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Virtual Role-Play in the Classroom – Experiences with FearNot!

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Abstract: FearNot! is a novel software application aimed at the age-group of 8-12 year old students with the aim to influence their attitude towards and knowledge about bullying. It is a virtual learning environment for social and emotional learning that allows for individual interaction with synthetic autonomous characters that engage in bullying and ask the learner for help and advice in order to escape victimisation. FearNot! uses an emergent narrative approach that generates stories through the interaction of the learner with the autonomous characters, a highly innovative and believable way to create engaging stories and evoke emotional learning in the user. Whether learning in the virtual environment transfers to real-world attitudes and behaviour about bullying is currently investigated in a comprehensive evaluation study, both in the UK and in Germany.

1. Introduction

The EU funded project eCIRCUS aims at applying educational role-play to social, personal and emotional learning for children and teenagers. This paper focuses on FearNot!, a virtual role-play approach with autonomous agents as social interaction partners in scenarios related to exploring coping strategies for bullying.

In FearNot! children are provided with the opportunity to explore a virtual school environment populated by 3D animated synthetic characters participating in an improvised

drama. The children watch the characters engage in bullying episodes and then interact with the victimised characters in order to help them with advice. By empathising with the virtual bullying victim, students become affectively engaged in the role-play and can thus be motivated to become active to stand up against bullying in the real world.

2. Objectives

FearNot!'s novel and highly innovative pedagogical approach to fight bullying in schools builds on the immersive power of virtual role-play. In this paper we will discuss the pedagogical use of virtual role-play, considering the benefits as compared to real-life role-play interventions and the technological challenges.

The domain that we are addressing with FearNot! is bullying: 10-15% of students all over Europe (and in other parts of the world) suffer from being bullied in school [1]. These students are repeatedly victims to behaviours like cruel teasing, social exclusion, physical aggression or thefts and, as a consequence, face long-term effects such as academic regression, social anxiety, somatic and psychiatric symptoms [2]. Our pedagogical goals in eCIRCUS are to enhance children's ability to empathise with the synthetic characters in a virtual bullying scenario and to improve their knowledge about ways of fighting bullying and helping victims. Hence, we will present how FearNot! can be used in primary schools in the UK and Germany and will report some early evaluation results.

3. Methodology

Educational role-play is widely accepted as a powerful instrument to change attitudes and behaviour, by facilitating the ability to take over someone else's perspective (in a holistic sense, integrating thought, feelings, and behaviour) [3]. Through the process of role-taking, students learn how others think and feel in a social situation. With FearNot!, we aim at reconciling the didactical approach of real-world role-play with a more private and less emotionally sensitive (in terms of stigmatisation and further isolation) virtual environment for social and emotional learning. By interacting with the victimised virtual character, we hope to prompt empathic reactions within the child user. Empathy refers to the understanding of the victim's plight as well as experiencing the social and emotional effects of bullying on victims. Apart from the empathic reaction to the victimised character, FearNot! prompts reflection on a variety of coping strategies that the learner can suggest to the character in order to help him or her. If the learner runs out of ideas, the systems will provide further coping strategies through the interaction with the characters. Hence, FearNot! fosters empathic reactions in the child users in order to make them *want* to do something against bullying, and aims at enhancing their knowledge about coping possibilities in order to make them *able* to do something against it.

FearNot! is structured in episodes and interaction sequences. The episodes show bullying incidents between virtual characters in a virtual school, with the learner acting as a spectator. In between the episodes, students engage in a conversation with the victimised character, acting as advisor and friend by suggesting coping strategies. The learner experiences vicariously the situation of the victimised characters including its thoughts and feelings and can influence the storyline in order to help the victim, as the advice given to the victimised character affects its mental state (personality, emotional state, goals etc.) and thus ultimately the victimised character's actions in the next episode.

Role-play can be a powerful instrument to change attitudes and behaviour, if the precondition of immersion is met. In FearNot!, immersion is achieved through character design including the modelling of the agents' minds as well as the narrative structure of the learning experience.

4. Technology Description

As described above, FearNot!'s pedagogical goals are to alter the attitude towards and the knowledge about bullying among primary school students by prompting them to empathise with victims and by providing them with coping strategies to help victims. A core precondition for the child to be able to develop an empathic relationship with the characters is the believability of the characters as well as of their experiences. This believability relates to storylines and drama, which have been continuously evaluated with the target group during the development of FearNot!. But believability also results from the design of the characters, both from their appearances as well as from their reactions and behaviour.

Regarding the issue of appearance, a near-realistic appearance can become a problem for the believability of characters, a paradox, that has been previously named "uncanny valley" [4]; the FearNot! characters and environment are thus cartoon-style, a design decision that has been backed up by the target group's preferences [5].

As far as the issue of reactions and behaviour is concerned, the FearNot! characters are autonomous in the sense that they perceive information from and flexibly react to the virtual environment and other characters as well as the interaction with the learner. To enable agents to do this, each agent has a mind, an emotion-driven architecture named FAtiMA [6] that is based on the cognitive appraisal theory [7] and on findings from research on coping [8]. Characters in FearNot! can perceive all relevant objects, events, and other agents that exist in the virtual environment and appraise them regarding their significance for their emotional state. They then build an internal goal hierarchy and appraise the goals' importance in relation to the current state of the environment. The appraisal processes are influenced by former experiences of the agent and result in an emotional state and action tendencies. Additionally, characters in FearNot! are designed to be more believable than pre-programmed characters (as they have often been used e.g. in many commercial games) since they select their actions autonomously within episodes (see figure 1). Thus, the resulting story has emergent properties, which creates more varied and thus more interesting, and 'life-like' user experiences.

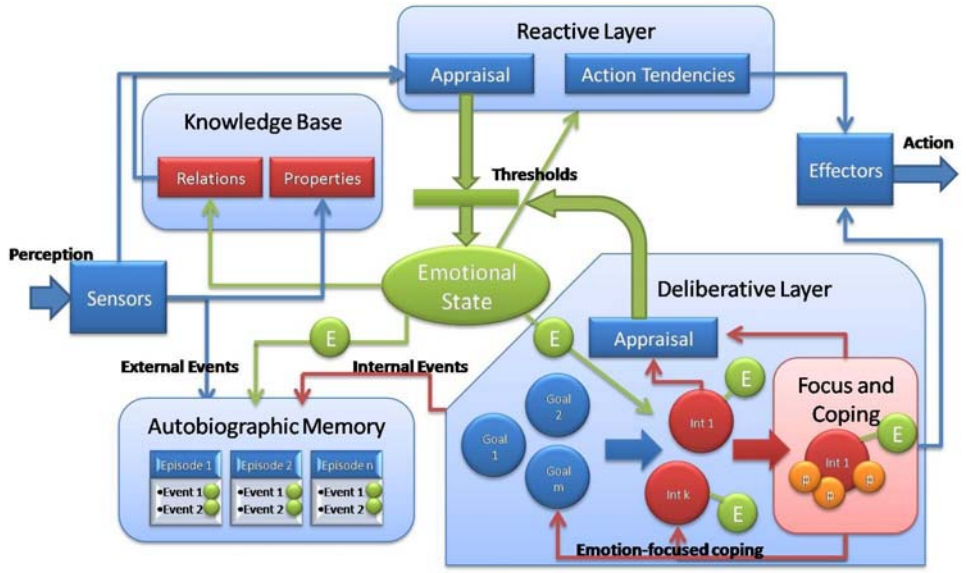

Figure 1: The FAtiMA agent architecture.

Characters are also equipped with an autobiographic memory [9], which gives them the possibility to refer to incidents from past interactions with the child user. In sum, the agent architecture allows for episodes to emerge from interaction between the characters, producing an emergent narrative [10]. In order to engage learners emotionally with the situation of victims of bullying, they are given a certain amount of control over the

narrative by interacting with the victimised character, influencing its decisions in the bullying episodes to come. While the development of the narrative is basically driven by actions of the autonomous agents, the combination with the learner's impact on the story results in a highly believable experience for the learner. A narrative facilitator agent controls the characters and locations of an episode and the succession of the episodes to ensure that the learning experience is coherent.

5. Preliminary Results

In this paper, we shall be focusing on those results that relate to the impact of role-play and children's willingness to engage with the characters in FearNot! Earlier results from one-off 20 minutes interactions with FearNot! indicated that in the short term children are not only willing to immerse themselves in the virtual drama, but that they also empathically engage with the characters; they attribute a range of emotions to the characters depending on the events that happen within the respective scenario. Furthermore, the characters are regarded as believable: Hall et al. [5] found that the perceived believability of the conversation with the character is associated with feelings towards the character, i.e. children who felt sorry for the characters rated the conversation as more believable and interesting than children who did not feel sorry, whereas children who felt anger towards the characters rated the conversation as less believable and interesting than children who did not feel angry.

Recent results from Classroom Discussion Forums held as part of the FearNot! evaluation have identified that over a several day time frame, interacting regularly with FearNot!, children become and remain immersed in the world of FearNot! and with the characters who inhabit it. The children do care about and clearly believe in the characters, not only in a single interaction but also over several separated interactions. Achieving this empathic response is a result of immersive role-play for the child.

FearNot! is being currently evaluated with 1180 learners (646 in the UK and 534 in Germany) in terms of whether the software is appropriate for the classroom situation and if it is really able to change victimisation within classrooms. The evaluation study employs a quasi-experimental design with control groups, pre- and post-tests and follow-ups. Initial results from the ongoing evaluation study strongly support the earlier findings reported above. These results regard ratings of the software that were provided as a part of a standardised questionnaire (Character Evaluation Questionnaire, CEQ) and were filled in after the children's third interaction session with FearNot! in three consecutive weeks. Boys rated the episodes featuring male characters; girls rated the "female" episodes.

Analyses of a German subsample of 230 children (age range: 7-10 years; M=8.44; SD=0.56), 122 (or 53%) of them being male, indicate that children enjoy interacting with FearNot!, that they react emotionally to the situation of the victimised character as well as to the bullying behaviour depicted by the perpetrators: 57.1% of the children answered that they had "fun" interacting with FearNot!, additional 23.2% stated they had "rather fun" (on a five-point scale from "fun" to "boring"). Among the male characters (victimised character, bully, assistant to the bully, and two defenders), boys liked the victimised character Jonas best (58.1%) and stated that it would be him they wanted to be friends with (53.0%); when asked who they would want to be if they could choose one of the characters, boys picked Jonas, the victim (37.9%) and Robin, one of the defenders (24.1%). 55.1 % of the boys would vote Lukas, the bully, out, if they could.

For the girls who indicated their preferences among the female characters of another episode with similar roles, 74.0% liked Franziska, the victim, most and 67.0% of them would want to be her friend. They also identified either with Franziska (39.4%) or with Marie, one of the defenders (37.6%) and would vote the bully Jessica out (55.3%). Results are depicted in more detail in table 1.

Table 1: Preferences for and identification with characters in FearNot!

Which character do you like most?		Which character do you like least?		Which character do you like to be friends with?		If you could vote a character out, who would it be?		If you could choose to be one of the characters, which one would you be?		Role
Boys										
68	**58.1 %**	4	3.4%	62	**53.0%**	23	19.5%	44	**37.9%**	V
8	6.8%	96	81.4%	13	11.1%	65	**55.1%**	13	11.2%	B
16	13.7%	4	3.4%	15	12.8%	11	9.3%	20	17.2%	D
20	17.1%	5	4.3%	23	19.7%	11	9.3%	28	**24.1%**	D
5	4.3%	9	7.6%	4	3.4%	8	6.8%	11	9.5%	BA
Girls										
80	**74.0%**	1	0.9%	69	**67.0%**	22	21.4%	43	**39.4%**	V
2	1.9%	90	84.1%	4	3.9%	57	**55.3%**	10	9.2%	B
18	16.7%	0	0	20	19.4%	5	4.9%	41	**37.6%**	D
2	1.9%	6	5.6%	3	2.9%	5	4.9%	4	3.7%	BA
1	0.9%	10	9.3%	1	1.0%	8	7.8%	6	5.5%	BA
5	4.6%	0	0	6	5.8%	6	5.8%	5	4.6%	D

V = victimised character; B = bully; D = defender, helps the victim; BA = assistant to the bully

Table 2: Perceived similarity to characters in FearNot!

Which character looks most like you?		Which character looks least like you?		Which character behaves most like you?		Which character behaves least like you?		Which character did you feel sorry for?		Which character did you feel angry with?		Role
Boys												
23	**22.3%**	38	37.3%	37	**33.6%**	18	15.5%	100	**87.0%**	6	5.3%	V
12	11.7%	20	19.6%	15	13.6%	78	67.2%	8	7.0%	92	**80.7%**	B
6	5.8%	35	34.3%	25	22.7%	7	6.0%	6	5.2%	3	2.6%	D
49	**47.6%**	6	5.9%	28	**25.5%**	6	5.2%	0	0	3	2.6%	D
13	12.6%	3	2.9%	5	4.5%	7	6.0%	1	0.9%	10	8.8%	BA
Girls												
15	17.2%	32	**32.0%**	52	**53.6%**	10	9.6%	103	**95.4%**	5	4.7%	V
20	**23.0%**	32	**32.0%**	5	5.2%	75	**72.1%**	2	1.9%	89	**84.0%**	B
28	**32.2%**	9	9.0%	31	**32.0%**	2	1.9%	1	0.9%	1	0.9%	D
2	2.3%	9	9.0%	4	4.1%	6	5.8%	1	0.9%	5	4.7%	BA
8	9.2%	15	15.0%	2	2.1%	10	9.6%	1	0.9%	5	4.7%	BA
14	16.1%	3	3.0%	3	3.1%	1	1.0%	0	0	1	0.9%	D

V = victimised character; B = bully; D = defender, helps the victim; BA = assistant to the bully

Regarding the perceived similarity between the child and the FearNot! characters, the largest group of boys felt similar to Jonas (victim) and Robin (defender), both in terms of appearance as well as in terms of behaviour; accordingly, boys felt sorry for the victimised character (87.0%). 80.7% of the male pupils in the sample also reported to feel angry with the bully. The girls again rated their perceived similarity with and emotional reactions towards the female characters in FearNot!. 95.4% of the girls felt sorry for the victimised character, and 84.0% of them reported feelings of anger with the bully. Concerning perceived similarity in appearance, girls show more variation among the characters, but more than half of them (53.6%) think that the victimised character is most like them in

terms of behaviour whereas 72.1% report that the bully is least like them, also in terms of behaviour (for a detailed overview see table 2).

As far as the content and story of FearNot! are concerned, the German subsample deemed it overall interesting and neither too long nor too short (see table 3). They further experienced the interaction with the victimised character as effective and felt they could help a lot to improve the victim's situation (again, see table 3).

Table 3: Ratings on the FearNot! story

Item	Min = 1	Max = 5	M	SD	N
Did you find what the characters talked about…	interesting	boring	1.99	1.16	228
What do you think about the story?	too short	too long	3.03	1.28	227
After talking with [victimised character's name], did you feel that…	they followed your advice	they paid no attention to your advice	2.07	1.17	230
After talking with [victimised character's name], did you feel that…	you helped them a lot	you didn't help them at all	1.72	0.97	229

6. Business Benefits

Regarding the ongoing analysis of the data collected within the comprehensive evaluation of FearNot! outlined above, we hope that the FearNot! application will reduce victimisation and improve knowledge about bullying and about the most effective coping strategies. Assuming that FearNot! is successful in its aims, the e-CIRCUS project team hopes to make it available to the public for educational purposes.

The preliminary evaluation results quoted above indicate that an empathic relationship can be created between a believable graphical character and a human user. This is a significant generic result with possible application well outside this particular system. It can be seen as an important component of any software being used for a persuasive purpose, in which changes in attitude and behaviour rather than only in knowledge are desired. A possible business benefit lies in extending the approach of FearNot! into other domains with adult users, for example in workplace-based courses covering topics such as harassment or gender and race awareness. Health education, in which motivating behaviour change is usually the ultimate objective, is another possible application domain.

There has also been a great deal of interest in FearNot! itself from countries outside of the UK and Germany, in which the more comprehensive evaluation referred to has just taken place. Enquiries have been received from Sweden, Denmark, Italy, the US and the Netherlands amongst others. While the project team does not itself have the resources to implement versions of FearNot! in other countries, there is clearly a demand from educationalists which could produce business benefits to a company that was able to take on this extra development work.

Finally, the FAtiMA agent architecture and the improvising characters that it supports might easily form the basis for much more flexible and versatile graphical characters in computer games, whether console-based and used individually or distributed and used by many hundreds of thousands of users as for example World of Warcraft. Companies that take this type of architecture on board would be able to produce improved products and indeed totally new game genres with a much more engaging narrative content than is currently the case.

7. Conclusions

The main challenge of the approach depicted in this paper is to reconcile the immersiveness and realism of virtual environments as learning spaces. As ongoing and comprehensive evaluation efforts indicate, FearNot! succeeds in engaging children empathically with autonomous characters involved in bullying. Whether this immersion leads to changes in attitudes and behaviour in real bullying incidents is currently investigated in an ongoing evaluation study.

Lessons learned during the development of FearNot! tackle two areas, one relating to the technical equipment in schools, the other relating to the importance of believability of and empathy towards agents:

As far as technical considerations are concerned, the most important aspect is to ensure that the application is running stable on school computers. Due to the fact that software developers usually do not have access to the school computers during software development, they are not aware of the technical limitations attached to these machines. E.g., primary schools tend to purchase lower specification computers because they simply do not need highly powerful machines to meet their basic requirements (e.g. regarding graphic cards, processors, RAM, etc.). Another issue is caused by large variability among the technical equipment, as well as management of administration rights, between different primary schools found both within and between the UK and Germany. This means that educational software for use in primary school classrooms needs to be very flexible and stable in order to run on many different systems. In sum, it is recommended that software developers do not only undertake a thorough survey of the equipment available in the schools they are aiming at, but also to use machines for their development work that are comparable to those available to schools [11].

Another lesson learned regards the engagement of the user in the virtual learning environment. While a nice and appealing appearance of the characters seems not necessary to keep a user's attention [12, 13], believability of the characters seems to be the key consideration when designing a virtual learning environment. Realistic appearance of agents is one approach to believability, which is linked to the danger of the 'uncanny valley' [4]. Autonomy is another way to enhance believability of characters; here, the difficulties lie in the dynamic real-time generation and coordination of verbal and non-verbal expressions and actions, in particular when it comes to emotional expressions. "Even if an agent is able to effectively communicate it's emotions to the user, that agent must also maintain coherence between its emotions and behaviour – an unpredictable character that lacks temporal and/or cross-situational consistency will not be believable" [11].

The believability of the characters and their ability to express emotions is particularly important for applications that aim at facilitating an empathic reaction in the user. This empathic reaction is substantially influenced by the perceived similarity between user and agent [14]. Hence, it seems plausible that different user groups react differently to the FearNot! characters: a small-scale evaluation of FearNot! with children, teachers, and AI experts showed that children responded more positively towards a number of aspects of the software than did teachers or experts, and were also therefore more likely to express empathic reactions [15]. Different users will therefore require different agents in order to empathise with them. It is thus recommended to continuously involve users in the design of characters for virtual learning environments, using a variety of methodologies like design walls, photo-elicitation, mood boards, and focus groups/discussions in different phases of a virtual learning environment's implementation [11].

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