Entrepreneurship and Product Design
Project Proposal

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In this Document, I attempt to define a structure around which I shall construct my Project for the 2021-2022 Entrepreneurship and Product Design course. To comply with the Project Proposal Guidelines, each section of this Document is numbered in accordance with the formatting of the Guidelines. I reserve the right to modify this Document at any given moment throughout the development stage of the Project.

1 I propose a project, which I refer to as the "Project" in this Document, of creating a Web-based platform to provide a service (the "Service") with the mission of assisting students with special educational needs in school environments to better connect with their instructors and, as for the instructors, to better provide instructions and assign tasks. The Service shall be accessible with Web browsers in the form of a Progressive Web Application (PWA) and available through a standalone native mobile application. Nevertheless, such mobile application is unlikely to be developed until further resources are allocated for this purpose.

1.1 The Project is an effort to achieve a more ideal classroom environment where students who have special needs enjoy the same level of comfort as those in the majority, the group of population that is almost always at the top of the priority list to satisfy. The lack of support for those students with needs, especially that observed at the school I attend, has been quite problematic and is undoubtably a violation to the principles of Diversity, Equity, and Inclusion. The Project promises to acknowledge and value the nature of neurodiversity and deliver the Service that shall make existing education resources more equally accessible to all students.

1.2 The Service, as the product of the Project, when utilized to its full advantage, benefits all students who are members of the neurodiverse community, including, but not limited to, individuals with autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), developmental co-ordination disorder (DCD, dyspraxia), dyslexia, dyscalculia, or Tourette's syndrome (TS), or any combination of these identifiers.

1.3 The potential audience of the product includes students who are the users of the Service and the direct recipients of its benefits, instructors who are in favor of making their instructions accessible to the student(s), school administrators who wish to make the Service available to the entire school, and parents who have noticed the struggles of their neurodiverse child(ren) at school and wish to be supportive of them.

1.4 I managed to discover several services that are designed for neurodiverse individuals and span the realms of organization, socialization, communication, and education. However, many of them require payments to use and, more importantly, none of them are meant to be incorporated in school environments. The Service, unlike any others, directly helps students with difficulties navigating at school to connect with their instructors, whom they usually seek supports from, and there is no other existing service that fulfills this need.

1.5 The Project presents a method of countering an existing problem that has not been seen in any other services. The idea of an online management platform designed for school itself is not so uncommon, and existing platforms like Canvas have already been used by institutions worldwide. However, the Project, while building upon the same idea, diverts the focus from the more common instructions, like assignments, exams, and course schedules, to the specific tasks that require the immediate attention of students. Such approach is completely novel.

2 The following timeline describes the expected progression of the development stage of the Project, in the form of features to be implemented, ordered by their priorities, from highest to lowest.

a. Minimum Viable Product (MVP)—that includes
    i. a Web application that creates pages with URLs ending in random keys, where each page contains an instruction that is displayed and, when edited, updates in real-time for all connected clients
    ii. a database including a table that stores the random keys and their associated instructions
    iii. a backend program that accepts requests for accessing and changing instructions for specific keys
b. Student/Teacher Login System
c. Multiple Task Instructions
d. Task Queue
e. Multiple Students Management
f. Management by Course
g. Native Mobile Application

I must state in full clarity that the timeline is subject to change at any given moment, as

a. additional features may be requested by the clients, the users or myself,
b. other user feedbacks may be taken into consideration, and
c. an improved prioritization of features may be proposed.

3 I must admit that neither the study of mental health nor special education have ever been my academic focus in the past. Therefore, to fully understand the recipients of the benefits of the Service, and to develop the Service so it best supports their needs, I shall embrace the wisdom conveyed in the following collection of research studies that I compiled in preparation for the Project.

a. Baron-Cohen, S. (2012). Autism and the Technical Mind. Scientific American, 307(5), 72-75. Scientific American, a division of Nature America, Inc. https://www.jstor.org/stable/26016176.
b. Blenner, S., Reddy, A., and Augustyn, M. (2011). Diagnosis and management of autism in childhood. British Medical Journal, 343(7829), 894-899. London: BMJ Publishing Group Ltd. https://www.bmj.com/content/343/bmj.d6238.
c. Hill, E.L., and Frith, U. (2003). Understanding Autism: Insights from Mind and Brain. Philosophical Transactions: Biological Sciences, 358(1430), 281-289. London: Royal Society. https://royalsocietypublishing.org/doi/10.1098/rstb.2002.1209.
d. Klipper, B. (2013). Apps and Autism. American Libraries, 44(6), 36-39. Chicago, Illinois: American Library Association. https://americanlibrariesmagazine.org/2013/07/30/apps-and-autism/.
e. Oriel, K.N., Reed, T., Saufley, R., Wetzel, E., and Wilt, C. (2020). Utilization of Physical Activity in School-Based Settings for Children with Autism Spectrum Disorder. Palaestra, 34(4). Champaign, Illinois: Sagamore Publishing LLC. https://js.sagamorepub.com/palaestra/article/view/10893.

I shall also consult the following individuals to better understand the mission of the Project.

a. Mrs. Desiree Jennings—
    i. as the person who suggested the Project, and
    ii. as the Winchester Thurston School Director of Academics

b. Dr. Amy McTighe—
    i. as the Winchester Thurston School Director of Support Services
c. Ms. Asia Shannon—
    i. as the Winchester Thurston School Upper School Counselor

4 The majority of the technical development of the Project can be performed within my area of expertise; I have, at the time of writing, been working on Web development projects in developer teams. Though that does not mean I am fully capable of a professional Full-Stack Developer role, since developing for small teams has a much lower requirement in a particular skillset than for actual corporations. However, I often find myself required to fulfill multiple roles concurrently in smaller teams, which, in turn, provided me with experiences to single-handedly transform a project from planning to development, and finally to production. Therefore, from my experiences, I compile below a summary of the technical specifications of the Project.

a. Web Front-End—written in React Typescript, rendered in Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) that are compiled from Syntactical Awesome Style Sheets (SASS) using the Sassy CSS (SCSS) syntax.
    i. React 17
    ii. Next.js 11
    iii. SWR
    iv. Bootstrap 5
        i. with customized theming
b. Web Back-End—written in Typescript, executed in Node.js 14 runtime environment
    i. Next.js 11
    ii. Express
    iii. MariaDB
    iv. Nginx
c. Web Development Environment
    i. Node.js 14
    ii. Typescript
        i. compiling to ECMAScript 2009 (ES5)
    iii. ESLint
        i. with customized configuration
        ii. with ESLint editor extension (when available)
    iv. Prettier
        i. with customized configuration
d. Mobile Application—written in React Typescript
    i. React Native

5 The majority of the costs of the Project comes from the resources consumed by the runtime environments for the Web applications, which can fundamentally be narrowed down to the processing power, the storage space, and the network usage. Luckily, Web applications themselves do not require much resource to run. Therefore, I estimate the costs of the Project with the prices of the Amazon Web Services (AWS) resources I use or will potentially be using.

a. Amazon Elastic Compute Cloud (EC2)

Instance Type	vCPU (threads)	Memory (GB)	Cost (USD/H)	Cost (USD/M)
t3a.nano	2	0.5	0.0047	3.38
t3a.micro	2	1.0	0.0094	6.77
t3a.small	2	2.0	0.0188	13.54

t4g.nano	2	0.5	0.0042	3.02
t4g.micro	2	1.0	0.0084	6.05
t4g.small	2	2.0	0.0168	12.10

Elastic IP (EIP)	First (USD/IP)	Additional (USD/IP/H)
Associated	0.000	0.005

Data Transfer	First 1GB	1GB-10TB	10TB-50TB	50TB-150TB	Over 150TB
Out to Internet	0.000	0.090	0.085	0.070	0.050

* The major difference between t3a instances and t4g instances appears to be the processors. The t3a instances use the AMD EPYC 7000 series processors, while the t4g instances use the ARM-based AWS Graviton2 processors, which deliver better price-to-performance ratios. According to the conclusion of a benchmark executed by the online user Abhishek, there is an increase in the processing power of the t4g instances. However, both the memory and the disk performances of the t4g instances appear to be considerably worse than the t3a instances.

b. Amazon Elastic Block Store (EBS)

Storage Type	Cost (USD/GB/M)
General Purpose SSD (gp3)	0.080

----------	First 3000IOPS	Over 3000IOPS (USD/IOPS/M)
IOPS	0.000	0.005

----------	First 125MB/S	Over 125MB/S (USD/MB/S/M)
Throughput	0.000	0.040

c. Amazon Simple Storage Service (S3)

Service	USD/GB/M	USD/GB/M		USD/GB/M
Storage Tier	First 50TB		50TB-500TB	Over 500TB
S3 Standard		0.023	0.022	0.021

Data Transfer	First 1GB	1GB-10TB	10TB-50TB	50TB-150TB	Over 150TB
Out to Internet	0.000	0.090	0.085	0.070	0.050

d. Amazon Relational Database Service (RDS)

MariaDB Engine				
Instance Type	vCPU (threads)	Memory (GB)	Cost (USD/H)	Cost (USD/M)
db.t3.micro	2	1	0.017	12.24
db.t3.small	2	2	0.034	24.48
db.t4g.micro	2	1	0.016	11.52
db.t4g.small	2	2	0.032	23.04

Storage	Cost (USD/GB/M)
General Purpose (SSD) Storage	0.115

Data Transfer	First 1GB	1GB-10TB	10TB-50TB	50TB-150TB	Over 150TB
Out to Internet	0.000	0.090	0.085	0.070	0.050

To develop and maintain the Service, I anticipate the use of the resources listed in the table below. This table must always reflect the most relevant usage of resources.

Resource	Note	Amount (N)	Unit (U)	Cost (USD/U/M)	Total Cost (USD/M)
EC2: t3a.micro		1	instance	6.770	6.77
EC2: Elastic IP	Free EIP	1	address	0.000	0.00
EC2: Data Transfer Out	Free 1GB	1	GB	0.000	0.00
EBS: gp3		20	GB	0.080	1.60
EBS: IOPS	Free 3000IOPS	3000	IOPS	0.000	0.00
EBS: Throughput	Free 125MB/S	125	MB/S	0.000	0.00

RDS: db.t3.micro	1 instance	12.240	12.24
RDS: General Purpose Storage	20 GB	0.115	2.30
Total			22.91

I estimate from the information in the tables above that a maximum of 22.91 United States Dollars is billed every month for the upkeep of the Service, excluding tax.

Resources that require one-time payments are recorded in the table below.

Resource	Date Billed	Amount (N)	Unit (U)	Cost (USD/U)	Total Cost (USD)
Total					0.00

6 The Project shall ideally rely on monetary donations and sponsorships to maintain and cover its costs. However, advertising revenues may also be considered when the lack of stability becomes a concern. Ultimately, the Service must never require any payments from its users.