FearNot! An Anti-Bullying Intervention: Evaluation of an Interactive Virtual Learning Environment

Scott Watson[1], Natalie Vannini[2], Megan Davis[1] , Sarah Woods[3], Marc Hall[4],
Lynne Hall[4]   and   Kerstin Dautenhahn[1]

Abstract. The eCIRCUS (Education through Characters with Interactive Role-playing Capabilities that Understand Social interaction) project aims to develop an anti-bullying software, FearNot!, and evaluate its effectiveness in the classroom. This paper presents findings from two evaluations conducted during the 2006 National I-Power-I Anti-bullying Conference for Young People. Participants interacted with FearNot! v.1 (*scripted* version) and then either completed a short questionnaire (in Study 1) or took part in focus groups (in Study 2) evaluating the difference between two versions of FearNot! (*scripted* versus *unscripted*). Overall the results suggest that perfect graphics are not necessary for users to engage empathically with autonomous agents, and that the virtual characters did evoke emotional reactions. It is concluded that development of the FearNot! demonstrator is progressing well and that FearNot! will be a useful and engaging intervention against bullying in primary schools.

1   INTRODUCTION

1.1   Bullying in Primary Schools

Defining bullying and victimisation behaviour is difficult due to its complicated nature. However, a common definition states that "a student is being bullied or victimised when he or she is exposed repeatedly and over time to negative action on the part of one or more other students" [1]. Furthermore, most bullying behaviour can be grouped into one of three categories [2]:

- direct physical bullying - e.g. pushing, hitting, kicking, and stealing belongings.
- direct verbal bullying - e.g. name calling, teasing, and threatening.
- indirect (or relational) bullying - e.g. social exclusion, rumour spreading, withdrawal of friendships.

In the same way that bullying styles can be categorised, the roles taken on by children involved in acts of victimisation can also be categorised. The most significant roles are: the 'pure' bully, the 'pure'

victim, the bully-victim (someone who bullies others and is bullied themselves), the bully-assistant, the bystander/neutral, and the defender (of the victim) [3], [4].

While studies report varying prevalence rates, bullying is acknowledged as a cross-cultural problem which can affect between 8% to 46% of primary age school children [5]. Bullying is a serious issue as victims can continue to show psychological problems (e.g. anxiety, depression) even after the bullying has ceased. In extreme cases victimisation can lead to psychiatric referral [6] or even suicide [7].

1.2   Current Bullying Interventions

Having examined the extent of bullying, many studies have attempted to demonstrate effective interventions against victimisation. Due to the complex interaction between bullying styles, coupled with the different roles that children may take, there is a large number of interventions that have been proposed. These include approaches which emphasise the role of the bully individually, the role of bully and victim together, and even whole schools [3].

Smith & Madsen (1997)[8] found that one third of schools in the UK have a specific anti-bullying policy, but Woods & Wolke (2003)[9] have shown that these measures are often ineffective against direct bullying, and can even lead to an increase in relational victimisation. As a result, Woods & Wolke (2003)[9] suggest that "individualised strategies may help to take the differential needs of bullying roles into account". Unfortunately, there currently appears to be few or no interventions which provide such individual education about anti-bullying coping strategies directly to children involved.

1.3   FearNot! as an Innovative Intervention

One potential medium for providing cheap, safe, and individual advice on coping with bullying could be a Virtual Learning Environment (VLE) which is populated by Intelligent Virtual Agents (IVAs).

FearNot! (Fun with Empathic Agents Reaching Novel Outcomes in Teaching) is such an application. FearNot! provides 8-11 year old children with the opportunity to visit a virtual school environment complete with characters representing the most significant roles in bullying (bullies, victims, assistants, bystanders, and defenders), locales (playground, classroom, library, and local streets), and scenarios (direct and indirect victimisation) that are commonplace in real-life bullying incidences. Characters in FearNot! are autonomous agents capable of making their own decisions and acting out their

[1] School of Computer Science, Adaptive Systems Research Group, University of Hertfordshire, College Lane, Hatfield, Hertfordshire, AL10 9AB, UK. email: {s.e.j.watson, m.davis, k.dautenhahn}@herts.ac.uk
[2] Department of Pedagogical Psychology, Psychology Institute, Julius-Maximilians-University of Würzburg, Germany. email: natalie.vannini@psychologie.uni-wuerzburg.de
[3] School of Psychology, University of Hertfordshire, College Lane, Hatfield, Hertfordshire, AL10 9AB, UK. email: s.n.woods@herts.ac.uk
[4] AMAP, Edinburgh Building, University of Sunderland, Sunderland, SR1 3SD, UK. email: marc.hall@sunderland.ac.uk
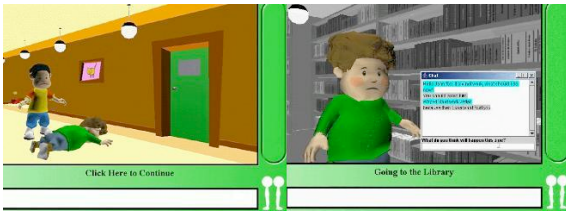
Figure 1. FearNot! v.1 Bullying and Interaction Episodes

own behaviours, thus leading to an emergent narrative as the storyline progresses [10]. Children interact with FearNot! on an individual basis by witnessing an emergent bullying episode, and then 'talking to' the victim character in order to advise them how best to cope in the following episode. The fundamental idea behind the FearNot! application is to allow children to try out various coping strategies without being directly involved themselves - the usefulness of a coping strategy can be learned safely and vicariously through the victim character's experiences. In this way the user takes on the role of an invisible 'peer buddy', or friend, to the victim character. Support for this kind of approach - learning through activity and play in virtual environments is privided by Roussou (2004) [11].

The eventual aim is for FearNot! to be voluntarily adopted by primary schools as an addition to the UK's existing Key Stage 2 Personal and Social Health Education (PSHE) curriculum. A German language version of FearNot! is also in development. The FearNot! prototype designed and evaluated during a preceeding EU Framework 5 project, VICTEC (Virtual ICT with Empathic Characters), was well accepted and reported e.g. [12]. Under the eCIRCUS project, though, FearNot! continues to be developed further - with an updated version made available for initial testing in 2006.

1.4 FearNot! Versions and Specifications

1.4.1 FearNot! v.1

FearNot! v.1 is an applet which runs within a webpage with the Wild-Tangent(WT) Plugin(R). As a showcase demonstration, this version comprises three consecutive, *scripted* male bullying episodes with an interaction episode between each. During interaction, coping strategies can only be suggested to the victim character by means of a drop down menu. Follow-up questions are answered through free text (typed) input. The suggested coping strategy has no impact on events in a following episode. Once the three male episodes are completed three female episodes are also available.

1.4.2 FearNot! v.1.5

FearNot! v.1.5 is an intermediary version of FearNot! which improves on v.1, but is still in final development. This version is also an applet which runs within a webpage with the WildTangent(WT) Plugin(R), but boasts a number of improvements including new graphical and language specifications. The graphical design of the characters was changed so that they all wear the same school uniform instead of their own clothes, which improves validity for the UK where most primary schools require their students to wear a uniform. The language was also updated to include more colloquialisms and more valid dialect that is used by children within the target age group. A

drop-down menu has been replaced by free text input during interactions, which now allows children to input their own ideas instead of forcing them to select from pre-set options. Open dialogue is a valuable research tool for understanding what children know about how to cope with bullying. Finally, the virtual characters are now able to act upon advice given by the user during an interaction episode, giving rise to an *unscripted* and *emergent* nature for the bullying episode. This version allows for a greater range of different user experiences. Only male episodes are available in this version.

1.5 The Current Study

While FearNot! v.1 was extensively investigated during the VICTEC project, the development to v.1.5 has not yet been evaluated. With the eCIRCUS project aiming to place FearNot! into schools for longitudinal investigation in 2007, it is imperative to ensure that the final version is ecologically valid - that the characters are believable and engaging, that the episode storylines are understandable and true-to-life, and that the overall user experience is fun and educational. This study aims to seek initial feedback about improvements to FearNot! made since the VICTEC project, and serves to demonstrate that FearNot! is still an innovative approach to a continuing problem.

In this paper we present findings from two studies conducted during the National I-Power-I Anti-bullying Conference for Young People held during November 2006 in Weston-Super-Mare, UK. While this setting may seem uncontrolled at first, one advantage of this approach is that it yields greater ecological validity since FearNot! is designed to be used in an unconstrained classroom environment. It also allows for an excellent cross-section of participants from schools across the UK which can differ in terms of achievement and socio-economic status. Study 1 evaluates user's perception of FearNot! v.1, while Study 2 investigates user's preference of the similarities and differences between FearNot! v.1 and v.1.5. Sections 2 and 3 of this paper present the methods and results of these studies respectively, while Section 4 provides an overall discussion of both studies and describes future directions for FearNot! and the eCIRCUS project.

2 Study 1

2.1 Method

In total 54 participants returned questionnaires. Of these 35 were male, and 18 were female (1 missing data point) with 14 respondents in primary school, 33 in secondary school, and 5 adults (2 data points missing). While the majority of participants stated that they were in secondary school, the investigators observed that these children were young enough to be comparable to FearNot!'s target age group.

Throughout the conference, laptops were used to simultaneously run four different instances of FearNot! v.1 at a stand accessible to all conference delegates. Respondents interacted freely and individually with FearNot!, but investigators were on-hand to answer questions and offer advice if necessary. Each interaction lasted approximately 15 minutes - long enough for participants to play fully through 3 related episodes. Once their interaction had ended, participants were asked to complete a short questionnaire and return it to one of the investigators.

The questionnaire used was adapted from the VICTEC project's Character Evaluation Questionnaire (CEQ). This questionnaire asked about six items of interest:

- Most likeable character

- Least likeable character
- Character graphic design (5-point Likert scale from 'Strange' to 'Good')
- Which character looked best/which character looked strangest
- Storyline believability (5-point Likert scale from 'Unbelievable' to 'Believable')
- Estimated usefulness of FearNot! in Primary Schools (5-point Likert scale from 'Not Useful' to 'Useful')

2.2 Results

2.2.1 Likeability of FearNot! Characters

The most likeable character was John - the male victim, while the least likeable character was Luke - the male bully. This pattern is also repeated for the female characters where Frances (the victim) is the most likeable character, and Sarah and Janet (the bullies) are liked the least (Figures 2 and 3). This suggests that the characters are evoking the kind of empathic reactions that they were designed to evoke.
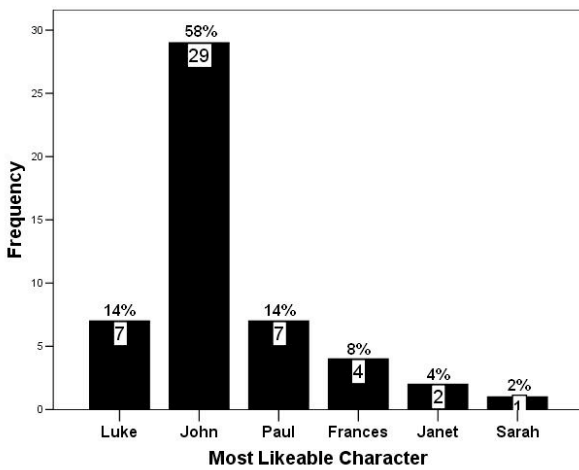
Figure 3. Least Liked FearNot! v.1 Characters (n=48)

Figure 2. Most Liked FearNot! v.1 Characters (n=50)

Figure 4. Best Looking FearNot! v.1 Characters (n=45)

Although it appears that the male characters are generally more well liked than the female characters this may be due to the simple explanation that more participants interacted with, and therefore gave more ratings of, the male episodes than female episodes. This explanation is upheld by the fact that the male characters receive more ratings on both the most likeable *and* least likeable scales.

2.2.2 Graphical Design of FearNot! Characters

With regards to the graphical presentation of the characters, Luke and John were jointly rated as the best looking designs, while John was also rated as the strangest character in appearance. From the female characters Frances and Janet were rated as the best looking designs, with Frances also rated as the strangest (Figures 4 and 5). This pattern (that the same characters were chosen as demonstrating both the best and strangest design) could be explained by the fact that these characters are the main protagonists in the story, and so have the greatest on-screen time. Another cause, however, could be due to the phraseology of the questionnaire which asked participants to nominate the 'best looking' and 'strangest looking' characters. It
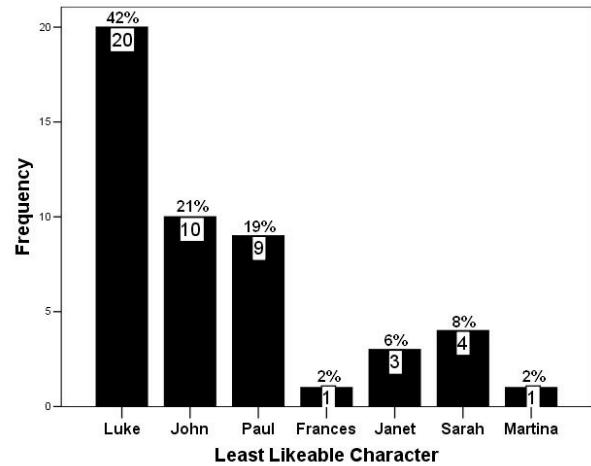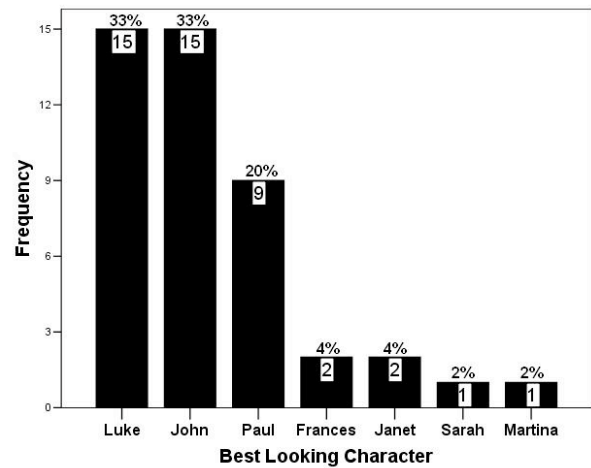
is possible that characters which ranked highly on both questions were thought to have been drawn well, but that the actual design was disliked - e.g. John is portrayed as slightly over-weight, and Frances wears glasses; both of which can be used to tease victims of bullying.

2.2.3 Overall Impressions of FearNot!

While it is necessary to look at the characters in isolation, it is also of the utmost importance to evaluate the user's general impression of FearNot! The current sample rated the overall graphical presentation as above average, with high ratings for storyline believability and usefulness in primary schools (Figure 6). Taken together, these findings are positively in favour of the validity and realism of the FearNot! episodes, and also show that the application has great educational potential . Given that the target age group comprised only a small proportion of the overall sample, the final analysis was re-run using data from just the primary school age participants. The results from this sub-set are quite similar to those of the whole sample. The
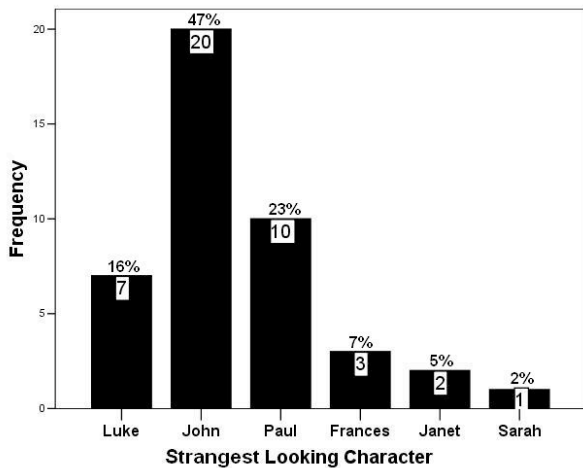
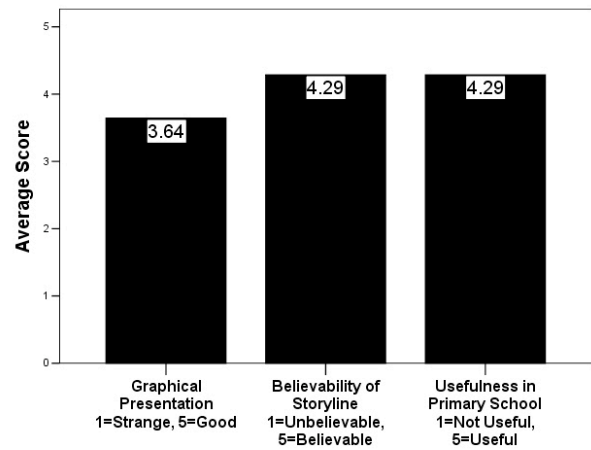**Figure 5.** Strangest Looking FearNot! v.1 Characters (n=43)

Figure 7. Primary School Children's Overall Impression of FearNot! v.1 (n=14)
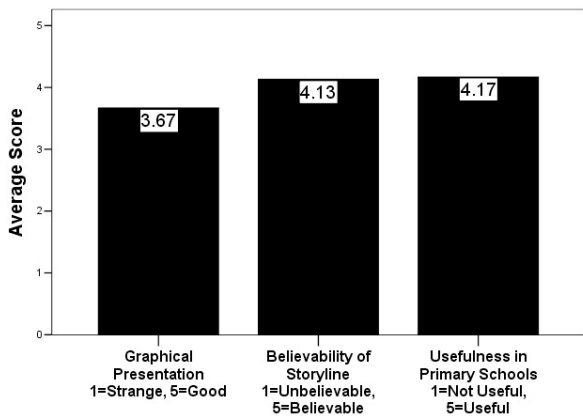

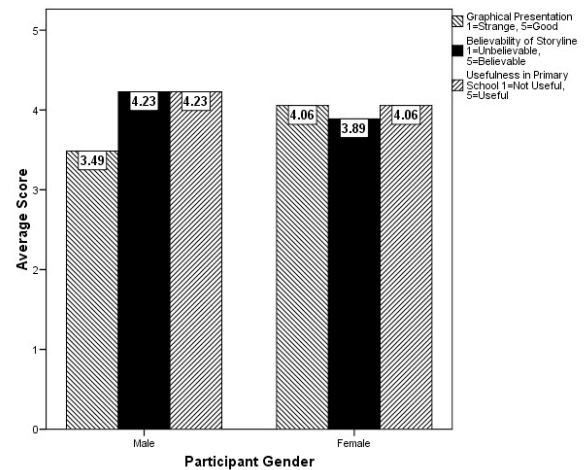**Figure 6.** Overall Impression of FearNot! v.1 (n=54)

Figure 8. Gender-Split Overall Impression of FearNot! v.1 (n=54)

graphics were again rated as above average in quality, with storyline believability and usefulness in primary schools both scoring highly (Figure 7). These findings are especially useful as they provide great support for the FearNot! application directly from the user group it is aimed at.

Gender differences show that females liked the graphical presentation more than males, while males found the storyline more believable and rated FearNot!'s classroom usefulness as higher than females (Figure 8). These results can be explained by the observation that males are more likely to interact with video games in everyday life, and so will expect higher standards for graphical presentation and will be more open to using such an application at school. That girls found the storyline less believable could be due to the fact that most participants interacted with the male episodes as opposed to the female episodes - naturally these episodes are less relevant to females. Unfortunately the small size of invidual groups did not allow for deeper inferential analysis.

3 Study 2

3.1 Method

45 participants attended a FearNot! workshop run as part of the anti-bullying conference. This sample's demographics were similar to those from Study 1. Participants interacted with FearNot! v.1 in groups of around 6 people to each laptop. This interaction lasted long enough to allow each group to experience both male and female episodes. After this interaction, participants were shown a pre-recorded video of FearNot! v.1.5 which lasted approximately 5 minutes. Participants were then organised into four small focus groups, each led by an investigator, to discuss the two different versions of FearNot!. Topics of discussion were similar to those from Study 1's questionnaire, but preferences of the different versions of FearNot! were also drawn out.

449

3.2 Results

The results from the workshop's four focus groups are descriptive/qualitative in nature and give a first impression of FearNot! v.1.5 as well as serving to expand on the quantitative data obtained in Study 1.

The most liked characters were John and Paul (the male victim and defender) with Luke (the male bully) liked least. John's and Frances' (the female victim) graphic design were considered to need the most improvement. The characters were able to elicit the kind of empathic engagement that they had been designed for - participants reported that they felt sorry for John and were angry at Luke, Janet and Sarah (the bully characters).

The storylines were generally well accepted with Frances' situation considered to be worse than that of John - presumably because of the relational nature of the bullying that Frances suffers, compared to the direct physical aggression that John is subjected to. This finding could be due to the sample. Because the participants were mostly of senior school age (12 years old and above), and slightly older than the target age group, it is possible that their more advanced cognitive development meant they were able to understand the relational bullying more easily than the target age group. In addition to this, the relational episodes were also considered more believable and realistic (when speaking to secondary school age girls) than the physical scenarios.

While the storylines were enjoyable and believable there was concern that the pacing was too slow and most participants agreed that longer, quicker-paced episodes would be more enjoyable. In keeping with the findings from Study 1, there was consensus that imperfect graphical design did not affect engagement.

FearNot! v.1.5 was greatly preferred to FearNot! v.1 in terms of graphic design (especially that characters now wore a school uniform which is appropriate for a UK setting), language used by the characters (though even more colloquialism/slang would be preferred by the target age group), storyline enjoyability, and interaction style. However, most participants reported that they would like even more interaction - specifically the ability to control their own personal avatar within the virtual environment. Many of the younger participants thought that FearNot! would be "better than normal" curriculum, that children "could learn from it" and that FearNot! "will make people think".

4 Discussion

In Study 1, victim characters were generally the best liked and the bully characters were liked the least. This shows that not only are human users willing to engage with virtual agents, but that the FearNot! characters are successful in eliciting the right kind of empathic and emotional reactions that are necessary for the user to experience a meaningful and educational interaction. While some of the graphical designs were considered to be strange, the overall quality of the graphical presentation was consistently rated as above average. In addition to this, the storylines presented were considered believable by both the whole sample, and the target age group in particular. The FearNot! application was thought to have great potential if included as part of existing primary school curriculum.

Interestingly, the graphical design of the characters seemed to have little impact on the user's rating of their believability or on the elicitation of empathy. For example, while the male victim was rated more often as the strangest looking character than the best looking character, he was also rated as the most likeable character. Taken

with Study 2's findings that refined graphic design is preferred, this pattern of results suggests that excellent graphical design is not necessary to create an engaging experience as long as characters act in a believeable manner. However, graphical presentation can provide the 'icing on the cake' for an engaging VLE.

Study 2 corroborated these findings and provided further depth. Participants felt sorry for the victim character, and were angry at the bully characters. The relational episodes were seen as more serious than the physical episodes. This was thought to be due to the cognitive development of the sample, which would be in keeping with the suggestion that the understanding and use of relational bullying requires more advanced social cognition [3]. It would be interesting to investigate this further with specific reference to age differences in understanding of different bullying styles. The most positive finding to emerge from Study 2 was the consensus that FearNot! v.1.5 was preferred over v.1. This shows that the changes made to graphics, character language, and interaction style all affect the user's experience in a positive manner and improve engagement and enjoyability.

This study's methodology could be criticised for being too informal in nature. However, it is argued that the informal methodology of this study does show a number of advantages. While FearNot! is not designed to be used in the conference environment that this study took place in, the method does not lack ecological validity entirely. FearNot! is to be used in primary school classrooms with little teacher input. In this sense, the current study closely fitted this setting in terms of amount of adult supervision, background noise, and equipment (many primary schools in the UK prefer the flexibility that laptops offer over a rigid suite of desktop machines).

Given that the setting was not fully controlled, the results are strong and robust enough to demonstrate that FearNot! is successful in creating engagement and eliciting empathy even in less-than-ideal settings - this can only be a positive sign given that FearNot! will eventually be used in a quieter and more controlled school environment.

In addition to this, while there were many exhibitors at the conference, the FearNot! stand was consistently among the busiest and most popular with primary aged children and generated a great deal of interest in children and their guardians alike. Many children returned to the stand a number of times over and again - demonstrating that children actively *choose* to play FearNot! It must be acknowledged, however, that such positive outcomes could be due to a social desirability effect. Since the participants were all delegates of an anti-bullying conference it is safe to assume that they will already have a vested interest in this area, and will react positively to any potential intervention.

While mainly positive comments have come out of these studies, it was also shown that certain areas would benefit from some improvement. Most notably among these are the graphic design and language used by the characters. While the graphics have improved from FearNot! v.1 to v.1.5 there is thought to be still more room for improvement, especially when compared to commercial video games.

The findings taken from studies which utilise an informal and qualitative methodology are especially useful in the design of VLEs and IVAs as they allow developers to gain a more detailed understanding of their user's attitudes and needs than statistical approaches allow for. A number of recommendations about the development of FearNot! are also of relevance to the development of virtual environments in general.

Firstly, agent and environment believability can be improved by ensuring cultural similarity with target users. Study 2 also shows

that, with regards to language issues, local and temporally relevant phraseology/colloquialisms can improve believability, as can accents for any audio output.

For virtual environments that also include a cohesive storyline, the issue of pacing must be taken into consideration. While it is beyond the scope of this study to demonstrate the effect of pacing on engagement, it is suggested that quicker paced but longer lasting episodes are more engaging than shorter and slower episodes - at least for a younger audience.

Many respondents stated that they would like to have 'more control' over a character within FearNot! It is thought that such interaction could lead to deeper immersion within a virtual environment, and even superficial interaction - such as selecting physcial characteristics of an otherwise unplayable agent - could lead to users identifying more with a given character. Some support for this claim could be found in the popularity of commercially available role-playing computer games. Because one of the fundamental ideas behind the FearNot! application is to allow children to try out various coping strategies without being directly involved themselves (the usefulness of a coping strategy can be learned safely and vicariously through the victim character's experiences), the inclusion of personal avatars is not possible in FearNot! However, it is an interesting issue which should be taken into consideration when designing a VLE, and is currently being investigated as part of the eCIRCUS project in the development of ORIENT - a VLE aimed at aiding refugee/immigrant integration into the host nation's school system.

A central aspect of the eCIRCUS ethos is 'user-centered design', in which target users are consulted iteratively on all aspects of a VLE's design. A further advantage of using an open methodology similar to that employed in this study is that it allows for a more varied sample to participate and become involved in the design of a VLE. While the VICTEC project allowed children to become involved in the design of FearNot! this study has now also given teachers and adults the opportunity to contribute toward FearNot!'s implementation. Furthermore, teachers and educational experts will play a larger future role with regards to the development of educational materials which will support the use of FearNot! as a classroom tool.

The final version of FearNot! is currently undergoing technical development. This version runs under the .net framework, and makes use of the Ogre3D graphical environment. Some major developments will include improved graphical design (such as fully motion-captured animation) [13], and more natural speech/audio output between characters (voices will be recorded by professional voice-artists, and the language and grammar will be generated and checked by a team including native English speakers who are familiar with the accents and linguistic nuances in the geographical areas in which FearNot! will be evaluated). A sophisticated text-recognition engine will be trained for use with younger users to allow full-text (typed) interactions. More characters, locations, and bullying incidences will be included to ensure a more believable and engaging experience. Finally, the characters will be much more responsive to the user's input.

The characters themselves are also undergoing development: More believable character actions and behaviour will be achieved by integrating an affective appraisal system which includes flexible management of goals [14]. This system will be further bolstered by a simplified version of the model of autobiographic memory devised by Ho and Watson (2006)[15].

This version of FearNot! will be piloted in schools during early 2007, along with a number of psychological evaluations. These include measurements of participant roles, children's knowledge about bullying and coping strategies, their empathic abilities, and moral disengagement. Once any necessary changes are made to either FearNot!, the psychological measurements, or the accompanying curriculum, a large-scale (900 children) longitudinal (6 week) intervention will be evaluated in primary schools in the UK and Germany to assess the impact of FearNot! on incidences of bullying and the children involved.

5 Conclusion

The final conclusions that can be taken from the current studies are positive for FearNot!. Although certain aspects, such as graphical design, still require further refinement, this does not interfere with storyline believability or the user's ability to empathise with the characters. The FearNot! application is well received by children and adults alike as an innovative, engaging and educational intervention against bullying. This conclusion will be fully investigated during 2007, when the final version of FearNot! is placed into primary schools in the UK and Germany for a large-scale longitudinal evaluation. Recommendations for the success of other VLEs include ensuring cultural relevance, appropriate pacing of a storyline, and allowing users greater control in the environment. Finally, agents who behave in a believable manner are more engaging than attractive graphical presentation.

REFERENCES

[1] Olweus, D. (1999). Norway. In P.K. Smith, Y. Morita, J. Junger-Tas, D. Olweus, R. Catalano, & P. Slee (Eds.), *The nature of school bullying: A cross-national perspective (7-27)*. London: Routledge.

[2] Wolke, D., Woods, S., Schulz, H., & Stanford, K. (2001). Bullying and victimisation or primary school children in South England and South Germany: Prevalence and school factors. *British Journal of Psychology*, **92**, 73-696.

[3] Wolke, D., & Stanford, K. (1999). Bullying in school children. In D. Messer and S. Millar (Eds.). *Developmental Psychology (341-360)*. London: Arnold.

[4] Salmivalli, C., Lagerspetz, K., Björkqvist, K., Österman, K., & Kaukiainen, A. (1996). Bullying as a group process: participant roles and their relations to social status within the group. *Aggressive Behavior*, **22**, 1-15.

[5] Wolke, D., Woods, S., Bloomfield, L., & Karstadt, L. (2001). Bullying involvement in primary school and common health problems. *Archives of Disease in Childhood*, **85**, 197-2001

[6] Kumpulainen, K., Rasanen, E., Henttonen, I., Almqvist, F., Kresanov, K., Linna, S.L., Moilanen, I., Piha, J., Puura, K., & Tamminen, T. (1998). Bullying and psychiatric symptoms among elementary school-age children. *Child Abuse & Neglect*, **22**, 705-717.

[7] Carney, J.V. (2000). Bullied to death. Perceptions of peer abuse and suicidal behaviour during adolescence. *School Psychology International*, **21**, 213-223.

[8] Smith, P.K., & Madsen, M. (1997). *A follow-up survey of the DFE anti-bullying pack for schools. Its use and the development of anti-bullying work in schools*. London: Department for Education and Employment.

[9] Woods, S., & Wolke, D. (2003). Does the content of anti-bullying policies inform us about the prevalence of direct and relational bullying behaviour in primary schools? *Educational Psychology*, **23**, 381-401.

[10] Aylett, R.S., Louchart, S., Dias, J., Paiva, A., & Vala, M. (2005). FearNot!: An experiment in emergent narrative. *In proceedings of IVA 2005: Intelligent Virtual Agents*, 305-316.

[11] Roussou, M. (2004). Learning by doing and learning through play: An exploration of interactivity in virtual Environments for Children. *ACM Computers in Entertainment*, **2**, 1-23.

[12] Hall, L., Woods, S., Aylett, R., Newall, L., & Paiva, A. (2005). Achieving empathic engagament through affective interaction with synthetic characters. *In proceedings of ACII 2005: Affective Computing and Intelligent Interaction.*, 731-738.

[13] Hall, L., Vala, M., Hall, M., Webster, M., Woods, S., Gordon, A., & Aylett, R.S. (2006). FearNot!'s appearance: Reflecting on children's expectations and perspectives. *In proceedings of IVA 2006: Intelligent Virtual Agents.*, 407-419.

[14] Aylett, R.S., Dias, J., and Paiva, A.(2006). An affectively-driven planner for synthetic characters. *In proceedings of ICAPS 2006: International Conference on Automated Planning and Scheduling.*, 2-10.

[15] Ho, W.C., & Watson, S. (2006). Autobiographic knowledge for believeable virtual characters. *In proceedings of IVA 2006: Intelligent Virtual Agents.*, 383-394.