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Playing Puzzle Games to Reduce College Students' Pressure

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As time goes by, college students have been faced with different kinds of pressure. Thus, how to reduce their stress has become an important topic. This research analyzed the impact on college students' stress and the benefits of different puzzle-solving factors in game design. By using different puzzle-solving ways, it was hoped that college students could reduce their psychological pressure during the game experience. This research collected feedback from 25 college students and randomly selected five of them for case analysis. The results showed that players obviously felt pressure relief before and after the game experience. The puzzle game required a variety of ways to advance from one level to another, so as to induce players' thinking strategies in multiple directions to generate different conclusions. It is also worth noting that players were willing to take the initiative to communicate with their peers to work together to solve the problems in the game.

Keywords: flow, puzzle game, reduce pressure

Introduction

In Taiwan, college students have faced all kinds of pressure in recent years. According to the National Health Insurance Administration, MOHW statistics data in 2020 (2021), the number of people under 30 years old who use anti-depressants is increasing year by year. This reflects that the pressure on college students has some adverse impacts, so how to reduce their pressure is an issue that should not be overlooked. Faced with growing stress levels, many college students reduce their pressure by playing games. According to Chan (2017), a sense of achievement after winning a game can reduce pressure and increase positive emotions. This research explored the stress relief experienced by college students as a result of playing a game integrating a variety of puzzles.

The Causes of College Students' Pressure

In 2021, the COVID-19 epidemic outbreak was continuing to grow, affecting daily life in many ways. Ministry of Labor statistics data (2021) show that the unemployment rate in Taiwan has increased to 4.11% by 2021, and by June, 2021 has reached 4.8%. A large number of dismissal cases increased from 18 to 25, and by June, 2021 had reached 39. Many jobs became casual employment or disappeared. This unexpected phenomenon meant that new graduates have to face more panic and pressure than before regarding their unknown future. How to reduce pressure in an efficient way to avoid giving rise to various diseases is an important issue. Faced with this phenomenon, many people aim to reduce their pressure by playing games. As Chen (2015) found, players can let off some steam and achieve self-assurance in the gaming world.

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How College Students Can Reduce Their Pressure

Many people reduce their pressure by playing games when they are under pressure. When they enter into cyberspace, they can reach agreement and shape self for themselves via communicating with others. Although playing games may be seen as escaping from real life or Internet Addiction Disorder (IAD) for many people, research (Chen, 2015) has shown that playing games not only brings entertainment but also helps players let off some steam. If people very fit in game state, they will get into a flow state (Csikszentmihalyi, 1975). Of all the different kinds of games, Role-Playing Games (RPGs) are the easiest for getting into flow (Hung, Chou, & Ding, 2012).

A Variety of Puzzle Games Benefit Flow

The concept of flow was proposed by Csikszentmihalyi in 1975. His research showed that a person who very fits in the environment, just reacting to what he or she is focused on, and who has control ability will enter the flow state. Flow only comes into being when there is a balance between challenges of appropriate difficulty and the individual's skills. Flow can help people grow up, and brings positive emotions. For example, it can bring excitement and a sensation of fulfilment (Ryan, Rigby, & Przybylski, 2006). Research (Csikszentmihalyi, 1990; Sherry, 2004; Vyas, 2021) shows that players will enter flow through playing games which can bring some challenges. The main elements of flow are: challenge-skill balance, clear goals, unambiguous feedback, concentration on task, paradox of control, action-awareness merging, loss-of self-consciousness, transformation of time, autotelic experience (Jackson & Marsh, 1996). If any of these elements are present, the player will enter a state of flow, and therefore have a sense of accomplishment and satisfaction. Our research has focused on game experience that will create a state of flow for college students.

Methodology

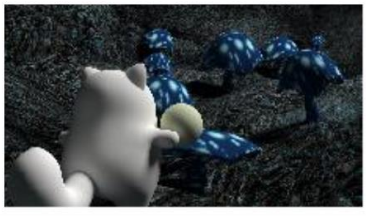
According to the above literature, our research explored whether game difficulty would bring flow affect for college students. The kind of game we chose was a Role-Playing Game (RPG), and we used a questionnaire survey to examine the elements of flow.

Game Experience Design

According to the above description, we used various puzzles in our game. Players have to think how to get through each obstacle, for example, pushing a stone wall down by clicking a button quickly and thinking how to cross the river; using the push-pull operation to pass the game level; and throwing a ball at the mushrooms in order light them; see Table 1.

Table 1

Various Puzzles in Our Game

Click button quickly	Push-pull operation	Throwing a ball at mushrooms
		

Game Level Design

As discussed above, game level is one of the most important parts of this research. We chose the push-pull operation as our playing method. There are wood, stones, and a yellow passageway in a 25-square grid on our game screen, where every kind of object has a different way of being moved. What follows is a description of each object. Woods can move either horizontal or straight in 25 grid, the direction of movement depends on woods growing direction, and stones can move horizontal and straight in 25 grid, while the yellow passageway represents passing. Players will pass the level when the yellow passageway is without stones and wood. In our game, there are many methods to pass from one level to another; players can move the wood and stones freely. The difficulty adjustment in our game is according to the number of pieces of wood and stones; see Table 2. The research investigated the impact of the three types of difficulty adjustment on players' flow benefits while playing the game.

Table 2

Difficulty Adjustment for Game Level

The easiest	Moderate	The hardest
		

Style Design

We chose a cat as the main character in our game because cats are common in daily life. "Chubby" was our association of ideas for the style design, so all characters were designed according to this adjective. Our main character's legs are short and his tail is thick to increase his cuteness. Similarly, the buildings and scenes are also cute and brightly colored to relieve players' stress while exploring this world. Players can manipulate the cat to appreciate a variety of characters and scenes to ensure a pleasant gaming experience; see Table 3.

Table 3

Style Design for the Game

Character design	Building design	Scene design
		

Process of Modifying the Overall Game

After confirming the style and levels, we turned to the game presentation. For the overall design correction process, we used self-review for subsequent corrections. There are seven main content elements in this game:

home page, setting, game screen, game tips, backpack system, dialogue mechanism, and gameplay. Presented in 3D, players can walk freely and experience the story plot during this game. The following is a brief report on the modification process.

Initial game screen. In the initial version of this study, there was a logo on the home page, and the background was the screen of the player entering an unknown area. Players could press any key to enter the game, and use the keyboard to control the character. It would produce interaction tips if the player got close to an object. Players could follow the prompts to interact with the NPC, and the dialogue was placed next to the NPC to present a translucent state; see Table 4.

Table 4

Initial Game Screen

Home page	Game screen	Game tips	Dialogue mechanism
			

Second game screen. After some feedback about Version 1, modifications were made to produce Version 2. There were three problems: (1) After entering the home page, players would not know what to do next to enter the game. (2) The game tip button was too large, thus making players think that the tip was also an interactive object. (3) A backpack system was needed for players to pick up things. Modifications were made as follows to address the above three problems: (1) We added a button and light function to the home page in order for players to know how to enter the game, and we added a new setting function so that players could adjust the game options after clicking on the setting on the home page. (2) We filled up the whole screen with the game screen, so players could immediately know how to operate the game. (3) We added a backpack system so that players could slide left and right to change the objects in hand. In addition to the above, we added a puzzle game allowing players to solve the challenge in the second version; see Table 5.

Table 5

Second Game Screen

Home page	Setting	Game screen	Game tips
			
Backpack system	**Dialogue mechanism**	**Gameplay**	
			

Third game screen. After some feedback about Version 2, modifications were made to produce Version 3. There were four problems as follows: (1) The game tips were not obvious enough. (2) The backpack system in the slide was not easy to operate, especially after taking props. (3) The dialogue mechanism was not obvious, as there was no way to know exactly where the dialogue box was. (4) The game difficulty could be further enhanced. Modifications were made to address the above three problems as follows: (1) We changed the game tips to an icon at the bottom and increased the recognition by making it blue. (2) We changed the backpack system to show all items at once, so that players could immediately know where the items were that they needed. (3) We modified the dialogue mechanism to be uniformly placed at the bottom and to show the avatar and name of the character currently speaking. (4) We changed the game level to three different levels and observed the players' reactions; see Table 6.

Table 6

Some of the Changes to the Third Game Screen

Game tips	Backpack system	Dialogue mechanism	Gameplay
			

Results and Discussion

This research used case analysis and feedback to collect user data. A total of 25 questionnaires were administered to college students. The main findings of this empirical research on the impact of flow on pressure are discussed as follows.

Case Analysis

This study used case analysis of five randomly chosen users. A separate questionnaire survey on the difficulty of the game was administered. The questionnaire survey focused on four of the flow factors: concentration on the task at hand, challenge-skill balance, clear goals, and transformation of time. Moreover, to find whether players would want to talk to others when they were under pressure, we added social interaction to the survey. The survey about flow was designed with reference to Li (2014); there are nine questions in this survey. The purpose of this questionnaire was to explore the reduction in pressure caused by the three different game difficulty designs for college students, and to analyze which of them was the best for flow. The questionnaire used a three-point scale, with three points for agree, two points for neutral, and one point for disagree; after adding their scores together, the higher the score the better. The results showed that the hardest level scored the highest, and there were also significant results in terms of skill, challenge, control, immersion, and social interaction. As a result of the above findings, it is clear that the hardest level was the easiest level to enter flow, and that it produced the highest achievement and reduction in pressure; see Table 7. This section has demonstrated which level is the best; the next chapter will analyze whether the style and various puzzles in this game reduced pressure.

Table 7

Game Difficulty for Flow Results

Question	Option	Number		
		The easiest	Moderate	The hardest
I feel that time passes quickly	Agree	1	0	4
	General	2	3	0
	Disagree	2	2	1
Playing the game requires a lot of skill	Agree	0	0	5
	General	2	3	0
	Disagree	3	2	0
I find it challenging to play the game	Agree	0	0	5
	General	2	3	0
	Disagree	3	2	0
I think about my next move when playing the game	Agree	0	0	5
	General	2	3	0
	Disagree	3	2	0
The target will be presented in each level in a timely manner	Agree	1	2	2
	General	1	3	1
	Disagree	3	0	2
I can always know my status when playing the game	Agree	1	2	2
	General	1	3	1
	Disagree	3	0	2
When playing the game, I am immersed in it	Agree	0	0	5
	General	2	3	0
	Disagree	3	2	0
When playing the game, I will discuss with friends how to pass the levels	Agree	2	0	5
	General	1	3	0
	Disagree	3	2	0
I feel my pressure is reduced after playing the game	Agree	1	0	4
	General	1	4	0
	Disagree	3	1	1
	Total	66	81	121

Analysis of Users' Feedback

We turn now to the experimental evidence from the analysis of the user feedback. The survey on the impact of stress in life and the ways to relieve stress was administered before playing the game. A total of 25 questionnaires were collected randomly from the college students playing this game. Among them, five were 18 to 20 years old, 14 were 21 to 23 years old, and six were over 23 years old. The analysis showed that 80% wanted to do nothing when they were under pressure, and those who feel that they cannot do things right were also 80%; 72% felt that they had a lot on their mind while under pressure, and not wanting to talk with anyone had the same percentage. Finally, 60% could not think about anything. From the previous discussion, it can be seen that college students generate many negative emotions when under pressure, for example feeling that they cannot do things right. These negative emotions indirectly affect their social interactions so they do not want to talk with anyone. This is a very bad phenomenon because if stress is not dealt with and accumulates over a long period of time, it will cause various diseases to both the body and mind; see Table 8. The section that follows moves on to consider the ways of stress relief for college students.

Table 8

Survey Results on Stress Effects Before Playing the Game

Question	Number		Percentage	
	Agree	Disagree	No opinion	Agree
When I'm under pressure, I do not want to do anything	20	3	2	80%
When I'm under pressure, I cannot do things right	20	3	2	80%
When I'm under pressure, I have a lot on my mind	18	2	5	72%
When I'm under pressure, I do not want to talk with anyone	18	4	3	72%
When I'm under pressure, I cannot think about anything	15	4	6	60%

This questionnaire focused on the methods students used to reduce their pressure, where method was a multiple response type. The results showed that 88% of respondents would choose playing games to reduce their pressure, while 60% chose sleeping, 36% chose listening to music, 32% chose taking a shower, and 28% chose reading books; see Table 9. It can be seen from these responses that playing games is an important way for college students to reduce their pressure. Having defined the importance of reducing pressure and the solutions, we now move on to discuss the benefits of reducing pressure after playing the game.

Table 9

When I'm Under Pressure, I Will Relax in the Following Ways

Method	Number	Ratio
Playing games	22	88%
Sleeping	15	60%
Listening to music	9	36%
Taking a shower	8	32%
Reading books	7	28%

This section follows on from the previous section, and examines how the same people felt after playing this game. The results showed that 100% felt a sense of achievement when passing, 96% felt stress relief, 92% felt a sense of concentration and immersion, 88% felt there were clear goals in this game, and 80% felt challenged. The above data show positive feedback about flow, for example concentration on the task at hand and clear goals. As pointed out in the introduction to this paper, people will enter flow if they conform to any one of the required elements. Thus, playing this game can indeed help people enter a state of flow.

Turning now to the experimental evidence of the benefits of playing this game, the data show that 92% of respondents were thinking about how to move next, and 88% of them tried various ways to solve the puzzles in this game. Because there were various ways to solve the puzzles, 68% of the players would discuss with friends how to get through when they got stuck. This fact is in contrast to the above questionnaire item: "When I'm under pressure, I cannot think about anything". When they were under pressure while playing this game, they were willing to communicate with companions and think about the way to get through together. After playing, 80% felt better about problem solving. From this it can be seen that entering flow while playing the puzzle game not only helps college students reduce their pressure, but also encourages them to think and discuss together during this game due to the various puzzles. They felt better about problem solving and it increased their sense of achievement after playing this type of the game; see Table 10.

Table 10

Stress Relief and Flow Result After Playing the Game

Question	Number			Ratio
	Agree	Disagree	No opinion	Agree
I felt a sense of achievement when passing	25	0	0	100%
I felt stress relief after playing this game	24	0	1	96%
I concentrated when playing this game	23	0	2	92%
I felt immersed when playing this game	23	0	2	92%
When playing this game, I would think about how to move next	23	0	2	92%
There are clear goals in this game	22	2	1	88%
I tried various ways to solve the puzzles in this game	22	1	2	88%
I felt challenged when I was playing this Game	20	0	5	80%
I felt better about problem solving after playing this game	20	2	3	80%
When I got stuck, I would discuss with my friends how to get through	17	2	6	68%

Game Design and Reflection

From the previous questionnaire results, it was found that six points should be modified in order to make this game more interesting: (1) The camera should have a switching function. (2) A jump and run function should be added to make this game more interesting. (3) There could be some surprises in the world when players interact during the play, for example unlocking achievements or getting souvenir objects. (4) The opening story can be made into a small animation. (5) The camera should not be moved too often when the character moves to avoid dizziness. (6) Players will be confused about how to operate when playing. With an understanding through the literature of the pressure faced by people these days, we designed a puzzle game with cute style, combining puzzles in the game to evoke flow. College students felt that their pressure was reduced when they experienced the game. The results show that people who play games consisting of various puzzles will feel relief and there will be increased opportunities to communicate with others. They will also think, collaborate, and solve problems together during the process. It is hoped that this research will be helpful in terms of designing game difficulty in puzzle games to help college students enter a state of flow, get stress relief, elevate their thinking, and improve their collaborative problem-solving skills.

Conclusion

The rapid social change and intense competition nowadays puts people under pressure, and if this pressure is not properly released it will cause disease. Currently, psychological problems are most likely to occur during college, as college students experience huge psychological pressure that can cause some diseases, for example depression. In order to reduce their pressure, most college students will choose to play games. This research analyzed different levels of game difficulty in a game combining a cute style and a variety of puzzles to determine whether they would have an effect on the flow of college students. The research findings showed that players of this game reduced their pressure compared with before playing the game. In addition, the puzzles in this game required multiple ways to pass, so players were willing to proactively communicate with their friends and work together to pass the obstacles. This indirectly solved the problem of university students' reluctance to talk to others when they are under pressure. The game will continue to improve in the future according to the above suggestions. It is expected that this study will be helpful for Taiwan university students to relieve their stress.

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