Designing Interactive Applications for Social Anxiety Scenario Stories for Children with Autism

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Abstract—Individuals with Autism Spectrum Disorder (ASD) often struggle with social interactions and communication. It is challenging for them to understand social cues such as facial expressions, body language, and tone of voice in social settings, leading to social conflicts and misunderstandings. Over time, feelings of frustration and anxiety can make them reluctant to engage in social situations and worsen their communication barriers. This study focused on children with autism who also experience social anxiety. Through focus group interviews with parents of children with autism and occupational therapists, it explores the reasons and scenarios behind the development of social anxiety in these children. Social scenario stories and interactive applications tailored for children with autism were designed and developed. In addition, working with the educational robots, coping strategies for various emotional situations were elaborated on, and children were helped to understand their emotions.

Keywords—Autism spectrum disorder, social anxiety, robot, social scenario story, interactive applications.

I. INTRODUCTION

AUTISM is a developmental disorder that can appear in early childhood, with primary characteristics including difficulties in social interactions and repetitive behaviors [1]. Children with autism often show repetitive and monotonous behaviors, such as hand-clapping and pacing back and forth. In social interactions, they may have difficulty responding to others and forming relationships, as they struggle with empathy and are frequently misunderstood and excluded by others. Furthermore, children with autism act differently regarding emotions, interests, and perceptions than typically developing children. They may display intense emotional reactions, fixated interests, and heightened sensitivity to sensory stimuli in their environment.

The behaviors of children with autism can appear peculiar to those who do not understand them, often leading to social stigmatization. Consequently, these children are more susceptible to bullying in school, social misunderstanding, and exclusion, which make them even more reluctant to engage in interpersonal interactions. Compared with typically developing children, children with autism are 3 to 4 times more likely to experience bullying [2]. The mental well-being of those who are bullied might deteriorate with symptoms of depression and anxiety. As a result, they are also prone to withdraw from participating in school activities and engaging in interpersonal communication and may even refuse to go to school [3].

Children with autism often receive negative evaluations from others in social interactions. The frustration they experience from participating in social activities can lead to further withdrawal. It also intensifies their social anxiety. These children may struggle to express their discomfort and thoughts when encountering social difficulties. Instead, they might react with disruptive emotional behaviors. It troubles those around them and challenges their families and teachers to care for them. To avoid anticipatory anxiety, children with autism often adhere rigidly to established routines and behaviors, using the fixed pattern to circumvent potential anxiety-inducing situations. However, this can lead to missed opportunities for social interaction and learning. Additionally, for children with hypersensitivity, the stimulating school environment can have a negative impact, causing anxiety, distraction, and even affecting teachers in the classes [4].

Daily, it is inevitable for individuals to engage in communication for group life and everyday matters. Moreover, interaction with peers is also an essential part of their lives during school years. Therefore, offering children with autism an early opportunity to learn social skills becomes particularly critical. In this study, we adopted the focus group interview method to interview parents of children with autism and therapists. We explored social stories and interactions of children with autism and used them to create interactive robots and social scenario stories suitable for these children.

II. LITERATURE REVIEW

A. Characteristics and Behaviors of Children with Autism

Children with autism often show either indifference or excessive enthusiasm in their social communication and interactions. They have difficulty responding to social stimuli, understanding non-verbal communication and social cues, and are less likely to share with others or establish relationships [5]. During communication with others, frequently, they may seem inattentive, asocial, or engrossed in their own world. Regarding behavior, children with autism often engage in repetitive and monotonous actions, such as hand-clapping, pacing back and forth, and repeating the same questions. They also tend to have specific requirements for routines and interests, such as fixed walking paths and the placement of objects. Their interests are often limited to the single, repetitive type, such as memorizing traffic signs, routes, animals, and plants [6], [7]. Children with autism may also experience sensory abnormalities. They show unusual aversions, fears, or overreactions to certain environmental stimuli, such as sounds, textures, tastes, and

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World Academy of Science, Engineering and Technology
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temperatures [8], [9]. Some children may also exhibit destructive behaviors, such as temper tantrums, aggression, and resistance [10], [11]. In addition to these characteristics, some children with autism face motor and social skills challenges. Difficulties with gross and fine motor skills include issues with walking posture, balance, and handwriting. Social skill challenges include challenges with imitation and social synchronization [12], [13].

In addition to core social interactions and repetitive behaviors, including perceptual, emotional, and motor difficulties, individuals with ASD often have comorbid conditions. Nearly three-quarters of individuals with ASD also experience comorbid conditions such as anxiety, depression, attention deficit, epilepsy, motor impairments, intellectual disabilities, and insomnia [14], [15]. The high prevalence of comorbid conditions increases the cost of treatment and places a significant burden on families. It also poses more challenges and inconveniences to individuals with ASD. Adults and children with ASD often rely on the support of their parents and caregivers [16], [17].

B. Social Anxiety

Ung et al. [18] conducted tests on 108 adolescents with high-functioning autism (ages 7-15 years), and the results showed that 41.7% of the adolescents also experienced social anxiety. Van Steensel et al. [19] noted that as many as 40% of children with autism have anxiety disorders, among which phobias are the most common, followed by social anxiety and obsessive-compulsive disorder. Social anxiety and autism are tightly connected. When they co-occur, the features of autism, such as fixation and social difficulties, can intensify social anxiety [20]. Individuals with autism often struggle to integrate into social activities, which makes them seem unsociable to others. These factors and others' misunderstandings tend to worsen their social anxiety [21].

Children with autism tend to adhere to routines and habits to avoid anticipatory anxiety-provoking scenarios. While this strategy may help them avoid potential anxiety triggers, it can also hinder their opportunities to participate in social interactions or lead to negative evaluations by others that cause misunderstandings and avoidance.

C. Applications of Robotic Technology

Technological applications can help people with ASD improve their symptoms, enhance attention, and learn social cues. Robots' appearance and interactive capabilities can help improve social interactions and behaviors, especially in enhancing participation and attention and reducing anxiety issues [22]. Unlike humans, robots do not show aversion, impatience, or dislike. For children with autism, robots are often considered more accommodating, approachable, and predictable than humans, and they can help prevent children from experiencing avoidance and anxiety. Compared to traditional treatments, the treatment with robot interventions is often more effective in motivating children to participate [23]. Robots can also serve as teachers for children to help them face various social scenarios. For instance, Efstratiou et al. [24] used

Pepper, a social robot, combined with educational simulations of monetary transactions to help children with autism practice and enhance their long-term and short-term memory and social interaction skills. Costa et al. [25] employed the QTrobot, a socially assistive robot, to explore its effectiveness in assisting children with autism. The results showed that robots performed better in capturing the children's attention.

Robots can provide meaningful feedback based on the content and children's responses and simulate real-world back-and-forth interactions with the children. The predictability of robots can help alleviate children's anxiety. Additionally, robots' autonomous responses and dynamic behaviors can encourage children to imitate, recognize, and enhance their initiative during social interactions [26].

III. Research Methodology

A. Focus Group Interviews

In this study, focus group interviews with parents of children with autism and occupational therapists were conducted to explore the scenarios and behaviors of social anxiety in children. The results of the interview analysis informed the selection, writing, and design of subsequent picture books.

The interviews with parents shed light on children's interactions and daily routines at home, school, and with others to enable investigation into the environments and factors that trigger social anxiety in children. Interviews with occupational therapists provided information about children's interactions with the therapists during the sessions, the arrangement of courses, factors contributing to social anxiety in the consulting room, and how to establish interactions between children and teaching aids in a structured fashion.

Children with autism are more sensitive to emotional and sensory stimuli in their environment. The interview content was compiled to understand the challenges these children encounter daily. Table I shows the interview structure, and Table II summarizes the interview. The Scenario section focuses on the impact of autism on their anxiety in different daily settings, such as different scenarios at school and home and difficulty in changing environments. The Interpersonal Interaction section explores reactions and anxiety issues experienced by children with autism when interacting with family members, siblings, or peers. The Response Strategy section examines the measures parents of children with autism adopt when facing their children's anxiety, including approaches like comforting, rewarding, or using educational tools.

In the analysis of the focus group interviews, factors related to the occurrence of anxiety were categorized and encoded into three main categories, "Scenarios and Reasons," "Emotional Responses," and "Mitigation Methods." Scenario and Reasons focuses on classifying the scenarios and reasons behind which children experience anxiety, such as at school, during therapy sessions, or conflicts with peers. Emotional Responses classify children's emotional expressions, such as crying, withdrawal, and anger, when they experience anxiety. Mitigation Methods explores the strategies and preventive interventions parents and therapists adopt when children experience anxiety, including

World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:9, 2024

companionship, early intervention programs, and encouragement.

Three groups of families and one occupational therapist were recruited as interview participants. The interviews were conducted online and recorded, with each session lasting one to one and a half hours. The interview analysis was coded based on the interviewees, the structure, and the questions. The three family groups were labeled as A, B, and C, the occupational therapist as T, and the researcher as S. For the coding for interview structure, Scenario and Reasons was labeled as P, Emotional Responses as I, and Mitigation Methods as M. Within each structure, questions would be coded in alphabetical order, starting with "a" and interview responses were sorted in ascending numerical order. For instance, responses from Parent A to the second sub-question (2) of Question 1 (a) in Scenario Reasons (P) would be "PAa-2."

TABLE I
INTERVIEW STRUCTURE

Theme	Summary
Scenario	To understand reasons and situations that children experience anxiety, through which to identify the scenarios that cause anxiety in children as the basis for scenario story design.
Interpersonal Interaction	To understand that, in addition to environmental changes, what other reasons and scenarios might cause anxiety when interacting with peers, family members, elders, and strangers.
Response Strategy	To understand how parents soothe children experiencing anxiety, the different technology products parents use, and children's attitude towards the products as the foundation for future development.

TABLE II
INTERVIEW OUTLINE

Interview Theme	Interview Content
Scenario	1. What are the typical social anxiety situations and interaction issues children often experience at home, school, therapy sessions, or other settings? Can you describe the typical scenarios they encounter? What types of behaviors and emotions do they often show at those moments? 2. Do they experience anxiety due to schoolwork pressure? What are the situations that cause anxiety? 3. Do children have specific daily routines at home, at school, or in therapy sessions to help them adapt to everyday life? Please briefly describe their daily routines. 4. What are the typical social anxiety situations when transitioning between settings or entering new environments?
Interpersonal Interaction	1. Has any social anxiety existed in the interaction between the children and the therapist during related treatments? Could you provide details about the situations in which anxiety occurred and the children's state? What types of behaviors and emotions do they often show at those moments? 2. When the children interact with family members, classmates, or friends, do they experience social anxiety? Could you describe the specific situations where anxiety arises and the children's behaviors and emotions during those moments?
Response Strategy	1. Have interventional therapies been implemented to address the children's social interaction issues? If so, what were the approaches and the outcome of these interventions? 2. When children experienced anxiety, were there any specific interventions such as soothing or guidance implemented? Could you describe the details? 3. What kind of help was provided to the children to alleviate their anxiety caused by schoolwork? 4. Has there been a method similar to story dialogues to guide the children in responding to specific social situations at home, school, or therapy sessions? What were the contents and contexts of these dialogues? 5. Following the previous question, were there any complementary teaching aids or electronic devices? What were the children's responses and outcomes?

Focus group interviews with parents of autistic children and therapists allow natural discussions to examine the causes and reactions of anxiety that autistic children may experience in social situations. It also provides a clearer understanding of these children's daily challenges and the hardships parents encounter while caring for them. Additionally, it helps identify the needs of autistic children when dealing with emotional situations and social contexts, which can be valuable for designing and arranging scenarios in subsequent story development.

IV. RESULT OF ANALYSIS

The interview analysis showed that in the Scenarios and Reasons category, factors related to the school environment accounts were the main reasons, including not wanting to attend classes, reluctance to do homework, being easily distracted in class, not wanting to go to school, and conflicts with teachers. Other than school environments, children also experience anxiety in less physical activities such as attending classes,

eating, or sleeping. Under the Emotional Responses category, it showed that when children experience anxiety, they often have behaviors such as engaging in their own activities, repetitive actions, and emotional meltdowns, with emotional responses being the most common. For the Mitigation Methods category, parents of these children often adopted strategies such as incentives and rewards, notices in advance, and preventive storytelling guidance when faced with their child's anxiety.

A. Scenarios and Reasons

Table III shows that children may experience anxiety due to factors including changes in their environment, school influence, and interactions with others. Among these, school-related matters occur the most often, such as not wanting to go to school, conflicts with teachers, and an inability to concentrate in class. Moreover, other reasons include empathy for others, unwillingness to play with peers, and resistance to specific behaviors. When developing applications, the analysis results can be employed to select the most common anxiety-inducing factors in the daily lives of children with autism.

World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:9, 2024

TABLE III
INTERVIEW ANALYSIS OF SCENARIOS AND REASONS

Scenarios and Reasons	Code	Interview Content
Not wanting to go to school	PAb-9	... he does not like being controlled too much; thus, sometimes, he finds going to school not so fun. For example, if we tell him that he has school tomorrow or if he wants to see his teachers at school, he would say he does not want to go to school.
	PBc-6	He is delighted when he goes to therapy. However, even if some classes make him happy, if he does not like the teacher and that makes him unhappy, he becomes very resistant to going to school.
Conflicts with Teachers at School	PBb-7	Nonetheless, his emotions do not just go away quickly. For instance, we took him out of the kindergarten because of the pandemic. It has been a few months, but he still remembers the conflicts with the teacher.
	PBc-6	... even though some classes at school make him happy, if he does not like the teacher and that makes him unhappy, he becomes very resistant to going to school.
Empathetic Feeling	ITa-1	... he would feel that when I am punishing that kid, it is like punishing him. He has a strong sense of empathy that is intense.
	ICa-1	... if he sees other kids get a time-out punishment, even though it is not him who made a mistake, he would still feel anxious and therefore become reluctant to go to school.
	MBb-3	Regarding emotion, for example, he was watching "The Lion King" not long ago. When he saw Mufasa die, he burst out crying. It is not like he cried out of sadness; instead, he immersed himself in the situation.
Not Playing with Peers of the Same Age	IAc-1	This troubles us the most because my child does not like to play with other children of the same age. He prefers to hang out with older kids, like elementary school students or older peers.
	IAc-2	When we first moved here, he did not like to play with other kids of the same age. He played with kids in middle school or high school. At school, he also only hung out with the teachers. When I asked him who he played with at school, he always said with the teachers.

TABLE IV
INTERVIEW ANALYSIS OF EMOTIONAL RESPONSES

Emotional Responses	Code	Interview Content
Focusing on Their Own Things	PTa-5	It is as if he does not care about what he accidentally breaks. You can tell that he does not know how to handle the fact that he breaks something by accident, so he gets stuck. He has no anger but is stuck and starts doing his own thing.
	PAb-2	... he probably gets bored, does not like the teacher, or is not feeling it. Then, he wants to do his own thing. For example, despite a group activity, he would prefer to focus on his own things or get out of the classroom.
	PBb-6	This is one of the main reasons he used to conflict with the kindergarten teacher. Even though he knows you will get outraged and upset, he is still doing his own thing.
	IBc-1	... the teacher noticed that he would not play with any other kids. He was happy playing by himself. Even if someone came to join him, after less than 10 minutes, he would still go to the corner to play by himself again.
Intense Emotions	PAa-4	... if I said something like "put away your meal" or "put it away," he starts to get anxious. For example, he would start crying and screaming or fixating on something I said, like "I will put it away if you do not finish it," and be like, "I want to finish it," and keep crying and yelling.
	PBd-1	... he used to have a terrifying meltdown, like crying wildly for half an hour or an hour, and any situation could break him down. However, he has got much better now... he improves as he grows older, even though he still has some difficulty with changing environments.
	PBa-23	... rolling on the floor, acting crazy, screaming, completely ignoring individuals around, he is just in his own world crying intensely for an hour. However, as he has grown older, he does not have the intense meltdown crying, just looking wronged.
Repetitive Behaviors	PCa-3	... he would practice telling the teacher, for example, to leave early in the afternoon. He might get worried about forgetting it; thus, he would keep repeating the question to me and say, "But I am afraid I will forget." He repeats over and over.
	IBa-7	If we go back to his anxious state, his emotional response is that he keeps going in circles in the same place. If he has toy bricks in hand, he might keep repeating his actions, like tapping the table. If someone interrupts him in the middle, he can have a meltdown.
	ICa-3	For a while, when we were on a car ride, he would constantly clear his throat and say, "Do not go there." Otherwise, it is alright, no temper tantrums.

B. Emotional Responses

Table IV shows that when children face social difficulties or anxiety, they often have more intense emotional responses due to the difficulty expressing themselves. Among these, the most common behaviors include focusing on their own things, avoiding the topic of the conversation, intense emotional reactions, repetitive actions, and resistance.

C. Mitigation Methods

Table V shows that parents would give notices in advance to inform their children and help them prepare for the upcoming activities. Parents also use incentives and rewards to motivate their children to finish more complex tasks quickly. Before the children face social scenarios, parents would also use stories to navigate them through potential social situations.

The interview analysis explained the reactions to and reasons for children's anxiety. The descriptions by parents illustrated various methods to alleviate their anxiety. In addition to the reasons and methods mentioned in Tables III-V, other factors contributing to anxiety include disruptions to rigid routines, difficulties transitioning between environments, problems in greeting others, sensitivity to sound, sleep difficulties, and seasonal changes. Children's emotional responses to anxiety-inducing situations include apparent refusal, nail-biting, making meaningless sounds, and bad mood and depression. Methods that parent adopt to help their children include establishing routines, redirecting their attention, therapy sessions, role-playing games, comforting techniques, and using storytelling and drawing to guide them.

There are many different reasons, reactions, and coping methods for anxiety, and this study adopted the methods emphasized and found effective by parents during the interviews as the basis for designing scenarios stories.

World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:9, 2024

TABLE V
INTERVIEW ANALYSIS OF MITIGATION METHODS

Mitigation Methods	Code	Interview Content
Notice in Advance	PTc-7	It is typically about anticipation. You have to get them into the mindset of anticipation. The arrangement for each kid is specific to their needs, depending on what works better for them. We would adjust the order of their agenda based on their behaviors in the first few classes to make it smoother in the future.
	PBd-3	Building anticipation is essential. Although we have been doing that, it was hard for him to accept it. However, as he has grown older, as long as he has the anticipation, he will accept the changes in environments even though he might not be willing to.
	IBa-11	We have already been preparing for this. For instance, yesterday, his elementary school teacher contacted us and said he was very concerned about his class number. Once we knew he was assigned number fourteen, we began to build up the anticipation.
Incentives and Rewards	PBa-4	Deep down, we already knew that he might be unable to accomplish the goal we set for him. Nevertheless, later on, we realized that effective communication required enough incentives for him to complete the tasks.
	PBa-15	For this situation, I would set a relatively large reward for him. It might be something he wants, like a smartwatch or something similar. However, we wouldn't just give it to him right away. Instead, we might give him a point to achieve, like 1500 points.
	PCd-6	... we have given him rewards before. For example, if he participated in activities six times, he would receive a toy to encourage his engagement.
Picture Book Guidance	MAd-2	Then I would ask him, "Which cartoon did you watch?" or "What did we read in the book?" For example, if character A did this to character B, can we do the same? Such as sharing with classmates, caring for classmates, or what can we say to the teacher when we go to school today?
	MBc-5	Using storytelling to guide him is something both his dad and I do frequently. It could be a picture book or a way to help him empathize and consider the feelings of others. Therefore, the situation is similar to what A's parents mentioned earlier.
	MCa-2	We mostly let him practice and encourage him to express himself. Since teaching aids are mentioned, we also have him read books about social interactions or going to school to allow him to make connections.

V. DESIGN SCENARIO

Through the information obtained from literature and interviews, we understood the reasons behind social anxiety in children with autism. By compiling and analyzing the various aspects mentioned in the interviews, the frequently encountered situations by these children can be classified as follows: general social scenarios such as participating in activities, attending classes, cooperating in non-physical activities and eating; conflicts with same-aged peers, including refusal to play with them, unawareness of social etiquette, overly competitive attitudes, and snatching others' toys; and emotional aspects, such as not understanding emotions or intense emotional behaviors.

With the data from interview analysis as the basis for designing simulated scenario stories, we discussed them with therapists. We decided to adapt existing picture books that address social anxiety with the analysis data considered. Table VI shows the adapted picture books and the corresponding original versions. The stories are designed to address social scenarios and anxiety issues that children may encounter, providing positive feedback on how to handle emotional challenges (Table VII). Interactions with a robot allow children to understand how to interact in social scenarios. The main social scenarios and positive feedback in the story scripts are as follows: In school settings, the story helps children become familiar with school, courses, and other activities, showing school as a happy and enjoyable place. Stories that describe emotions would include feelings such as loneliness, jealousy, and anger, along with reasons behind them. The stories help children understand and cope with their emotions. In superhero stories, children are encouraged to explore and understand themselves, recognize differences between themselves and others, and learn to navigate uncomfortable or confusing scenarios.

After rewriting scenario stories, an application with an educational robot was developed to tell the story. The application was created in Unity with the official robot kit to create a user-friendly interface; the application can provide corresponding emotional actions and real-time touch feedback based on the scenario's stories. The steps of the application are as follows:

a) Click on the start button on the homepage to enter the story selection page.
b) Swipe left or right to choose the story theme, and then click to enter the story-listening page.
c) Include three to four basic questions in the stories, along with two to three situational questions.
d) Select options on the screen to answer the situational questions; to answer basic questions, touch the robot's hands to respond.
e) At the completion of the game, display an exit button enabling players to return to the main menu to select a different level.

The robot's appearance and interactive features were designed to motivate children to learn. With its agile movements and redesigned emotional expressions, the robot tells stories to children with autism in a positive and lively tone. It allows children to effectively learn social interaction responses and skills while interacting with the robot. Images of the application are shown in Fig. 1.

TABLE VI
ADAPTED PICTURE BOOKS AND THEIR ORIGINAL VERSIONS

Adapted Story	Original Picture Book	Author of the Original Picture Book
I Love School	The Things I Love About School	Trace Moroney
I am Not Afraid of Loneliness	When I am Feeling Lonely	Trace Moroney
I am not Afraid of Jealously	When I am Feeling Jealous	Trace Moroney
I am not Afraid of Anger	When I am Feeling Angry	Trace Moroney
Superpower	Isaac and His Amazing Asperger Superpowers!	Melanie Walsh

World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:9, 2024

TABLE VII
STORIES CORRESPONDING TO SOCIAL SCENARIOS AND POSITIVE FEEDBACK

Story Title	Corresponding Scenarios or Anxiety-Inducing Situations	Positive Feedback
I Love School	1. Avoiding school or refusing to go to school. 2. Understanding the class. 3. Participating in lunch breaks, classes, and physical and non-physical activities.	1. Every day at school is full of fun and happiness. 2. The knowledge learned in class is interesting. 3. There is delicious food at lunchtime, and I can have fun with friends.
I am Not Afraid of Loneliness	1. Coping with loneliness. 2. Anxiety during group assigning in class. 3. Potential anxiety when briefly separated from family.	1. Loneliness is not scary, and there are ways to deal with it. 2. Strategies for coping with group assigning. 3. Loneliness is temporary; family and friends will still be around you.
I am Not Afraid of Jealously	1. Coping with jealousy. 2. Understanding etiquette and toy-sharing issues.	1. Reflecting on things you own. 2. Reflecting on the experience of jealousy. 3. Providing methods for coping with jealousy.
I am Not Afraid of Anger	1. Understanding anger. 2. Anger caused by physical discomfort. 3. Conflicts due to interactions with others. 4. Anger due to disruptions or delays in daily routines.	1. Expressions and causes of anger. 2. Providing methods to cool off from anger.
Superpower	1. Anxiety about differences between oneself and others. 2. Feeling uncomfortable with the environment, sound, smell, and other sensory experiences.	1. Helping children recognize differences between themselves and others in a positive and friendly way. 2. Providing methods for seeking help from others.

Homepage

Story selection page

Interactive page

Motions in the story

Scenario questions

Ending page

Fig. 1 Images of the application

VI. DISCUSSION AND CONCLUSION

Children with autism have difficulty establishing relationships with others and may struggle to respond to social situations. They may also experience intense emotional reactions. These children often encounter social challenges daily and might be perceived differently by others due to their unique behaviors. It often challenges caregivers in providing education and care for children with autism.

According to the interview analysis, many causes can trigger anxiety in children with autism. At school, it might relate to classroom situations, reluctance to interact with teachers and peers, and the transition between physical and non-physical activities. Anxiety can also be triggered by minor environmental noises, changes in seasons, routine changes, or interactions with family and friends. Due to a lack of understanding or coping mechanisms, when children with autism experience anxiety, they may react with intense emotions, switching topics, or repetitive actions. In the interviews, parents of these children provided many methods to help the children adapt and learn. With notices in advance, rewards, and storytelling guidance, parents can help them learn how to react to social difficulties.

Based on the categories from the interview analysis, i.e., scenarios and reasons, emotional responses, and mitigation methods, this study aimed to design scenarios for children with autism that help them cope with anxiety-inducing situations, identify intense emotions, and apply mitigation techniques. These scenarios provide positive feedback to children to help them feel less helpless and fearful when encountering similar situations in the future.

Scenario stories can couple with tech products, such as smartphones, tablets, or educational robots, to tell the story through interactive elements, animations, and sound. It creates vivid storytelling that can effectively engage and motivate children.

The causes and reactions leading to anxiety in children vary depending on individual circumstances. Currently, the number and content of the scenario stories are limited. Establishing a system for quick scenario content writing in the future while

World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:9, 2024

maintaining quality and effectiveness can provide children with various scenario stories and help them learn different ways to respond to social situations.

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