Time Shift

Adam Rivkin and Sam Schwartz

Abstract

Time Shift is a typing game designed to allow visually-impaired students to attain keyboard fluency. While typing games already exist in abundance, none are designed specifically for visually-impaired students, putting an already-disadvantaged group into an even more disadvantageous position. *Time Shift* attempts to fill the void in content designed for this specific subset of students and decrease barriers to expressive communication at early ages. In developing learning trajectories and goals, we draw from our existing knowledge of typing best-practices, as well as some already-established curriculum pieces laid out in games such as *Type to Learn* (teacher's guide found here), with an additional emphasis on generating conceptualizations and internal understandings using primarily audio cues.

Players take control of a young, visually-impaired character who wakes up one day to find themself in an unfamiliar land in the medieval era. Accompanied by a mysterious fairy and armed with a magical keyboard enchanted by the fairy's magic, the character sets out on an epic journey to discover just why and how they were sent back in time, with gameplay taking place between a continuous mixture of menu, narrative, and combat screens. Along the way, the character visits nations/kingdoms around the globe and is forced to make impactful decisions during dialogue scenarios that affect the direction of the narrative, all while defending themself from evil monsters that force the player to develop adequate keyboard skills to be able to block enemy attacks and counter with their own.

User Profile

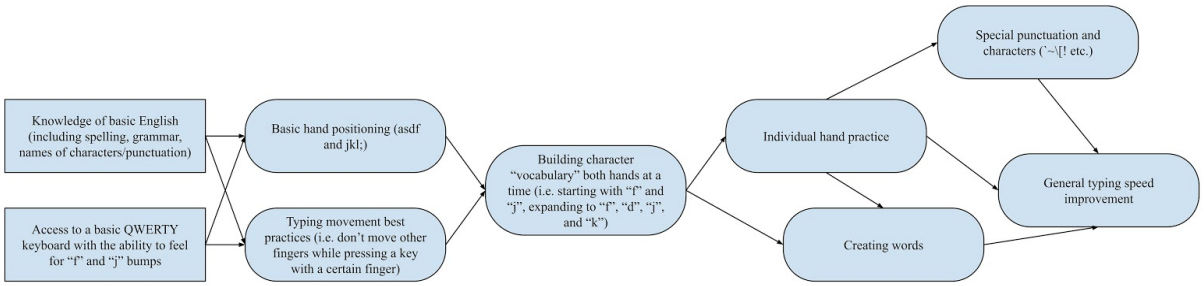
Time Shift is targeted at visually-impaired third-grade students, with the young demographic owing to the desire to enable kids to communicate in a print medium as early as possible. The relative youth of the player base primarily affects the narrative/premise elements of the game, with the fantastical world setting and assumption of only a basic vocabulary meant to keep the game engaging and accessible. The visually-impaired demographic influences a myriad of design decisions in the gameplay and interface design and ensures that the game is designed with UDL concepts at the forefront.

Students are assumed to be from any cultural and/or socio-economic background, with language settings allowing for nearly any language to be learned with full support for narration. While students from the US and English-speaking European countries may find more familiarity in the medieval setting modeled just slightly after King Arthurian legends, the character's journey around the world will bring them to many settings more familiar to students from diverse cultural backgrounds.

Skills

Typing skills will be taught incrementally, first working with home-row keys (i.e. “asdfjkl”), then in clusters utilizing fingers both together and separately (i.e. “fred” and “juik”), followed by full alphabet usage and standard punctuation (i.e. “.,?”;!()”), and finally with special characters (i.e. “@#&+~{”). Spelling skills are not required, but the game will also help students build a working spelling vocabulary, with non-random word inputs during battle narrated in the style of “Fireball! F-I-R-E-B-A-L-L”. Ultimately, students will be working to not only learn the layout of keyboards, but also gain the skill of touch-typing at a relatively fast WPM speed.

Learning Trajectory



Game Design

<u>Premise</u>

Time Shift will be set in medieval times, with players controlling a young, visually-impaired student who is mysteriously sent back in time from the modern era during their sleep. Upon waking and discovering that they are in fact not in their bed at home, but rather in an open field, the protagonist meets a magical fairy who explains that they are in the medieval era, and that the protagonist is the “chosen one” brought back in time to help defeat the evil warlock Chronos. The fairy agrees to accompany the character on their journey to defeat the mage and to discover why they are the “chosen one”. Deeming that it may be too dangerous to arm a visually-impaired adolescent with a blade weapon of any sort, the fairy conjures up a magical keyboard that the protagonist can learn to cast spells through. As the character travels the world seeking answers, the player faces increasingly difficult enemies that test typing skills taught gradually by the fairy. The player also faces increasingly difficult choices that influence the narrative and ultimately lead to divergent end-game narrative paths (i.e. “Good Ending: The protagonist defeats the warlock and is able to return home to modern times”; “Bad Ending: The protagonist defeats the warlock but the portal back to the modern world collapses and the protagonist is stuck in the medieval world”).

User Interface and Fundamental Mechanics

The gameplay of *Time Shift* takes place primarily across three types of screens: menu/inventory, narrative, and combat.

Menu/Inventory

The menu/inventory screen is the least crucial to the core gameplay/learning/narrative elements of the game, but allows for character customization in the style of traditional JRPGs. Here, players can equip armor (reduces damage taken per enemy attack), change accessories, view stats, save their game, and configure a variety of visual and audio settings. This can all be navigated with the home row keys which are taught early in the game.

Narrative

Narrative screens drive the game forward through development of the plot and allow for the fairy to teach the player keys in a non-combat setting. Visually, narrative screens consist of a background image overlaid with sprites of the characters speaking (with the speaking one highlighted and the rest faded/greyscaled), and a large text box featuring the text that is simultaneously narrated. Occasionally, the player will have to make a choice, in which case the player is prompted with two or more keys to press to confirm their decision.

Combat

The primary mode of typing practice/teaching that unfolds in the game takes place in battle/combat screens. The objective during an instance of combat is to defeat a monster who has a certain number of hit points while preventing the monster from depleting the player's own hp. The monster has a telegraphed moveset (prompted by audio cues) that can be dodged/nullified/blocked by the player's own moveset (activated by pressing certain letters or combinations of characters). Over the course of the game, players learn more moves but also face stronger monsters that act quicker with larger skillsets and have more hp. Other elements that bring variety and strategic planning to gameplay include an RPG-like upgrade system (i.e. better armor that decreases damage taken, or magical glacial boots that grant players one extra second to complete each action) and item system (i.e. players can purchase a frost potion that reduces enemy spell cast time by 50%). Audio cues drive combat by signaling moves from both the player and enemy, followed by a narration of the sequence of letters that must be typed to successfully perform an action. Important audio cues are given about the battle environment when necessary, such as the conformation of a successful player attack, followed by the statement "The monster is at 50% hp!". Visual elements are not necessary to complete battles, but exist to enhance the player experience for those that are able to see them. Health bars are at the top of the screen for both the player and the enemy, and the required sequence of inputs is displayed at the center of the screen in large text on top of a text box. Player and enemy sprites stand at opposite ends of the screen and fire moving projectiles at each other that hit depending on if the player correctly inputted the set of required inputs.

Skill Building

Difficulty is managed through a variety of gameplay mechanics, including monster attack speed, skillset size, hp management, and skill activation complexity. Basic tutorial levels have turn-based battles with limited inputs needed to both attack and defend (i.e. “f” for attack and “j” for defend), while more advanced levels have the player in a real-time/continuous-time battle with extensive inputs needed to deal with the enemy (i.e. requiring the player to open their spellbook with “s” and then enter “fireball” to cast a fire spell against an enemy that is only weak to fire but resistant to all other attacks). Additionally, at later levels, the player can toggle between a real-time combat system and a turn-based combat system depending on their preferred style of play, their comfort level with the keyboard, and/or the unique circumstances necessitated by their condition (although real-time is recommended for maximum effectiveness).

To build proficiency with proper typing technique using different fingers, players are told hand positions before each lesson and then are held to using the described techniques through systems such as (“Press F-G-T-R with your index finger while holding down A&S&D with your pinky, ring finger, and middle finger!”, or alternatively, “Alternate pressing D-E with your middle finger while holding down A&S&F with your pinky, ring finger, and index finger!”). Enemies will test these specific location skills by requiring similar inputs. In between battles, the player will have the opportunity to enter a “sparring zone” to hone their skills and practice skill combinations. The narrative progression of the game is also be diversified/“web-ified” to allow players to both choose their own adventure, but also practice skills that they are more inclined to want to practice (i.e. the player arrive at a fork in the road in the forest and depending on the path they choose can only use either the left hand or right hand for upcoming fights). Thus, we empower players to pick the skills they think they need the most work on, or pick the skills that will give them the most confidence while still allowing them to progress –inducing a state of flow by providing players with a personalized level of challenge with consistent, tangible growth.

Motivation

Time Shift’s motivational concepts and methods fall closely in line with those laid out in Goal Setting Theory, with battles acting as “difficult, specific, context-appropriate, and immediate goals” (Richter et al. 27). Battles direct attention towards a specific attainable task that builds upon previous knowledge but is sufficiently new to be both interesting and a challenge. Feedback on performance is provided real-time during battles—health bars do not exist as independent game structures, but rather act as indicators of immediate success (low enemy health bar and high player health bar represents success, etc.). As mentioned in the Skill Building section, this goal-setting motivational method using battles creates an environment where players can more easily enter a state of flow.

In addition to the motivational forces engaged by the battle system, the fantastical world vibrant with colors, artwork, magic, monsters, voice acting, and music (originally composed by Sam) is meant to appeal to the whimsical nature of young elementary-school-level minds. By focusing on a narrative adventure with the player playing as the "chosen one", young students are given a sense of agency that is often denied from them in the real world, and are allowed to develop their own story in a world not bound by the limitations of our own.

We believe that our game will appeal most to players that fall into the categories of "explorer", "achiever", "collector", and "storyteller". The sweeping narrative with some elements of choice appeals to the sensibilities of the explorer, artist, and storyteller. The achiever will find enjoyment in defeating increasingly strong foes and bosses, as well as collecting achievements (which unlock exclusive equipment/consumables).

Specifically, the player types will interact with the game as such:

- Explorer: explorers will find the open-world/choice elements of the game appealing and will hopefully also find the fantastical world and narrative elements engaging
- Achiever: achievers will enjoy the level progression experienced through defeating stronger enemies and bosses, in addition to the achievement system
- Collector: collectors will seek out all possible variations of the choices in the game which grant different sets of equipment and ultimate narrative outcomes, as well as attempt to collect achievements which unlock powerful end-game items
- Joker: jokers will appreciate the fantastical world and the light-heartedness of the dialogue; jokers will not have total freedom to engage the game in all the comedic ways that they want, but hopefully the dialogue choices will allow them to make their character a comedic figure
- Artist: artists will have a hard time finding visually appealing elements to appreciate our game as the game is meant for the visually-impaired, but the artist may appreciate the sonic world created
- Storyteller: storytellers will be able to craft their own stories through the variable story directed by the dialogue choices presented at important narrative moments
- Craftsman: craftspeople will be hard-pressed to find craftable elements in our game; as the equipment system is tangential to the main storyline and combat system, there will not be a crafting system that would only serve to obfuscate the gameplay mechanics and world-building we want the players to focus on
- Competitor: competitors will appreciate the difficulty of later stages, as well as the "challenge mode" that becomes available after beating the game; an online leaderboard will exist where competitors can compare their challenge mode scores to others

Designing for the User

The primary skill limitation we face with the demographic we are targeting is the presumed inability to effectively interpret standard visual cues and determine one's place in space around a keyboard without explicit instructions based on tactile and aural feedback systems. We design around this assumption in various ways to maximize accessibility to our targeted set of visually-impaired learners. To make the game useful, interactive, and comprehensible for students with complete blindness, the game features fully narrated gameplay sequences and cues based on distinct musical motifs and sound effects. We understand how this type of persistent audio signaling can overwhelm students, however, and as such, the first few levels are the most saturated with "sound descriptions" that are removed once players understand the basic mechanics of play (much akin to the technique of scaffolding in a classroom setting). However, players are still be able to access the information removed by pressing certain keys if needed (i.e. "Press 'TAB' for full list of player stats!" or similar). For visually-impaired but not completely-blind students, the graphical interface is made accessible through large text/items, contrasting colors, and a restraint during important gameplay sequences on using colors easily confused by colorblind students.

Culturally-Relevant Instruction

While we use a basic premise of medieval folklore/mythology (i.e. a King Arthur-esque world), we understand that there are some problematic aspects associated with this setting, notably those relating to heteronormativity and the very gendered roles espoused by "chivalry". We work to address these issues in the game's narrative and allow for flexible dialogue and customizable "personality" options developed through dialogue decisions made by the player. *Time Shift* specifically does not assign a gender or name to the protagonist or the fairy, instead opting for gender-neutral pronouns. While customizable character creation would be optimal, we deemed that using nameless, gender-neutral characters would be better for students who would neither be able to see their customizations in full effect nor would be able to customize at the beginning without prior knowledge of how to use a keyboard.

While the premise primarily appeals to American and British students, where the legends of King Arthur are a part of popular culture, the game's plot also involves the protagonist traveling to different parts of the world, allowing us to introduce new soundscapes and graphical settings that will facilitate our connection with students from diverse backgrounds (i.e. traveling to a period-appropriate Chinese dynasty, such as the Southern and Northern Dynasties, Jin Dynasty, or even the Three Kingdoms period). Extensive research is done on various cultural destinations as to we do not unintentionally stereotype certain cultures.

Badge System

Participation badges

- Defeat the first enemy, the slime!
- Reach the castle and complete advanced spell training with the knight (grants one bonus health potion)
- Defeat the final boss (grants a relic that enables the player to use expert-level spells in their next playthrough)
- The End…? (start a New Game+)
- Greenhorn: play for one hour of total game time
- Squire: play for two hours of total game time
- Knight: play for five hours of total game time
- Warlock: play for seven hours of total game time (grants two bonus damage charms and doubles charm damage)
- Merlin: play for ten hours of total game time (unlocks Ultima, the ultimate spell)
- Reach every narrative ending (unlocks hidden ending)
- Jousting Tournament: try out the online competitive mode!

Achievement badges

- Defeat an enemy without taking damage
- Defeat an enemy without missing a spell
- Defeat ten enemies without taking damage
- Defeat ten enemies without missing a spell
- Defeat every enemy on real-time battle mode (grants boots of risk, increasing damage dealt and received by 100%)
- Chosen One: beat the entire game on hard difficulty without missing a single spell or getting hit by a single attack (unlocks heroic difficulty, where time moves twice as quickly and the player only has one health point throughout the entire game [one-hit KO])

Other badges

- Resolute Spirit: defeat an enemy after losing to it at least once
- Replay a battle after already beating it
- Play five battles in sparring mode

Intelligent Systems

The addition of an ITS into *Time Shift* would be most visible in battle scenes, where an intelligent system can be used to determine the optimal inputs demanded of the player based on the player's tendencies. If a player were to consistently get a certain input wrong, the ITS would select that input considerably more to help the player practice it more (and similarly if the player often takes particularly long with certain inputs). An ITS can also create specialized programs in the sandbox-like practice/sparring mode, and require players to complete the specialized training before proceeding with the next level.

UDL

UDL concepts play an integral role in the design of nearly every aspect of *Time Shift* as the target demographic is a subset of the group with whom UDL is most concerned. To accommodate students with sight impairments, the game is fully narrated and can be played without any visual information at all. Conversely, for those with hearing impairments, the game is also fully animated and can be played without any aural information as well. For students with cognitive impairments or time-induced anxiety, the turn-based mode enables players to proceed with the game at their own pace. Overall, the game is designed to help players take advantage of the game's learning environment in the most individually accessible way possible.

Tangibles, Movement, Collaboration

A potential tangible activity would be to engage students with an exercise in learning the basics of braille. Students would be presented with 3x2 boards that could be punched out in various configurations to reflect the different combinations found in the braille system. While the activity would not relate directly to typing proficiency, it would both help students with their ability to recognize and interpret distinguishable symbols in space using only tactile feedback, as well as open a new avenue of learning for students who may not have been exposed to braille before.

Assessment/Transfer

<u>Basic Hand Positioning</u>

- Press "asdf and jkl;" at the same time with four fingers from each hand
- *Real-world learning objective*: gain the ability to internally conceptualize the concept of unique, discrete, ordered objects in space

Special Characters

- Type the sentence: “That orange juice cost ~$4 and since you got two, the total cost will be $4 * $2 = $8 (which is the same as $4 + $4).”
- *Real-world learning objective*: not only learn where the special characters are on the keyboard, but when and how to use them in a functional sentence in a coherent manner

Creating Words

- Type the words: “joy”, “free”, “sad”, “hugs”, and “type”
- *Real-world learning objective*: players learn common typing letter associations/sequences allowing for faster typing while also building a working vocabulary to allow for more complex written/non-oral expression
- *Bridge activity*: “Type out as many words as you can think of in one minute”
    - This will help players not only understand which words they already know, but also allows them to be more alert for words they do not know that show up in the typing lessons/battles