WSOA3003A Exam Game: Reflection and Analysis

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Group 7

Intended game to be developed.

The intended game to be developed, named "Trial of the Elements" (TotE for short) is a top-down puzzle game in which a player must work through and solve a series of puzzles to progress. The game will utilize a grid-based movement system with the player only being allowed to move in the four cardinal directions (up, down, left, right).

The puzzles will be facilitated through a push-block style of gameplay in conjunction with an elemental combination system. This means that a player may interact with the different objects by pushing them along the grid. These objects are categorized by specific elements that each would have their own purpose when used in the game (for example Earth elements can fill holes and block projectiles). Should a player push compatible elements into one another, these elements would combine to make a completely new element with its own unique purpose and use.

The intended game and project plan has changed accordingly during the development process based on things that came up during the actual implementation of the game and feedback acquired through playtesting. For a detailed look at what was specifically changed in the project plan please look at Appendix A.

Development Process.

The development process followed the project plan by following the idea that primary goals (the core mechanics) should be completed first before even attempting to design any levels or extra bits that add to the game overall (secondary and tertiary goals). This process began with implementing the movement system. The movement would be done using a grid-based system, this would allow the player to move in one of the four directions when the appropriate button was pressed. Initially the players would be allowed to hold the directional button down to continuously move in a single direction, this was to ease traversing longer distances without having the player spam the key continuously. However, during testing, it was seen that because of this continuous movement, there were moments when a player would make a mis-input and make unintentional mistakes by holding the button down for too long and there would be conflicts with colliders and triggers as well because of this rapid movement. This was changed so that movement will only be done once per key press and through feedback from playtesters, it was decided to decrease the time it takes to move from one spot to another (as well as decrease the delay between when a player could make a move).

The elemental objects and the pushing of these objects were created at the same time as the pushable objects would simply move along if walked into by utilizing how the physics system works in Unity. At this stage simple blocks were used to represent the specific elements and their specific usage was not established. However, the combination system was.

If compatible blocks were pushed next to one another, a new element was created that would have its own use. At this stage I decided to remove the combinations for lava and ice (where Fire + Earth combined into Lava and Ice + Fire would turn into Water). This decision was made because it seemed counter-intuitive for these obstacles to be dynamically created or destroyed. The only purpose of Lava is to be a permanent obstacle that you cannot touch, or you will lose, so therefore being able to create it did not seem like a good idea. The same could be said with ice, as ice is an obstacle that limits your movement to a specific direction. So, if you were to change one single piece of ice, it doesn't make much difference overall and may potentially disturb the intended flow of the level.

The combinations that remained would be Water + Earth to make Mud and Water + Fire to make Steam. At this stage, the actual usage of each primary element was put in, as well as the objects the elements themselves would interact with.

- For the fire element, it had a basic use to destroy objects (doors within the game) that blocked off a player's path.
- Water at this stage did not have a clear use other than combining with other elements as it was by far the most important when it comes to element combinations.
- Earth initially had a single use of filling in 'pitfalls' in the ground that would otherwise be dangerous to the player, later it would also be used to block enemy projectiles.

When it comes to the combined elements of Mud and Steam, there was a problem in their implementation to make their purposes unique. At this current stage, the primary elements would be more than enough to figure out any of the puzzles and therefore some thought was put in for ways to make these elements work without adding mechanics for the sake of it. There were two key usages that were conceptualized which came from a discussion I had with some of my peers.

- Steam would be the catalyst for many different steam-powered devices. These devices would range and would mostly open specific paths or generate the power needed for certain objects to move around. For example, once powered, a platform would now be active that would take the player from one location to a previously inaccessible one; or a device would begin to generate primary elemental objects, allowing a renewable source for said objects. In the end this was not implemented, but the framework is there for future use.
- Mud would be used in a way to create bridges over pitfalls that would allow a player to safely get across. This idea was inspired by many natural bridges that can found around the world. A flowering plant would require soil and water to completely grow, therefore by combining the water element and the earth element, the player would have exactly what is required for the plant to grow. Once the mud encountered the flower, a vine bridge would be created, and the player may proceed.

Now with all the various systems being in place and working to some degree, the things that would create tension in each level and be a dynamic obstacle was implemented. These are the enemies that would be patrol certain areas or shoot projectiles at a player. If a player were to encounter an enemy or projectile, they would then lose (like a pitfall or lava). The enemies

were supposed to be split into categories based of their own element, namely basic; fire; earth; and water. Basic enemies would be weak to all other elements and be destroyed should they encounter any elemental object, while the others would only be weak to a specific element (i.e., Fire enemies are weak to water, Water enemies are weak to earth, and Earth enemies are weak to fire). In the end however, elemental enemies were not implemented as the basic enemy was sufficient. There was never a time during testing where players would worry about what element they were using to destroy an enemy and would at times simply just ignore them and proceed during an opening in their patrol or projectile pattern.

The rating system was done during the primary development phase as it was extremely hard to gauge the average time it would take someone to finish a level while no proper was available at that time. Therefore, the rating system was one of the last things to be done.

The secondary goals were worked on simultaneously and implemented sporadically as progress was made, but the hardest task that took most of the focus at this point was the level design. Due to the nature of the game, the level design needed a lot of attention and testing to ensure that the puzzles found within were neither too difficult nor spoon-fed to the player. This is also where I made the decision to change how the levels would work fundamentally from what is stated in the project plan (seen in appendix A). In the project plan, it was stated that we wanted to implement six levels that would each be relatively short, focusing on one aspect. I changed this to be two levels (as well as a tutorial to make it three) that utilize a few different mechanics. This makes each level a little less straightforward and allows the players to explore the mechanics and surrounding areas further. This increase in both a levels size and complexity allowed me to design the levels with potentially multiple paths and solutions so solving the entire level, rather than focusing on one isolated puzzle at a time.

 For an example of how level design was implemented and adjusted accordingly, I will discuss how one of my playtesters decided to solve a puzzle found in the second level of the game. The second level is five separated rooms that are connected by ice paths. Each room has something in it that is needed to proceed to the final room where the levels end point is. One of the puzzles has a series of inaccessible enemies that are lined up to completely fill the room with projectiles. The entrance is containing multiple earth objects that equal the number of enemies. The solution I had designed was where you would push each earth object in front of the enemies, to effectively stop the barrage of projectiles. The playtester decided to stack these objects vertically and push those along, effectively making a path for themselves to recover the object needed to proceed. Afterwards they would take a single earth object back with them as an added layer of protection for any other projectile enemies found in the level. This was just one of the few ways a level was solved through a playtesters intuition. Further playtesting data can be found in Appendix B.

In terms of development once the levels were created, the rest of development would focus mainly on UI, the different menus, and the books scattered around that gave useful information to the players.

Reflection

With the final implementation of "Trial of the Elements", there are many things that could have been improved upon from both the games design and its actual implementation. Firstly, if I were to work on this project again from scratch or could pick one thing to reimplement. I would create the game utilizing Unity's tilemap system. The tilemap system would help facilitate not only the push block style of gameplay, but it will allow for the grid system to work exactly as intended. The tilemaps would also allow for levels to be rapidly designed and tested as the current method is very time consuming with the placement of the objects.

There are a few bugs that can be found in the game, none of which are game breaking but still are quite bothersome. To name a few, at times, a player might move around too quickly, and this would cause a complication with the many colliders and triggers, this would then cause a player to not be allowed to move in a particular direction until they meet a wall or another object. I tried revising the movement speed but at the speed it would never be an issue, it was far too slow and my playtesters agreed with this. It is an issue that happens rare enough that I decided to stick with the feedback I was given and keep the player speed the same.

For the rating system. It was extremely difficult to get a clear consensus of the average players ability as some people would take their time and be methodical about how they would approach things, while others would try to complete each level in the fastest time they could, using any tricks they found along the way. On average it took people between one and two minutes to solve a level once they were comfortable with the mechanics and different features, while those who knew exactly what they were doing would generally complete a level in less than a minute. These values were gathered from both my playtesters and my one independent testing to get an overall range of time. However, this time can be refined much further and can be separated into each level itself to ensure a true rating is achieved for each level consistently.

Other things that would further improve the game is a generally better level design with more feedback during its creation rather than after it is completed so less adjustments are made, and more meaningful decisions are established for the player to enjoy.

Other things I have learnt from this project that are not directly related to the actual game and more along the line of planning and development are things such as the importance of planning and how to work together as team to create the idea behind a game. This game was not difficult to develop from a conceptual point of view, and this mostly thanks to how well the plan was laid out with all the necessities being laid out beforehand. This allowed me to rapidly develop and test mechanics without having to worry about thinking about what needs to come next or exactly what the direction is going. Of course, there is open ended things that were up to us as individuals but by using a plan and adjusting accordingly as progress was made, it made the development process much easier.

In general, I am happy with how the game turned out. There are many improvements that can be made from what has been stated above, but also from an aesthetic point of view, it would be so much better with better quality art and animation. The biggest thing I would want to implement however is a greater sense of feedback to the player which would also further solidify what I wanted to game to produce.

Appendix

Appendix A: Project Plan Changes

Narrative and Theme

Trial of the elements takes ~~place in the dungeon beneath a school of wizardry and witchcraft~~. The player takes on the role of a student, taking part in their school exam. Each level is presented in the form of a 'puzzling' exam question. Upon completion of each level, the player is graded and receives a score based on their performance. The faster they solve each puzzle, the higher their score - being rewarded an average grade for simply making it out of each puzzle alive. Within each puzzle, the player is tested on their magic knowledge by using the various elements found within each level to aid them in completing each challenge. The elements help them overcome obstacles within the levels, as well as allow them to protect and defend themselves from the creatures that lurk in the depths of the school dungeon.

(The narrative was alluded to but was never a core focus of the game at any point)

Project outcome and requirements

We want to create a game that:

- *Is an engaging and entertaining pass-time for players (casual gameplay).*
- *Has a simple control system that allows for multiple possible actions and uses.*
- *Is readable and well communicated in its interface design.*
- *Contains simple, understandable mechanics.*
- *Contains puzzles that allow for exploration of mechanics.*
- *Encourages thought and strategizing through its challenging puzzles.*
- *Develops and encourages the use of logic, rather than twitch skill.*
- *Offers players a variety of different approaches and options in solving puzzles.*
- *Encourages interaction and experimentation.*
- *~~Has at least six playable levels, available to players~~. Has 2 playable levels and a tutorial level.*

(I changed the game to have two playable levels (+tutorial) that were larger and played more explorative than six small levels that focused on one aspect individually)

Project duration

The allocated time period for the creation of Trial of the elements is from ~~Monday, 31st of May~~ Tuesday, 8th of June, through to Friday, 25th of June. Making up a total of 17 days, including weekends and personal days.

(Changed the development timeline to match up with when the brief was given to us to work on the game.)

Feature List

Player Movement

- *Player can move in four directions, going one grid space at a time.*
- *Player moves across the grid at the same speed as all other objects.*

Pushing Objects

- *Player walks into a pushable object to move it in the same direction the player is moving if there's space for it to move in that direction.*
- *Pushing objects is the main way that the player interacts with objects in the game.*

Combination System

- *Elements, which are a type of object, can be pushed by the player into each other.*
- *When two compatible elements are pushed together, they are destroyed and from a new element on the spot.*
- *Each element has a unique gameplay function, so the player uses pushing to create new elements to solve the puzzle.*
- *Non element objects can also 'combine' in the sense they create a new state on contact with another object, such as earth filling in holes in the ground and certain elements killing enemies on contact while also being destroyed.*

Obstacles

- *Static obstacles exist to block the players movement and present a challenge.*
- *Basic obstacles like doors can be destroyed using basic elements, such as fire in the doors case.*
- ~~*Other obstacles like grates allow objects to pass through but not the player, they cannot be destroyed.*~~
- *Ice and lava work like obstacles ~~but combine with elements to make new elements~~, with lava killing the player and enemies and ice forcing the player to keep moving in the same direction until they hit a wall.*

Enemies

- *Enemies function like obstacles that kill the player on contact and cover multiple tiles at the same time.*
- *Patrol enemies move along a route back and forth and can be destroyed by pushing elements into their path, so they eventually walk into the element.*
- *Ranged enemies fire continuously in a set direction and are also killed by elements being pushed into them.*
- *Basic enemies are vulnerable to any element killing them, while ~~elemental enemies can only be killed by a specific element i.e., water enemies are killed by the water element.~~*

Score & Star System

- *Players are awarded a score at the end of every level, from 1 to 3 stars.*
- *The score is given based on the time the player takes to finish a level, with each level having its own scale for how quickly it should be completed.*
- *Adds replayability to each level, with 3 stars given for the player completing the level faster than the average time, 2 being an average score, and 1 star being for time going over the average amount of time.*
- *Multiple routes to solve the level usually account for the time differences between a low and high score.*

(Many of the features would be changed or new ones would be added as development continued either through discovery or from feedback. These include:

- Complete removal of grates for steam to pass through.

- Complete removal of Lava and Ice from the combination system. Making them pure obstacles rather than something that can be used as a combination with another element.
- Removal of elemental enemies, keeping only basic enemies in final implementation.
- Added functionality to certain elements that were not explicitly stated.
- Added flower + mud = bridge mechanic.
- Rating system: Created a system that would work with player moves instead of time. Was reverted to time due to a levels design and feedback. Moves are still displayed to a player.

These changes are a few among others that are not explicitly mentioned in the plan and were left to the developer's discretion in their implementation.)

Appendix B: Playtesting Results

General Feedback:

In general, feedback was received on things that would potentially improve the game. This included the use of certain elements and whether elemental enemies were necessary in the games current stage.

Feedback on Levels and difficulty:

Majority of my playtesters have said that the difficulty of each level seems fair with each not being too hard, nor is the solution obvious or directly given to you. Of course, there were many things that could be improved upon. Majority of testers had said that for level 2, the projectiles that enemies shot should be slightly faster and that the delay between each shot should be increased. This change was a great welcome and the overall level felt much better afterwards.

Times it took for players to finish each level:

	Approximate Average time taken for level 1 (seconds) Taken from 2 playthroughs	Approximate Average time taken for level 2 (seconds) Taken from 2 playthroughs
Independent Testing (myself)	36	54
Playtester 1 (blind playthrough)	156	207
Playtester 2 (Given information on how game works)	84	108

Playtester 3 (Watched previous playtests and was given information on exploits and tricks)	52	74