Spell'O'Type – Type. Spell. Learn.

Problem Statement

Many children with special needs find writing very difficult and sometimes close to impossible. There are some children who do not have the ability to speak. And then, there are also some children who can neither write nor speak. "***How then would anyone ever get to understand what these children with special needs know and what brilliant thoughts they have to share?***" is the problem of many educators and parents.

Typing is a formidable and life changing tool that opens doors for individuals with special educational needs, as it presents them with a new and powerful medium for exhibiting their learning and communicating their thoughts and ideas. With this tool in their arsenal, it puts them on a more even standing – giving them a greater chance to reach their full potential. Teach a child with special needs the skill to type and you open up possibilities that seemed impossible till then!

With most typing programs you type random keys and learn the letters, one finger at a time. It's very difficult to get a child with special needs motivated to learn in that way. Moreover, the programs are usually cluttered with a lot of distracting graphics and animation that may be off-putting for a child who may find the sensory experience overwhelming. It is very important for the child to feel success at every step and to stay motivated and encouraged to practice and learn more. A good typing program should therefore fulfill all these criteria.

Description of the project

In my project Spell'O'Type, children learn to type by writing proper words. This program introduces commonly used words which the child spells by typing letter for letter as it is spelt. The child learns the letter names as it is typed and hears the word as it is completed. The words are made more meaningful with a pictorial representation of it. So a child is learning letters in words and words with meaning. By connecting typing with literacy, they see a means to an end and they really enjoy it. This is a very friendly way to introduce typing to children who would one day use this as a mode of communication.

The words presented are carefully selected from a collection of beginner CVC words, number names, animal names, names of colours and body parts, and other lists of sight words that are in line with academic goals. The program has 70 words.

Keeping in mind the challenges faced by children with special needs, I have used the following design considerations for my user interface:

- a simple, fresh and uncluttered presentation style

- both written and spoken instruction
- an easy to read typeface
- high foreground and background colour contrast

My program works as follows:

- A word is presented on the screen. As the children find the keys on the keypad of the laptop and computer, they learn to spell words.
- The letters are sounded out as they type and the whole word is called out when completed. As part of its multi-sensory approach, users see a word, hear it, read aloud and then type it.
- Then a picture appears to reinforce the vocabulary.
- And finally, an accolade which encourages them and nudges them gently to do more and more.
- There is no acknowledgement for a wrong letter typed. The program goes forward only when the right letter is typed. This enables them to work independently and gives them a sense of pride and accomplishment.

These specifications have made Spell'O'Type unique in style and it resonates very well with children with special needs. By engaging the major senses of sight, sound and touch simultaneously, it radically enhances memory retention and recall.

Teachers and parents like the program for its simplicity. No installation or login is required. They simply need to click on a link, press the green flag and the child can start learning.

Project Logic and Control Flow

1. **The random word generator**

   In my program, each word is a sprite and correlates to a unique number. The logic to generate a new word is handled by the backdrop. I have created unique messages for each word. I set a variable, `no of words,` to the total number of words in my game. Then, I use the `pick random` block.

   Every time a unique number is picked, it is appended to the `words already done` list. I run a check to ensure the number isn't already in the list. I then use a custom block to broadcast a message according to the number.

   The whole random generator code is controlled by an `if-else` block. If the length of `words already done` list is equal to the total number of words, the list is reset, else the game continues to generate new unique numbers.

2. **Response when a key is typed**

   Each word has its own sprite and a unique message. Initially all the words are hidden and set to 100% size. When a word is displayed, it's size is set to 200%. Then a variable, `letter,` iterates from 0 to number of letters in word-1 to indicate which key press should be accurately detected. Everytime a key is pressed, I change the letter variable by one, I use text-to-speech to speak the letter aloud and I add a box around the typed letter as a visual cue. At the end, the whole word is spelled out and a graphic is displayed, to enhance vocabulary.

3. **Accolade Sounds -** I wanted to use the built in text to speech extension in Scratch. However, the generated sounds were not very stimulating. While reading a newsletter on AI, I came across this site **15.ai** - **a deep learning text-to- speech tool for generating natural high-quality voices of characters.** I used this tool to generate accolades in the voice of "My Little Pony" with a "happy" emotion. Then, I generated audio files in the `.wav` format and imported them into Scratch.

4. **Teacher Tools -** This is a collapsible list of various parameters that teachers can monitor or modify to customize to the needs of every student. These are the parameters:
    a. **Accolade Frequency -** This is programmable from 1 to 5. The default value is set to 1 but teachers can adjust it as per the student needs. Each time the accolades are changed, a variable called `accolade counter` is set to 0 and incremented at the same time as the total words typed. The program gives the student accolades if `(accolade counter) mod (accolade frequency) = 0`
    b. **Total Play Time(in seconds) -** This is a cumulative sum of all times when the word is presented till the time the last character is typed. It doesn't take into account the time when the teacher tools are being used or the accolade is being played.
    c. **Typing speed (wpm) -** This is a statistic that is expressed in terms of words per minute and is calculated by dividing the `total play time` by 60 and then dividing it by `total words typed`. I calculate it upto 2 decimal points.
    d. **Word List -** The teacher can select from a specified range of word categories such as random, number names, colour names and body parts. The random option is set by default when the program starts and presents words from the complete word list in a random way.
    e. **End Session -** This ends the current session and displays summary statistics which can be used as a benchmark to measure student progress.

Impact of the Project

My younger sister is my inspiration for my creation. Spell'O'Type is a creation of love for my sister whose special needs make it impossible for her to speak and very difficult to write. After just about a month of using the program, my sister independently types out 20 words without a pause and is learning to spell words in response to questions asked. This seemed an impossible feat earlier on.

Having witnessed the utility of this program firsthand, I chose to share this program with my sister's schoolmates who all attend a special school program at Samatha Learning Center, Bangalore, India(http://www.samathalearning.com/). Since then, this program is being used on a daily basis to teach typing, reading and vocabulary to many kids, with a lot of success.

"We are using Spell'O'Type very impactfully with more than 15 of our students. Children love it so much that the teachers use typing time on the program as an incentive to finish their

otherwise harder tasks. With this, they are also able to extend their learning as they type out words in response to questions into word documents," said **Ms. Anita Eipe, Managing Trustee and Founder, Samatha Learning Center.**

"Having used Spell'O'Type with many kids, I find improvement in visual-perception skills such as scanning and discrimination. With improved visual-motor integration, kids are more successful in the classroom," said **Ms. Neha Rastogi, Paediatric Occupational Therapist.**

"With Spell'O'Type, my daughter is picking up the keyboard skills well. I am glad that the program is interactive because she can actually pick up the sound of the letter as she types which keeps her interested in the activity," said a **parent of a six year old child on the Autism Spectrum.**

My program can be accessed at the following link:
https://scratch.mit.edu/projects/387803162/fullscreen/
At the time of submission, the program has already been **used 360 times(and counting).**
I have shared my program with many other professionals and educators and hope to get many more kids on board. The program will continue to evolve as I get more support and encouragement.