

FINAL THESIS PROJECT 2022

PUTTING MIND WANDERING TO GOOD USE

An Application

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PROJECT: Putting Mind Wandering to Good Use

PROGRAM: Undergraduate Professional Programme

AWARD: Digital Media Arts

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BCU/UOM REG. NO: 18SBF257



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**EXPOSURE TO
CERTAIN TOPICS IN
THE INITIAL DAYS**

TOPICS WHICH INSPIRED ME TO WORK WITH MIND WANDERING:

- The article where Daniel Hillis talked about the possibility of a knowledge web where the system works in the form of a personalized tutor for which he used the example of Aristotle and his teaching and the system becoming like the much-needed guides instead of giving routine info which seems overwhelming for most.
- The book Stolen Focus: Chapter 5 Cause Five: The Disruption of Mind-Wandering:

The text conveys the message that it is alright to let the mind wander. Doing nothing or daydreaming is condemned in many schools, but apparently it helps to think about the subject better and more deeply, sometimes making connections to our lives, or something completely different. Thinking narrowly will only allow the person to think in a single dimensional way. Questioning, contemplating about the topic won't really be possible then.

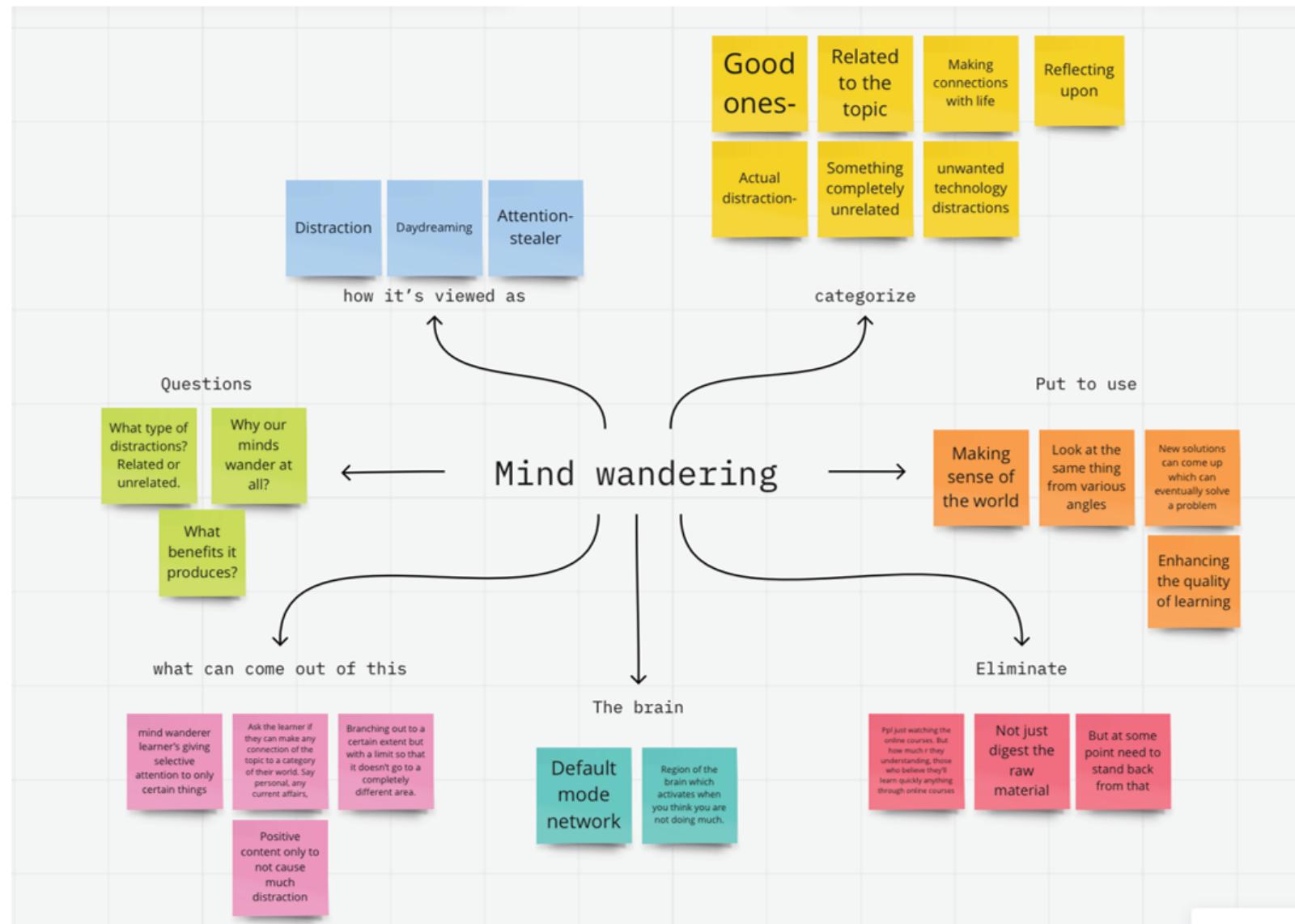
For me personally, when I am expected to focus on nothing but just on what i am studying at that moment, i fail very badly at it. I need to take time to think what is going on actually, absorb to understand better not only in studying but in other

activities and conversations too, but i get called a "tubelight" sometimes for this.

Also, I concluded that people have different speeds of learning, hence today the 1x, 2x speed options we see under some videos, it completely makes sense for such technology to exist. It's the students' choice to learn at whichever speed they want at their own pace.

- Fractals- The concept of patterns within patterns. In real life too, we can apply this theory of making use of what we have already to create newer objects. Also, look at various things zooming in, zooming out. I was really interested to know how it can be used in education and learning.
- How We Learn video by Dr. Pasupathi - Emotional engagement while learning. Learning about a topic which one really cares about. But also not all emotions can help in learning. Suppose if one is sad, they might learn in a narrow way, but if we are happy or in a positive mood, we may make connections with the topic and widen our horizons.
- Dr. Anjani's masterclass- after a masterclass we had with Dr. Anjani Bhargavi, Oregon Health and Science University, I wanted to examine an aspect more closely and that is what goes on in a learner's mind while learning. The most talked-about trait I found is mind-wandering. I thought why not deal with the same issue in a “play” manner.

SOME RESEARCH ON MIND WANDERING AND WHY I DECIDED TO WORK WITH THIS TOPIC



Significant statistics:

In a survey by psychologists Matthew A. Killingsworth and Daniel T. Gilbert of Harvard University, it was reported that on an average, respondents informed that their minds were wandering 46.9 percent of time, and no less than 30 percent of the time during almost every activity. Hence it is quite impossible to remove this particular functioning of the brain while learning something. What I think is instead of thinking of this function as an obstacle to focusing while studying, it is best to accept this as a natural behaviour and use it in a way that will turn it into an advantage.

An assistant professor at University of Virginia, Irving proposes that mind-wandering should be understood as ‘unguided attention.’ One thought after another.

Benefits of mind wandering:

- Making sense of the world
- Looking at the same thing from various angles
- New solutions can come up during mind-wandering which can eventually solve a problem
- Enhancing the quality of learning
- Facilitate emotional engagement

The problems it can solve:

- Some learners just digest the raw material blindly which is put in front of them. But the learner needs to take a step back and judge the content carefully.
- Most people who are learning through online courses believe that these courses are a shortcut. There is a misconception that they will learn anything quickly just by watching things online. But how much are they actually understanding? How long is the knowledge going to last?

Some questions which we are going to be dealt with further:

- What are the types of distractions?
- Why our minds wander at all?
- What happens when the mind wanders?
- How do we learn when the mind doesn't wander?
- What is the difference of productivity or output between students who are just learning what is given in front of them and the students whose minds are wandering places and are looking at the same thing from different angles?

ARRIVING AT AN IDEA

Initial idea was to make mini games to make the learning content user-friendly by they themselves experiencing the content by executing certain things. But as soon as I explored deeper into mind-wandering, my plan changed.

Final idea:

This project aims to put the mind-wandering functioning of the brain to use by developing a system or framework that will encourage users to make more visual connections with the topic they are learning in order to enhance the quality of learning and not look at it with a narrow mind.

The system asks the learner if they are making any connection with the topic through any aspect be it social, political, cultural or so on.

They can even use their past memories which may get triggered while learning. Say if the learner is thinking from a cultural point of view, the system can present visuals showing how the topic is related with various cultures or if the learner wants a specific culture, then it can show the topic being used in one specific culture.

Example: One is learning about characteristics, pros and cons of Mass Drill in Physical Education. One's mind may wander towards the various moments or small incidents they had when they themselves were made to do drills in their PT classes. The connection-making system comes in between as a filler and based on the user input, it can show the topic

branching out to a particular exercise done in the Mass Drill say Jumping Jacks and based on what the user says or types next, it can branch out further more maybe dive deeper into the benefits of Jumping Jacks or any significant fun fact regarding this particular exercise through relatable visuals.

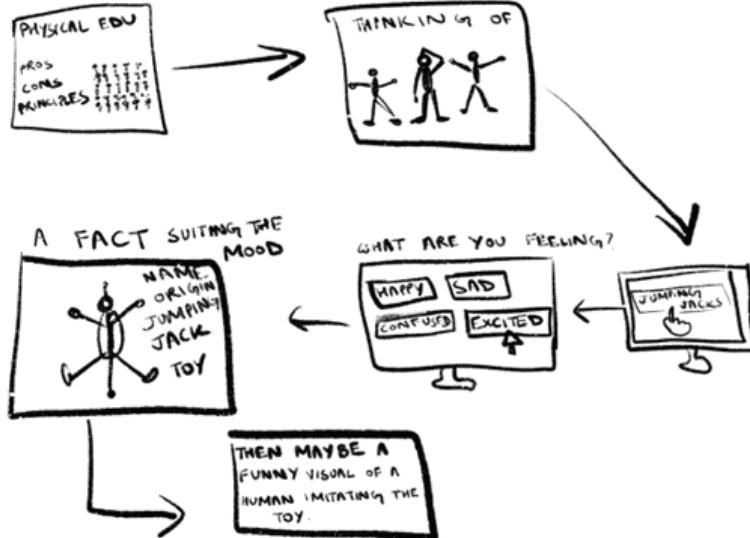
Inspired from a tip suggested by Dr. Anjani, it will be made sure that the visuals impart positive content not negative ones so as to not make the emotional engagement go out of hand.

User input mechanism: They type out one key-word about the thought they are having and the system checks if it has any visuals related to that keyword and plays it.

According to their thoughts, the system can make an accurate visual connection with whatever they are thinking or want to make connection with. But it is also being aimed to keep a limitation so that the system doesn't branch out so much that the focus is completely shifted from the main topic.

If possible, instead of looking at how the user is feeling, the user can also type out their thoughts. Whichever visual has the most keywords matching with the user input, that visual will be shown.

My target Audience: High school students mostly in 9th and 10th grades. In recent years, several laboratory studies have indicated that healthy older adults exhibit a reduction in mind-wandering frequency compared with young adults and adolescents. It is a fascinating age to deal with because they are going to a new stage of life where they experience many things and express many worries and thoughts.

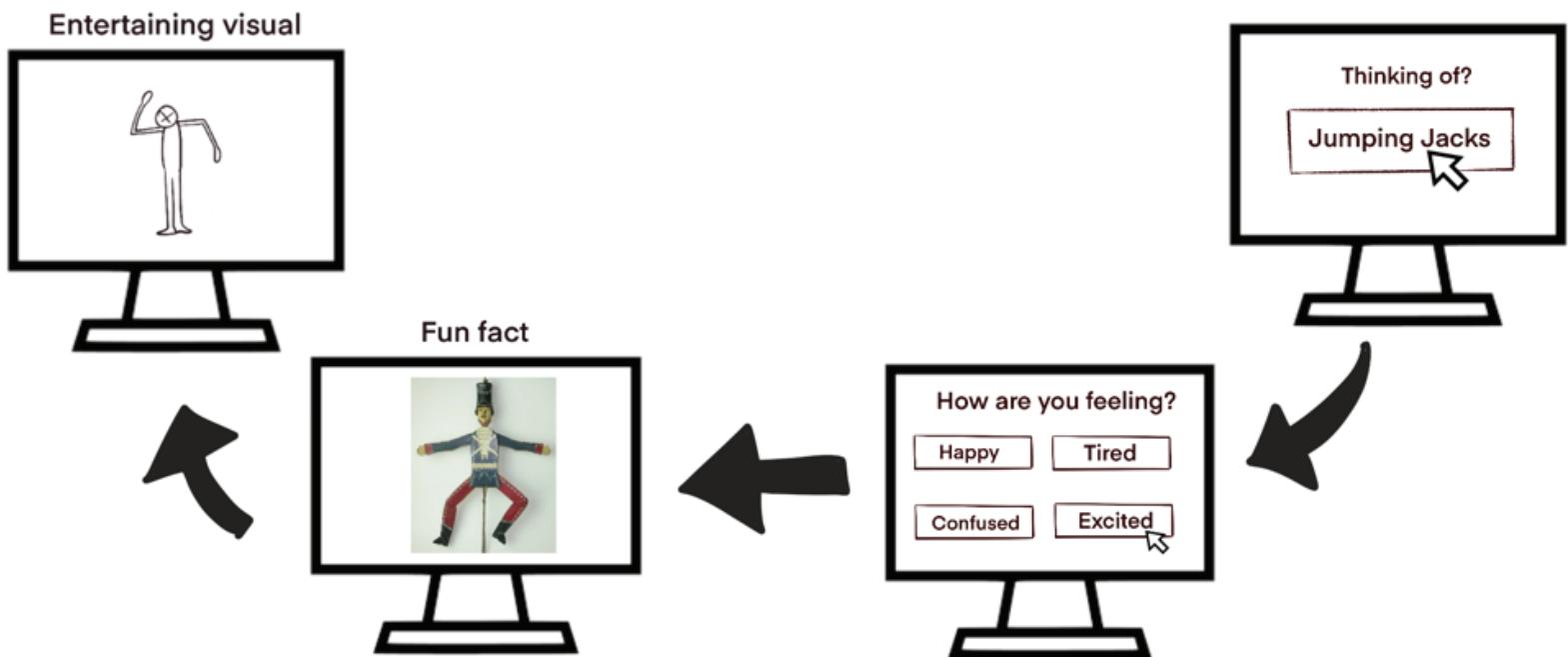
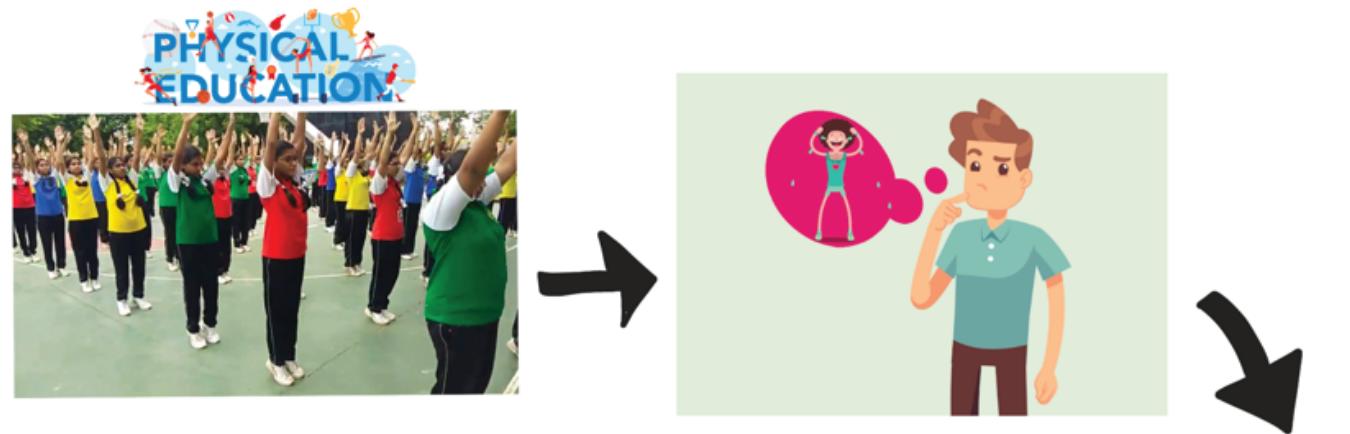


Planning the features of the mind-wandering system:

- Empathetic, compassionate.
- Curious. As in, to know what the user is thinking at that moment.
- Encouraging. Aims to encourage the user to make connections, no pres-

sure though.

- Organized.
- Improves with time, based on the user interaction and inputs.
- Reflective.
- Non-repetitive. Trying to repeat a particular visual (to be used as connection) as less frequently as possible.
- Simple. Just a mouse-click or typing a word from the user's end.
- Not a supervisor. Will not dictate the user what to think or do. A good amount of autonomy to the user.
- Maybe connect that student to other students whose thinking processes are similar to that student. This can even give rise to a like-minded learners' community.



A rough Visual Roadmap

SOME MORE RESEARCH

How the mind wanders:

According to the site Frontiers in Psychology, mind wandering has been only associated

with negative effects like worse mood, less- life satisfaction, greater stress and lower self-esteem.

It has been classified into several types:

- superficial kind of listening accompanied by frequent distractions.
 - a close following of the speaker's train of thought.
 - A kind of listening in which they felt that they were actively meeting the speaker's mind.
- More distraction occurs when one is tired, stressed or not liking what they are engaging with. Similarly, less distraction occurs when one is happy or good at or liking the current activity or deems it important.

Current interventions or steps that has been used already to reduce distraction:

- A clicker technology to indicate whenever their attentions have been drawn away.
- Distractions seemed to have been reduced through quizzes and demonstrations.
- Using materials like word lists, face-name pairs, prose passages, conducting brief tests at regular intervals can help to improve retention of materials.
- Interpolated Testing

Studies have shown there is not much difference between the amount of mind wandering

caused during online classes and that during offline classes. No matter what the duration of each online lesson is, mind wandering is inevitable.

I found a very good passage on the internet explaining Why the focus is less while studying in particular and not during other activities like watching a movie?

- The fact that some lectures require the use of laptops and also the presence of smartphones in class.
- Environmental factors of a classroom like flat lighting, audience whispers, entry, exits with relative freedoms, presented visuals being often textual, static or basic instead of graphic, dynamic and complex and also monotonous audio narrations.

My Final Project Brief:

A framework that will act as an extension to existing online courses and its main objective is to direct the learner's mind-wandering from distraction to a more productive path where they can make connections with the content they are learning through related words and visuals.

EXPLORATION IN TO CONNECTION-MAKING

I needed to gather some data about connection-making.

The major purpose of connection-making is that it involves a process of connecting prior knowledge to new knowledge and experiences.

Other purposes of connection-making are:

- It enables students to build on their prior experiences to further construct knowledge and make meaning of the world around them.
- provides opportunities for the development of deeper understanding of concepts, skills and the nature of science and technology.
- promotes understanding of the relationships between science and technology and the social and environmental contexts of science and technology

With the help of my project guide, I got the inspiration of making connections to the topic **through words rather than emotions**. That is why I decided to alter the emotion-connecting aspect because it is very hard to detect what a person wants when feeling a particular emotion. The word-play seemed a more practical application in this sense.

FOCUS QUESTIONS IN THE RESEARCH SURVEY

aimed at Government / aided schools following
the CBSE system.

CONTENT ANALYSIS

Out of the questions in the questionnaire we sent to schools to gather data for secondary research, the following are my focus questions (numbering is in accordance with that of the questionnaire form):

Students section:

16. Do you use any of these apps when you study? Select all that apply:

My target answer: Youtube

My conclusion: Preference of variety of content.

19. Why do you think the selected chapter(s) is important to know?

My target answer: Related to life | everyone should know

My conclusion: They want to learn something which they can relate to and deem important.

21. What's the best way for you to learn how something works? Select all that apply.

My target answer: Watch someone else do it.

My conclusion: Explains why they prefer Youtube because someone else usually performs the job or does the necessary in the videos.

23. In your opinion, what about social media (WhatsApp, Facebook, Instagram) makes it so enjoyable?

My target answer: Scrollable Short Content

My conclusion: The general attention span is on the decline

24. Do you find peer learning helpful? Why?

My target answer: Ease of solving problems with peers around.

My conclusion: They want some kind of guidance or help or assurance.

29. What are the challenges you face while using phone/technology, etc.?

My target answer: Distraction.

My conclusion: The easy availability of distraction. Distraction is inevitable.

31. How many hours do you study after school on a school day?

32. How many hours do you study on a holiday?

My target answer: 1-2 hours on a schoolday, 2-4 hours on a holiday.

My conclusion: Most people usually do not prefer long hours of study like we used to see before like 8-12 hours. Productivity over quantity.

39. What features do you think motivates you to play video games?

My target answer: Winning points

My conclusion: They find gratification and some sort of approval (in this case, points) motivating for progress.

Teacher's Section:

16. What are the different kinds of activities you introduce to the classroom to engage students? Select all that apply.

My target: Storytelling | Showing videos

My conclusion: Entertainment or seeing the content from a non-conventional way is preferred.

27. Which of these do you think helps students recall information better that are practical in a real world scenario? Select all that apply.

My target: Writing what they learn.

My conclusion: Associating what they learn with words helps in knowledge retention.

29. What about social media (WhatsApp, Facebook, Instagram) do you think draws students attention?

My target: Easy to use | Keeps them connected

My conclusion: People prefer less complication.

36. How do you help students who do not understand certain topics and/or those that need extra help?

My target answer: 1 on 1 Doubt Clarification

My conclusion: Personal guidance and clarity is much needed.

39. At what time of the day do you find students being the most active/responsive in class?

My target answer: Morning time.

My conclusion: Learning is usually more effective in a fresh mind than in an exhausted mind.

Coding Manual

Attributes of my Framework

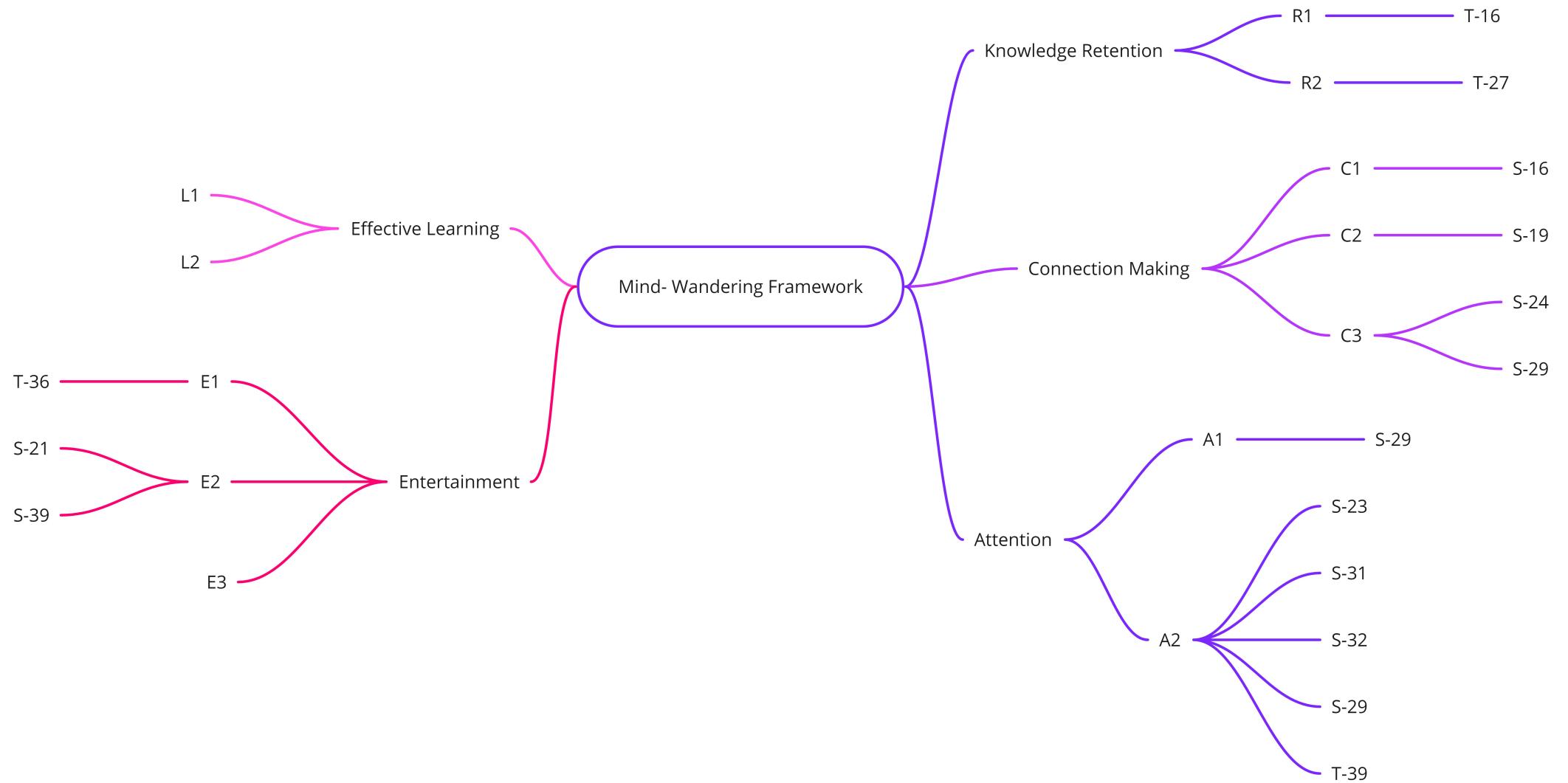
Coding Manual		
Construct	Items in each construct	Code
Effective Learning (L)	Looking at the content from multiple dimensions, instead of a one-dimensional perspective.	1
	Enhance vocabulary, they are free to check out what other words lead to.	2
Knowledge retention (R)	Associating what one is learning to a particular visual or memory helps the knowledge last longer in the brain. Eg: Flash cards and their wide use	1

	While trying to remember a particular portion of say a chapter, they can associate their preferred words to the portion.	2
Entertainment (E)	System interacts with user and challenges itself to guess what the user is thinking.	1
	The system keeps a score system as if the system is the player and the user is the challenger.	2
	The system is open to learning from the user by telling them to input new words to the word cloud.	3

Coding Manual

Construct	Items in each construct	Code
Connection making (C)	User associates a content with any aspect which has been there in their minds or which is there at the moment or something completely unexpected which pops up.	1
	Knowledge branches out to a wide range of topics.	2
	Connect the dots and Develop solution-building abilities.	3
Attention (A)	Directs any distraction to a productive path which relates to the content.	1
	Short, simple, less time-consuming pathway	2

Mapping done to help with the Frequency-distribution



Based on the Mapping above , the following Thematic Analysis is made.

-----STUDENT'S SECTION-----

Question 16:
YouTube= 172
WhatsApp= 115
Question 19:
importance or life skills= 56
Question 21:
watch someone else do it= 77
Question 23:
Scrollable short content= 99
Question 24:
Problem solving easier= 110
Question 29:
Distraction= 105
Question 31:
1 to 2 hr= 103
Question 32:
2 to 4 hr= 83
Question 39:
winning points= 54

-----TEACHER'S SECTION-----

Question 16:
Showing videos= 69
Question 27:
writing what they learn= 52
Question 29:
easy to use= 41
Question 36:
one on one doubt clarification= 39
Question 39:
morning= 97

Based on the frequency counting done above (with the help of the Pandas library in Python), the following Thematic mapping is done.

Thematic Analysis		
Construct Code	Item Code	Frequency
L	1	0
	2	0
R	1	69
	2	52
E	1	39
	2	65
	3	0
C	1	172
	2	56
	3	107
A	1	105
	2	97

The code C1 has the highest frequency that states “Connection with Prior Knowledge or anything existing in mind”. C3 which was about connecting dots and solution-building, has the second-highest frequency.

Developing the Prototype

Since my target audience are students of 9th and 10th grades, the vocational subject I chose to work with is Retail because they will be introduced to this subject for the first time at this stage and since I too am from a non-commerce background, this is a new subject for me as well. It will be easier to look at it from their perspective then.

For demonstrating the prototype, I decided to work with the Five Heads of Accounting. I studied the basics of each term that is Assets, Liabilities, Capital, Expense and Revenue. I came up with all possible words I could think for each of these terms and planned to let the users make connections with the set of words presented in the form of a word-cloud.

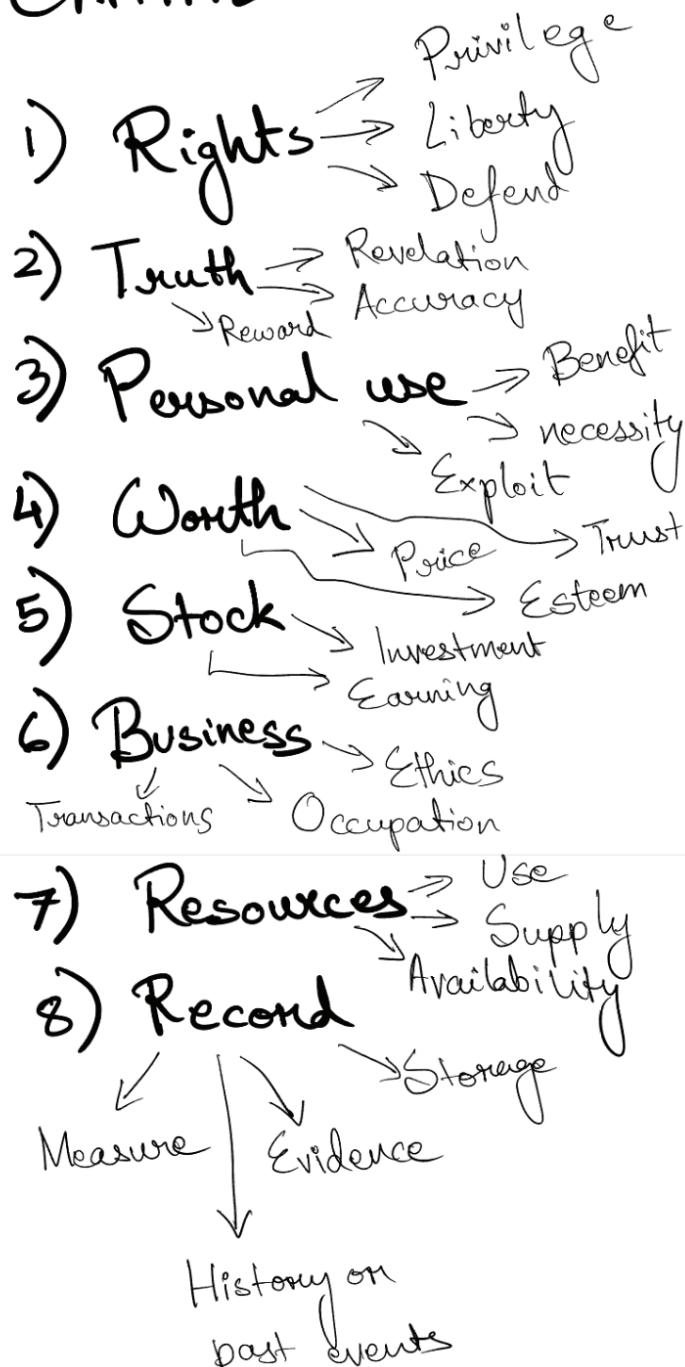
Rough word-ideas and planning for each of the before-mentioned terms.

08-Apr-2022 at 8:12 PM

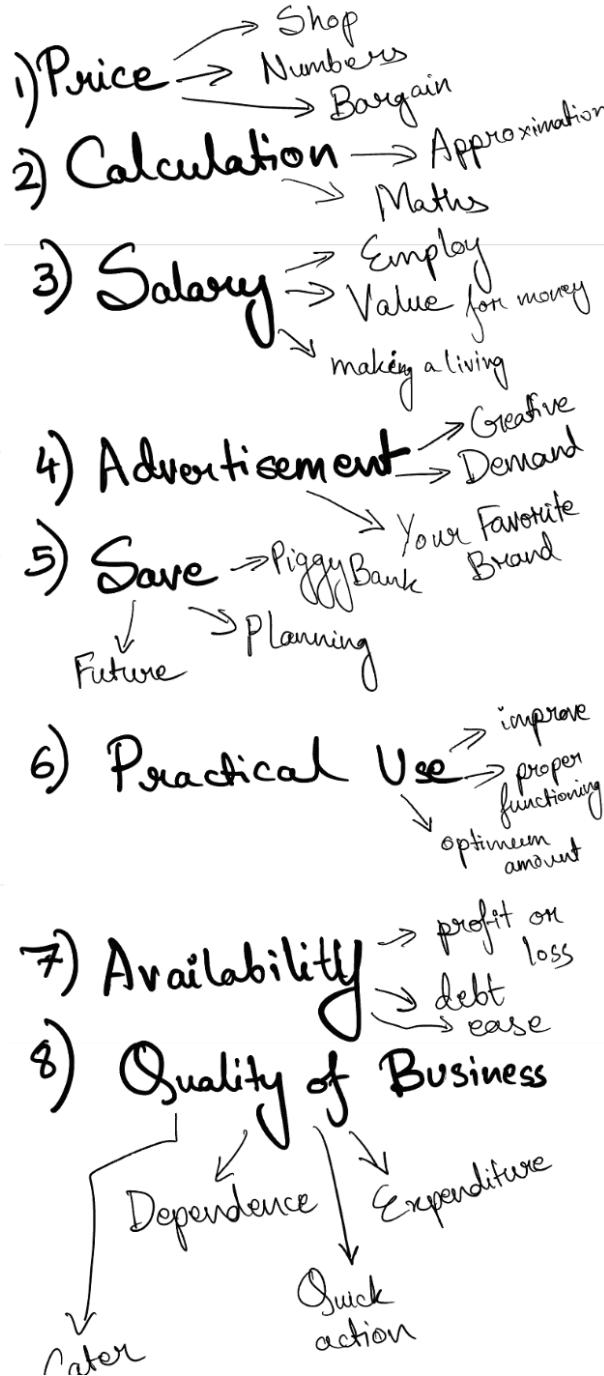


- Liability :-
- 1) Ownership
Thinking of something you owned
Thinking you'll one day be the owner
Sharing
- 2) Savings
Your pocket money
Your piggy bank
Your own account
- 3) Belonging
Your loved ones
- 4) Conserve
Creation
Build
- 5) Exchange
Bet
Balance / change
Exchanging with your friends
- 6) Wealth
- 7) Treasure
Gold
Some Adventure
- 8) Currency
Collection
A valuable thing from another country
- 9) Success
Future
A famous personality
- 1) Debt
Danger
forget
Borrowing
- 2) Loss
Wealth
Regret
- 3) Loans
Bank
Money lender
- 4) Giving away
Something very close
Reveal
Conceal
- 5) Responsibility
Close ones
Hardwork
Importance
- 6) Burden
Luggage
Weakness
Strength
- 7) Pressure
Compulsion
Long-hour work
- 8) Settled
Accomplishment
Organised
Relief

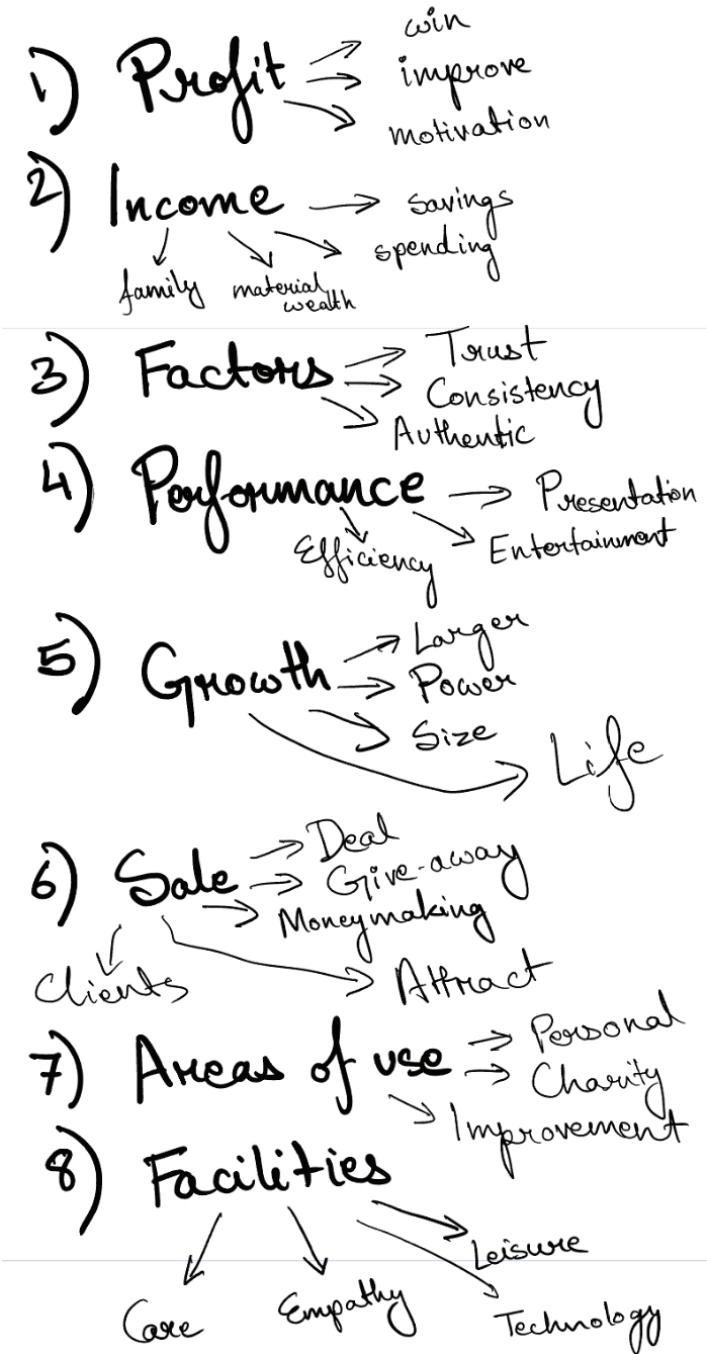
CAPITAL :-



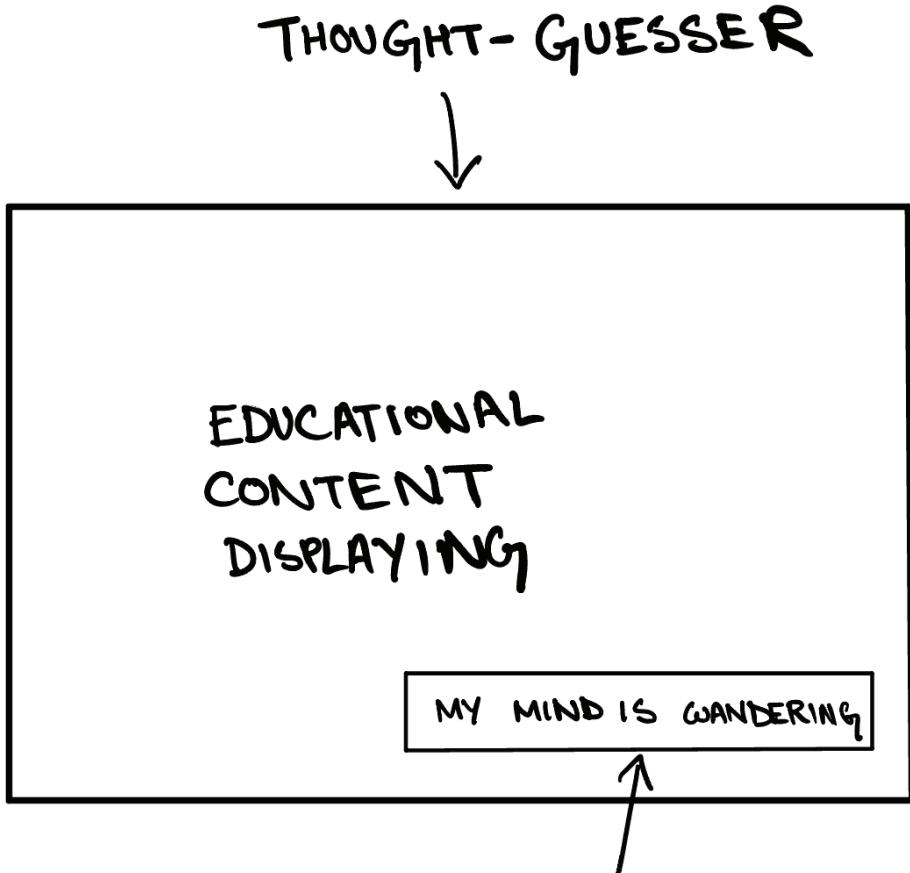
EXPENSE :-



REVENUE :-



The Initial rough Prototype



This button is always available at the screen corner.

If the user feels they are distracted, the button is there for them to click on.

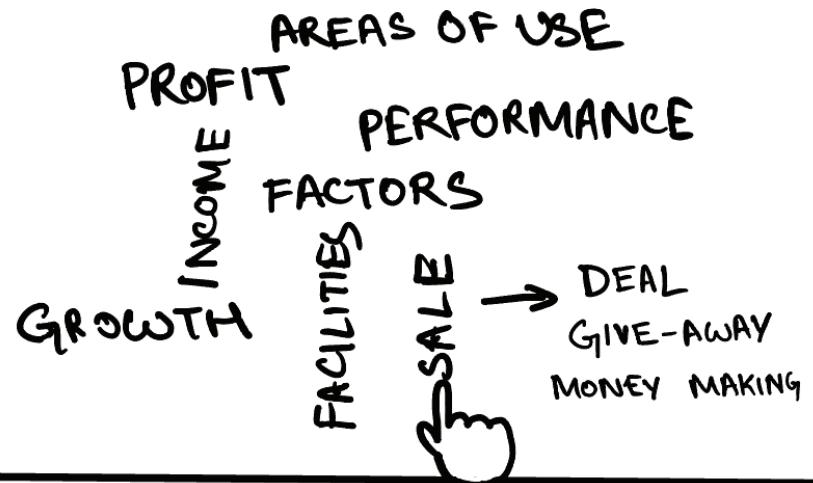
THEN A WORD-CLOUD APPEARS,

LET'S SEE IF WE CAN RELATE TO YOUR THOUGHTS
Which among these words are closest to what you are thinking right now?

AREAS OF USE
PROFIT PERFORMANCE
INCOME FACTORS
GROWTH FACILITIES
SALE

LET'S SEE IF WE CAN RELATE TO YOUR THOUGHTS

(Which among these words are closest to what you are thinking right now?)



SYSTEM'S SCORE: 1 ←

YOUR WORD
NOT HERE?

Tell us so we
can enhance our knowledge.

A scoring system —

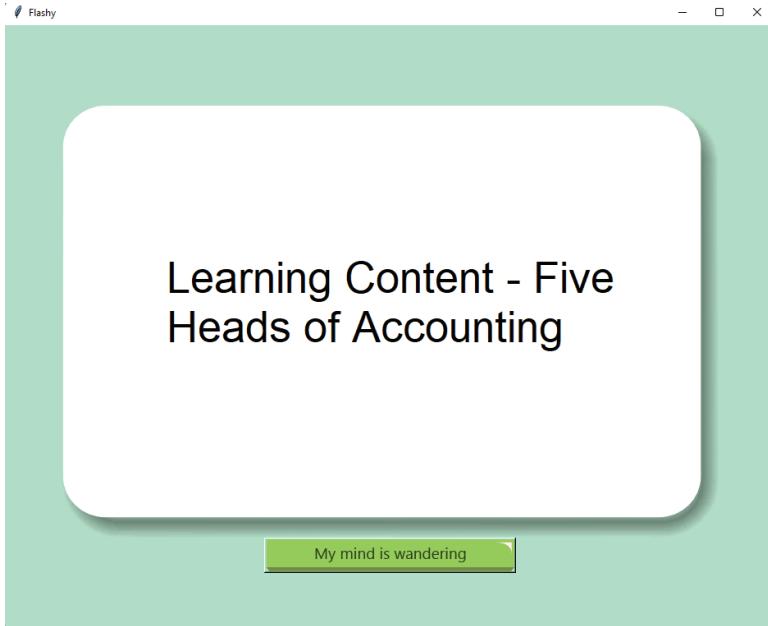
A kind of reward to the system if the user thought-words are present.

The system's objective is to guess the user's thought by putting forward a set of words which the user can relate their current thought to.

- 1) While they are learning from their usual courses, a button called "My mind is Wandering" is always available for them to click on, whenever their minds are wandering or when they are distracted.
- 2) On pressing the button, a word cloud related to the current topic they are studying pops up in front of them.
- 3) If their preferred word is there, they click on that word and its sub-words appear.
- 4) If the word resonating with their thought is not there, they can enter a new word into the system and that will be stored in the system to improve user experience.
- 5) The next step which is not mentioned in the sketches is that if the user gets the preferred word till the end, then the system will display a fact with a visual about the word. Then takes the screen back again to the learning content.

Final Prototype

1

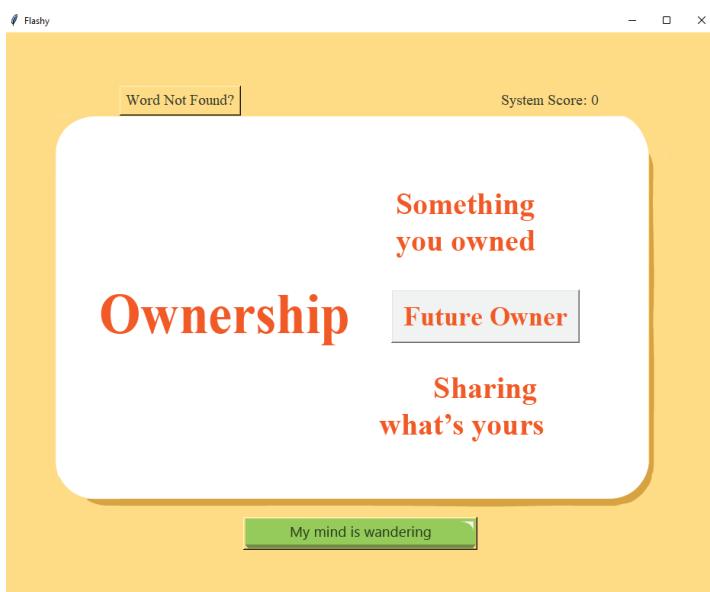


2

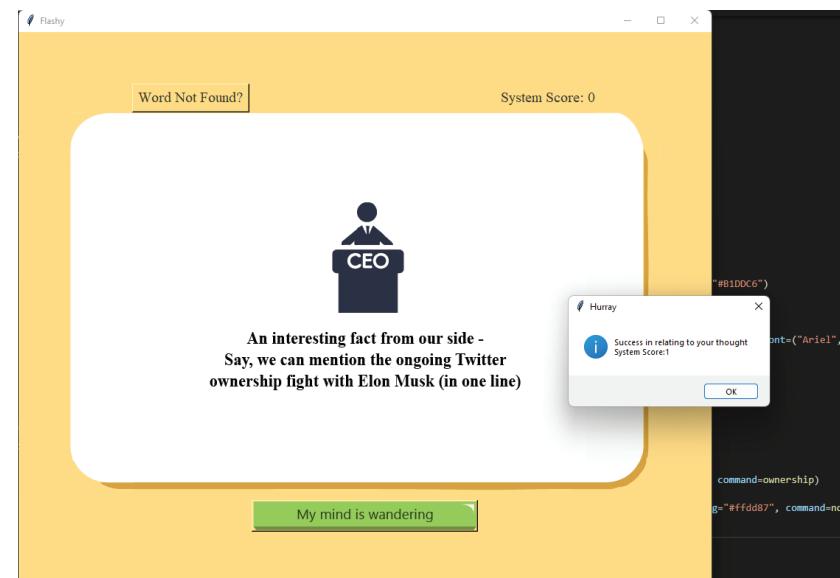


On pressing the green button, the above appears

3

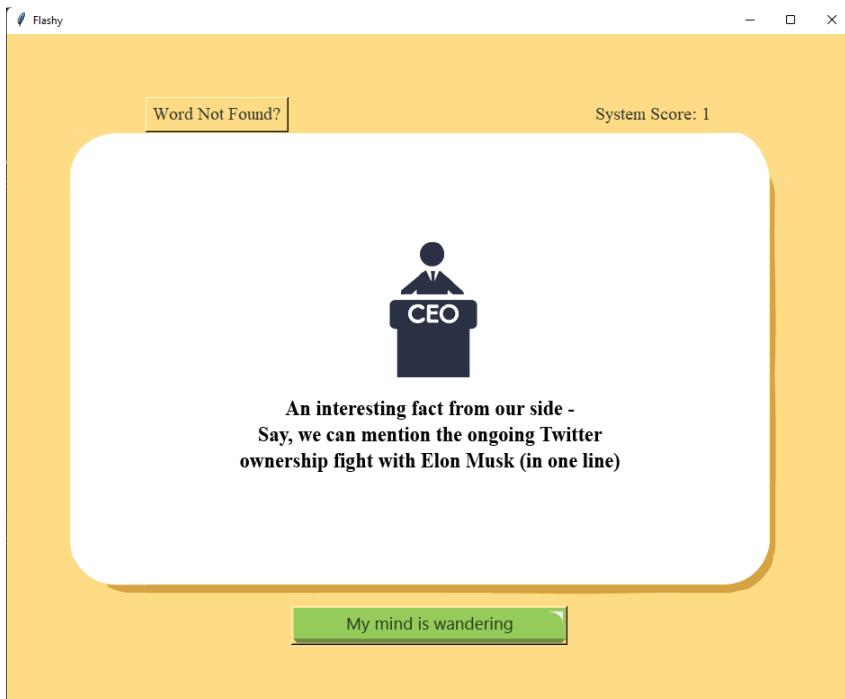


4

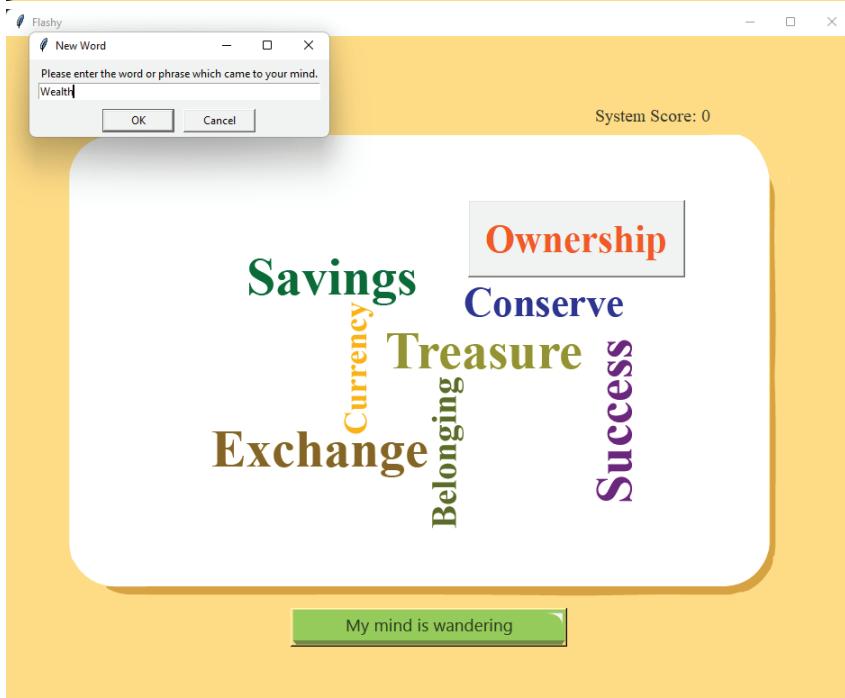


After pressing the Ownership button, the above appears.

5



6



(If a word is not found)

All the words are buttons, but just for the sake of demonstration, only specific words are made into buttons.

Also, instructions as mentioned in the rough sketched prototype like “Which among these words resonate with your current thought” are yet to be added in the final prototype.

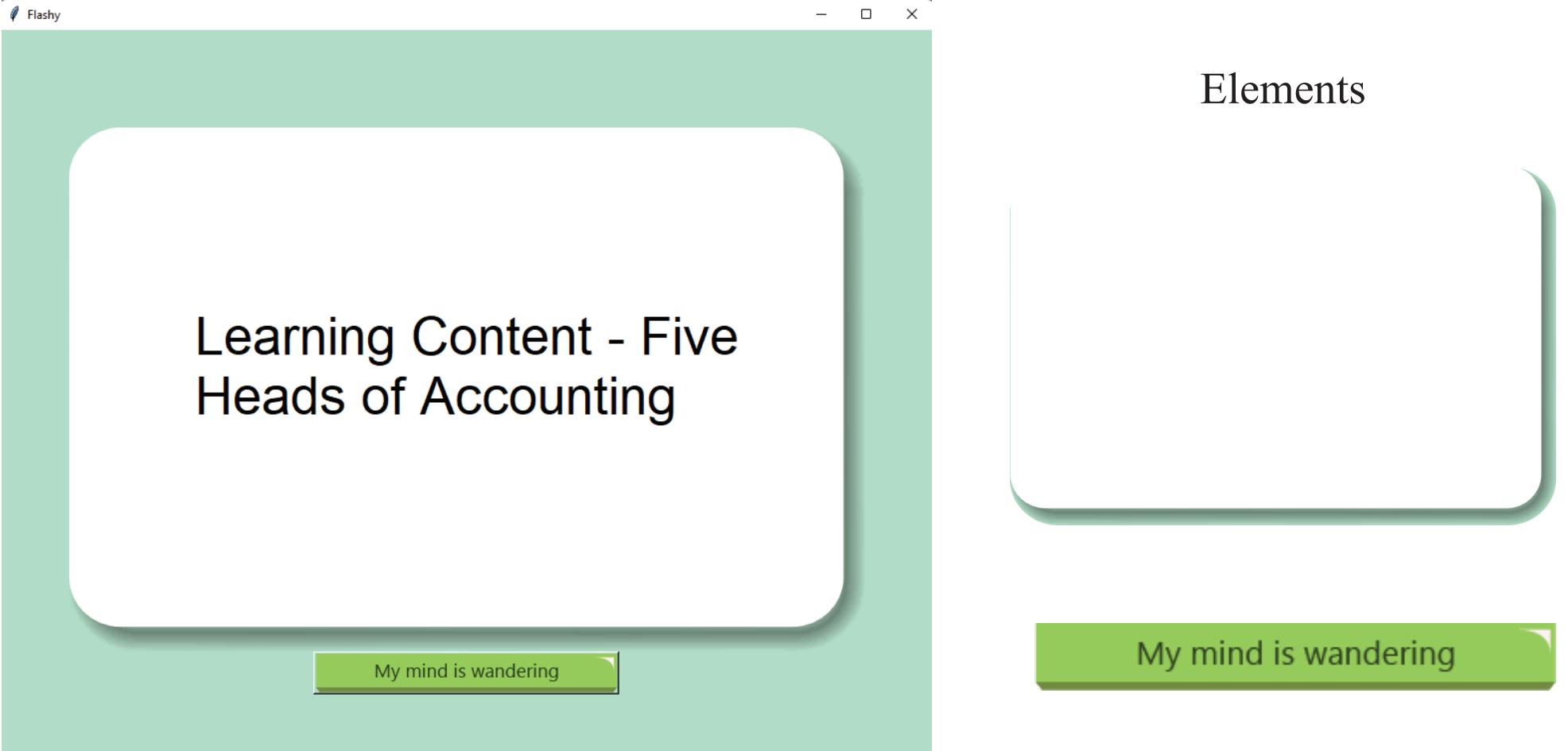
Coming to the themes with highest frequencies in the thematic analysis, I tried to make the connection-making aspect one of the major purposes of this system.

Hence connecting my A3 with the results of the survey,
the themes I tried to inculcate the most for this application were:

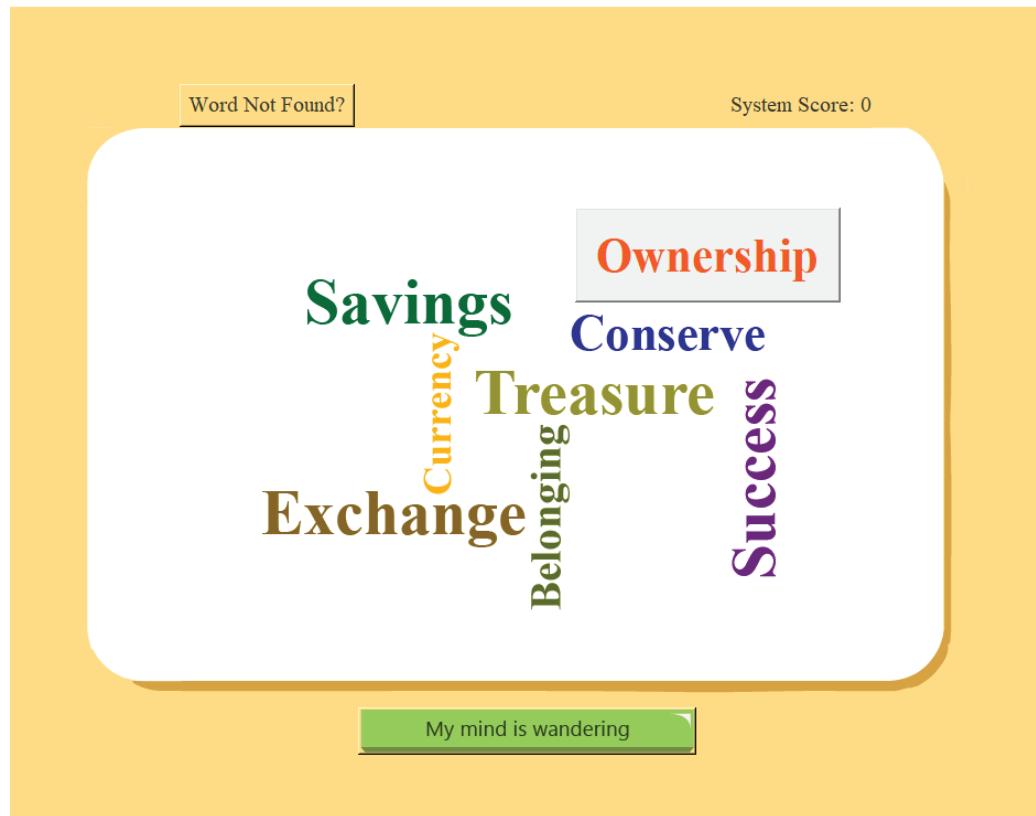
- Connection with Prior Knowledge or anything existing in mind
- Directs any distraction to a productive path which relates to the content.
- Short, simple, less time-consuming pathway
- Associating what one is learning to a particular visual or memory helps the knowledge last longer in the brain.

HOW I EXECUTED MY CODE

(Please do watch the attached video before proceeding)



- Illustrated the necessary elements on Illustrator, like the displaying foreground, the mind wandering button.

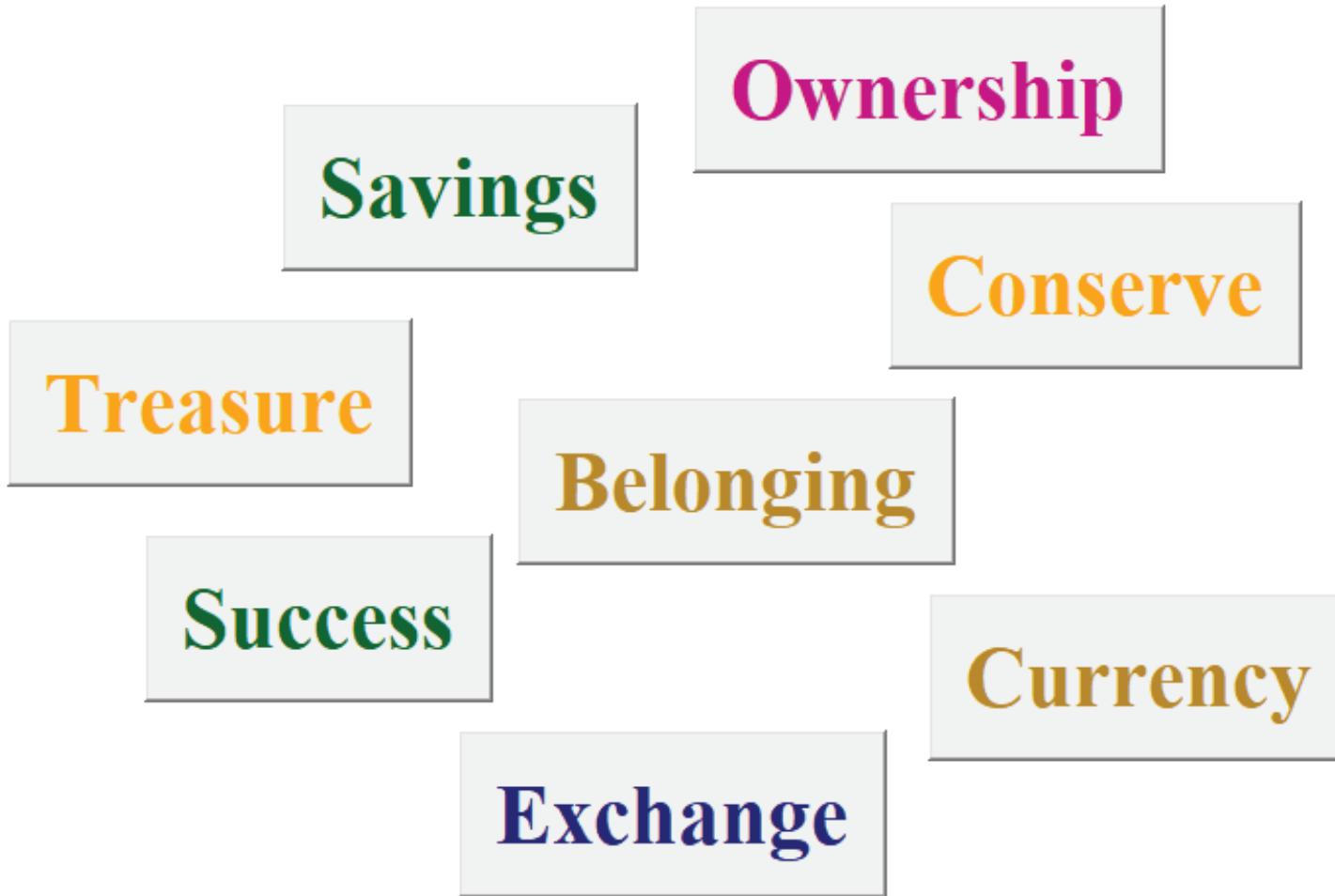


```
assets.csv
1 Word,Sub-word1,Sub-word2,Sub-word3
2 Ownership,Something you owned,Future Owner,Share
3 Savings,Pocket money,Piggy Bank,Own Bank Account
4 Belonging,Your loved ones, ,
5 Conserve,Creation,Build,
6 Exchange,Bet,Balance,Trade
7 Treasure,Gold,Adventure,
8 Currency,Collection,International goods,Artifact
9 Success,Future,Fame,Celebrity
```

	Word	Image	Fact
1	Word,Image,Text ↓		
2	Something you owned,"something you owned.png"	Although Einstein	
3	Future Owner,"future owner.png",From shareholder to owner- Elton		
4	Share,"share.png",In the initial days, the original plan for P		
5	Pocket money,"pocket money.png",While most of us get pocket mo		
6	Piggy Bank,"piggy bank.png",During the Great Depression in the		
7	Own Bank Account,"bank account.png",Parents nowadays are creat		
8	Your loved ones,"loved ones.png",Did you know Mother's Day is		
9	Creation,"creation.png",Adam and Eve as we know were the first		
10	Build,"build.png",Colonel Sanders started serving his trademark		
11	Bet,"bet.png",Football is the most popular game on the planet,		
12	Balance,"balance.png",In most of the shops in India, the shopke		
13	Trade,"trade.png",During the first long-distance trade that occ		
14	Gold,"gold.png",Nearly all the gold on Earth came from meteorit		
15	Adventure,"adventure.png",Seems like the most beloved adventur		
16	Collection,"collection.png",Coin collection is the most popula		
17	International goods,"international goods.png",In the economic		
18	Artifact,"artifact.png",The ancient world's best-known artefac		
19	Future,"future.png",The NBA star, Michael Jordan is dubbed as		
20	Fame,"fame.png",Fame does happen in an unusual way. When Vin D		
21	Celebrity,"celebrity.png",People may become celebrities in a w		

```
assets.csv
capital.csv
connections.csv
expense.csv
images.csv
liability.csv
main.py
revenue.csv
```

- Made five csv files for storing the words related to the particular topic and further made another csv file for storing which words will display what images.



- Made each button functional by assigning them to follow the command to display whatever word is stored along with them in the csv file.

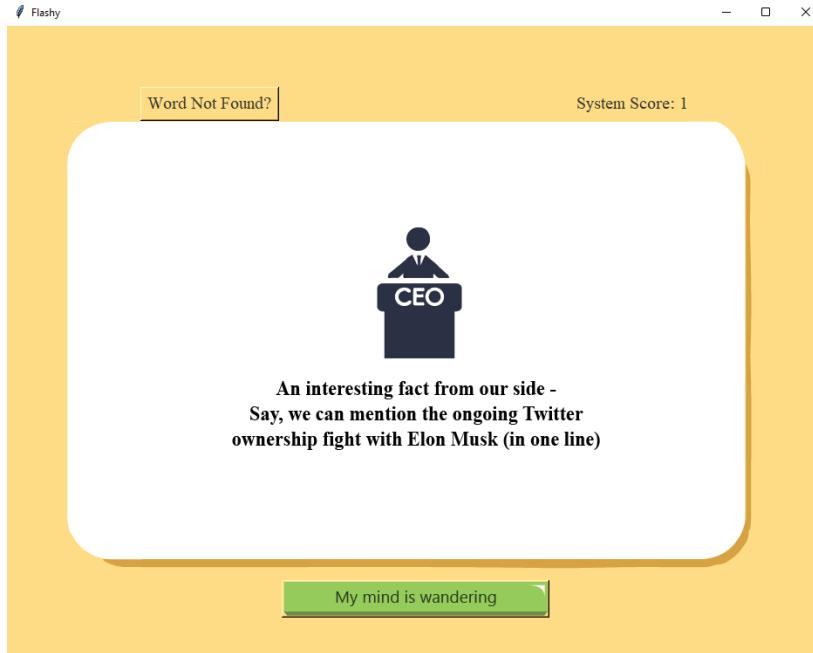
Something you owned

Future Owner

Share



- Did the same with the buttons representing the sub-words to follow the command to display whatever image is stored with them in the csv file.

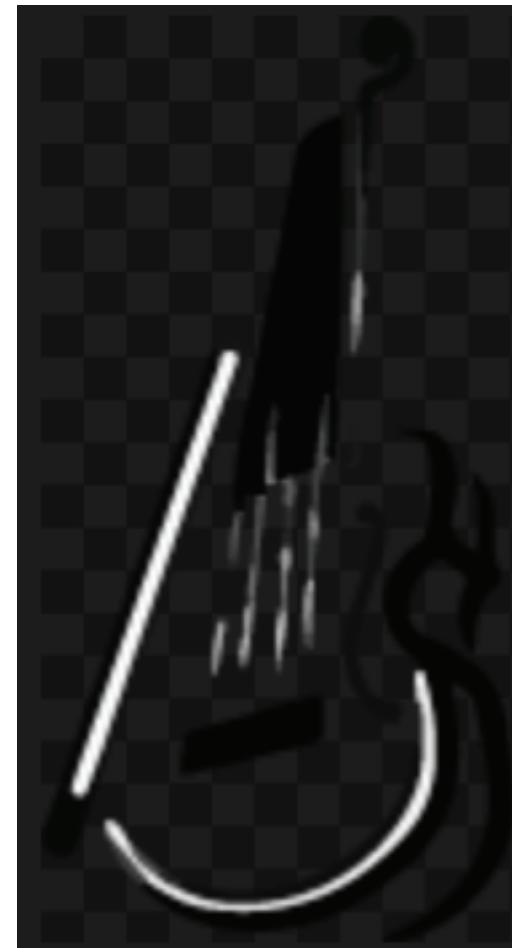


An Interesting Fact from our side



Although Einstein initially disliked his violin lessons in his early age, after hearing some Mozart sonatas, he owned a violin, continuing to play up until a few years before his death.

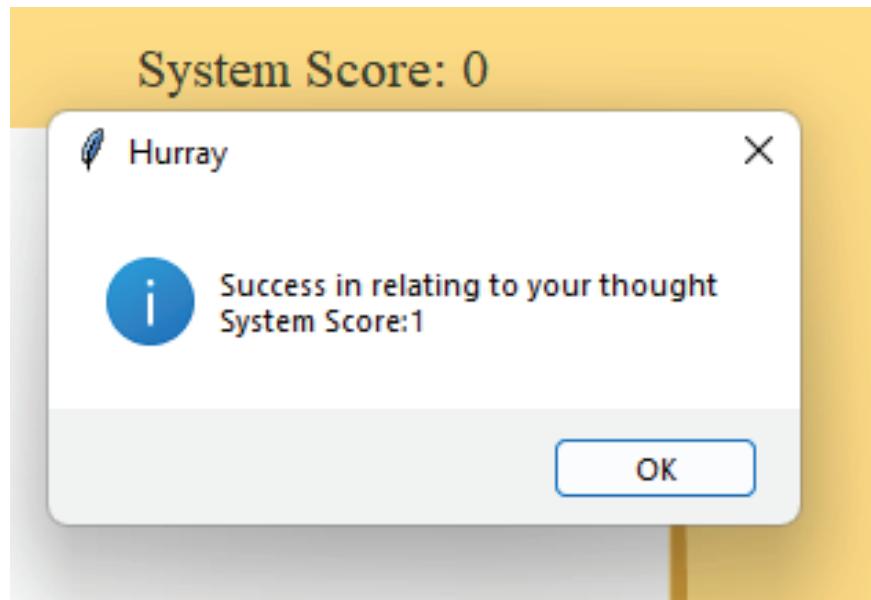
Separate Elements



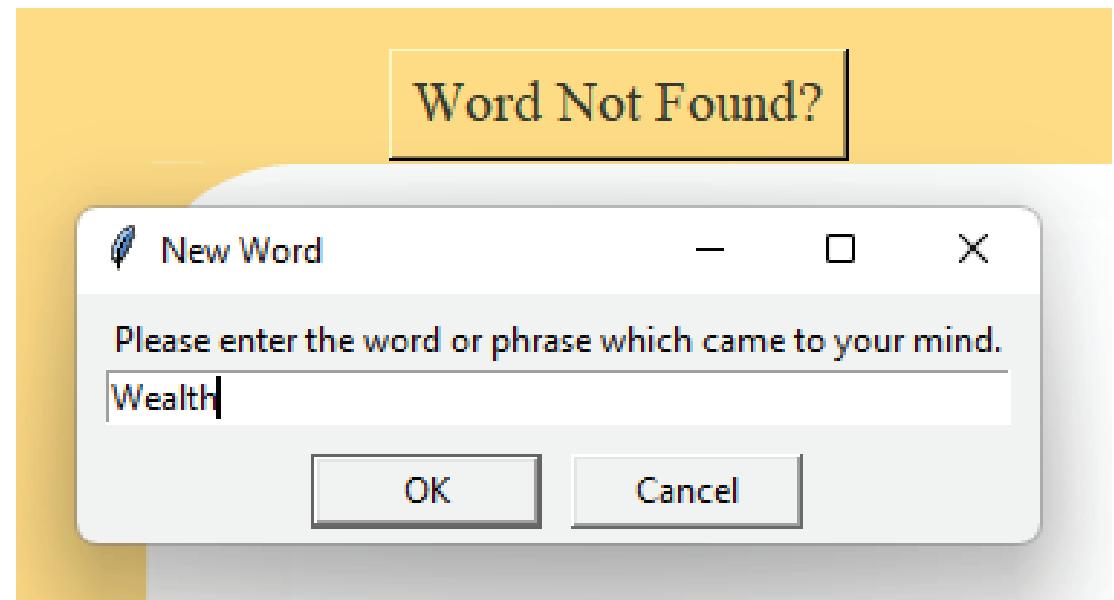
An interesting fact from our side -
Say, we can mention the ongoing Twitter
ownership fight with Elon Musk (in one line)

- Converted the facts-images and the think emoji image into png on Illustrator.

Extra elements for a greater user experience



Reward System



User can input a word if their choice of word is not found

PLEASE READ, IMPORTANT

The zip file named A2 Mind Wandering has the code which shows just prototype functioning, only a few buttons are functional there.

The zip file named A3 Mind Wandering has the code which shows how it is actually intended to function. The things missing there are:

- Positions of the buttons are a little off.
- The background colour has to be changed as shown in the prototype.
- “Word Not Found” button and the “System score” are missing.
- The buttons could not be rotated to form an ideal word cloud.
- The storage mechanism of the word-input, by the user, into the system is missing.
- The images attached to the zip file are the images I intend to put corresponding to the facts of the words.
- **Fact and image is only available for one word that is,
ASSETS>OWNERSHIP>SOMETHING YOU OWNED**

And in both the zip files, the function that takes the system from the mind wandering phase back to the actual learning content has not been executed yet.

**IN ORDER TO RUN THE CODE, PLEASE DO RUN THE FILES NAMED
main.py**

REFLECTIVE STATEMENT

AMMACHI Labs, Amrita University signed an MoU with Srishti Institute of Art, Design and Technology, Bangalore to bring forth a design perspective and lens to the premise of creating a robust online-virtual platform for Vocational Skill Training for the target user group of Class 9-12 students (as mandated by the Ministry of Education, Government of India). Through this 16 week UG thesis project, a group of graduate students came up with design approaches to tackle the same to explore outcomes that could be, but are not restricted to Design solutions of UI/UX formats, Conceptual frameworks, Recommendations and guidelines based on research, Pedagogical interventions, Systems study and strategy, Technology output in the form of 3D simulators, gamified learning among others.

Mind wandering is something which I can relate to a lot and reminds me a lot of my own high school study days. Instead of putting an end to it, why not embrace it and facilitate in a good direction and make complete use of the benefits. In the initial days, I was lost as to how to make the education better and it was really important for me because I myself never enjoyed high school education and I needed to think of an executable plan. There were many options to choose from and aspects to work with, but it was tough to fixate on one. But then when the neuroscience aspect was introduced and the psychology of learning was discussed in class, I just knew what to work on.

My mind wanders during every activity be it listening to music, be it taking a walk, but mostly during work and study hours. I never want it to stop because if directed in a good direction, it does give a good feeling to think about a variety of things. Hence while working on this project, I recalled my high school days and placed myself in the student's position and thought about words that are the most relatable. Also, the facts and images given, I tried to make it as fun as possible to take the mind off the content for some time. This has been a very different experience from all the projects I have done at Srishti as a DMA student and something I can take pride in.

A1 Bibliography

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- New Science: Why Our Brains Spend 50% Of The Time Mind-Wandering-

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A2 Bibliography

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Mind wandering and education: from the classroom to online learning -
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Making Connections- <https://letstalkscience.ca/educational-resources/learning-strategies/making-connections>

Retail syllabus for 9th and 10th standard students-
https://cbseacademic.nic.in/web_material/Curriculum22/Skill/401-RETAIL-Sec.pdf

A3 Bibliography

Angela Yu's Design of Flash Card Application - Inspiration for Background and Elements

FINAL THESIS PROJECT 2022

PUTTING MIND WANDERING TO GOOD USE

An Application

STUDENT: MRIGAKSHI ROY CHOUDHURY

PROJECT: Putting Mind Wandering to Good Use

PROGRAM: Undergraduate Professional Programme

AWARD: Digital Media Arts

BCU/UOM REG. NO: 18SBF257



Examiner 1 (name, signature and date):

Examiner 2 (name, signature and date):

Academic Dean (srishti Seal):

18SBF257

Final Thesis Project 2022
(Undergraduate Professional Programme)

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