Proceedings of the Third International Symposium on AI & Games, Daniela M. Romano and David C. Moffat (Eds.),
at the AISB 2010 convention, 29 March – 1 April 2010, De Montfort University, Leicester, UK

AEINS: The Role of Interactive Narrative in Fostering Character Education

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Abstract. Interactive narrative allows collaboration of humans and computers in the creation of innovative experiences. Different narrative techniques have been used in computer narrative-centered learning environments to help in creating enriching experiences for its users, sparking problem-solving skills, and transfer of tacit knowledge. Graph structured narrative and dynamically planned generated narrative are two examples that have shown advantages and disadvantages when deployed in these environments. This paper proposes the integration of both techniques in a way that allows: (a) balanced user agency during the game interaction course; (b) the generation of a dynamic continuous story that exhibits a story arc; (c) the presence of virtual evolving agents that provide dramatic and pedagogical roles. The proposed idea has been applied to AEINS, an adaptive educational game that aims to foster character education. Results from AEINS evaluation are presented and discussed.

1 Introduction

> "Stories are connections to the past and yet carry us into the future; they speak of relationships, of human connections, and to what gives a quality to our lives."[29]

Simpson (1998) in her article emphasizes the importance of stories in our lives and their role in tightening human relationships [29]. Stories help children to cope with feelings and develop their imagination. Role playing allow children to put themselves in another one's shoe and experience how others feel. It helps students to transfer their knowledge and beliefs into actions and see how their decisions affect other people and things [24]. In addition to its feasibility to be used as an appropriate medium to transfer tacit knowledge to the students in the classroom environment [3].

Interactive narrative allows collaboration of humans and computers in the creation of innovative experiences and plays an important role in cognition and culture. Narrative-centered learning can be viewed as rich generated stories that allow a kind of unintentional learning process to happen through an engaging and appealing experience, and the student is seen as an active participant in the construction of his own knowledge. As a result, narrative-centered learning environments have been the subject of increasing attention in the last few decades and has been used as a testbed for many application areas such as games, edutainment systems, and educational games.

Narrative-based educational games aim to offer education through an engaging experience in which narrative is a key instrument in facilitating teaching and learning. Such environments should exhibit certain educational properties in order to be able to achieve the educational targets. They may contain one or more of the following tutoring components: tutorial planning, student model, learning objectives, domain and pedagogical models. Some environments also provide feedback or hints.

This paper focuses on the application of narrative in the current educational games and the existing limitations, in addition to proposing an approach that addresses those limitations. The main narrative problem encountered is due to the contradicting nature of games and learning. On one hand, games allow high user agency for an engaging entertaining experience and do not expect transfer of knowledge to real world. On the other hand, personalized learning requires restricted user agency to allow tracking and assessing the learning process and expects transfer of knowledge as an outcome. Therefore, there is always trade off between both gaming and learning.

The current educational games either use continuous planning to generate a dynamic story and lose some aspects of the educational process such as keeping track and assessing the learning process [22, 28, 31], or use predefined paths in order to preserve the educational goals [14, 1, 32, 12, 26, 5, 13], which limits the freedom of the student [27] and requires an extensive amount of authoring work [9]. Some efforts have been done to integrate both narrative techniques, such as that of [23, 13]. Nevertheless, these edugames have not take full advantage of storytelling potential of games seen in interactive drama applications, such as the presence of a story arc and/or evolving virtual agents that can achieve more than simply being single virtual guides and virtual tutors. Their role could be extended to interact with each other as a set of characters to present a dramatic storyline, in addition to serve as all sorts of sparring partners for players to interact with, such as representing the bad guys, or companions who ask for help [34]. These properties allow highlighting the relationships among the narrative elements, which is considered as a key point for provoking active thinking and supporting meaning construction [5].

The main idea to present in this paper is the integration of a dynamically generated narrative and a scripted branching narrative approaches in a way that allows: (a) balanced user agency during the game interaction course; (b) the generation of a dynamic continuous story that exhibits a story arc; (c) the presence of virtual evolving agents that provide dramatic and pedagogical roles. This idea has been applied to AEINS, an adaptive educational interactive narrative system that aims to foster character education in the ethics domain [15]. AEINS integrates interactive narrative and intelligent tutoring in order to have strong learning objectives underpinned by effective story telling. For more information about AEINS educational pedagogy, see [17]. The next section motivates the choice of the ethics domain and character education. Sections 3 and 4 present AEINS and the interactive narrative generation techniques used. Finally, evaluation and conclusion are presented in sections 5 and 6.

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2 The Ethics Domain

The ethics domain is a challenging domain for its ill-defined nature. It exhibits the following characteristics: (a) ambiguity in classifying a problem's answer as correct or incorrect [12], (b) lack of defined rules that helps in transferring the solution path from the initial step to the final step [25]. The ethics domain can be considered as one of the the important ill-defined domains because it holds in nearly every action in our daily life. Developing child and adolescent awareness of social and moral responsibilities is a prominent aim, so-called character education. Effective character education promotes core ethical values such as caring, honesty, fairness, responsibility, and respect for self and others, along with supportive performance values such as diligence and perseverance that form the basis of good character [20].

According to Kohlberg, quoted in [8], if children get engaged in enough independent thinking they will eventually begin to formulate their own conceptions of rights, values, and principles by which they evaluate existing social arrangements. Watson also mentioned a very important point which is the desire for good [33]:

> "The trick lies not solely with knowing what is right and good but also in building a love for the good and the worthwhile."

Watson points out that by giving the students the chance to see successful people do what's right and good, chances are better that students will be biased to follow suit themselves than they might otherwise. Interactive narrative environments are rich by agents and objects and story worlds that can provide the suitable environment to tackle these issues.

Another generally accepted fact is that learning about moral virtues is different from doing them, as Watson clarifies [33]:

> "Getting high scores in an ethical course does not guarantee at all the actual behavior of that student."

This explicitly indicates that teaching in this domain is not based on acquiring more knowledge but on the development of skills and transition in the children's reasoning process. These properties make it very difficult to use intelligent tutoring, tracing and assessing algorithms, to teach in an ill-defined domain. Therefore, providing an environment that allows situated learning in a pleasant interactive way can be seen as an advantage. Transferring what the children had learned to the real world or indications that this can happen can be seen as a plus.

3 AEINS

To the extent of our knowledge, there is no educational game developed yet to develop core ethical values at young children. AEINS is the first step taken to provide such environment. AEINS is an educational game that aims to foster character education. The architecture composed of two levels; tutoring and narrative, see figure6. Each module in the system is fully separated from the other parts, however all the modules interact together through sets of production rules. AEINS is intended to assist 8-12 year old children to learn ethics and citizenship. The student is able to act in the environment influencing the path of the unfolding story, and at the same time be monitored and guided by the tutor. AEINS aims to inform the students about various ethical values by giving them the chance to explore and experience different moral actions, gain new insights and allow them to see the consequences in a safe environment. It uses stories and interactive narrative as a source of inspiration and direction for moral conduct. Following the constructivist approach to learning, AEINS provides a problem based learning approach [11] designated in the teaching moments. In these approaches, learning is anchored around a specific problem and context, and the focus is on the student solving a problem. The student is able to discover what knowledge gaps and deficiencies they may have along with skills they may need to develop.

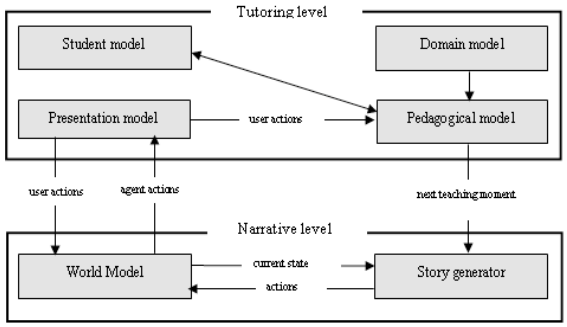

Figure 1. AEINS architecture

AEINS provides adaptation on the tutoring level by incorporating four components: domain model, student model, pedagogical model, and presentation model. The domain model is a main component of tutoring systems. It consists of the educational concepts and their relationships (dependency upon each other). The domain knowledge has been collected from [6] and then arranged in the suitable hierarchal order to represent the learning progression. The domain model in AEINS is divided into two parts. The first part is a hierarchal frame representation of all the moral values the student required to gain skills of. The frame representation provides desirable flexibility by allowing constructing the relationship between the domain concepts in an easy and clear way. The second part of the domain model comprises of teaching moments repertoire. The teaching moments can be thought of as a variety of ethical problems that require tough decisions. The idea behind the current design of the teaching moment is based on analyzing moral dilemmas and transforming them to a story graph structure, then specify the decision points that reflect the specified skills.

The pedagogical model adapts instruction following a model of human tutoring expertise that balances motivational and cognitive goals. The model uses the Socratic Method as it has been shown to be a highly effective approach [7] that helps children develop new ideas and gain new insights. The pedagogical model is able to infer knowledge about the student's skills and expand the student model. The student model is a crucial component that mainly aims to create an individual model for every student. The student model is currently a simple form of the overlay model represented in the form of rules. AEINS builds a model of the student's learning process by observing, recording and assessing the student's actions and choices from the generally accepted ethical views. The student model consists of three parts: the student's personal details, the student knowledge and the student intention. Finally, the presentation model handles the flow of information and monitors the interactions between the user and the system and vice versa. To interact with the story, AEINS offers a GUI, where the student is able to take different actions, such as moving between different places, inviting friends, ask friends round

to play, and so on. More details on the tutoring level and AEINS educational outcomes can be found in [16, 17].

The narrative level consists of two components: a story generator and a world model. The story generator uses continuous planning for the dynamic generation of narrative at run-time and allows a graph structured planning to interfere (whenever required) as part of the story to present the various moral dilemmas (teaching moments). The motivation of learning roots in the uncertainty and curiosity resulted from the nonlinear structure of paths and different ending alternatives of the teaching moments [21]. In this way, the player expects to play the game many times, trying different strategies each time. The teaching moments are selected and presented in a way that allows the student to draw analogies from one problem to another (if needed).

The world model houses the objects, such as places and tools, and the AI character models associated with their properties. Each AI character is implemented as a set of rules that describe the character personality and control the character behavior. All the characters share the same basic knowledge base to support interacting with the world and other characters. By the end of the whole experience, the learner would have experienced some emotional and moral complexities. This kind of experience, especially when theses complexities develop over the course of a game-like environment, can leave the player with a better and deeper understanding [10]. For more information about AEINS working model, see [15]. The following section focus on the narrative side in AEINS and how it addresses the currently existed shortcomings.

4 Interactive Narrative in AEINS

AEINS aims to allow students to move from the *making moral judgments state* to the *taking moral actions state*, from the knowing state to the doing state, which we consider a very important step in moral education. AEINS combines dynamically generated narrative and scripted branching narrative approaches in order to allow: (a) balanced user agency during the game interaction course; (b) the generation of a dynamic continuous story that exhibits a story arc; (c) the presence of virtual evolving agents that provide dramatic and pedagogical roles. The rest of this paper explains how AEINS manages to reach these aims.

Balanced user agency

The hybrid narrative generation can be considered as a further step in addressing the agency problem discussed previously. The problem lies in the trade off that always occur when combining learning and narrative-based games. In other words, the use of dynamic generated narrative allows high agency but overrides the educational side, and the use of graph structured narrative allows tracking the learning process but offers low agency. The blend of both techniques can act as a solution to this problem. It sustains balance between the participant's freedom and keeping track of the educational process. It allows student's high agency and increase his feel of control and in the same time, conserves the educational process and allows tracking and assessing the student's actions.

In AEINS, A STRIPS-like planner is used to generate the story in favor of the learning objectives. The student is able to act freely influencing and controlling the direction of the story. This freedom is allowed at any time outside the teaching moments (i.e., before reaching or after finishing a teaching moment). A more restricted agency is required during the interaction with the teaching moment to preserve the educational targets. This is acceptable because the teaching moments themselves are relaxed through varying the places and characters that can participate in their worlds; this part is illustrated in [15]. The dynamically generated story can be seen as the 'glue' that sticks the teaching moments together to form a continuous coherent story. This principle is very similar to a game play where the player is exploring the game environment and at certain points he has only one path to go through, in order to force him (implicitly) to perform the required tasks.

The recognized result obtained from the empirical evaluation is that the used techniques are integrated together in a seamless way managing the student's game and learning experiences. Although there are no current problems with the STRIPS planner, scalability issue could be raised when using bigger worlds.

4.1 Story Genaration in AEINS

The story in AEINS starts with setting the scene for the user. The user starts by allowing the user to choose his friends from a number of virtual characters. The story unfolds in a logical coherent way based on the student actions. Climax is reached within a teaching moment. The events of a teaching moment story become complicated and through the user interactions the conflict in the story is revealed. The teaching moment has more than one end point that can be reached according to the student's actions. This is very similar to real life situations with a start, a climax and a resolve leading to an end. The whole story in AEINS can be seen a one long story that is interleaved with various situations and the student is an active participant affecting how the story unfolds.

Dynamic continuous story generation

AEINS uses planning for its efficiency and its ability to generate different narratives for different users, and also different narratives for the single user on subsequent play turns [27]. This technique enhances the user's sense of control in the narrative environment [27]. The main story in AEINS is generated using a STRIPS-like representation planning algorithm, similar to the work of Barber and Kudenko [2] that selects a story event to be executed based on a set of authored story actions, see figure2. However, AEINS extended the used planner by implementing a reactive planner that allows the agents reactions to be more relevant to the student's actions and keep the sense of realism.

action name	*preconditions*	*postconditions*
move(Y,Z)	place(Y), charat(stud,Y)	place(Z), charat(stud,Z)
invite(X,Y,Z)	char(X), place(Y), charat(X,Y)	place(Z), charat(X,Z)
make_friend(X,Y)	char(X), char(Y), like(X,Y)	friend(X,Y)
play_with(X,Y)	friend(X,Y)	enjoy_play_time(X,Y)

Figure 2. Example of the story world operators

The presence of reactive planner in AEINS offer the agents the opportunity to act according to the latest student's action instead of only basing the action choice on the whole past history of the narrative, as the STRIPS planner usually does. Imagine the following situation, the planner picks 'be_friend_to' and 'move' actions to be executed. Luckily, the student's follows the plan and chooses to be_friend_to one of the agents. In normal planning this will lead to the execution of the move action automatically. Through the use of the reactive planner, the agent responds first to the be_friend_to invitation then the reactive planner hands over the role to the STRIPS planner to

continue the execution of the original plan. We argue that this kind of prioritizing the latest user's action increases the believability of the agents and keeps the sense of realism of the world. It is worth to mention that the reactive planner does not interfere with the original plan. In other words, the reactive actions can not invalidate the original STRIPS planner, see figure3.

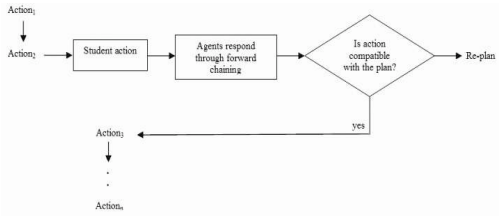

Figure 3. Plan execution flowchart

action name	*preconditions*	*postconditions*
reply_friendship (Agent, stud, N_1)	like(Agent, stud)	agree_to_be_friend & friend(Agent, stud)
respond_to_play (Agent, stud, N_2)	not(current_TM(TM_2)) & friend(Agent, student)	accept_play_invitation

Figure 4. Example of the reactive planner operators

The reactive planner is used by the non-playing characters (agents) and uses the same actions representation as the STRIPS planner with an increment of one more parameter denoting the suitability cost. The suitability cost (#N) is an integer that guides the agent to choose the most suitable response action to the current student action. An example of two action operators for the reactive planning is shown in figure4. The N value changes dynamically during run-time through forward chaining rules based on the story events. The advantage of using forward chaining rules within the reactive planner is that it allows the reception of new data and can trigger new inferences, which makes the engine better suited to dynamic situations in which conditions are likely to change. For example, as the relationship between the student and the agents inhabiting the world evolve over time, agents reactions towards the student need to suit the current conditions of the world. The more the action is a logical response to the student actions the more the story is believable.

At the level of story generation, a STRIPS planner is used for the dynamic generation of narrative in the run-time where, currently, every user's action that violates the plan, can be accommodated by re-planning. Extending the STRIPS planner through the use of the reactive planner have had its effect on the user's experience as it provides more realistic and dramatic story. An example that illustrates the narrative generation can be seen in figure6. In the example, the first row represents the current story world and the last row represents the goals to be satisfied. The left column shows the first plan the story generator produces, the actions in italic are assumed learner's actions. If the learner's action does not satisfy the first plan, another plan is developed; the second plan in the middle column. Again if the learner's action violates the plan, a third plan is developed; the plan in the right most column. This continues till the goals (teaching moment narrative preconditions) are satisfied. This representation allows the use of an intelligent tutor to follow the student's actions and to make an assessment for them in a step by step follow up. Ideally, each teaching moment path describes an inquiry-based narrative, a story in which the protagonist is the user in the role of making moral decisions. These dilemmas allow students to pursue different procedures for solving the problem. These various procedures arise from allowing different perspectives based on students perceptions and interpretations of the nature of the problem. Through role playing and discussions, students can see that their decisions affect other people and things [24]. In addition, the students' understanding gained through this process is situated in their experience and can best be evaluated in terms relevant to their experience.

Scripted narrative

Although dynamic generated narrative was used to generate the stories connecting different teaching moments together in a one continuous coherent story, it was practical not to follow the same technique in designing the teaching moments, where it is very important to conserve the educational targets. Branching graphs were used to develop the teaching moments solution spaces, see figure 5. This data structure allows the presence of a set of reasoning lines that a student may pursue. This helps the system to decide which line of reasoning underlies a student's action [4].

Despite the different branches of every teaching moment are hand coded, each teaching moment exhibits variability through allowing different characters and places to present the teaching moment depending on the story world state. Each teaching moment represents a part of the whole story and focuses on teaching a certain concept (value). Each teaching moment has certain prerequisites that must be fulfilled before the execution of the teaching moment takes place. The teaching moments priority is computed via pre-defined rules as follows:

Trigger: teaching moment X_1 has not been presented
and teaching moment X_2 has not been presented
and value Y is not held by the user
and value X is held by the user
Action: set priority to teaching moment X_2

The capital letters in the rules represent variables and the representation denotes that if (a) a specific pattern of teaching moments has not been presented to the student yet; (b) the user holds certain values and does not hold others, the action part of the rule executes (the next teaching moment priority is identified).

Interaction with teaching moments

Within every teaching moment, the learning tasks are tightly coupled with the narrative where specific skills (goals) have to be acquired by the student. The interaction of the student with the teaching moments is monitored and evaluated by the cognitive tutor. Such interaction has the following structure:

- The teaching moment begins with a specific theme to act as a starting point or trigger for learning.
- Generate possible problem solutions (ethically approved solutions).
- Assess the viability of alternative solutions by constructing arguments and articulating beliefs.
- The student is asked about his opinions through series of questions
- Evaluate the students answers and construct arguments that lead

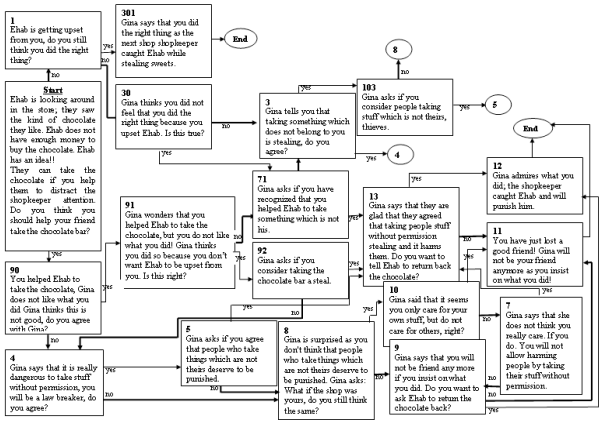

Figure 5. Example of a branched teaching moment graph

the students to examine the validity of his opinion or belief.

- If the student agrees with a desired ethical choice, the teaching moment ends
- Else if the student sticks to an unethical decision, the system raises the ante ("what if" style questions).
- If the student keeps sticking to the unethical choice, choose another teaching moment and repeat the above steps.

The teaching moments have two types of preconditions; tutoring and narrative. The teaching moment is selected according to the current student model (tutoring precondition) and is presented after the system satisfies the story preconditions (narrative prerequisites) through the planner (story generator). Within the teaching moment the learning tasks are tightly coupled with the narrative where specific skills (goals) have to be acquired by the student.

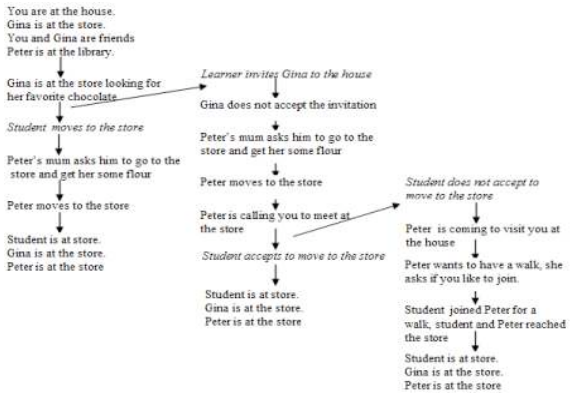

Figure 6. Example of the generated narrative

Dramatic and pedagogical roles of the evolving virtual agents

The game nature of AEINS allows the existence of non-playing characters (pedagogical agents) and objects in AEINS story world. The purpose of pedagogical agents is not to perform tasks for users or to simplify tasks, but rather to help users learn how to accomplish tasks [30]. They aim to increase problem solving effectiveness by providing students with customized advice [19]. The pedagogical agents in AEINS are semi-autonomous agents, where on one hand they are able to act and react according to their state and the current world state. On the other hand, the story generator can dictate them, when required, what to do in order to preserve the coherence and dramatic tension of the whole story. The presence of a continuous story with characters personalities evolving during the story unfold helps with the mental and emotional engagement of the student.

The AI of the non-playing characters is represented in the form of rules, these rules can be modified during the story course as a result of certain actions. The main advantage of having more than one non-playing character is to have the freedom to portray agents who do not share the student's goals, for example provide negative examples [31]. On the other hand, they can also act according to the moral goals and give positive examples or help the student to stay on the right track. For example, a character who is a friend to the student can become an enemy as a result of a student action or a holder of an unethical moral virtue character can become a holder of a good moral virtue as a result of some interactions with the surrounding world.

The student and the agents are responsible for the story unfold as it is generated based on their actions. When it is time to present a teaching moment, the currently involved agents in the main story will take the corresponding roles (that fits their current personalities and relationship to the student). If there exist a role that is still needed to be occupied or an agent is not capable to take that role, the story world with the assistance of the story generator will allow the inclusion of another agent smoothly through the narrative. Once the scene is set, the teaching moment starts.

As mentioned previously, the predominant teaching pedagogy is the Socratic Method. The holder of the good moral virtue uses the Socratic Voice to provide discussion, hints and feedback to the student. The text dialog produced encourages the student to think critically in order to solve the discrepancies encountered in the moral situation(s) they are facing. In addition, students have opportunities to choose among different options and to reason which criteria lead to the chosen option [18]. When the teaching moment ends, the student along with the agents are free to act again influencing the story. The story world receives the required agents' actions to be executed and displayed to the student by the presentation model.

5 Evaluation

This paper shows how AEINS successfully worked on the drawbacks mentioned in the related work in the area of the development of narrative-based educational games to teach in the ethics domain. The main narrative problem discussed was the implementation of narrative-based educational systems that either uses continuous planning and loses some aspects of the educational process such as keeping track of the learning process and being able to assess the student or uses the graph structured stories and constrains the student's freedom in order to maintain the educational goals. AEINS succeeded in overcoming this by integrating both continuous planning and branching planning approaches. The former was used to generate the outer story that links the teaching moments together and forms a coherent, continuous story. The latter has been used in structuring the teaching moments and allows the use of an intelligent tutor.

A full study has been completed to test AEINS for different criteria such as the technical infrastructure, functioning, ability to support

or enable specific activities, and generation of predicted educational outcomes. We chose qualitative approach rather than quantitative one as it allows the use of semi-structured interviews which provide flexibility in dealing with children and gives them the chance to explain themselves and their thoughts freely and without being constrained to any gouges.

The study was conducted on a voluntary group of 20 children aged 7 to 12 years to test the hypothesis of building an educational game that integrates multiple narrative techniques and an intelligent tutor techniques in order to provide personalized learning process in the ethics domain. The students were of different origins and had different cultural backgrounds, for example Egypt, UK, China, Malaysia and Fiji. In each assignment, the student has been left to explore and interact with the system at their own pace. The student is not merely learning about a process or concept undertaken by an ethics teacher, but he experiences that process himself.

To evaluate AEINS, post interviews were conducted focusing on the system, its interface and the experiences of playing. The first category includes questions related to the technical infrastructure and its functioning. The second category includes questions related to the functions and features inherent in the system and its ability to support or enable a specific activity. The third category includes questions related to the student tasks. The fourth category includes questions related to the capability for specific technology-based activities to generate predicted outcomes. And finally the fifth category includes questions related to re-playability and self reflection. Results from this evaluation are presented below for the first time.

Students did not experience any interruptions in the narrative as the story was generated smoothly and successfully accommodating the teaching moments in a seamless way without affecting the student's experience. Accordingly, we can say that AEINS manages to give the student the appropriate freedom and is able to track and assess the learning process within a single generated narrative.

The evaluation shows that children appreciate the social characteristic in the system, as they were able to recognize the genuine social aspects and the realism represented in the game. The analytical questions confirm this recognition. For example, the presence of some verbal statements during and after the session that show some students' opinions, from a personal perspective:

> P1: " The best moment was when my parents and my teacher were proud of me because of what I did."

More evidence that the students' were recognizing the social situation and recognizing the non playing characters as real friends. One of the interviewees said

> P2: "I felt as if I am in a real world and these characters are really talking to me, their reactions were very believable."

another student said

> P1: "I did not mean to upset my friend, I felt as if it really happened and I had lost my friend who would not talk to me ever again. I think I will be careful next time."

Actually, what was really interesting is the way the students personalize the non-playing characters in the game. They do not only interact with them as their friends in the game but also they gave them lives and pictured how these characters would behave beyond these moments. For example, one interviewee said

> P5: "I do not like Gina when she lies, I want to tell her that this is wrong and she has to stop lying"

, the interviewee added

> "If she keeps doing this now, no one will believe her in the future."

The students also believe the non-playing characters personalities, they like some and dislike others. One student said

> P7: "I like Peter the most, he is funny."

another student said

> P8: "I do not like Gina, she is not a real friend. She always ask me to do wrong things."

The realism present in AEINS allows the students to think about the non playing characters as real friends who can feel and expect certain actions from them. For example, one student quoted

> P9: "If I choose to be on the side of one friend, the other one could become angry."

Moreover, the students were treating the situations as real ones and responding to them in a realistic way, for example one student said "I found the homework situation very confusing." and when he has been asked why, he replied

> P10: "When my mum called me to see the TV, I was *scared* as I still have homework to do and the teacher will figure out the next morning."

These results reflect an important point that the students were able to react to the aspects of the domain and to apply their current and potential capacities in this game. From the students' answers, we have figured out that most of them were not treating the game as just a game, they do respect and appreciate the interactive narrative generated. The game was able to generate an engaging continuous story that is interleaved with difficult situations (graph planned teaching moments) within which the students tried to prove themselves and use their skills in order to solve the discrepancies faced.

What has been also observed that the game is not giving certain skills but it empowers the students to use the skills they have. The students were able to recognize their abilities and skills, they feel proud when they succeeded in solving problems and support their friends.

> P1: "It was really nice solving my friend's problems."

> P1: "it is good to feel that your friends rely on you, and ask you for help when they needed to."

These results go well beyond the educational theories that state the importance of stories in transferring tacit knowledge and speak about relationships and human connections. In addition, being involved in stories and moral dilemmas help in emphasizing the moral behavior and give the students' the chance to take different roles and experience various situations.

6 Conclusion

There has been significant interest in deploying narrative in education. Narrative provides a good medium to transfer tacit knowledge, create enriching experiences for its users, and sparking problem-solving skills. Many narrative-based educational systems have been discussed highlighting the shortcomings existed. An adaptive educational interactive narrative system, AEINS, has been introduced that

addresses those shortcomings and aims to help teaching in the ethics domain.

AEINS integrates multiple interactive narrative techniques and n intelligent tutoring technique in order to provide an adaptive engaging learning experience. Two types of narrative were used; the first type is graph structured teaching moments with non-interactive story presentations that are interleaved with student's decision points. The teaching moments are selected and presented in a way that allows the student to draw analogies from one problem to another (if needed). The second type is the run-time dynamic generated narrative, which aims to connect the teaching moments together and form one continuous story.

AEINS offers a safe environment that encourage and recruit situated, experiential, and embodied forms of learning and thinking. It offers the required privacy and an environment that the children can explore. It allows the inclusion of different dilemmas that the student can interact with and learn from, and hopefully transfer what he learns to the real world. Most importantly it offers learning at the student's pace and adaptation that provides personalized teaching and feedback.

The evaluation of AEINS shows positive results starting from being engaged with the environment passing through interacting with an adaptive learning process to developing new ideas and thoughts about basic ethical values. Overall, we believe this research provides students with a practical means of exploring abstract issues in concrete settings and allows students to practice making ethical decisions in a realistic context.

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