Combating Juvenile Delinquency with Empathic Agents

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Summary

Juvenile Violence is one of the most pressing problems in Japan. The work reported here explores the use of empathic virtual agents for Citizenship Education. In order to teach the values of society to juveniles, we intend to stir Intelligent Virtual Agents into action with role role-playing capabilities, as a probable answer to delinquency. The synthetic character will create improvised dramas divided by periods during which the user will enter into dialogue phases and will evaluate and recommend a potential course of action for the protagonist. Applying such agents in schools is an effective and immersive way to sensitize students for the problems and dangers related to anti social behaviours.

Key words:

Intelligent Virtual Agents (IVAs); Virtual Edutainment Environments (VEEs); Drama Manager (DM); Emergent

1. The Crisis

Japan is normally perceived as a country with a low violent crime rate and admired for the general safety of its citizens. However, recently there has been a marked increase almost an epidemic in incidence, of bullying *(ijime)*, student violence against other students, aggression towards teachers and parents. Since the mid-nineties parents and educators have become deeply concerned about the volatile situation at schools, namely '*deviancy and delinquency*' [1] among students. The state officials, mass media and social scientists have referred to the following trends: (1) a stark increase in juvenile crime, (2) a rise in homicide and other types of violence together with bullying both inside and outside of schools, (3) an increase in juveniles who explosively become agitated and violent without clear impetus (*kireru*) and (4) an increase in juvenile drug abuse [2]. The entire predicament at schools can be described by the term *gakkyu hokai* that entails beyond violence and crime, a general breakdown of class discipline, a loss of values and a lack of social competence are ruling daily life at schools. The social dimension of the problem has serious repercussions on the moral and social fabric of the society. The family unit is tearing apart and parents are generally worried about the future of their offspring's. The situation implies that we need to deal with

two areas of problem behavior: juvenile crime or *delinquency* and problem behavior at schools without juridical consequences or *deviancy*. The later may indicate rising juvenile criminal felonies in the future.
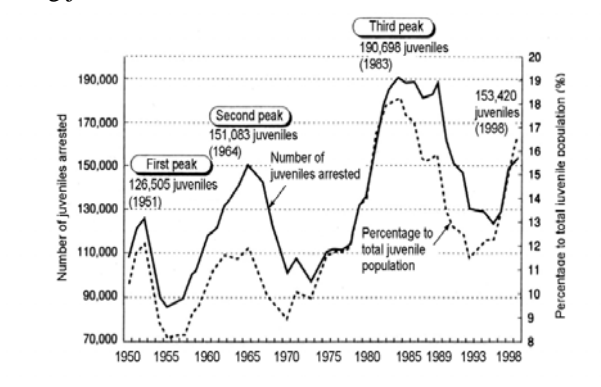

Fig.1 Aggravation of juvenile issues in a historical context [3]

What it all boils down to the point that there is a dire need to suggest remedial measures to arrest its fast growing trends (Fig.1), because if the increasing trend of youth delinquency is unabated and un-noticed, this will further create socio-economic problems of stunning proportions. Although, a number of intervention strategies to effectively deal with juvenile issues have been developed, yet the problem still persists rather proliferates. Unfortunately, almost all of these initiatives met little success in rooting out youth delinquency, owing to the fact that they focused principally on stabilizing the environment and merely to prevent deterioration. It remains uncertain as to how juveniles can be provided strategies to handle such problems. Regrettably, there appears to be no effective intervention mechanism that provides such individual education about citizenship, social norms and ethics directly to the students involved.

The paper is a multi-disciplinary work in progress, explores an ICT-based solution of a socially sensitive problem. Section 2, examines the potential of ICTs with educational role-playing capabilities in tackling social issues, followed by section 3, which discusses the role of empathy as powerful instrument to change attitudes and behavior. Finally, the design motivations of a highly

innovative pedagogical intervention are described in section 4.

2. Early Childhood ICT Education: *A Promising Deterrent to Youth Delinquency*

Findings of various studies initiated by sociologists, criminologists and psychologists reveal that antisocial behavior is not hard-wired and early childhood education is the best course for prevention and intervention to reduce juvenile delinquency [34]. But, how to provide social and emotional education to children on sensitive issues in a classroom environment is still hard to answer. Nevertheless, the advent of Information Communication Technology (ICT), as an enabler of experiential learning, has made such tasks easier. Now, the role of computer has been changed from merely a knowledge provider to an experience builder. The substantial increase in children's exposure to the ICTs is clear evidence to the fact that Virtual Learning Environments (VLEs) are now seen as an emergent and engaging medium via which children learn experimental sciences and other disciplines. Conceivably triggered by the success of computer games, Intelligent Virtual Environments (IVEs) are now becoming a promising new technology to be used in the development of interactive learning environments for children. VLEs populated with Intelligent Virtual Agents (IVAs) offer children a safe and exciting environment where they can explore and learn through experiential activities [4]. It offers a high level of engagement, through their use of expressive and emotional behaviours [5] making them intuitively applicable for exploring socially sensitive issues.

Furthermore, the triumph of VR therapy over Post Traumatic Stress Disorder (PTSD) [6], Schizophrenia [7] and Spatial Disorder [8] offers us a prospect to explore the potential of the ICT against societal and complex situations that exist among students e.g., *Ijime*-bullying, drug addiction, Inter-Cultural Antipathy etc. Juvenile delinquency is an extremely important area for which there are presently limited digital materials. There is growing recognition of the need for children to receive educational support for social and emotional learning, with consciousness of its importance for both non-academic outcomes and improved academic performance [28].

Experience is the key to individual and social learning, but such experiential learning is difficult in a classroom setting [4]. Intelligent Virtual Environments (IVEs) bring new challenges to the usage of technology in instructive contexts, encouraging and creating new learning experiences where experimentation and presence are explored. One of the immense advantages of IVEs is that they offer a secure place where learners can explore and understand through experimentation without being exposed to the hazards or risks involved in the real situations. Through empathically engaging the users, we can facilitate them in experiencing the character's emotions and problems in a distanced way, while at the same time being engaged in what happens to the characters [33]. Moreover, when IVEs are augmented with related information, questions and activities, they can engage learners in amusing and motivating experiences, which otherwise are often considered as boring. Parallel to computer games, IVEs may allow learners to get immersed and interact in synthetic worlds using a set of interaction amenities, such as move, talk and particular actions with other characters. Inhabiting these IVEs there can be agents or intelligent characters, which are responsible for proceedings that take place in the environment and make it non-predictive or entirely controlled. Characters can be assigned the roles of educators, helpers, companions, elements in the simulated worlds, or even friends [9]. They become part of this setting giving joie de vivre to the interaction with the learners.

To fight the severe long-term effects of Juvenile delinquency, the *Shimpai Muyou*! project intends to come up with a software product based on episodic virtual drama to be used in schools with a goal to develop students' insight; enhance their consciousness regarding the destructive nature of juvenile crimes and sensitize them of the destructive consequences for the society. By means of a 3D virtual environment for education purpose, students are encouraged to explore the problem of juvenile violence in a safe and stimulating environment. The central idea is to encourage empathic understanding towards the virtual victims and hence create sensitivity towards the problem. To achieve this target, we think the most effective means available to us is to instigate an open dialogue between the user and the protagonist of our improvised role-playing drama. We consider that in order to tackle Juvenile delinquency effectively, it is imperative that the voice of children is heard therefore, by asking students what they think or what might works against Juvenile issues, is a significant step which. Incorporating their opinions can lead to real-life impacts such as the development of constructive solutions. Nevertheless, one must keep in mind that this sort of learning rests heavily on emotions and feelings rather than direct education. Therefore, the contemporary theory of Narrative Role Playing has been generously adopted in *Shimpai Muyou*!, because educational role-playing has been widely acknowledged as a powerful instrument to change attitudes and behavior. We hope that educational role-playing modus operandi (featuring autonomous agents as social interaction partners) shall be an affective way, to create awareness among the Japanese students. *Shimpai*

Muyou! will portray actual *youth delinquency* scenarios, with the user watching and acting as an adviser engaged in offering moral & emotional support to the virtual victim [32, 28, 18, 16].

3. Mediating Empathy

According to McCollough, "*Moral imagination is the capacity to empathize with others, i.e., not just to feel for oneself, but to feel with and for others. This is something that education ought to cultivate and that citizens ought to bring to politics*"[12]. To achieve this goal, the software focuses on the issue of empathy as one crucial aspect of the affective engagement between the user and the characters. The term empathy has been derived from the German expression "Einfühlung" (feeling into something or somebody) [10, 11]. It has been defined as "*an observer reacting emotionally because he perceives that another is experiencing or about to experience an emotion*" [13]. Empathy may be educed by two diverse types of stimuli, converging from the emotional expression of the target (i.e. a person who smiles is happy, a person who frowns is sad) or from the condition or situation (i.e. a person who is beaten might be afraid, embarrassed or angry).

Fig.2 Mediating Empathy via Situation [14]

Interaction with computers can be lead human to feel empathy, and undergo a diverse set of emotional responses to the computer applications. Synthetic characters have become increasing prevalent as a way to establish communication between users and computers. A plethora of research suggests that synthetic characters have particular relevance to domains with flexible and emergent tasks where empathy and believability are crucial to the goal of the system [9]. It can be mediated, in the application, through situation (Fig.2), proximity (i.e., based on children's favorite cartoon characters (Fig.3), facial expression, and body gestures (Fig.4).

Fig.3 Mediating Empathy via gestures [14]

The perceived resemblance between the user and the character has been kept in mind while designing the Virtual learning environment. Secondly, the appraisal mechanism in *Shimpai Muyou*! Agent architecture will trigger emotions accordingly. Lastly, the Japanese favorite anime characters i.e. Nobita and Chibi Maruko will be used to perform the virtual drama in order to educe empathy in the user.

Fig.4 Mediating Empathy via favorite characters [14]

4. *Shimpai Muyou*! Innovative Intervention

We have been working on to create a VLE called "*Shimpai Muyou!*" in the sphere of juvenile delinquency problems. The software highlights a virtual school inhabited by virtual students furnished with an agent architecture which generates autonomous behavior [15]. These agents will engage in various youth delinquency issues e.g., violence, drug addiction and crimes with the user watching and acting as an advisor to the protagonist of the improvised dramas. The agent architecture has been schematized in a way that will allow diversity of characters in the system.

4.1 Aims & Objectives

The proposed ICT intervention focuses on the following issues:

- A 3D state of the art *Ijime*-bullying combat kit that shall make use of unscripted narrative, social memory believable synthetic characters.

- The exploration of various perspectives involved in youth delinquency by students in a safe and exciting interactive narrative environment.

- Present students with an opportunity to be face to face with virtual delinquency scenarios and try helping the victims.

- Determine whether the virtual edutainment environment influences student attitude towards violent behavior.

- Measure the degree of students' empathy towards the virtual victims of hostile behavior

- Incorporate the virtual learning environment as part of the Japanese school curricula.

4.2 The System Articulation

Episodic structure for *Shimpai Muyou*! has been chosen, primarily because such a field requires a narrative framework that involves different characters and events for different users rather than a pre-scripted plot [16]. It also addresses the need for narrative to emerge through interaction with the intelligent synthetic characters. In order to keep emotional distance and security for those who have been victims or intimidators of violence in the real world the users act out as spectators, this also offers an opportunity to intervene in the virtual youth violence which may pose the danger of creating a 3D violence game rather than educating children on the cognitive and affective level for the purpose to curb violent tendencies [18].

During the dramatic enactment, after being threatened the victim consults the user asking for support or advice on how to deal with this problem. The user being an unobservable friend of the victimized character advises appropriately. The structure of *ShimpaiMuyou*! is inspired from the Forum Theatre Approach developed by the Brazilian dramatist Augusto Boal [17]. In this form of drama, the spectators are split into groups, with each group taking responsibility for one of the characters in the drama. Between episodes of dramatic performance, each group meets the actor, who stays in role, and consults with them about what they should do subsequently in the drama, respecting the confines of their role and character (Fig.5). This structure of dramatic episodes divided by periods in which advice can be given to a character has been adopted for *Shimpai Muyou*! [18]. In accordance with our desire to dramatize the problem and also because other conventional performances offer limited interaction, we deemed it best to use theatre in our system. This interaction sequence in *Shimpai Muyou*! (Fig.6) between the user and the character focuses on encouraging the

empathic processes in the user as well as to provide an opportunity to understand the significance of juvenile delinquency and deviant behaviour.
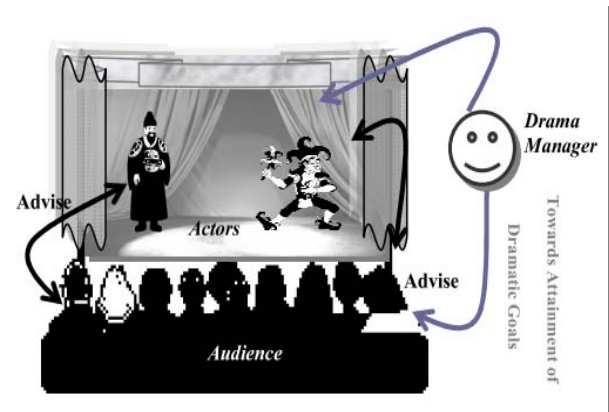

Fig.5 A simple representation of Boal's Approach

Shimpai Muyou! articulates juvenile violence in the form of an episodic virtual drama. Two different scenarios have been developed for *Shimpai Muyou*! prototype, a physical *Ijime* Scenario for boys (mainly because it often occurs among boys) and relational *Ijime* Scenario for girls (mainly due to the frequent occurrence amongst girls) each scenario consists of several episodes to create a believable and engaging narrative [16].
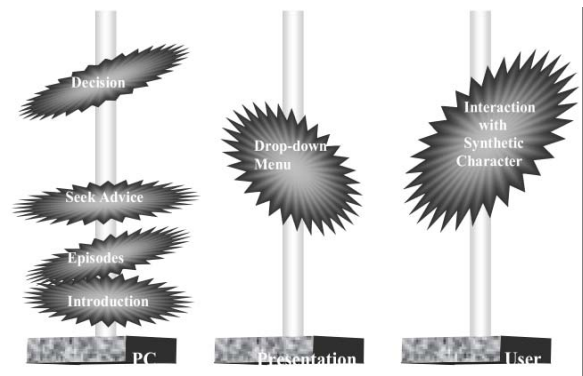

Fig.6 Interactive Sequence in *Shimpai Muyou*!

The user observes these *Ijime*-bullying incidents that take place between autonomous agents in a virtual school and acts as a friend or advisor to the victimized character in between episodes, offering guidance and advice about how to deal with the bullying incidents. Each episode is framed by an introduction segment at the start of the episode, and a reflective interactive segment at the end. The dialogue affects the behavior of the virtual victim in the following episode. However, there is a certain risk of matching the episodes to the narrative due to the fact that characters' behavior is activated by the agents themselves.

Therefore, an agent called Drama Manager (DM), as akin to Forum Theatre approach, has been created to facilitate the selection of episodes in a way that produces a coherently emergent story (Fig. 7).
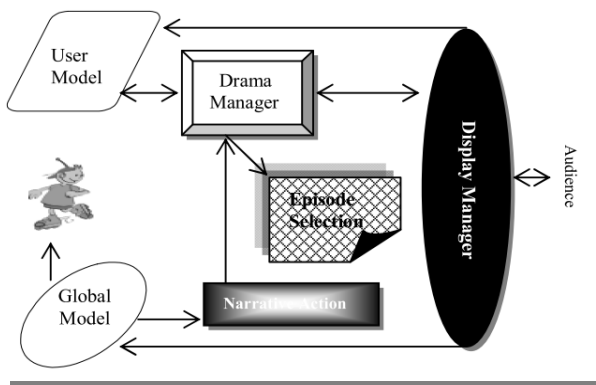

Fig.7 The General Architecture of the System

Shimpai Muyou! has been designed solely to be used in schools therefore, it includes educational messages albeit, it poses restrictions to autonomous and emergent nature of the narrative and the environment. The difficulty arises due to the fact that in the case of juvenile delinquency there is no magic-wand answer to the problem and the only response education experts agree on is avoiding the issue and without putting any effort will not improve a victim's state. Apart from educational deliberation, the congruity, in terms of location of an episode and the characters, is more important and this coherence has been provided by the DM. Its prime-function is to manage and make possible the unfolding of the narrative as well as retrieve and accumulate all interactions made to the user in log files. The DM has the prerogative of knowing whatever is going on in the NLE with an ability to intervene. The back & forth transactions between the agents and their Narrative Framework is invigilated by DM.
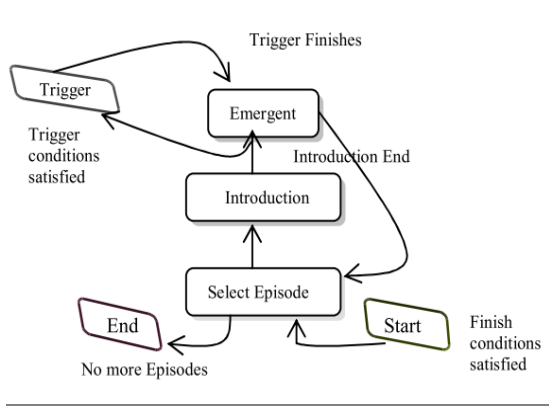

Fig.8 Various stages whilst running an episode

It also keeps track of all actions taken by the characters and the users. Choosing appropriate episodes is perhaps, the most important function of the DM (Fig.8). For this purpose, it carries out a sequencing algorithm during the filtration process. Hence, in the episode selection state-one, the DM after the Introduction Phase (typing in code, name, gender, intro of characters and schools) has to choose Conflict-oriented Episodes first, and then go for the Resolution Episodes (based on simple principle-- 'there's no solution if there is not a problem). As for instance, we want the child user to recommend the victim to 'ask help from your friend', the episode Make Friends must be ended prior to this advice. Thus, Resolution Episode shall be made accessible by the DM only if Make Friend episode has already been passed. In the state-two, the DM sifts the Contextual Information of an episode which are basically logical assumptions shaping the context of an episode. For instance, what type of episode is this? What's the location of the episode? What are the characters present in the episode & with what roles? Lastly, the ending condition of an episode is detected by the DM and proceeds towards displaying the Educational Message, if there are no more episodes left. After each condition is satisfied, the DM fires triggers. Nonetheless, the characters perform action autonomously and display suitable behaviors in accordance with the emergence of different situation thereby, allowing user to think over numerous perceptions on the delinquency and violence issues.

4.3 Similarity in *Shimpai Muyou*!

Focusing on the crucial issue that 'similarity between observer and target enhances empathy and helping behavior within the observer' [19], the characters will be envisaged as similar to the user primarily to inculcate empathic relations. Keeping this in mind, we have worked for a couple of weeks with thirty students randomly selected from different elementary schools of Oita Prefecture. Our objective was to include their views, expectations and perspectives within the design process of the software by using storyboards in classroom setting. The storyboarding exercise with the students helped the researchers to capture the stories and experiences that students tell about delinquency. Thereby, produce and appraise scenarios for a Virtual Edutainment Environment (VEE) inhabited by Intelligent Virtual Agents for exploring deviancy issue.

To generate *Ijime* (bullying) scenarios, we have applied a classroom-based approach that includes the use of comic-strips, short comic stories on the domain of *Ijime* (bullying), projectors, drawing boards and color pencils. The scenario generation is intended to explore children's understanding and experience of *Ijime* (bullying) and to

investigate children's own responses to this violent and aggressive behaviour in schools. These situations included a direct and a relational *Ijime* (bullying) scenario. Students took part in storyboard generation and evaluation. They were divided into six groups according to their school ranks. The Japanese *Manga* (comic books) were distributed among the children for reading and afterward they were told to express their experiences on the drawing boards (Fig.19). Responses were obtained through written questionnaires and Classroom Discussion Forums (CDFs).

The CDFs were developed to serve the purpose of extracting verbal feedback, applying the commonly used methods in schools i.e "Table Time" or "Circle Time" or "on the carpet" (entire class discussion). Storyboards were formed by six pairs of Japanese children over a forty five minutes period. Later, a CDF led by the researcher was held to gain feedback from each group on the subject of storyboarding exercise. Questions inquireD about reactions to the scenarios, character inclination, empathy, emotions and coping strategies. Focusing on pupils' after thoughts and reactions, towards the *Ijime*(bullying) scenarios and the characters, a twenty five minutes CDF, concluded the session (Fig. 9).

Fig.9 On the left children with their comic-strips and on the right they are participating in CDF.

4.3.1 Results

After the successful generation of the storyboards delineating *Ijime* (bullying) by the participants, they were content evaluated. Several design implications were concluded from the results. The stories collected were a reflection of the cognitive and social understanding of the *Ijime* (bullying) behaviour among children. In addition, the study enabled the researchers to observe, understand and derive ideas about the complex social behaviours and language capabilities for scenario development and the language system for *Shimpai Muyou!*. The participants stated that the exercise helped them to gain an insight about the serious nature of *Ijime* (bullying) in a profound way.

Gender emerged to be an important factor for the target age group (Fig.10). Substantial differences were seen for main character choice i.e which character you (the child) would prefer to be? The Japanese girls wished to be in place of the female victim character and the Japanese boys wanted to be the male victim character. The bully and assistant violent characters were the least preferred choices. It is noteworthy that the Japanese boys disliked the female bully characters. In contrast, some of the students of Hispanic and the American origin showed a strong preference for wanting to be a bully character rather than a victim character. Amazing results were revealed for empathic feelings where the Japanese children felt more empathy towards the victim characters as compared to the Hispanic and American children, who expressed more anger than empathy. The Japanese girls expressed more empathy towards the victim characters than boys and expressed displeasure towards the bully characters. The manifestation of empathy by the participants towards the victim characters is positive as it reveals that pupils are willingly engaging and immersing themselves into the *Ijime* (bullying) storyline. The outcome from this exercise facilitated in the development of personality and emotional modules of the agent.
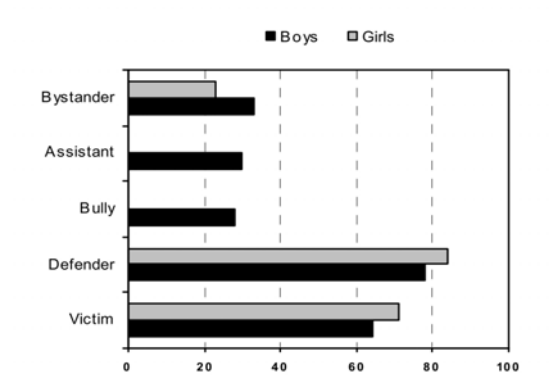

Fig.10 Gender Preference for Characters

In order to promote empathic relations linking the user and the character and engagement in scenarios with educational drive for boys may mean that same gendered scenarios are compulsory for *Shimpai Muyou!*. On the other hand, gender seems not to be an important consideration for Hispanic and American children. This has had a considerable impact on designing scenarios for our application motivating us to keep male characters in the physical *Ijime* (bullying) episode largely because it happens amongst boys. On the contrary, the inclusion of the female characters in the relational *Ijime* (bullying) episode was decided for the reason that it is a common occurrence among the girls. The *Shimpai Muyou!* storyboards are now same-gender generated with agents for the most part being of the same gender as the child (Fig.11).
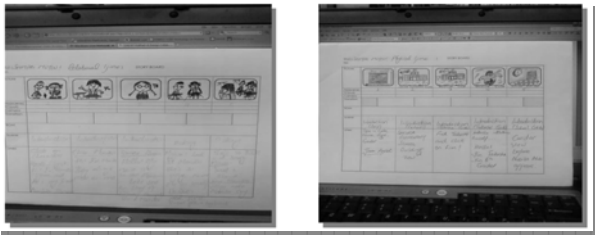
Fig. 11 On the left Shimpai Muyou! storyboard for boys (Physical Ijime) and on the right for girls (Relational Ijime)

The analysis of how to tackle *Ijime* (coping mechanism) by the Japanese and foreign children revealed differences with foreign children emphasizing on telling a friend or a teacher about *Ijime* (bullying). In contrast, the Japanese children avoided doing so, which is discouraging as it did not reflect the sign of 'a telling culture' in Japan and probably, one of the major reasons of enormous number of children suicides in Japan [20]. Through the CDFs exercise it is evident that the understanding of the physical *Ijime* (bullying) scenario was greater among boys and the comprehension of relational *Ijime* (bullying) was higher amongst girls. This was in conformity with the developmental and gender socialization theories that girls related to the relational *Ijime* (bullying) scenario the most and boys related more to the physical *Ijime* (bullying) scenario. From an educational point of view it is important that pupils understand the nature of both categories of *Ijime* (bullying) therefore design decisions have to be made in relation to the fact that girls interact more with relational *Ijime* (bullying) and boys interact more with physical scenarios. The information gathered from the CDFs greatly contributed to the formation of coping mechanism in the *Shimpai Muyou*! software on the domain of *Ijime* (bullying).

4.4 Modeling Empathic Synthetic characters

Technically, the property of *Shimpai Muyou*! empathic agent lies in that it is able to identify and internally represent other agents' emotions and/or experience an appropriate emotion as a consequence and, by its behavior and features, allow the users to build an empathic relation with it. 'A coherent character, which acts according to its personality, will be more believable' [21] as well as it has a greater probability of evoking empathy in the user as compared to a character that has no consistency in its emotions. According to Thomas and Johnston [18], animators from Disney, there are three important issues when expressing emotions: 1) the emotional state of the character must be clearly laid out , in such a way that is undoubtedly perceived by the viewer, 2) The consequences of the emotional state affecting the process of reasoning must be perceivably reflected in the actions

of the characters, and 3) emotions can be emphasized or accentuated, to clearly communicate to the viewer the emotional state of the character.
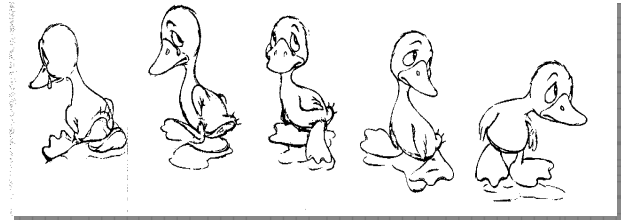

Fig.22. Emotion Vintage Points

To achieve this purpose, *Shimpai Muyou*! project team is focusing on the subject of mediating empathy by emotional expression. Therefore, emotion model must be able to appraise all situations that the character might come across and must be able to provide a structure for variables influencing the intensity of an emotion. Such an emotion model enables the character to show the right emotion with the right intensity at the right time, which is necessary for the convincingness of its emotional expressions [22]. In order to reasonably integrate emotions into the agent architecture we are using OCC model [23] which has established itself as the standard model for emotion-synthesis. Based on valence reactions to situations, this model describes twenty two emotions created either as being goal relevant events, as acts of an accountable agent, or as appealing or unappealing objects. The OCC model devises dynamic pursuit objectives and interest goals which are fed in a goal hierarchy using goal links (necessary, sufficient, facilitative, and inhibitory) that identify the relationships among goals. The character appraises the importance of its goals after a goal update phase, it evaluates aspects of objects, action of agents (regarding standards of behaviour), and the outcome of events. As a result of the evaluation, depending on a set of emotional thresholds and decay rates that are pre-set for different personality profiles, character's emotions are activated (Fig.13).

Negative Actions	Normal Actions
Slap / Aggression / Hot-temper	----
Punch / Aggression/ Hot-temper	----
Push / Aggression / Hot-temper	----
Swipe / Aggression/ Anxiety	Walk – Self-esteem, Shyness
Cry / Anxiety / Self-esteem	Run / Anxiety / Aggression
Mock / Aggression/ Shyness	Pick / Aggression

Fig.13. Association between Personality Traits and Actions

For the emotion to be activated the threshold for an emotional state has to be reached while the decay rate decides for how long the emotion will remain activated

before fading out (Fig.14). Then, the action selection mechanism that decides on which action will be performed, includes two stages: on the first stage, action is directly triggered by activated emotional states; the second stage is based on existing research on coping [24], discriminating problem-focused coping (planning to reach goals) from emotion-focused coping (changing the appraisal that produces the emotion). The currently most intense emotional state is associated with an intention that is selected and stored. Actions are performed accordingly using effectors. These actions are then transformed into graphical animations that are shown to the user as an episode of the system [18].

Shimpai Muyou! characters can be recognized by their functional roles i.e. a bully, a victim, a defender, an assistant and a bystander. Each role has been categorized by a pattern in the following personality attributes i.e. aggression, hot-temper, self-esteem, anxiety and shyness (Fig.15). The relationship between the characters can be either affable or aggressive. As for instance, bully and victim will always be hostile towards each other. On the other hand relationship between bully and assistant will be friendly.

Emotions	Gestures	Reference
Dread	Moving character's hand in front of its eyes	"Fear is associated with avoidance" --*Lazarus* [24]
Surprise	Inclining trunk slightly backwards and open character's arms backwards too	"Surprise is associated with attention and with a sudden event and inclination of trunk backwards" -- *Laban* [25]
Anger	To place its arms crosswise	"tendency to attack" -- *Lazarus* [24]
Nauseate	Squeezing it slightly	"Tendencies for disgust include "move away", nausea and even vomiting" --*Lazarus* [24]
Felicity	Putting it dancing	"Joy is portrayed with open arms, movements such as clapping or rhythmic movement" --*Darwin* [26]
Sadness	Bend down its neck or entire trunk	"Sadness is expressed through slow movement inwards and head down" --*Scherer* [27]

Fig.14. Patterns for Emotion Recognition

Traits	Bully	Victim	Assistant	Defender	Outsider
Aggression	High	Low	High	Low	Normal
Hot-temper	Normal	Low	Normal	Low	Normal
Self-esteem	High	Low	Normal	Normal	Normal
Shyness	Low	High	Low	Normal	Normal
Anxiety	Low	High	Low	Normal	Normal

Fig.15. Personality Traits of *Shimpai Muyou!* Characters

4.5 Engaging the User

Effective Virtual Edutainment Environments (VEEs) offer interfaces to the users which make them feel being in a different world. These VEEs are composed of entities called Intelligent Virtual Agents (IVAs) and by their actions the world changes, the story evolves and gives an illusion of life to the user [31]. Empathic engagement is the fostering of emotional involvement intending to create a coherent cognitive and emotional experience resulting in the development of empathic relations between the user and the character. Through empathic engagement the user perceives and models the emotion of the character experiencing an appropriate emotion as a consequence. Empathic engagement is realized through affective interaction, that is, interaction that relates to, arises from, or influences feelings and emotion [29]. Through empathically engaging the users, we can enable them to experience the character's emotions and problems in a distanced way, while at the same time being engaged in what happens to the characters [30].

In *Shimpai Muyou*! we give due consideration to the engagement between the interacting partners, focusing particularly on the affective and empathic aspects of this relationship. However, to create empathic engagement between the user and the character, the former needs to be in a position to engage with the problems faced by the virtual victims. The scenarios have been designed to plunge the user into newfangled territory containing sudden reversals of feeling, climax and anticlimax points, hope and hopelessness etc (Fig.16). We build our VR dramas to make the user's feelings as intense as possible so that they feel themselves in the environment in the real sense of the word, and present in a relationship of sorts.
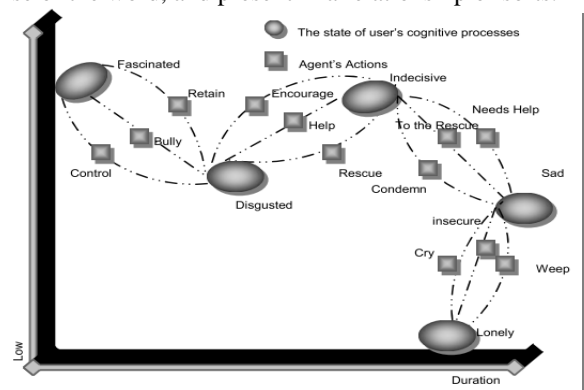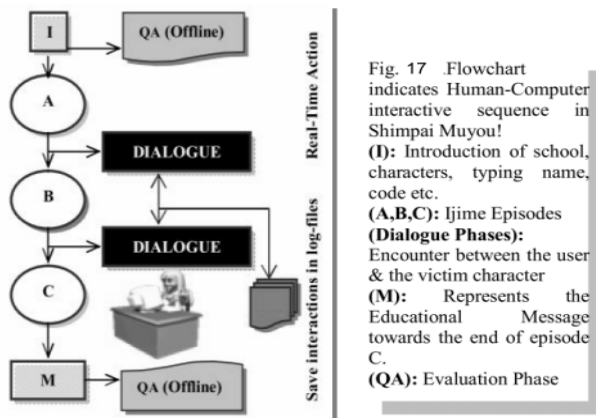

Fig.16. The Emotions substrate

After the introduction of the characters, school and situation, users view the first youth violence episode, followed by the victimized character seeking rescue, where it starts communicating with the child user [32]. Within the initiated dialogue the user selects an advice

from a list of coping strategies (shown as a drop down menu). The user also explains his selection and what he thinks will happen after having implemented the selected option, by typing it in. The next episode then starts. The content of the final episode depends on the choices made by the user concerning the coping strategies. At the end of the scenario, a universal educational message will be displayed (Fig.17). This message has to be incorporated as all teachers have strong preferences for children to finish the interaction with a positive feedback message.

Fig. 17 .Flowchart indicates Human-Computer interactive sequence in Shimpai Muyou!
(I): Introduction of school, characters, typing name, code etc.
(A,B,C): Ijime Episodes
(Dialogue Phases): Encounter between the user & the victim character
(M): Represents the Educational Message towards the end of episode C.
(QA): Evaluation Phase

4.6 Evaluation

The prototype will be evaluated in a school setting as well as in the laboratory to get children's and teachers' feedback regarding the character interactions; the design of the graphics; the design of AI responses; the animation of objects and characters. As children are the intended users of the application, it is important to incorporate their views, expectations and perspectives within the design process. Evaluation of the prototype shall be carried out intensively by applying both the Classroom Discussion Forum (CDF) technique and longitudinal & large-scale studies. Questionnaires shall be designed to assess general cognitive and affective empathy reactions. Two types of questionnaires, will be distributed among the participants:
I.   **Pre-test:** Prior to interaction with the software.
II.   **Post-test**: Post interaction with the software.

Conclusion

There is a clear need to support social and emotional learning in the classroom, providing children with strategies for citizenship and conflict resolution. The focal point of our study is to explore child's understanding and experience of delinquency and deviancy problems in Japan which are serious matters of concern to all of us. We do not believe that we have done enough to address this problem in the past that not only scars the life of the

Japanese children, but also indicates a serious weakness in our education system. Therefore, to identify children's support needs we intend to bring into play the synthetic characters with role-playing capabilities and unscripted narrative to investigate pupils own responses to this problem. To achieve this goal, we think the most effective means available to us in collecting child's viewpoint is by initiating an open dialogue between the user and the protagonist of our improvised role-playing drama on the domain of juvenile delinquency. The subsequent feedback will be useful for the policy makers, law enforcing agencies and civil society.

However, such a domain requires a narrative framework that involves different characters and incidents for different users rather than a pre-scripted plot. It also highlights the need for narrative to emerge through interaction with the intelligent synthetic characters. Herein lies a tension between narrativity and interactivity albeit, the tension between storytelling and interactivity is a well-established fact [16]. In order to ease this tension that often arises between the Script-Writers/Designers and programmers, Boal's Forum Theatre Approach [17] provides us with a common platform where narrativity and interactivity can grow together. Furthermore, creating affectively engaging educational software; assessed through longitudinal and large-scale studies investigating the long-term pedagogical impact; engagement, usefulness, and satisfaction for the desired end user-groups would have potentially large-scale effects, not only on the learning experience, but also on e-learning providers, who would be able to use the affective loop as the basis for wholly novel products and systems [18]. The dissemination of results from this proposed intervention mechanism will determine approaches to effectively counteract youth delinquency, support conflict resolution and potentially improving the quality of life in schools.

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