Towards Validating Game Scenarios for Teaching Conflict Resolution

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ABSTRACT

Teaching conflict resolution skills via serious games has received increasing attention in recent years. This paper describes game scenarios that were developed to evoke variant levels of conflict intensity to children. To validate the scenarios, we implemented a prototype and created videos from play-throughs of the prototype. We then carried out a user study and ran statistical analyses to test if children would perceive the game scenarios as intended by scenario designers in terms of conflict.

Categories and Subject Descriptors

L.5 [**SIMULATION/GAMES**]: Game Based Learning

General Terms

Game Design, User Study

Keywords

conflict, serious games, game scenarios, children

1. INTRODUCTION

Learning to resolve conflict in various situations is an essential soft skill as society becomes diverse, consisting of people from very different backgrounds. SIREN (Social games for conflIct REsolution on natural iNteraction) is an FP7 EU funded project that aims to develop serious games to facilitate children in learning how to constructively resolve conflict situations among peer students [13]. Our use of games is inspired by experiential learning theory. In experiential learning theory [9], learning occurs through a repetitive cyclic process of 4 steps: concrete experience, abstract conceptualization, reflective observation, and active experimentation. At the same time, and particularly in the context of learning about conflict resolution, serious games serve as a safe venue where students can take actions in attempts to experiment with different strategies to solve conflict-related problems in concrete situations.

Recently, a number of serious games have been developed aiming at dealing with topics related to conflict. FearNOT![2] deals with a particular case of conflict—bullying. Choices and Voices[1] is a role-playing game in which players can experiment with peer pressure management. In Quandary[2] the player is given a mission to solve ethical problems that arise in a community by collecting facts and taking different perspectives. The Global Conflicts series (Serious Games Interactive, 2007)[3] concern games set in different locations around the world dealing with major international conflicts.

The Siren game consists of various technical components: adaptation [6, 7], storytelling [10], emotional agent framework [5], natural interaction [1], and group modeling [8]. This paper focuses on our ongoing effort to design game scenarios so that children can experience some conflicts during the gameplay. The next section describes our game design and gameplay scenarios. These scenarios were implemented and evaluated in terms of conflict intensities by children in South Korea. The statistical analysis of the data showed that our game design and game scenarios were effective in eliciting conflict experience to these children.

2. DEVELOPING GAME SCENARIOS

Different from existing conflict resolution games focusing on the student's role as a mediator, we designed our game as a virtual venue in which children can practice various conflict resolution skills as a participating member. To experiment and explore their conflict resolution strategies, the students

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[1]http://playgen.com/play/choices-and-voices/
[2]http://www.learninggamesnetwork.org/
[3]http://www.globalconflicts.eu/

Figure 1: A screenshot of video in which the carpenter character proposed the alchemist to trade.

must experience some level of conflict [6]. To meet the requirement, the game has to feature multiplayer capacity and afford social interaction, and needs to be visually convincing. We designed a game to allow children to take actions to escalate conflicts, such as starting a rumor, damaging other's property, stealing, disliking the other player, and rejecting trades. A player character can also take actions to reduce conflicts, such as accepting trade, giving, liking the other player, and posting positive messages. Most importantly, we designed the game quests to promote interaction and cooperation among players. Four player characters appear in the game: the alchemist, the innkeeper, the blacksmith and the carpenter. In order to complete a given quest, the game requires a player to interact with the other players, e.g., trading resources and asking for help. It is noted that all characters are controlled by human players. Automated NPCs are not employed in the current stage.

We then implemented a game prototype to serve two purposes: a) to allow the target audience to preview the game, and gather early feedback on conceptual and visual design, handling, and the ability to evoke emotional responses, and b) to collect qualitative and quantitative feedback on example conflict scenarios. The analysis of these data sets will be used to devise conflict intensity detection heuristics and inform the design of the user model. For the sake of a quick implementation, we utilized "PlanetCute" library of 2D game art released by a professional graphic artist under a permissive license[4]. The prototype was built on Fabula[5], a game engine specifically designed to be used in teaching and research [4, 3].

For the user study, we prepared three storylines that cover conflict situations typically occurring between peer students (e.g., two characters are competing against each other to obtain another character's friendship). Those scenarios were carefully designed to induce some potential conflicts but not to provoke children. Low conflict scripts contained mild negative actions such as trade refusal. Medium conflict scripts contained refusal as well as rumor actions. High conflict

[4]http://www.lostgarden.com/
[5]http://fabula-engine.org/

Story Background

The carpenter's shop was damaged by a severe storm. The carpenter needs tools to fix his shop, but only has food and wood. The blacksmith has tools, but doesn't know the carpenter needs them.

Medium Conflict Scenario

— BREAK 1 —
1. The carpenter proposes to trade wood for tools with the Blacksmith. 2. The blacksmith refuses. 3. The carpenter proposes to trade food for tools with the Blacksmith.
— BREAK 2 —
4. The blacksmith refuses. 5. The carpenter spreads a rumour "The blacksmith is unfair! I need tools to fix my house!"
— BREAK 3 —
6. The blacksmith proposes to trade tools for food with the carpenter. 7. The carpenter accepts. 8. The carpenter upgrades how much he likes the blacksmith.
— BREAK 4 —

High Conflict Scenario

— BREAK 1 —
1. The innkeeper downgrades how much he likes the alchemist.
— BREAK 2 —
2. The blacksmith upgrades how much he likes the innkeeper. 3. The alchemist steals tools from the blacksmith's house.
— BREAK 3 —
4. The alchemist spreads a rumour "With the innkeeper as mayor there will be lots of thefts!" 5. The blacksmith downgrades how much he likes the innkeeper. 6. The alchemist upgrades how much he likes the blacksmith.
— BREAK 4 —

Figure 2: Scenario 2 (Medium conflict) which gives a mission to the player to fix the shop.

scripts contained stealing actions. As a control scenario, we created a script that involves no negative actions. We recorded a total of 10 gameplay videos including one control scenario. The other nine videos were obtained when three varied conflict intensities (i.e., low, medium, and high) were imposed on three dictinct storylines. All the videos begin with textual description of the story background and show in-game actions about 1 minute.

Figure 2 shows two scenario examples (targeting medium conflict and high conflict) which include a background story describing the mission given to the carpenter to fix her damaged shop. Lacking proper tools situates the carpenter to interact with the other player (via trading and stealing in the examples), which naturally results in some amount of conflict depending on the player's behavior in the game. In these scenarios, four break points are determined; the first measurement is made before the story begins and the last break is measured after the story ends. The other two measurements are made in the middle of the stories.

Table 1: Mean and Standard Deviation values of reported Conflict Intensities across the 10 videos

Scenario	Conflict level	No. of reports	Mean	SD
Contol	No conflict	217	1.18	2.10
Scenario 1	Low	206	3.09	2.83
Scenario 1	Medium	205	3.24	3.08
Scenario 1	High	196	3.73	2.98
Scenario 2	Low	195	2.73	2.69
Scenario 2	Medium	207	3.40	2.92
Scenario 2	High	205	4.32	3.06
Scenario 3	Low	205	3.31	3.24
Scenario 3	Medium	187	4.59	3.08
Scenario 3	High	198	4.21	3.17

3. VALIDATING SCENARIOS FROM THE CHILDREN'S PERSPECTIVES

We carried out a user study at an elementary school in South Korea. Sixty seven pupils enrolled in three classes with age ranging from 9 to 12 years old participated in the study. Three different sequences of the 10 videos were determined, and all the students in one class watched one particular sequence together on a television set in the classroom. Korean voice-over narrations articulating the game actions were provided to help children understand the situations in the gameplay. However, the English textual information in the game was not translated into Korean. Therefore, the students had to rely on the voice-over narration and graphical visualization for story comprehension. Each student reported her conflict intensity she felt at four predetermined break points (see Figure 2 for example) on a 11-scale (from 0 meaning 'no conflict' to 10 meaning 'extreme conflict') from watching each of 10 videos on a paper-based survey. Our pre-processing step eliminated 12 student's responses due to their high rates of missing and inconsistent reports. The total number of valid self-reports on conflict level collected from 55 students is 2021 (missing or erroneous reports sum up to only 8.1% of the full dataset). TABLE 1 shows the average conflict intensities of each of the 10 video.

Some differences in conflict intensities are found among different storylines (see Figure 3). A Welch Two Sample t-test showed differences at the 99% confidence level between the control scenario and the remaining scenarios and between scenario 3 and all other scenarios. However, there was no significant difference between the conflict levels reported for scenario 1 and those for scenario 2.

Differences in the conflict intensities between different conflict levels within a same scenario are also found. A Welch Two Sample t-test showed that significant differences with the 99% confidence level were obtained at every pair of comparison among low-conflict, medium-conflict, and high-conflict videos in scenario 2 (see Figure 4). For scenario 3, significant differences were found between low-conflict scenarios and the remaining scenarios. For scenario 1, a significant difference with 95% of confidence level was obtained only between low-conflict scenario and high-conflict scenario.

We also investigated the average conflict intensities reported at every break point. The average conflict intensities across all the scenarios at each break shown in Figure 5. The
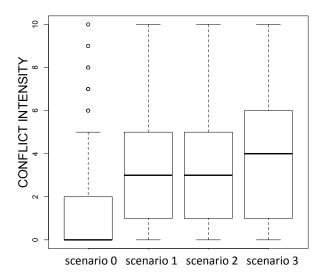

Figure 3: The average conflict intensities across different scenarios.

first conflict rating was reported right after the textual description of story background was presented. Although no in-game events occurred before the break 1, some conflict level was reported when the story background describes a situation that may develop into potential conflicts. On the other hand, the last conflict rating (Break 4) was measured after story endings, where conflict resolution is generally expected. However, in cases where conflicts were not clearly
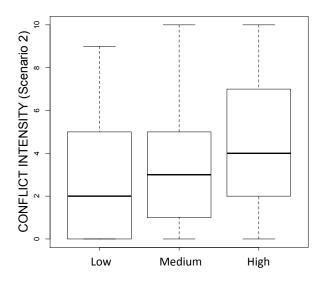

Figure 4: The average conflict intensities across different intended conflict levels for scenario 2.
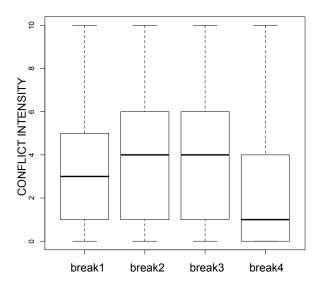
Figure 5: The average conflict Intensities at four break points across all the scenarios.

resolved, some levels of conflict were reported.

In summary, the average reported conflict intensities over the four breaks constitute an unbalanced bell shape as shown in Figure 5. This finding is consistent with the view from sociological theories and practices [11, 12] claiming that typical conflict experience takes a curve form which begins with no conflict and gradually increases toward the peak point at least a medium conflict intensity followed by a de-escalation phase when the conflict is successfully resolved.

4. CONCLUSIONS

This article described game scenarios specifically developed for children to experiment conflict resolution skills. We prepared 10 short video clips of recording the game scenarios and asked children in South Korea to rate the conflict levels at four specific points during watching those videos. Simple statistic analyses on the collected data reveal that the game scenarios successfully invoked perceptions of conflict from children that we intended in our design. Significant differences were found in conflict ratings reported by children among low-conflict, medium-conflict, and high-conflict level scenarios. We also discovered that the average reported conflict intensities in the beginning of the scenarios was lower than the two conflict intensity ratings measured in the middle of the scenarios but, interestingly, higher than the average conflict ratings measured in the end of the story. We believe this is to be due to the effect of the initial background story on reported conflict intensities.

The observation from this user study informs our future work on game development and quest design. We also plan to use this crowd-sourced data to estimate the conflict level from gameplay for generating personalized game content to provide personalized, effective learning experience.

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6. REFERENCES

[1] S. Asteriadis, N. Shaker, K. Karpouzis, and G. N. Yannakakis. Towards player's affective and behavioral visual cues as drives to game adaptation. In *LREC Workshop on Multimodal Corpora for Machine Learning*, 2012.

[2] R. Aylett, M. Vala, P. Sequeira, and A. Paiva. Fearnot! - an emergent narrative approach to virtual dramas for anti-bullying education. In *International Conference on Virtual Storytelling, Saint Malo, France*, 2007.

[3] F. Berger, A. Liapis, and G. Yannakakis. Prototyping an adaptive educational game for conflict resolution. In *ITS 2012 Workshop: Emotion in Games for learning*, 2012.

[4] F. Berger and W. Müller. Towards an open source game engine for teaching and research. In Z. Pan, A. D. Cheok, W. Müller, M. Chang, and M. Zhang, editors, *Transactions on Edutainment VIII*, volume 7220 of *Springer Berlin Heidelberg*, pages 69–76, Berlin, Heidelberg, 2012.

[5] H. Campos, C. J., C. Martinho, and A. Paiva. Virtual agents in conflict. In *IVA*. Springer Berlin / Heidelberg, 2012.

[6] Y.-G. Cheong, R. Khaled, C. Grappiolo, J. Campos, C. Martinho, G. P. D. Ingram, A. Paiva, and G. Yannakakis. A computational approach towards conflict resolution for serious games. FDG '11, pages 15–22, New York, NY, USA, 2011. ACM.

[7] C. Grappiolo, Y.-G. Cheong, J. Togelius, R. Khaled, and G. N. Yannakakis. Towards player adaptivity in a serious game for conflict resolution. In *VS -Games 2011 Natural Interaction and Player Satisfaction in Games Workshop*, Athens, Greece, May 2011.

[8] C. Grappiolo, C. Y.-G., K. R., and Y. G. N. Modelling global pattern formations for collaborative learning environments. In *IEEE International Conference on Advanced Learning Technologies (ICALT)*, 2012.

[9] D. A. Kolb, R. E. Boyatzis, and C. Mainemelis. Experiential learning theory: Previous research and new directions. In *In*, 2001.

[10] R. Swanson and A. Jhala. A crowd-sourced collection of narratives for studying conflict. In *Proceedings of the 2nd Computational Models of Narrative Workshop at LREC*, 2012.

[11] N. Swanstrom and M. Weissmann. *Conflict, Conflict Prevention and Conflict Management and Beyond: A Conceptual Exploration*. POLICY PAPER, 2005.

[12] K. W. Thomas. Conflict and conflict management: Reflections and update. *Journal of Organizational Behavior*, 13(3):265–274, 1992.

[13] G. N. Yannakakis, J. Togelius, R. Khaled, A. Jhala, K. Karpouzis, A. Paiva, and A. Vasalou. Siren: Towards adaptive serious games for teaching conflict resolution. In *Proceedings European Conference on Games-Based Learning (ECGBL), Copenhagen*, pages 412–417, 2010.