Modelling Well-Mannered Society with Emotional Agents to Promote Students' Learning

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Abstract— Emotions play a critical role in the day to day activities of humans, especially children. Emotions are instinctive feelings identified from reasoning or knowledge. They have the power to express intense feelings. Emotional agents in a virtual world can be used to attract, inspire, motivate, stimulate, encourage and energise children's way of thinking and guide their behaviour. This undergraduate research focuses on modelling well-mannered society with emotional agents to promote student learning. Here, Well-Mannered society is defined as children with rational behaviour and advanced cognitive and analytical skills. To explore how emotional agents in the educational game setting would be used to create a well-mannered society in order to promote students learning as a positive influence, this research adopts Skinner's Operant Conditioning Theory to deal with behaviours based on positive and negative reinforcements. We designed a simulated computer game to model well-mannered society. This research used StarLogo TNG, a modelling and simulation software used to create agents and 3D graphics in a simpler way as a programming tool. The designed simulation game contains several emotional agents to promote student learning. This phenomenon encourages students to have good manner and attain a positive success. Future work will adopt EBDI (Emotion-Believe-Desire-Intention) model as the design prototype for emotional agents, and the results will be used to analyse what kind of emotional strategies will help to promote children's learning.

Keywords— Emotional Agents, Interactive Virtual World, Emotional Intelligence, Emotional Competence, Virtual Agents, Interactive Characters.

I. INTRODUCTION

Emotional agents are specifically designed basic proxies which express humans' affective state of consciousness through joy, fear, sorrow, hate, like etc. in a symbolic platform. The main emphasis of giving attention to emotional agents in developing consumer adaptive intrusion has long been the appreciation of certain designs and arrangements towards some specific values [1]. These core values intrude personal purposes according to the arrangements of consumer activity [2]. This research addresses the relationship between people's thoughts, understanding and actions using emotional agents. Previous research on emotional agents were mainly for educational and entertaining purposes: however this research focuses on the advantages of using those emotional agents to design well-mannered society.

Since there is a strong relationship in interactive characters between people's emotions, thoughts and actions [3], it is important for children to learn how to understand those terms and how to react towards those specific actions. Negative emotions can be the cause or the effect of problems with learning [1]. As people's emotional state has the power to influence their thinking, emotions also have the power to emphasize their thoughts [4]. Students can perform more effectively when they feel happy, motivated and influenced by positive environments. Emotions have the power to energize students' way of thinking and guide their behaviour to attain a certain goal. One of the basic skills students should develop is Emotional Intelligence (EI) [5], which is defined as the ability to perceive, control and evaluate emotions at a certain degree. Some researchers suggest that emotional intelligence can be learned and strengthened while others claim it as an inborn characteristic [6]. Hence, our research group support the idea of attaining emotional intelligence through education and training.

The simulation game is based on EI competency, which brings a change on people's thoughts and behaviour. An Emotional competence is a learned ability based on emotional intelligence that gives outcomes in outstanding performance and a rational change [7]. In addition on measuring how much of those skills a person has developed, emotional intelligence also analyses how much of a potential needed for that specific change a person has realized.

II. RESEARCH BACKGROUND

Emotion is described as an on / off switch for learning [8]. Using emotional agents, interactive virtual worlds offer a highly energetic intermediate for practical and theoretical learning [9]. Since there is a strong relationship in interactive characters between people's emotions, thoughts and actions [3], it is important for children to learn how to understand those terms and how to react towards those specific actions. Emotions have the power to energize students' way of thinking and guide their behaviour to attain a certain goal. Children can perform more effectively when they feel happy, motivated and influenced by positive environments. B.F. Skinner [10], strongly suggests that behaviours are controlled

by consequences. Reinforcements, positive or negative play a very important role on the decision-making process of children. One of the best ways to boost motivation is by offering reinforcements to those who deserve it. Rewards help in most circumstances but sometimes they do not give the necessary outcomes in order to motivate that specific individual. Therefore, we have to be careful in our rewards in order to keep the individual motivated using the emotional agents [11]. Offering a reward to people for which the game is designed is found to be more helpful as a motivating factor in providing the needed information and on attaining the target [12]. For instance, on Figure 1 the Emojis help to encourage the children to express themselves in an appropriate time/place/manner, without fear of ridicule [13]. Additionally, such emotional agents are used to express feeling in an easier way like anger, happiness, feeling depressed, drowsiness and affection etc.

Figure 1. Emojis as expression of emotions to express personal feelings

A. THE OPERANT CONDITIONING THEORY

Operant Conditioning is a strategy of learning in which responses that are mainly voluntary become manipulated by their consequences. This kind of learning technique is called "operant" because the behaviour has a fundamental effect on the environment in which it is being implemented on [14, 17, 18, 19]. Operant Conditioning Theory was first developed by an American psychologist B.F Skinner. Skinner explains its principles by positive as well as negative reinforcements [15, 18, 19]. Positive Reinforcement strengths the behaviour, increasing the chance of incidence of the specific task by introducing a positive stimulus after the behaviour has occurred. While Negative Reinforcement strengths the behaviour by removing a negative stimulus immediately after the behaviour has occurred. For instance, if a teacher gives a student 5 points each time he/ she complete his/ her assignment (i.e. a reward) the student is more likely to repeat this behaviour in the future, thus strengthening the behaviour of completing the assignment. This type of learning enables the individual to survive in a dynamic environment in which the consequences of their actions may vary. This can be associated with the Pavlovian conditioning theory, in which learning specific task is limited to receiving some kind of reinforced stimulus that provokes the inborn behavioural reply [16]. Our simulation model we tried to reinforce both positive as well as negative reinforcement as a primary motivation factor for the user. This helps the player/ user to be on track and be alert while playing the simulation game with caution as for the negative reinforcement and be excited to receive the final prize, which is the positive reinforcement.
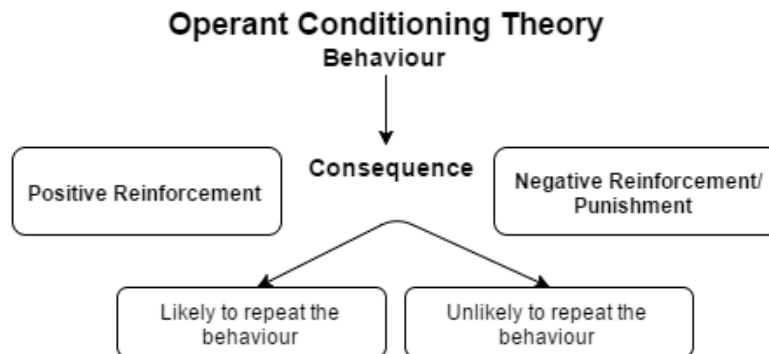

Figure 2. Chart of how Skinners Operant Conditioning Theory functions

III. THE USE OF EMOTIONAL AGENTS IN DESIGNING A WELL-MANNERED SOCIETY

Nowadays, children are more manipulated by different kinds of video/computer games and it is becoming more important to add emotional agents in order to educate and influence them positively. An increasing number of researchers are working on the prospective for computer games to augment interactions with the computers [20]. Computer games have mostly always been connected to learning as well as education [21]. When EAs are introduced on a virtual game setting the probability of attaining the objective of the computer game is highly plausible [12, 20, 22]. As we mentioned earlier, much research has been done on how to use emotions for educational purposes. Instead of focusing on how to educate the user, this research mainly emphasizes on applying emotional agents to design a well-mannered society.

Operant Conditioning Theory explains well on how a person needs to be motivated to achieve a goal and what kind of reinforcement is needed for an individual to keep himself/ herself track of their level of achievement. Even though a child performs well on his/her education, he/she might encounter difficulties being engaged in social interactions, leading them on gaining bad habits. Though several research are made on emotion modelling, few cases of this research have moved into game-based training environments. A reason for this is the trial in both modelling how emotion interacts with reasoning along with physical and emotional behaviour of the user [23].

Being well-mannered has a wide range of meaning. Performing well at school does not guarantee someone on being successful. Success in its literal meaning is defined us to achieve one goal, to have a healthy life, to acquire what you certainly be admired to achieve and to enhance the solution for the problem that has to be deciphered. We connected the idea of success with well-mannered society. Well-mannered society can be defined as a society that can be supportive, compassionate and role model for oneself and others. Emotions are the expressions of once inner situation as well as modes of communication within a society [19, 24].

One of the possessions that we have supremacy over children is that we can influence them positively and show them the adequate ways to behave. One of the effective ways we can use to enhance this phenomenon is using emotional agents as their role models. Therefore, we used a simulation game designed using StarLogo in order to inspect the influence of emotional agents on users.

A. *DESIGNING A SIMULATED EMOTIONAL/RATIONAL AGENT PLATFORM*

The design idea of emotional agent platform to visual cues in virtual agents have the power to influence how the child feels based on levels of achievement. Virtual Agents (VA's) are software services that involve in computerized dialogues with customers in self-service environments [25]. As we can see from the figure below, the platform contained five key features to control the capacity of psychological preparations of a person for a better behaviour which indeed help to build well-mannered society. In order for a society to be well-mannered, there should be a psychological preparation based on the rule of conduct. To attain psychological preparation, there are prerequisites such as increment in motivation, getting a reward, having excitement and acquiring knowledge. Psychological preparation is the main ingredient on fulfilling a required task [26]. These prerequisites lead to a psychological preparation which makes one person to work hard and improve his/her behaviour.
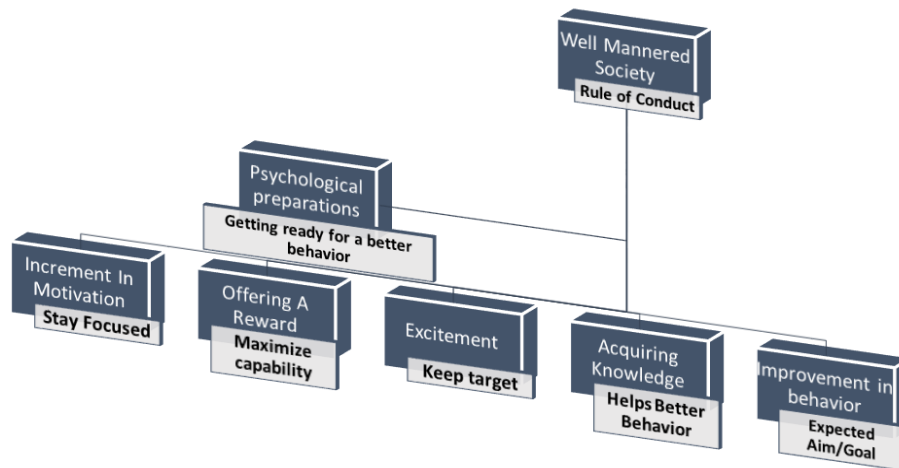

Figure 3. The simulated emotional agent platform

B. *Simulation Game Model*

The objective of the game is to influence children's professional manner which will help them to behave appropriately. The game is a model of a life path that most people pass through. As we can see from the figures below, we used many agents to interact and engage with children's feelings in order to influence them positively. We used StarLogo TNG, a modelling and simulation software which is used as a tool to create and understand simulations of complex systems, 3D graphics and sound. We used this software because it has a user-friendly interface and keyboard input that makes it a great tool for programming educational video games.

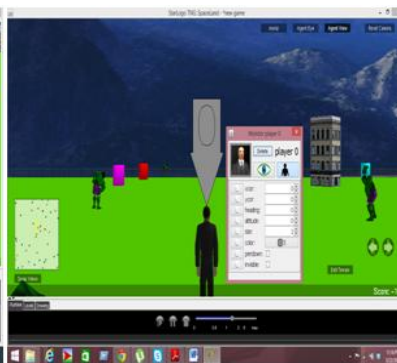Figure 4. Controlling Commands   Figure 5. Monitor Player

The above figures depict how the StarLogo Program can be used to construct a simulation. Specifically, Figure 1.4 shows the commands used to control the player. And Figure 1.5 shows the monitor player. In this case, the professionally well-dressed player is used as the main agent and modelled specifically to be an example for children in order to show them the ways of attaining success. The resulted program also includes other interactive and formidable agents that exist

in the environments as a positive and negative influences, respectively. While the colourful interactive agents express a motivating and inspiring factor, the negative, weirdly looking agents are expressed as a challenging factor in order to keep the user active and alert, which are interpreted as the influence existing in the environment. In both cases, while the children are trying to win the game, they will acquire a high level of rational reasoning and intelligence. This feature will make an impact on designing well-reasonable and bright future generation.
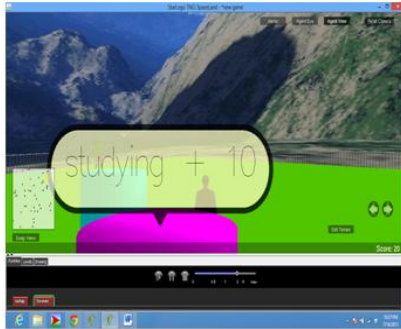

Figure 6. - Gaining Points   Figure 7. Losing Points (Negative reinforcement)

Figure. 8. - Reminder for achievement   Figure 9. – Prize (Positive Reinforcement)

The above figure illustrates how the game is designed and how it works. The arrow keys are used to play the game. The aim of the game is to get into the building which is labelled as Success Building. Once the game is started, the player has to move around in order to get scores. When the player goes through the colourful boxes which are superscripted as studying, the player will get 10 points. On the other hand, when the player gets in contact with the partying agents, he will lose 10 points. To get into the Success Building the player has to have at least 100 points. Once the player gets into the building the player will get a superb reward, which is a car. As we can see from the figures, the player (the main agent) dressed professionally, the attractive agents presented in colourful ways are used positively, and the scary agents symbolize the wrong way of life which is partying, presented in an unattractive and negative way. We also used different kinds of sound effects in order to stress the effect of gaining, losing, and rewarding process of life.

IV. CONCLUSIONS

In conclusion, this research paper strived to address and state the effective approach of using emotional agents in order to create a well-mannered society. It managed to show the specific ways to influence children in a professional manner which will help them to behave appropriately, instead of amplifying how emotional agents are used for educational purposes. The paper first instigated how the emotional agents can be used as a power for good and success professional wise. Then, it headed on explaining the use of emotional agents and the use of reinforcements as a concern by a means of the specific game, designed using StarLogo simulation software.

Although the simulation program has not been practically tested on children, it is expected that it will produce a preliminary result as it managed to show the specific ways to influence children's behaviour in a professional manner. This research and idea need to be given more resource in order to be done explicitly. It is an area which needs more attention and study. It should be stressed more on making the emotional virtual agents a role model for children. Since the simulation game is designed on simpler base, the results are preliminary. However, the research we conducted and the simple sample game we built showed us the best strategies we should apply in order to have a positive influence on creating well-mannered younger generations.

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