

# Does an AI-Designed Emotional Game Benefit Young Students in Terms of Emotional Communication and Expression Skills?

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**Abstract**—With the advent of the digital age, young students commonly use technological tools such as LINE and Instagram for emotional communication and interaction. However, this trend has led to the gradual decline in the abilities of emotional communication and expression among younger generation students. Therefore, enhancing these skills in young students through games is a worthwhile skill to develop. This study aimed to improve the emotional communication and expression abilities of young students through game design, and explored how Artificial Intelligence (AI) technologies in current multiple studies can innovate learning environments and teaching methods, investigating whether games designed using artificial intelligence AI could effectively strengthen the players' emotional resonance, thereby enhancing emotional recognition, empathy, and improving interpersonal communication. To explore this issue, we utilized the ChatGPT-4 (GPT-4) large language model to learn to recognize and categorize different emotional expressions and developed game mechanics through AI. The researchers implemented the game concepts generated by AI, actualized them, and made them available for use by young student players. Simultaneously, the researchers observed the players' emotional communication and expression abilities after interacting with the emotional images and narratives created by AI, in order to assess the feasibility of the game. The study results confirmed that the players felt curiosity and emotional resonance with the emotional games generated by GPT-4. Through participating in the game, the players enhanced their understanding of emotions and promoted emotional expression. This research further provided valuable insights for the development of AI-based emotional games, with the potential for a positive impact in the fields of education and mental health.

**Keywords**—artificial intelligence, ChatGPT-4, emotional resonance, emotional recognition, empathy, emotional communication, expression abilities

## I. INTRODUCTION

The digital technology era has transformed the way people communicate. While it offers easy and convenient communication tools, it may also reduce opportunities for face-to-face interactions and even lead to feelings of social isolation. The abundance of digital information in life can lead to a decrease in deep communication between individuals while neglecting their own emotions and thoughts, thereby increasing feelings of negative emotions and anxiety [1].

Therefore, enhancing emotional intelligence to address these issues has become particularly important. This not only helps in effectively dealing with the challenges of information

overload and digital communication but also strengthens interpersonal communication skills and promotes critical thinking, thereby maintaining mental health and high-quality social interactions in modern society.

In the late 20th century, with the development of Artificial Intelligence (AI) technology, questions were raised about the emotional and empathetic capabilities of AI. Despite being a powerful computational tool, AI lacks human understanding and judgment, leading to skepticism about AI technology replicating or replacing human emotions, empathy, and moral decision-making [2].

However, in the 21st century, with the advancements in AI technology, especially in the applications of emotional recognition and simulation, recent analyses have shown that the latest language models, such as GPT-3 and GPT-4, excel in understanding complex emotions, with GPT-4 even surpassing most human participants [3]. Therefore, the emotional content generated by AI may resonate with human emotions, helping to enhance human emotional intelligence and becoming a fascinating topic of discussion.

## II. LITERATURE REVIEW

AI technology has demonstrated its immense potential in multiple fields, especially in the domain of education where AI can customize teaching content and assessment methods to adapt to students' learning paces and styles, thereby enhancing the absorption and retention of learning. Additionally, AI technology can also provide students with richer learning resources and interactive experiences through intelligent teaching systems and online education platforms. Particularly in the application of emotional technologies, the use of AI in education is expanding [4]. For instance, AI's emotion recognition technology has been utilized to enhance learning experiences [5], and in serious games centered around skill enhancement and training, AI provides creative ideas and solutions in integrating educational elements, thereby deepening the understanding of the learning process [6]. Given the widespread application of AI in emotion recognition and the field of education, we have an excellent opportunity to further explore its potential in the development of emotional games, providing new ideas and opportunities for emotional education.

When AI was first introduced into the gaming sector, its application mainly focused on basic emotion recognition. This included simulating game character behaviors and the

complex programming of emotional responses. Although this stage of AI technology was relatively primitive, it laid the foundation for the development of more advanced emotional interactions and intelligent behaviors.

For example, in 1997, the game *Creatures* innovated game AI by simulating a hormonal system and designing a neural network-based brain for each creature. Subsequently, *The Sims* continued this progression by bringing game characters to life through a complex AI system, enabling them not only to perform tasks but also to exhibit emotions [7]. The progress in AI design was evident in Quantic Dreams' 2010 game *Heavy Rain*, which dynamically influenced the story development and outcomes based on player choices and character states, offering a more personalized gaming experience [8]. In recent years, the application of AI in emotional games has reached new heights. *eQuoo*, released in 2018, utilized machine learning algorithms and natural language processing technologies for deeper emotion recognition and more complex emotional interactions [9]. These games not only respond to the player's emotional state but also simulate real social interactions, providing an immersive experience and serving as a subject for other researchers in studies of improving mental health.

The development of AI in emotional games shows that using AI technology to recognize, respond to, and even simulate human emotions establishes deeper emotional connections with players. In the aspect of emotion recognition and interaction, Ryan Volum and his team applied OpenAI Codex, a specially tuned large language model, to create Non-Player Characters (NPCs) that can engage in free-form dialogue with players and influence game states in real time [10]. Chujie Zheng similarly utilized Large Language Models (LLM) to unlock the vast potential of expanding dialogue datasets. This approach allows dialogue models to adapt and respond more flexibly to various unscripted topics, significantly enhancing their effectiveness and adaptability in open-domain dialogues [11]. In AI storytelling, applications enable game developers to create dynamic and non-linear storylines that adjust according to the players' choices and emotional states, offering a unique experience in each gameplay. Games like *Detroit: Become Human* and *Life is Strange* feature story endings that vary based on player decisions. Other studies, such as those by Yanting Pan and colleagues, combine narrative structures and character development to create game environments that resonate emotionally with the players [12]. A number of research designs also focus on cultivating emotional intelligence, like those by Amirreza Rouhi and others, using machine learning techniques to assist groups needing support in emotion recognition and expression, and teaching how to correctly identify and express emotions [13]. In summary, AI plays a key role in providing immersive storytelling, enhancing social interactions, and fostering the development of emotional intelligence.

From the current research trends, can AI-designed emotional games facilitate emotional communication and enhance expressive abilities? The answer to this question seems to lean towards the affirmative. AI-driven emotional games, leveraging advanced emotion recognition technology and highly personalized interaction methods, provide players

with an immersive gaming environment. This environment aims to increase their attention and perception abilities and may become an effective tool for enhancing emotional intelligence. Ahmed Hassan suggested that serious games designed to improve emotional intelligence need to maintain their appeal in addition to their strong theoretical foundation, as they can fail due to poor implementation [14]. Future studies should focus on balancing the educational and entertainment aspects of games to ensure the participants can effectively improve their emotional communication and expressive abilities while enjoying the game.

### III. METHODS

#### A. Participants

This study recruited seven students from the College of Design at Taipei University of Technology as the participants (three males and four females, aged 18–24). The participants had been trained in visual communication, user experience design, and interactive media, and they were particularly sensitive to the details and emotional elements of game design. Their professional background gave them a unique understanding of games and endowed them with deeper insights into the emotional aspects of games, making them ideal subjects for researching the impact of AI-designed emotional games on emotional communication and expression abilities.

#### B. AI Emotional Game Design

Based on the application of GPT-4 in emotional game design, the design process followed a number of steps (Fig. 1), including brainstorming with AI, defining goals for enhancing emotional intelligence, designing game mechanics related to emotions, developing game objects based on AI analysis, and creating prototypes to test the impact of the game on the players' emotional intelligence.

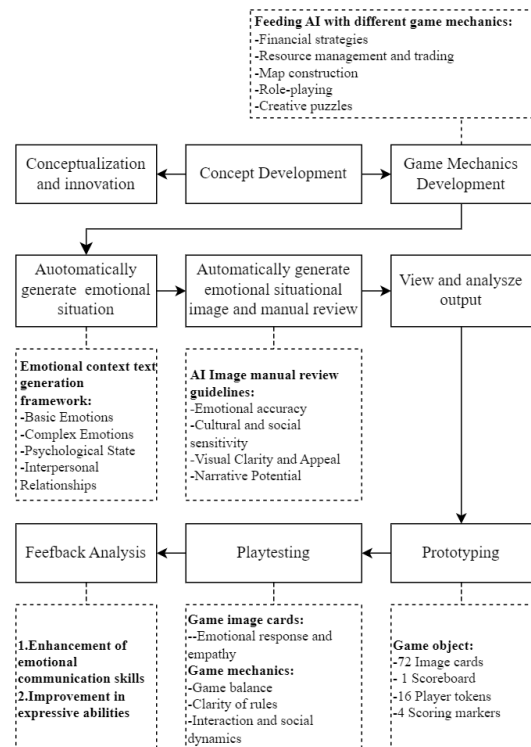


Fig. 1. The design method flow chart

In view of GPT-4’s primary characteristics based on data-driven decision-making, multiple game mechanisms were experimented within the game design to enhance its creativity and feasibility. These included mechanisms related to financial strategies, resource management and trading, and map construction, as well as role-playing and creative puzzle games.

After repeated AI simulations and analyses, we used GPT-4 to create a game titled Emotion Canvas. Its core feature was the use of visual art to explore and express emotions. The game could facilitate emotion recognition through situational cards, guiding players to a deeper understanding of the meaning of emotions. Additionally, through emotional dialogue mechanisms, it could teach players how to appropriately express and understand emotions, thereby enhancing their emotional intelligence (Table 1). The next step after finalizing the game concept was to design the game components. GPT-4 not only provided suggestions on the items and quantities of game objects but also played a significant role in simulating emotional scenarios in language and generating images.

Table 1. Design concept of Emotion Canvas

Name	EmotionCanvas
Mechanics	1 Narrator’s turn: Each player takes a turn as the narrator, who selects an image card and provides an emotional narrative or story related to that image.
	2 Other players pick cards: The other players choose a card from their hand that responds to the narrator’s description.
	3 Guessing and scoring: All chosen cards are mixed and displayed, and the players collectively guess which card is the narrator’s original card. If the majority guesses correctly, the narrator collects all cards; if wrong, the other participants score all cards. The game ends with the player having the most cards declared the winner.
	4 Emotional dialogue: After each round, the players discuss why they chose specific cards and how these images represent or respond to certain emotions.
Objectives	1 Emotional expression and understanding: Through imagery and storytelling, the players learn to express and interpret emotions more accurately and deeply.
	2 Enhancing emotional intelligence: The game encourages the players to understand the diversity of emotions and learn to accept and respect others’ emotional expressions.

In order to create a set of cards representing various emotions or psychological states, this study used GPT-4 to express basic emotions through categorizing them into intuitive and easily recognizable images. It also encompassed complex emotions corresponding to individual experiences, cultural backgrounds, and social interactions. Additionally, it included descriptions of emotional patterns within personal inner worlds and interpersonal interactions. The aim was for the image generation under various conceptual frameworks to enable the players to better understand and express concepts of emotions and stories (Table 2).

Table 2. Image card examples

Conceptual Framework	Emotional Example	Specific Example
Basic Emotions	Happiness	Specific examples
	Sadness	Sunshine on flowers; rainbow shining in the sky.
	Anger	Lonely figure walking in the rain; leaves drifting in the wind.

Conceptual Framework	Emotional Example	Specific Example
Complex Emotions	Fear	Raging fire; sky with thunder and lightning.
	Surprise	Dark forest; unclear shadows.
	Loss	Fireworks blossoming; eyes wide open in expression.
	Love	Empty chair; a departing figure.
	Loneliness	Two hands tightly clasped; heart-shaped balloons.
	Longing	A single shadow on a long road.
Psychological States	Doubt	Person gazing out of the window; a starry night sky.
	Calm	Blurred mirror; question marks.
	Chaos	Peaceful lake surface; silhouette under the sunset.
	Pessimism	Complex lines; maze-like patterns.
	Optimism	Dark clouds in a reflection; head hung low.
	Indifference	Plant growing upwards; a smiling face under the sun.
Interpersonal Relations	Friendship	Empty eyes; a void background.
	Betrayal	Two people holding hands; shared smiles.
	Estrangement	A knife behind the back; fallen chess pieces.
	Competition	Distant figures; views through a window.
	Trust	Chess pieces in confrontation; eyes locked in a gaze.

To ensure the effectiveness of the game, the images were initially screened based on four criteria: emotional accuracy, cultural and social sensitivity, visual clarity and appeal, and narrative potential. This was to ensure that the images would authentically reflect the intended emotions and avoid misunderstandings due to cultural differences. Visual clarity and appeal were key in ensuring the quality of the images. Lastly, the narrative aspect of the images was evaluated, with the best images being those that could tell a story or convey a perspective (Fig. 2).

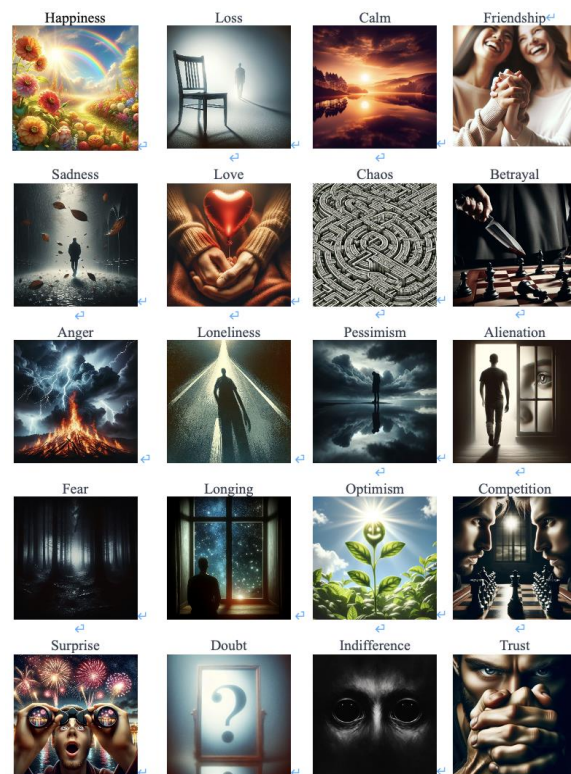


Fig. 2. Image card examples.

### C. Experimental Design

After finalizing the images for 72 game cards, the seven students initially conducted an emotional assessment analysis on the images to verify that the game cards were visually appealing and accurately conveyed the intended emotions and moods. After discarding four images through a screening process (Fig. 3), according to the game mechanics outlined in Table 1, we tested the game mechanics to observe the feasibility of the emotional narratives and interaction mechanisms among the players in the game (Fig. 4). Following the completion of the game, random participants were chosen for interviews, and all participants were asked to complete a questionnaire, to understand the players' experience of the game and its impact on their emotional intelligence, as well as to gain insights into their thoughts and attitudes towards the AI-designed emotional game.



Fig. 3. Evaluating the emotions and moods of the picture cards.



Fig. 4. Gameplay testing.

## IV. RESULTS AND DISCUSSION

After the seven game participants completed the gameplay testing, interviews and questionnaire surveys were conducted with all participants to explore the game's effectiveness in enhancing their emotional communication and expression abilities. The questionnaire was based on a five-point Likert scale, with each question having five scoring options ranging from 1 to 5, representing strongly disagree, disagree, neutral, agree, and strongly agree, respectively. The analysis of the questionnaire survey revealed a number of specific results. In

terms of emotional communication, the data showed significant improvements in the participants' understanding of their own emotions (average score 4.0), enhanced understanding and empathy towards others' emotions (average score 4.3), and strengthened empathic abilities towards others (average score 4.4). In terms of their expression abilities, the participants reported that the game helped them better express their emotions (average score 4.4) and more easily express emotions that were usually hard to convey (average score 4.6), and it increased their confidence in expressing emotions (average score 4.4). These data reflect that the participants experienced a significant positive impact on enhancing their individual emotional communication and expression abilities through the game (Table 3).

Table 3. Descriptive statistics

	Mean	Standard deviation
<b>Enhancement in Emotional Communication Skills</b>		
Have you found a deeper understanding of certain emotions in yourself?	4.0	4.6
Did the game facilitate understanding and empathy towards others' emotions?	4.3	0.8
Did the game strengthen your empathic abilities towards others?	4.4	0.5
<b>Enhancement in Expression Abilities</b>		
Did the game help you better express your own emotions?	4.4	0.5
Did the game make it easier to express emotions that are usually hard to convey?	4.6	0.5
Did the game enhance your confidence in expressing your own emotions?	4.4	0.6

During the interviews, several participants reported feeling excitement and joy throughout the gameplay. One participant mentioned that the emotional game designed by GPT-4 sparked their curiosity and thus drew their interest in the game. Another participant noted that the expressive imagery in the game and the mechanism for guessing their own and others' emotional states deeply engaged them, and making incorrect guesses provided an opportunity for discussion and reflection with other players. Such feedback suggested that the emotional game designed by GPT-4 positively influenced the players' abilities in emotional communication and expression. In the paper, an exploratory study with a small sample will be used herein for preliminary verification and adjustment of research hypothesis and research methods to be employed prior to large-scale data collection in a bid to optimize the research design.

## V. CONCLUSION

This study found that AI-designed emotional games have certain benefits in enhancing the emotional communication and expression abilities of young students. In today's technologically indifferent living environment, AI-generated emotional games create an environment that promotes earnest listening and understanding of others' emotions, while also providing opportunities for players to examine and recognize their own emotions through emotional exchanges and discussions with others. However, the development of emotional intelligence in real life involves not only the cognition and expression of personal emotions but also the ability to establish and maintain positive relationships with others. Furthermore, considering that a certain proportion of

testers question the equivalence of AI and human designers in emotional understanding and creative expression, this may indicate the need for further work in building players' confidence in the quality of AI game design. To increase player acceptance and satisfaction, future AI game designs should focus more on improving the appropriateness of emotional image expression and the diversity of creative elements, while ensuring players' confidence in product quality while communicating the capabilities of AI design.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

#### AUTHOR CONTRIBUTIONS

Chiumi Chen was responsible for data collection, data processing and analysis, research content analysis, and writing journal manuscripts. Ijui Lee took charge of determining the research title, formulating research questions and objectives, approving the research framework and process, and reviewing journal manuscripts. All authors had approved the final version.

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