trial	Brazil		Denmark		*F*	*p*
		Mean	SD	Mean	SD		
IndP	1	28.01	0.0021	28.39	0.0015	2.19	0.171
	2	24.39	0.0018	25.41	0.0018	1.217	0.444
ColP	1	22.56	0.0018	23.03	0.0016	5.059	0.068
	2	18.29	0.0022	16.26	0.0007	2.558	0.161
IndE	1	0.66	0.471	2.33	0.577	2.195	0.171
	2	0.66	0.471	0.5	0.577	3.638	0.094
ColE	1	2.66	0,471	4.5	1.29	7.774	**0.021***
	2	3.33	1.247	2	1	1.891	0.221

IndP: Individualism time performance
ColP: Collectivism time performance
IndE: Individualism error efficiency
ColE: Collectivism error efficiency

Table 8. Results of two-way ANOVA test in collectivists and individualists team performnace efficacy, between participatory Brazilian and non-participatory Danish children, measured in completion time (minutes) and Error count

Table 6 shows the overall comparison of all the children participating in the experiment, in a two-way ANOVA test. The test measures *performance* and *error rate*, by the affect of individualistic and collectivistic *Team performance strategies*. The affect is significant at the p<0.05 level. The test shows a significant difference between the performance of a roleplaying MC and a Shared MC (p: 0.0104).

Variable	RMC		SMC		*F*	*p*
	Mean	SD	Mean	SD		
Performance	26.40	0.002	20.26	0.002	10.393	**0.0104***
Error	1	0.8	3.23	1.367	3.054	0.114

RMC: Roleplaying Main Character
SMC: Shared Main Character

Table 9. Results of two-way ANOVA test comparison of non-participatory children, between Roleplay and Shared MC's Measuring efficiency in performance (minutes) and error (integer).

In the Cross-Country participatory design experiment, having Brazilian children contribute to the game design as informants showed to increase the performance rate significantly. In all cases, except the first trial of the shared MC version, the Brazilian children showed to better complete the tasks, proving *H2 ("Children collaborating as informants in a participatory design for serious games, perform better than non-informant participants")* to be true. This is furthermore stated in Table 4, when comparing the children who was not involved in the participatory design. In this case there were no significant difference in the performance and error dependent variable of measuring the *team performance*. proving both H1a and H1b to be false, as the cultural oriented simulated roleplaying of self- and group appraisal had no effect in the quantitative measures. Table 6 shows that there was an overall significant (*P*: 0.0104) better performance in the individualistic version, indicating that roleplaying allowed for the children to better perform as a group, rather than having a shared MC. The results from table 6 is however biased, as the children involved in the participatory design are weighing in the results, having already showed a raised efficiency by participating in the design.

DISCUSSION

Using roleplay as an individualistic method to simulate the culturally oriented behavior of receiving self-appraisal, showed to be a biased game mechanic. As the observations during the experiment and responses in the semi-structured interview indicated that roleplaying a character each was the preferred game mechanic, not the NPC's self-appraisal responses. Also, the better performance time and lower error rate in the individualistic version was due to the participants having individual characters. The efficiency of exploring the scene environment and selecting multiple dialogue options was of higher interest when having individual goals. It was also observed that there were peer responses when roleplaying, and the ingroup seemed to cooperate at a higher level. When playing the shared MC, the peer group rarely responded and occasionally lost focus. This was further identified in the post semi-structured interview, where the children would frequently use phrases, such as, "*it was booring,*" when asked to describe the experience of the shared MC version, and when asked to recall task objectives, they would mainly refer to their individual characters' relation to the task. However, as the study lacks video recordings of the Brazilian experiment, it was not possible to do a behavioral video analysis, which could have been important when identifying more accurate behavioral items. Furthermore, the study lacks better quantifiable measures to predict the psychological behavior of children and their cultural orientation. Identifying behavioral preferences has the potential to benefit the edification of children when using persuasion technology.

Developing the game design in collaboration with the Huin Kuin community as informative content experts, showed to be an effective process of developing a game narrative and storyline. As their culture is rich with folklore and they have shared stories orally through many generations, the translation to an adventure game environment was almost obvious. The idea of having spirit animals serve as individual guides (roleplaying MC), for the children to design their own conceptualization on paper, could have been the dominant factor in the chosen game mechanics to exhibit a significant preference. Furthermore, Danish children spoke enthusiastically about the roles designed by the Brazilian children. The design failed to include the influence that a roleplaying system would have on the measures of culturally oriented NPC dialogue interactions. The NPC responses to an individual character were observed to cause a positive peer response. However, the efficiency of thoroughly exploring and completing tasks with limited errors, was not due to self-appraisal and group appraisal, but due to the roleplaying mechanic.

CONCLUSION

Developing technology that harnesses culturally relevant motivations in the context of individualistic and collectivistic traits, has been shown to lead to greater persuasion [11][14]. However, the current persuasion technology is mainly western-individualistic, which can potentially cause the user discomfort [6]. Children between age zero to six are largely involved with technology at daycare facilities [24], and start exhibiting the first signs of interaction and knowledge sharing with peer groups before age 2 [17]. The need for a larger understanding of social behavior involving culturally persuasion technology for children exists.

The study takes a look at the effect of self-appraisal and group appraisal, simulated in the narration of non-player characters in a serious game. The experiment did not show any significant bias towards preferring roleplaying individual characters, instead of a main character where players share control within the group. The study could not determine any significant difference between the efficiency of Danish and Brazilian children, as both showed to largely favor the roleplaying mechanism. However, roleplaying is mainly referred to as an individualistic trait within persuasion technology. The large preference by the collectivistically oriented Brazilian children shows to differ with their classification. This could be due to roleplaying being a game mechanic in serious games that can increase persuasion for both individualistic and collectivistic societies. In order to come to that conclusion, more research on the subject is demanded.

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