

Lights On!

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Keywords—2D puzzle, platformer, lightsOn!, interface

I. INTRODUCTION

Platformer games have long been a staple in the world of games. With classics such as Mario, Sonic, and Megaman and newer releases such as Hollow Knight and Dead Cells, the genre has not only managed to stay relevant since its early days, but has grown and expanded ever since. Puzzle platformers, however, a subgenre that have only relatively recently begun to come out into the spotlight. With the classic objective of having players move from one end of the map to the other, puzzle platforms add their own unique twist by including special mechanics and puzzle-like challenges to add an extra layer of depth to the player experience. This allows the player to challenge themselves with both input dexterity and critical thinking.

Lights On! Is a 2D puzzle platformer game made in Unity and accessible through which centers around a little lightbulb character on legs attempting to complete each level by traversing from one end of the screen to the other. The added special mechanic of this game, however, comes with the ability to switch the character's light "on" which causes a stage shift, and allows the player to discover ways to overcome obstacles that would otherwise seem impassable. The intent of the game is to challenge the player to recognize when and where to use their light, and to do so sparingly so as to not run out before reaching the end of the level. With each level complete, the following one will become more challenging in both traversal and in puzzle difficulty.

II. PRODUCT DESCRIPTION



Figure 2.1 (The Lights On! Start menu)

Lights On!'s main interface is avatar manipulation via the WASD or arrow keys, and the space bar. (Figure 2.2) The user maneuvers the character throughout the stage using these inputs. The second method of manipulation is stage manipulation. By moving the character into certain terrain (in the form of crates) the player can push them across the screen or off a platform.



Figure 2.2 (The character is faced with a gap which they must jump over to traverse)

The most unique mechanic of the game is the light switch function, which serves 2 main purposes. The first purpose is to cause a stage change, which will lead to certain blocks to materialize/dematerialize, allowing your character to move on or through them depending on their respective mechanic. (Figure 2.3)

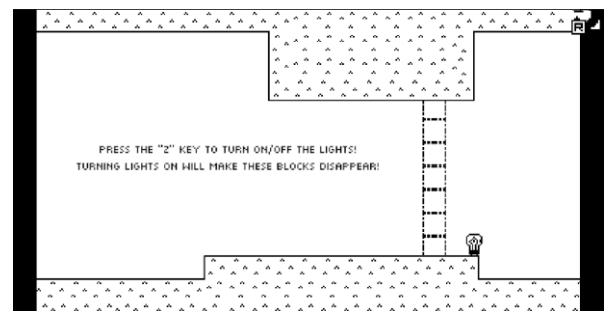


Figure 2.3 (The player switches the lights on, causing the dotted out wall on their left to dematerialize, allowing them to pass through it onto the next level)

The second purpose is to change the behavior of the aforementioned movable blocks. When the light switch is turned on, these blocks will not be affected by gravity, and will float endlessly in the direction they are pushed until they hit another piece of terrain. (Figure 2.4). When the light is

switched off, the block's horizontal movement will cease and it will fall until it either lands on terrain or the light is switched back on again, which will suspend it in the air.

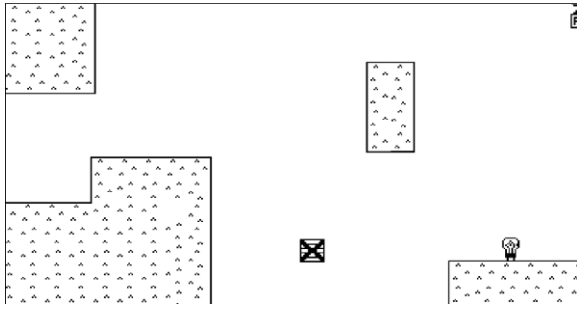


Figure 2.4 (The crate is suspended in air by the light switch, which has allowed the player to use it to traverse from the leftmost platform to the rightmost)

The three features that were to be evaluated were the ability to start the game from the menu (Figure 2.1), traversal in the form of moving and jumping, and manipulation of the stage via the light switch.

III. EVALUATION

The evaluation of the game was centered around 3 criteria. Firstly, could the user start the game through the menu screen? Secondly, could the user use the movement and jump keys to move the character around the screen? Thirdly, could the user identify and use the key to switch the lights on and off? Although not strictly a defined research question, the success rate of the players when completing the levels was also taken into account.

A. Procedures

To test each of our research questions, we enlisted a group of seven playtesters. After allowing them to read and sign an informed consent form, we supplied them with a laptop on which the game was preloaded. We then directed the playtesters to start the game from the menu screen (shown in Figure 2.1) After clicking start game, the players were immediately loaded into the first of the three levels we designed for the purposes of the demo. (Figures 2.2-2.4 representing each respective level).

As a means of collecting qualitative data, we placed a microphone next to the player, and asked them to think aloud as they navigated the levels. Once the player had completed the demo by solving each puzzle presented by the game, they then were asked to fill out a questionnaire on the intuitiveness of the controls, the design of each level, and their overall enjoyment of the game (Figure 3.1). The names of the subjects and their identities were not included in the questionnaire, so as to protect their privacy.

Questionnaires Analysis

Questions that were asked to the subject:

1. On a scale of 1 to 5, how easy was it for you to start the game from the menu screen? (1 being very difficult, 5 being very easy)
2. Rate your experience in controlling the avatar/character in terms of responsiveness and smoothness.
Poor Fair Good Very Good Excellent
3. Please share your thoughts on the controls for moving the avatar/character. Did you find them intuitive?
4. Were there any aspects of the game that you found confusing or difficult to understand?
5. What aspects of the game did you enjoy the most?
6. Were you able to solve the level? Yes or No? Please explain your answer.
7. What improvements or additions would you suggest to enhance the game experience?

Figure 3.1 (User Satisfaction Questionnaire taken after the completion of all three levels)

B. Data Collection

The primary data collected pertained to our three research questions. For each subject, we observed the success rate in starting the game, maneuvering the character, and using the light switch mechanic. Additionally recorded was the success rate for the completion of all three levels. The time taken for each subject to complete all three levels was also inadvertently taken via the audio recordings of each player's playtest. All of these data points fall into the quantitative category.

Qualitative data was collected in both the form of gameplay analysis, and the feedback submitted by players within the questionnaire provided after their playtest had concluded. We observed and noted the difficulty each player displayed between levels, and which mechanics they grasped quicker than others. This allowed us to intuit which mechanics felt natural for the player to use, and which ones required trial and error. Additionally, we collected feedback within the questionnaire on:

- a) The player's thoughts on how easy it was to maneuver the character.
- b) Which aspects of the game they found difficult to decipher or understand.
- c) Which elements of the game they enjoyed

These variables would allow us to later deduct which elements of the game worked, and which would need improvement

C. Analysis

Our analysis of the data showed that seven out seven players were able to open the game via the menu screen, navigate the character via moving and jumping, and manipulate the stage via the light switch mechanic.

Additionally, though not originally an object of research, we also found that all players were able to complete all 3 levels with minimal or no assistance. The average time for completion for all three levels between all test subjects was 3 minutes and 12 seconds, with the highest time for completion being 5 minutes and 49 seconds, and the lowest being 1 minute and 52 seconds.

As for qualitative data, we found that subjects enjoyed the challenging nature of the game, found the controls to be intuitive, and the concept to be unique and interesting. However, a recurring theme between subjects was that the difficulty increase should be more gradual between levels. Additionally, subjects felt that the gravity function of the light switch was not made initially clear via the game's tooltip, specifically that turning the lights on and off would halt a block's movement completely midair.

IV. RESULT

After tallying the quantitative data collected from each playtest, we found that:

- a) All players were able to start the game from the menu screen*
- b) All players were able to maneuver the character around each stage.*
- c) All players were able to utilize the light switch function*

While the subjects we acquired all agreed that the controls were intuitive and easy to use, this result cannot be applied to all potential users, due to our sample size being relatively small. Additionally, we cannot conclude that all players would be able to solve the puzzles without any assistance, even though our test subjects managed to do so.

While the qualitative data was largely subjective, it can be inferred that some users may feel that a more gradual increase in difficulty may be appropriate in the full release of the game. Additionally, the tooltip for the manipulation of crate gravity via the light switch could have been made clearer.

The analysis of the data, however, points towards the answers to each of our research questions being "yes". The product was conclusively usable, and feedback from users suggests that it was also useful as a fun and thought provoking challenge to pass time with.

V. CONCLUSION

With the completion of the demo of "Lights On!", we can conclude that while our product is indeed usable and useful, there are some areas in which it can be improved to make it more accessible. The first change would be to improve the clarity of the tooltips to more effectively demonstrate the mechanics of the game to new users. The second would be to create more levels, perhaps with more mechanics, to expand on the challenging nature of the game that players seem to enjoy. The third and final improvement to make would be to structure our levels in a way that they gradually become more difficult as they go, so as not to leave potential users stuck or overwhelmed at a particular level.

Overall, user testing of this product supports the claim that "Lights On!" is a fun and functional puzzle platformer for those who enjoy the genre.