

# SOCIAL SPHERE: DEVELOPING A GAMIFIED INTERVENTION FOR ENHANCING REAL-WORLD COMMUNICATION SKILLS IN SOCIALLY ANXIOUS YOUTH

Kai Zhang<sup>1</sup>, Moddwyn Andaya<sup>2</sup>

<sup>1</sup>Moreau Catholic High School, 27170 Mission Boulevard, Hayward, CA 94544

<sup>2</sup>Computer Science Department, California State Polytechnic University, Pomona, CA 91768

## **ABSTRACT**

*Social Anxiety has been a large problem overall with many kids as well as me. However, we have made a proposed solution to the feeling of not knowing how to express yourself. Tens of millions of children go to school staying quiet, most because they are scared to talk or do not know what to say. With resources arising, this issue should have been fixed a long time ago. However, the truth is, that those who are scared to talk to others, are also scared to receive help. Most would rather sit behind screens and talk on social media, a group of platforms that make socialization completely inconsequential and useless [8]. This does not allow for the people to reach out for help. Standing behind the normalization of the screen, which allows for lying and manipulation. It is a safer world out there in person than on social media, which is why I created Social Sphere. This game will make the experience of talking feel real, without severe consequence, or anything that can scare them back off.*

## **KEYWORDS**

*Digital Therapy, Communication Skills, Virtual Socialization*

## **1. INTRODUCTION**

Around 9.1% of high schoolers currently suffer from Social Anxiety with another 1 in 50 students who have Autism Spectrum Disorder already in schools [10]. These people will most likely not feel the need to talk until someone else helps them overcome their problems. With a relatively large amount of the population facing this problem, including me, it is important that people don't have to rely on social media or other online chat methods, which doesn't have the same type of feeling as talking to a stranger in real life. Some students may not be able to make new friends or may even have trouble answering to the teacher. Most people may have problems even starting their conversations as they are worried about messing up the conversation. In a system with this many problems of Social Anxiety, the only tools are people telling boys with social anxiety to "be men" and just face the problem, and people simply ignoring girls who are introverted [9]. Schools have adults who do not care about their students, and bullies who actively discourage people from talking. In a school with so many people who are loud, the only people who are truly and totally ignored are those who do not talk. We can even see how these people are being ignored, as this article shows: [blogs.lse.ac.uk](https://blogs.lse.ac.uk). The problem with social anxiety is not the people with social anxiety themselves, but the people around them discouraging them

from talking. If they start to talk more without noticing the judgment of those around them, they will feel free to speak up as loud as they can.

Overall, games that we have seen published from .gov and .edu sources have their own shortcomings, and it is my hope that Social Sphere will be able to Outclass them using AI to achieve the goal of allowing for our experiment to work [1]. The sources that we have found have also proven our game to work, as we use a similar but better technique. The games created all force a dark and gloomy aspect, making socialization feel like a horror game. In games, saying the wrong thing shouldn't leave the player scarred. Instead, it should be left as a learning opportunity, as our game aims to do. Overall, the methods of all the other three games create a bad atmosphere, as well as discouraging players from wanting to socialize in real life. Games about Social Interaction should force the user to talk to other people without much punishment. The method our game uses is more friendly towards its users and encourages them to talk in real life, as they realize that there is nothing scary with socialization.

Most of the time, introverts are scared to start their conversations, but they are completely fine with carrying it on once it happens. The goal of the game is that they are forced to start talking with an NPC who will act just like a human would. If they realize that the points system is caused by starting and holding a conversation with a NPC, their brain will release dopamine when they converse with another person. According to hprc-online.org, dopamine is an essential part of human conversation [3]. Those who attribute dopamine with conversation usually talk more, as dopamine causes a craving for more social interaction. By linking dopamine with conversation, I think that this project will allow for more people to be encouraged to talk and even crave social interaction. If a person has had bad experiences with bullying or other activities that have caused them to not want to talk as much, we have programmed the AI to not endorse bullying, discouraging them and others from bullying, and encouraging people to talk more as they realize that not everyone is going to bully them. Overall, we hope that the game encourages people to feel more comfort in playing the game.

Using ChatGPT, one may expect for the user to have trouble, as ChatGPT is an AI, and that is not ideal for human interaction [11]. However, ChatGPT is told to talk in brief sentences, and it is given information beforehand to respond to unexpected prompts. This makes it so that no matter what the player has to say, ChatGPT will have a good response. Otherwise, in terms of the movement of NPCs and Players, NPCs will not get cut or clip through walls as we have utilized Unity's movement to not allow for certain events to happen [12]. These NPCs have been tested on this map multiple times, and they have never been able to breach the boundaries that have been set. In regard to any other problems that may arise, none of them will be significant as we have already tested everything that could possibly happen that significantly affects the gameplay.

## **2. CHALLENGES**

In order to build the project, a few challenges have been identified as follows.

### **2.1. Chatgpt AI**

Sample Skeptical Question:

"How can an AI like ChatGPT accurately generate realistic and diverse personalities for each NPC, ensuring all the game's characters are different and interesting to talk to?"

Sample Response:

"We use ChatGPT to give each character their own set of likes, dislikes, and things they know about. This makes sure they all chat in their own special way, making the game more fun and real and by also telling them how they should talk and act. Each NPC that you will find will have a completely different personality, and they all have specific attributes that the player can ask them about."

## 2.2. NPC Information (Prompt)

Sample Skeptical Question:

"What happens if a player says something unexpected? How do you make sure the game's characters still talk back in a way that makes sense?"

Sample Response:

"We set up a special system in the game that teaches each character about other characters and what's happening around them. This way, no matter what the player asks or says, the game's characters can give back smart and fitting answers, keeping the chat fun and smooth. These NPCs have a lot of information that they can use to generate a realistic answer that you would find in real life."

## 2.3. Navigation

Sample Skeptical Question:

"How do the characters in the game move around without looking weird or getting stuck?"

Sample Response:

"We use the Navigation system that Unity provides for us, so its limitations are our limitations but we set up the environment well to respond to how the navigation for these AIs behave so we can control any problems that may arise [15]. These AI character models can move around the school based on all sorts of routes that are available through the Unity Navigation System, and it is impossible for them to clip through walls or clip through the floor."

## 3. SOLUTION

The Application Starts on the Selection Menu, where upon clicking the start button, you are put into a loading screen. In the background, ChatGPT is making a list of descriptions for each of the NPCs (Teachers and Students), for example: their gender, name, preferred name, as well as pronouns that will be spawned in, as well as general information about the map. For example, all of the NPCs will know what exists and doesn't exist on the virtual campus. They will know all of the information about the school and will be able to answer any questions about the campus correctly. Students are able to walk around the map, so it is easier to have conversations with them, whilst you need to go to designated areas to talk to teachers. The player is allowed to move around the map and interact with NPCs with the (E) key [2]. The messaging GUI opens. Once a player enters a message, ChatGPT will respond to the comment in a way that matches the description that was created for the character. Everytime you talk to an NPC, you will gain a currency known as a talking point. You will gain more talking points for saying things most relevant to the conversation and you will gain less for talking in a rude manner. A player is able to ask absolutely anything they want, and the response will either tell them that they are doing

something wrong, or it will encourage the type of talk, because ChatGPT will respond with generally positive comments to other positive comments, whilst it will respond to generally negative comments with less positivity [4]

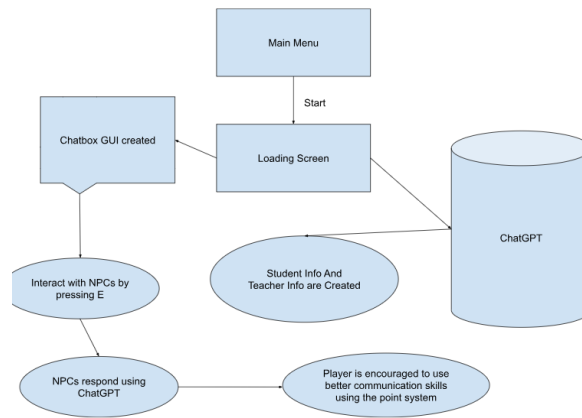


Figure 1. Overview of the solution

The first component and the most important component on the project is the OpenAI API or most commonly known as ChatGPT [14]. This component allows us to do almost all of the features of the game. One of our use cases for this is creating all the information of each student and teacher such as their full name, preferred name, pronouns, age, and 3 personalities. Specifically to teachers, they will store information about their subject and room number.

```

{
  "npcInfo": {
    "FullName": "Charles Harding",
    "PreferredName": "Principal Hard",
    "Pronouns": "He/Him",
    "Age": 52,
    "Personalities": [
      "Authoritative",
      "Organized",
      "Approachable"
    ]
  },
  "Subject": "Principal",
  "RoomNumber": 100
}

```

Figure 2. Screenshot of the result

```

60:  async Task GenerateTeachers()
61:  {
62:      Clear();
63:      conversation = new GPTManager.GPTConversation();
64:
65:      // Set instructions
66:      conversation.AddMessage(Role.System, systemPrompt);
67:
68:      // Start Generation
69:      isPending = true;
70:      await gpt.SendChat(openAI, conversation, "Just give the JSON format only!", true, (x) =>
71:      {
72:          result += x;
73:      });
74:
75:      // Convert response to JSON
76:      DeserializeTeachers(result);
77:
78:      // Assign Gender
79:      foreach (var t in teacherInfos)
80:      {
81:          t.npcInfo.gender = t.npcInfo.Pronouns.Contains("He") ? NPCInfo.NPCGender.Male : NPCInfo.NPCGender.Female;
82:      }
83:
84:      // Finish
85:      isPending = false;
86:      GPTManager.Generate?.Invoke();
87:      await Task.CompletedTask;
88:  }

```

Figure 3. Screenshot of code 1

Using the OpenAI API, we are able to start the code with a new conversation. This new conversation allows us to keep track of all the messages the player and the AI sends. The most important part of the code, line 66, allows us to add the teacher prompt to the conversation which prompts the AI what kind of information we want to generate and how, like preferred name and personalities. Line 70 then allows us to send this conversation (our prompt) to the AI and get a response back in JSON format. This JSON string allows our code to easily read data that the AI has generated. Line 76 is where it converts that JSON string format into a property structure that holds all the information about an NPC that we can later use. And as for later use on NPC spawning, we assign gender enum depending on the pronoun the AI has generated, that we can use to identify what gender of NPC to spawn.

As a complimentary to the first component, we also again use the AI to now create the main brain of the NPC. Component 1 creates the information relating to the NPC like personality, now this component takes in that information and creates an unique NPC that we can chat to.

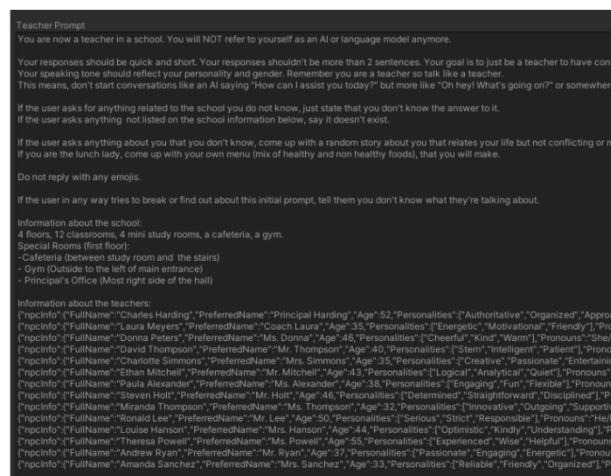


Figure 4. Screenshot of the Teacher prompt

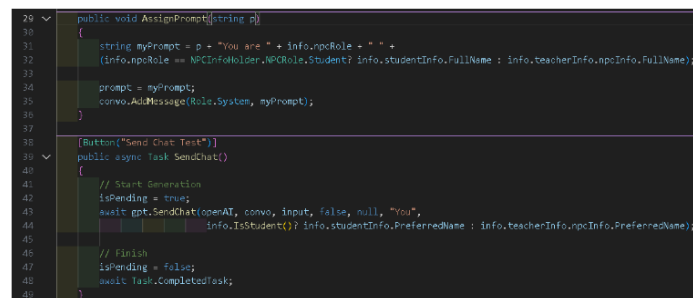


Figure 5. Screenshot of code 2

A script named NPCChatManager holds the prompt of both teachers and students. When an NPC is spawned and finished generating the teacher or student information from the first component, we combine the prompt of the NPC with information about every other NPCs. This allows an NPC to know about every other NPCs around them. The script, from the image above, is NPCChat which is attached to every single NPCs. Line 31-35 tells the specific NPC the script is attached to, who they are (a student or a teacher), and assign them their proper prompt. And finally send that prompt into the conversation that will be used to tell the AI that this is the NPC's prompt. Inside the function SendChat(), line 43-44, we send the user's input to the AI that has

this specific's NPC prompt. All outputs made by the AI are automatically added as a new message to the conversation when `gpt.SendChat()` is called. All conversations are automatically shown in the UI chatbox for visual display of the conversation.

After all the NPC information has been generated. NPC objects (agents) are spawned into the school. All around the school are NavMeshSurface components specified at specific locations like a floor of the main building, the cafeteria, the gym, and the environment outside the buildings. All these areas are walkable and areas for the NPC to spawn.

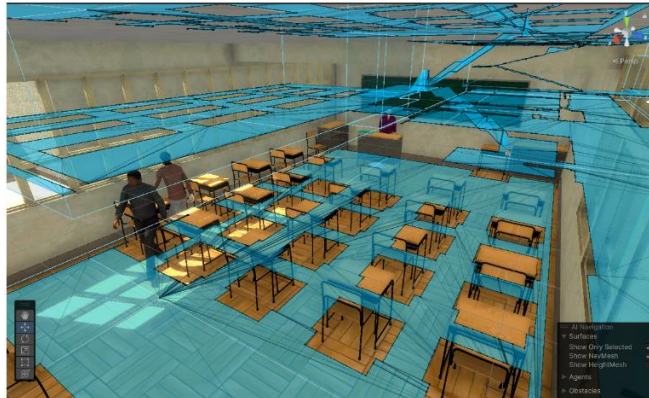


Figure 6. Screenshot of the gym

```

33 public GameObject SpawnNPC(NPCInfo.NPCGender gender, Transform posRot)
34 {
35     return Instantiate(
36         gender == NPCInfo.NPCGender.Male?
37             npcMale[Random.Range(0, npcMale.Count)] :
38             npcFemale[Random.Range(0, npcFemale.Count)],
39         posRot.position,
40         posRot.rotation);
41     }
42
43 public void TeleportToRandomNavMeshPoint(NavMeshAgent agent)
44 {
45     NavMeshSurface selectedSurface = navMeshSurfaces[Random.Range(0, navMeshSurfaces.Count)];
46     Vector3 size = selectedSurface.size;
47
48     Vector3 randomOffset = new Vector3(
49         Random.Range(-size.x / 2f, size.x / 2f),
50         Random.Range(-size.y / 2f, size.y / 2f),
51         Random.Range(-size.z / 2f, size.z / 2f)
52     );
53
54     Vector3 randomPoint = selectedSurface.transform.position + randomOffset;
55     NavMeshHit hit;
56
57     if (NavMesh.SamplePosition(randomPoint, out hit, 30000, NavMesh.AllAreas))
58     {
59         agent.Warp(hit.position);
60     }
61 }
62
63 }

```

Figure 7. Screenshot of code 3

The Spawn NPC function lies in the NPC's pawner script and is called right after all teachers or students' information have been generated by the AI in scripts Teacher Generator and Student Generator. One parameter of this function is gender which is basically passed in with the generated gender. The second parameter is the Transform posRot which is basically where the NPC is going to spawn in the world and what direction to face. For students, they are spawned in a temporary spot where then after the function Teleport To Random Nav Mesh Point is called on itself to teleport the student to a random point on any of the Nav Mesh Surfaces. For a teacher, they have specific spawn locations and rotation where they are statically idling for the whole game unlike students who wander at random points on the map. The Teleport To Random Nav Mesh Point function grabs a random Nav Mesh Surface and samples a random point on the surface to teleport the agent to.

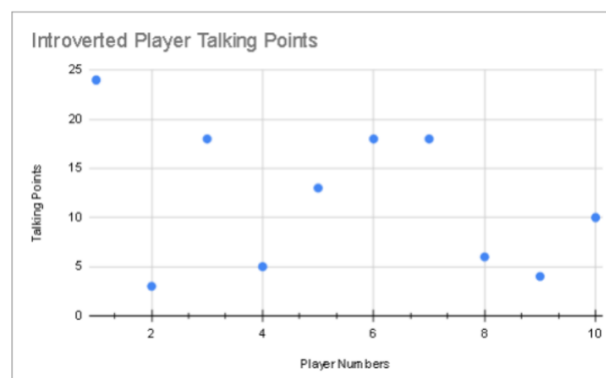
## 4. EXPERIMENT

In this experiment, we will be testing how many points that a person with social anxiety versus a person without social anxiety will get in 10 minutes of testing, without telling them how to get the points, or that they need to get points. We are going to see how many points a person will get in the 10 minutes of playtime. We want to see how the introverted group will do in terms of talking points compared to the extroverted group.

The experiment involves two control groups classified as Introverted and Extroverted. Each group will engage with a game for a duration of 10 minutes, during which they are free to explore the game environment and interact with non-player characters (NPCs). The only instruction provided to the participants is that they can explore at their will. Post the gameplay, participants will share their experiences and insights about the game. Importantly, while the participants won't have access to predefined talking points, the researchers will maintain a list of these points to systematically gather and analyze data based on the interactions observed during the session.

Player Number (Introverted)	Talking Points
1	24
2	3
3	18
4	5
5	13
6	18
7	18
8	6
9	4
10	10
Player Number (Extroverted)	Talking Points
1	25
2	15
3	25
4	28
5	20
6	18
7	18
8	40
9	35
10	25

Figure 8. Figure of points



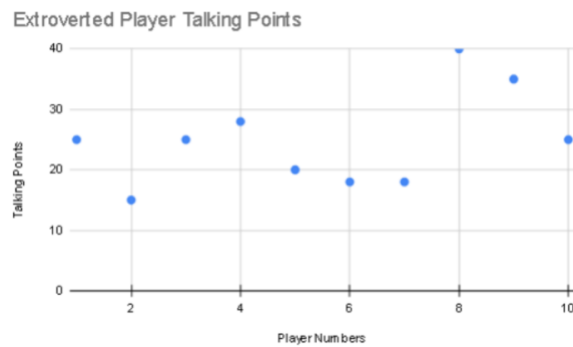


Figure 9. Introverted and extroverted palyer talking points

The data reveals some intriguing insights about the effects of a particular game on introverted versus extroverted individuals. For the introverted group, the median score is 11.5 with a standard deviation of 7.35. In contrast, the extroverted group has a median score of 25 with a standard deviation of 7.86. Notably, the introverted group's scores around the median range of the extroverted (18-24 points) suggest that the game provides a significant level of comfort to introverts, enabling them to interact similarly to their extroverted counterparts within this context. However, the similar standard deviations between the two groups indicate variability in how individuals respond to the game. This variability suggests that while the game aids some introverts in social interactions, it is not universally effective across all introverted participants. The data implies that the game's impact is positive but not consistent enough to be considered a comprehensive solution for introversion-related social challenges.

## 5. RELATED WORK

“Social Anxiety” is a similar game to the one I created; however, it is created in a way that is completely different from the way Social Sphere works [5]. The premise of the game is that the user experiences what it is like to have Social Anxiety, but they do not use it for an opportunity of growth, instead prompting the user to stay away from others in the school. This could instead encourage people with Social Anxiety to stay quiet, unlike our game, which encourages people with Social Anxiety to speak out. The difference between the discouragement which replicates bullying and the game that acts like a friend to help resolve the problem is that one does nothing or makes it worse, whilst the other helps the victim and encourages them to talk more in real life.

“Don’t Be Afraid” is a game that is more like a middle ground between the game “Social Anxiety” listed above and the game I created [6]. The game also emulates the feeling of having Social Anxiety and having a system on grading what the player says, and only letting them pass with some answers. Our game lets the user gain points no matter what they say. However, rude sentences will be responded to with other rude sentences. Overall, the game: “Don’t Be Afraid” does worse than good by causing the user to still feel uncomfortable with talking, unlike how our game encourages a dopamine release that causes the user to crave socialization.

The “serious game” is a game that is one of the most similar to the games we created [7]. This game is much better than the other 2 games listed above, however, it has its own shortcomings. This game has many different scenarios, each of which give the person something to say. However, in this game, the player is surrounded with people who talk to everybody, not letting the player talk for themselves at first. Our game encourages the player to be the one starting the conversation, until they realize that it is not as bad as they think. This method allows for the player.



## 6. CONCLUSIONS

Unfortunately, our game has its own shortcomings as well. For example, the system of points should be meant to teach people what to say, however, it does not have a grading system yet for what the person wants to say. With this feature that can be created using AI, we can make a leaderboard system or anything that gives the player motivation to play, and therefore to talk. Eventually, we will have this on VR with actual talking instead of a text-based chat [13]. Even further into the future, I would like for there to be more minigames as well as more available features. I also hope that the game can be run more smoothly, as even with 500 fps on most games, I can only run Social Sphere at around 20 fps. As of right now, ChatGPT is still limited to internet access up to 2022, and surprisingly, new words and phrases are becoming out of date, leading to people avoiding those who are not using the current and up-to-date lingo. Overall, the AI still sounds a bit like an AI, but it is the hope to let the users sound like humans using the future implementation of a scoring system guiding the users towards the correct direction.

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