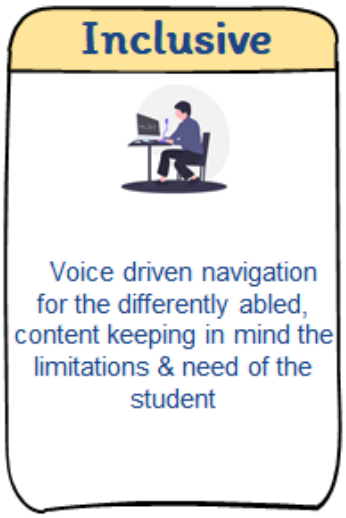
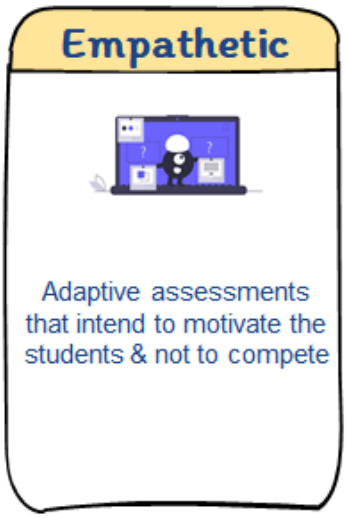
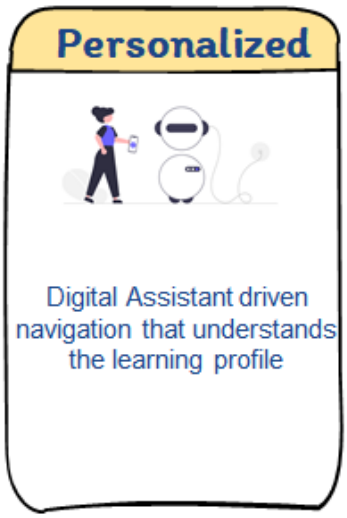
Learning your way with

HAMSA

Ensure inclusive and equitable quality education and promote lifelong learning







INTRODUCTION

Learners with disabilities and from rural backgrounds often find currently available learning platforms intimidating. Many students are not conversant with English and prefer the content in local languages or explained to them in simple terms. Several students are slow learners and prefer to go in stages and seek different kinds of encouragement to move forward. Same type of assessments in courses for all, often pose unfair comparison to different learners with different learning styles. Such learners may want a different kind of interaction with the content - understand speech or sign languages and respond appropriated through vision or speech.

According to a survey by Lok Foundation in 2019, English speakers tend to be richer, educated and belong to the urban areas. The educational system has always followed a one size fits all approach disregarding the diverse backgrounds of students. This has often given an unfair advantage to the students who have a better command over the English language.

We aim to democratize education by personalizing the course content to cater to the diverse needs of the students.

BACKGROUND

Teaching technical education in rural parts of Andhra Pradesh for over 5 years have brought us close encounters with the challenges the students face from onboarding to skilling to career development. Majority of the students come from an economically weaker section with a hope to gain better career opportunities and help elevate the living standards of their family.

Prior to COVID, we would split these students into smaller groups and do lots of personal coaching exercises. These people will try to attempt the tasks assigned, but not ask questions and would be shy. Most of the resources being in English, the students would often feel dependent on someone explaining them in either an easier English or in their mother tongue Telugu. They would want help at each level from teacher or friend, and self initiative would be minimal.

During COVID times the situation became too difficult as these people could not cope up with online videos, even live sessions, nor the learning resources we would share with various LMS like Moodle, Canvas etc. We even sponsored Coursera and EdX certification for many but those people resorted to copy paste of exercises instead to complete on their own. Any content that crosses their limit of perception, they tend to give up than persist. Often they resort to Google search for finding similar material that might be easier to understand for them than the suggested materials. However they end up in too much information and get confused. Being in rural areas, there are limitations to infrastructure like poor internet bandwidth, only working with cheaper smartphones etc.

In 2016, UNESCO reiterated: “To be taught in a language other than one’s own has a negative effect on learning”. Today over 40% of the students do not have education in a language that they understand.The plight of differently abled students is even worse with just 10% of them attending schools in underdeveloped countries, and reducing the avg schooling year to merely 5.4 years globally.

All this made us develop a platform leveraging state of the art AI facilities to provide a digital assistant and carefully crafted content and suggestions based upon each individual's learning profile. We believe that such a system will improve user acceptance

SOLUTION APPROACH

We envision a three fold solution that addresses - language barriers, infrastructure constraints, content identification with proper encouragement

MultiLingual Content and Interaction

We adopted a chatbot style interface with a personal digital assistant that would use the modern state of the art Machine Learning and Natural Language Processing.

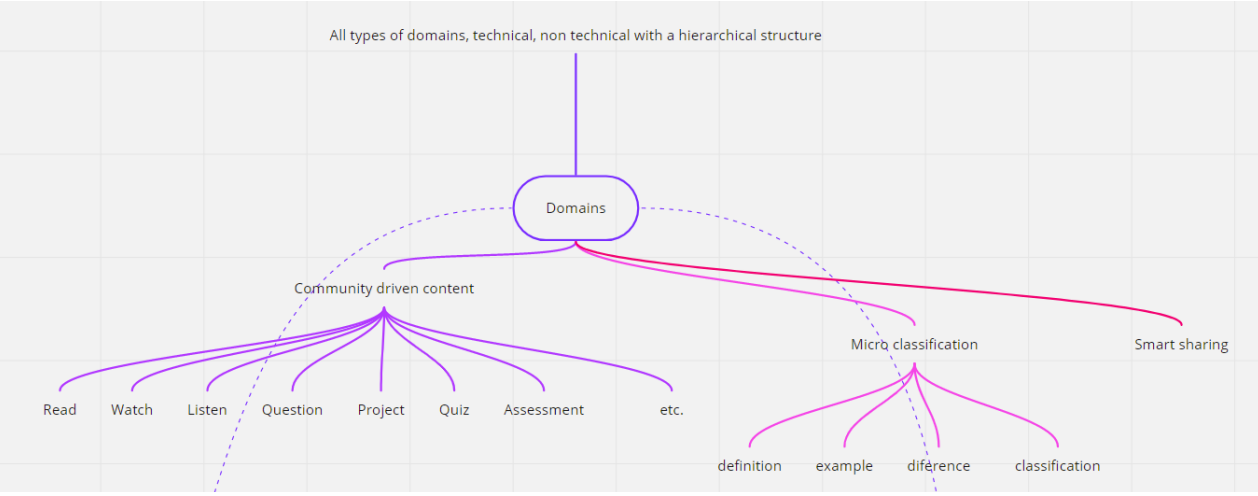
Illustration of Using Google translate

The chatbot would give choice to the user for the language of interaction both as text and voice. Similarly language translation can translate content from one language to another, unless curated content in their own language is available. In random experiments we found that students tend to explore more when they are given a direction. The personal assistant will engage them in discussion by offering them timely updates, right tasks, and encouraging feedback.

Personalized Content

This forms the crux of the solution. The Internet is adorned with an ocean of content on every topic, much of which is freely accessible. Modern search engines offer search results at best following the local trends, without understanding the individual personality. At the same time distracts in terms of ads and irrelevant content often takes the learner away from the context. The available content is also often buried in opinionated articles and only an experienced learner can filter out the needful.

Classification of the content in various categories

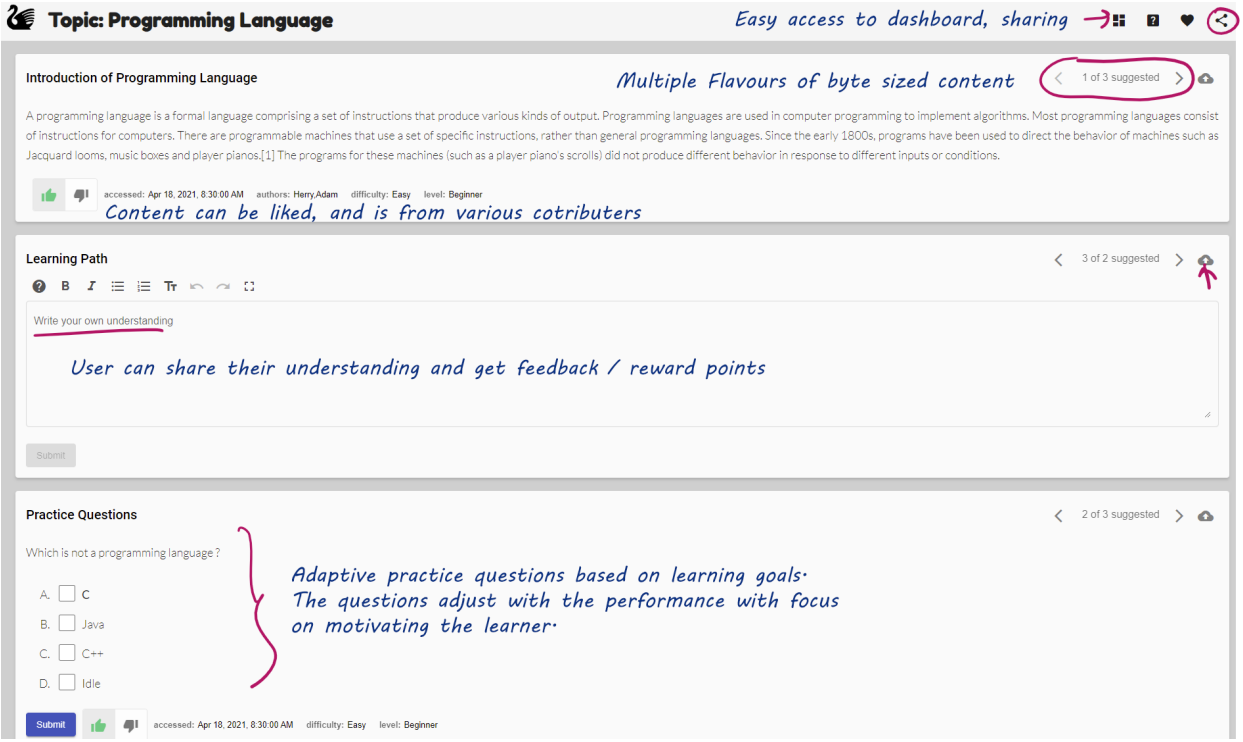


Byte size learning is often preferred as the attention span required for that is less. Dividing the content into what aspect of the topic it covers helps better absorption. It also helps to drive away from opinionated articles often found on the internet. It allows for multiplexing of the content so that multiple aspects of the article can come from multiple sources all selected by a recommendation engine that pays attention to the writing style, difficulty level, and learning goals of the individual.

Collaboration and Rewards

Content is crowd sourced with NLP tools to help avoid duplication, entity linking, auto classification, keyword extraction etc. Users are encouraged to write their understanding as

it helps them learn. As they write, the NLP engine evaluates if they have written in their own words relevant to the topic and rewards them points. If their version is good, it can recommend that to be shown to others and as it accrues likes, they earn more reward points. Users are encouraged to contribute to any type of the content including offering their own questions, videos, projects, etc.



Building better learning groups

As the system assesses the learning profiles it can match people based on their profiles as well as locations, and offer better suggestions to form study groups or project groups.

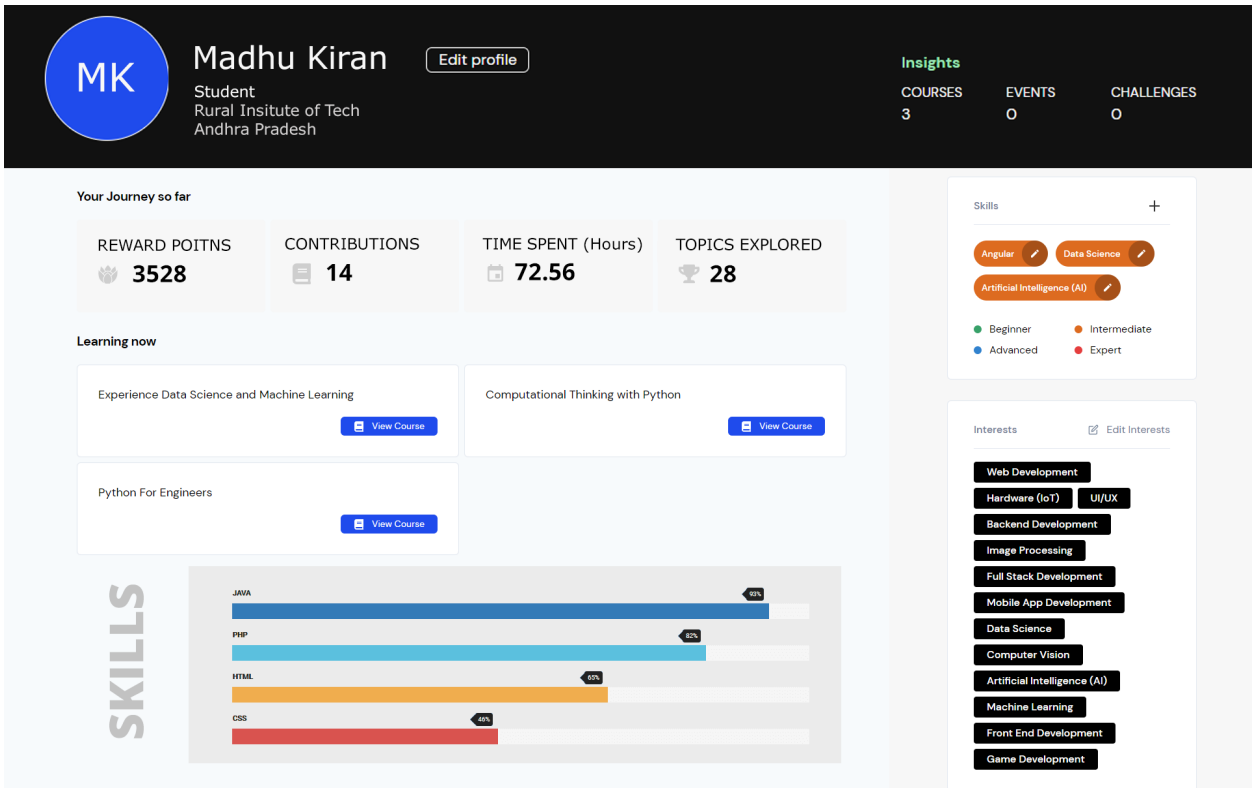
Dashboard

The dashboard clearly tells users how they are performing and how they are earning the rewards. They can also share their dashboard to anyone in order to seek opportunities. The dashboard is not comparative and offers encouraging comments from the digital assistant, like *you are doing well*, *you can practice a bit more on this*, *here is a good project for you to learn* etc.

Addressing Infrastructure Bottlenecks

1. **Content filtering based on available bandwidth**. For example, a user with low bandwidth will not get video suggestions and get more pictorial illustrations and text based content. Offline access to content is also made available.

2. **Turning Reward points into discounts**. Reward points earned on the platform can be redeemed in many ways - subscription, course access, certifications, or even discount towards internet connection, laptops etc.



TECHNOLOGIES INVOLVED

Web Application Development

We used Angular, NodeJS, Oracle Database to make the proof of concept and deployed it in the Oracle cloud. The deployed app can be accessed here. The database schema and the application code can be found in this Github Repository.

Machine Learning Models

We explored various models during these few days and plan to explore and develop more. Several of the models we tried are in the Github Repo. More references are below.

1. Content classification:
    a. https://github.com/utk4rsh/question-classifier
    b. https://github.com/kaxterzz/blooms-taxonomy-classification
2. Similarity detection to prevent duplication of content.

    a. https://www.learndatasci.com/tutorials/building-recommendation-engine-locality-sensitive-hashing-lsh-python/
    b. https://pypi.org/project/lshashpy3/
3. Keyword extraction from text
    a. https://github.com/LIAAD/yake
    b. https://github.com/MaartenGr/KeyBERT
    c. https://github.com/csurfer/rake-nltk
4. Entity linking between texts
    a. https://github.com/sebastianruder/NLP-progress/blob/master/english/entity_linking.md
    b. https://github.com/NewsEye/Named-Entity-Linking
5. TTS and ASR
    a. https://responsivevoice.com/
    b. https://developer.mozilla.org/en-US/docs/Web/API/Web_Speech_API
6. Translation
    a. https://cloud.google.com/translate

USP's

1. There is no product in the world that classifies content in a micro manner and enables collaboration at that level
2. There is no product that can build a single article from multiple content from multiple collaborators rto match the learning style of the user
3. There is no product in the market that evaluates a learner against his/her own core abilities. Most platforms offer competitive kinds of rewarding experiences.
4. A digital assistant is not fully integrated into any LMS. Mostly it is to drive certain insights, but here we are engaging the user primarily through a digital assistant.

MARKETING STRATEGY

To bring the solution to the market, we intend to tie up with institutes in tier 3 cities and rural areas to get those students as early adopters. These users would help us further retrain and improve our recommendation system that would be more empathetic and provide better personalisation. We would then try to attract content contributors who could provide us with unique content thereby attracting more students through cross-side network effects. We understand that as we onboard more users we would incur costs in the form of platform maintenance, marketing and administrative expenses. We intend to meet these needs through fundings from NGOs and institutions who support the cause. We also wish to enter into a public private partnership model wherein the government would fund us to deliver these services to help them attain their goals on sustainable education.

SWOT

1. Our strengths are our USPs
2. Our weakness is that the product is not production ready and it is very much needed now.
3. Our opportunities are worldwide as the seed idea from experience in rural communities in India is just one example of the same phenomenon happening everywhere.
4. Our threats are the corporate players who capitalize on education.

Meet Who Are Behind The Scenes