

Development of Women Education in India through Conversational AI Assistant

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Abstract— *Education is something which is endless but due to some challenges, the women of rural parts of India are not able to acquire the sufficient amount of education which they desired for such that they are discontinuing education because of factors like cost, safety and travelling. This has been an urgent problem to which we are proposing a solution namely “AI Conversational Assistant”. Artificial intelligence (AI) education is in high demand since the adoption of AI technology such as Amazon Alexa is proliferating. This solution suits best to the mentioned problem by the females of rural India under age group 14 to 17. The proffered solution will be tested on Amazon Alexa with the aid of AWS Lex technology by training it via MIT app inventor. Conversational AI Assistant will reduce the cost, time and let the customer segment educate themselves anywhere, wherever they feel safe and comfortable. This smart education system can modify the teaching methods by changing the course of the future.*

Keywords— Women Education, Rural India, Conversation AI Assistant, AWS Lex, Amazon Alexa

INTRODUCTION

Any product which is deployed in the cloud will be great success. Almost many companies tasted the success when their product was deployed on cloud. The future decade will be completely dependent on cloud due to its reduced IT costs, scalability and vast storage facility. We discussed the difficulties faced by Indian girls in this paper, especially in rural areas where they discontinue their studies due to poverty and lack of transportation facilities. And also, this paper discussed the solution to this problem through the cloud. So, we developed a mobile application with Conversational AI feature which will be present in cloud for easy access. This resolves the above problem where students will converse with Alexa assistant regarding any subject in order to educate themselves and it will illuminate students about several courses and knowledge on board. Previous

works were made by researchers by introducing Artificial Intelligence in the field of education by introducing smart classes where most of the students were not able to attend their classes regularly, so we introduced an application, integrated with AI technology, in which students will be able to pursue their education remotely anytime anywhere. Below steps indicate the business ways to make this model more successful.

BUSINESS RESEARCH: PROBLEM

This section proffers the first persona with the help of comprehensive research and analysis that includes certain problems which user is addressing by specifying user's urgent requirement and detailed segmentation of user. In addition to this, existing alternatives as well as market gap analysis is discussed.

User & Urgent Requirements: In India, RTE Act of 2019 have made education mandatory for children between age of 6-14 years but after 14 years of age specifically girls of rural parts have to left further studies as their parents hesitate to allow them to go out for schooling and college such that after secondary level they either indulge themselves in household work or result in getting married. In rural parts, safety is an issue for women and most of the women become victim of this safety issue while going out for schooling. As the females are discontinuing education, thereby they have a very bad impact on their mental conditions which increases anxiety and depression because of not obtaining sufficient amount of education and not fulfilling the desired goals. Moreover, feeling inferior to educated men as well as women from urban parts and getting bullied by them [1].

Another problem to be highlighted is cost which is being barrier to higher education as in villages, education is luxury. That is why today in India still 35% of females are illiterate. Most of the women are forced to discontinue their studies because of expensive “Education System”. Moreover, the schools in rural areas have poor transport facilities and parents do not have money to arrange expensive transportation, consequently female students have to travel and face severe harassments to reach schools located too far [2], [3] and hence, the customer segment includes females of rural parts of India under age-group 14 to 17.

Existing Alternatives: For the problems mentioned above, there are following alternatives which are being implemented by users across the country to procure appropriate education. Teachers, professors, governmental bodies have a part in addressing these problems.

1. Regular schools or colleges: In regular schooling specifically in rural areas, students have to travel to their respective educational institutions on week-days in spite of how far it is and have to devote proper time in studies to gain knowledge and clear the exams in order to promote to new class. The schools charge fees quarterly and provides the facilities of mid-day meal, extra-curricular activities etc.

2. Open Schooling: In this student do not have to travel to schools or colleges much as compared to regular schooling. They can simply educate themselves at home and can give exams anytime according to their wish. The students only have to travel for exam perspective thus, it is highly flexible but they don't procure proper guidance of teachers in this like regular schooling. Also lacks the classroom environment and curricular activities. This schooling doesn't require travelling and mitigate the safety concerns.

3. Online/Offline fast track courses: This is a short-term course which covers the essential syllabus in just couple of weeks. It is designed for people who lack awareness in classrooms or are not able to make up to schools at regular interval of time. This alternative is the cheapest among the other mentioned alternatives. Thus, this approach is best to avoid travelling in order to reach schools on regular intervals.

Market Gap Analysis: The alternatives are effectual to an extent but the literacy rate is still less in women

as compared to men, in essence 35% of women are still illiterate in India and remaining are not able to continue with further studies [4]-[6]. The current solutions lack the following things:

- Travelling: The female students are sent to schools or colleges in rural areas only till 14 years of age as it is mandate and free by government but after that parents don't allow their daughters to travel to schools/colleges where travelling is one of the major issues for women of rural areas as after the secondary school parents hesitate to send their mature girls to school for studies because of safety concerns.
- Flexibility: It is needed as female students in rural areas are not always available to devote time in studies and give exams as per the school timings because they are also engaged in household work.
- Safety: For woman proper safety is indeed a required but somehow the current solutions like regular schooling and fast track courses are lacking there.
- Quality education: Though fast track courses and open schooling are way cheaper than regular schooling but they don't provide the desired quality of education.
- Time: Parents in village don't send their daughters out for a longer period out of their residence but regular schooling requires at least 5-6 hours whereas female students are only available at school for shorter period thus time is chief domain.
- Cost: Regular and open schooling demand money to a greater extent which poor parents can't afford thus they end up in educating only a child out of their family where preference is given to boys.
- Curricular Activities: Extra-curricular activities play a crucial role in student's life to live a healthy life by engaging themselves in physical fitness and also aid in identifying the special talent out of the students which is not possible in open schooling and fast track courses.

TECHNOLOGY RESEARCH: SOLUTION

The females of rural parts of India under age-group 14 to 17 are discontinuing further studies due

to expensive education system and not letting to travel to schools/institutions by their parents because of safety issues. Therefore, the solution which best suits to this problem is “Conversational AI Assistant”.

Conversational AI Assistant: It can be tested on Amazon Alexa/Echo and can be trained using MIT app [5] such that there will be no need to travel for female students and they can educate themselves anywhere wherever they feel safe and comfortable. Furthermore, it will reduce cost, save student’s time and improves productivity resulting in ‘Smart Education System’. As students can study anywhere, irrespective of time with this solution therefore, it enhances flexibility as well.

There are several foundations across India and globally as well where students in rural areas are provided with free education, with the key purpose being to make a difference in the lives of the millions who are not yet affected by education in their budding age. These foundations can tie-up with this solution of Conversational AI Assistant in order to aid in providing more subject related content which will enhance the variety and quality of the courses offered to students via Conversational AI Assistant. Therefore, the study material procured by students from this solution will be highly qualified [7], [8].

Features	Regular Schools/ Colleges	Open Schooling	Online/Offline Fast-Track courses	Conversational AI Assistant
Travelling	✓	✗	✓	✗
Flexibility	✗	✓	✗	✓
Safety	✗	✓	✗	✓
Quality Education	✓	✗	✗	✓
Long hours required	✓	✗	✓	✗
Expensive	✓	✓	✗	✗
Curricular Activities	✓	✗	✗	✓

Table 1 Feature comparison matrix

Apart from it, for the complete development of students, the application lays emphasis on curricular activities also where it provides some skilled set of sessions included feature as well. Ultimately, students will converse with Alexa Assistant

regarding any subject in order to educate themselves and it will illuminate students about several courses and knowledge on board. Alexa can modify the teaching methods by changing the course of the future.

Technology Overview: Conversational AI Assistant can be build using Amazon Lex technology. It is cost-effective, easy to use, built in integration with AWS, can be deployed and scaled seamlessly. The features include integration to smart speakers such as Amazon Alexa/Echo as well as integrating with services like AWS Lambda. Lex provides advanced deep learning utilities such as:

- Automatic speech recognition (ASR) in order to convert speech to text.
- Natural language understanding (NLU) to understand the intent of text.
- These functionalities help in building applications comprising great engaging user experiences as well as realistic conversational interactions.

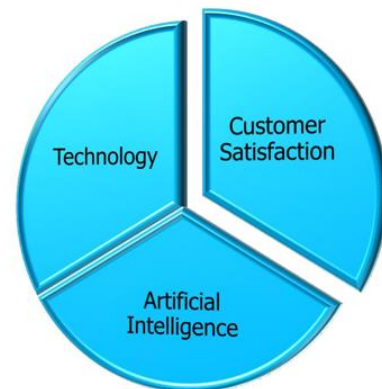


Fig. 1 Technology overview

Additionally, we will be using Amazon S3 and MIT app inventor to train our conversational AI by sending the VUI (Voice user interface) in which the language Amazon understands where Lex is used to read the input and deliver it through Alexa either by speech or text.

User Experience: In Conversational AI Assistant users will be able to converse with Alexa Assistant in regard to massive range of subjects such that they can educate themselves anywhere. For this first they have to register themselves by which they can choose their respective class and preferred language. Conversational AI Assistant can be tested on Amazon Echo/Alexa and is designed in a way that users can use it on smartphone or tablets easily with a user-friendly interface. Such that after registration,

students will be eligible to add device and schedule class with echo or alexa and can refer notes too. Apart from it for complete progression of students the application offers sessions related to skills and games. It also enables students to know news across the globe in order to keep them updated. Every day brings new session and students can also clear their doubts by conversating with alexa after the session. It will illustrate the users about different courses and comprehension on board. Alexa can enhance the methods of teaching by modifying the course of future. The service adds value by resulting in the Smart Education System [9].

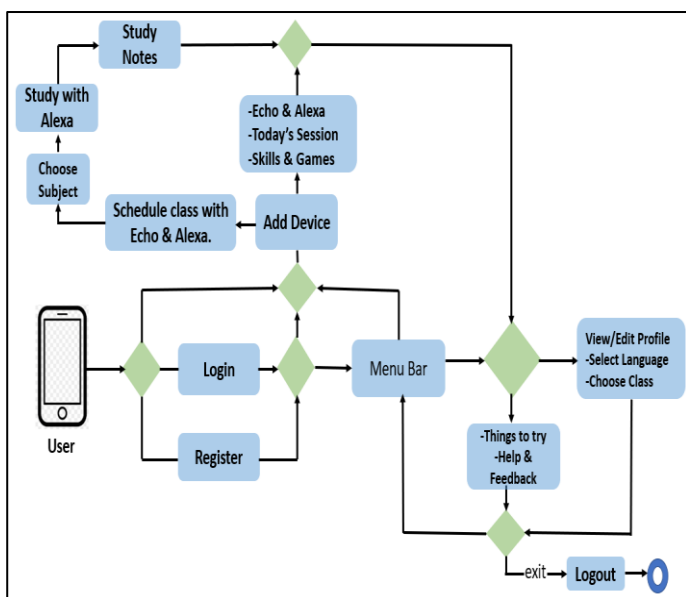


Fig. 2 Step-by-step process on how the solution works

TECHNOLOGY PRACTICE: BUILD

This section focuses on technical architecture (Back-end), technical specification and the instructions for building the prototype.

Technical architecture: The user will be accessing the mobile application that will be deployed on the AWS cloud. While accessing the application there will be two sides teacher and the student login. When student wants to study the material uploaded by the teacher it will be retrieved using the API call, which is used to communicate with a third-party software to get the information needed. Once it is retrieved students can select the language and get an output in the form of voice with the help of Alexa. This is done through an API call to Amazon Alexa where we have used MIT app inventor to train our conversational AI by sending the VUI (Voice user interface) in which the language Amazon understands where Lex is used

to read the input and deliver it through Alexa either by speech or text.

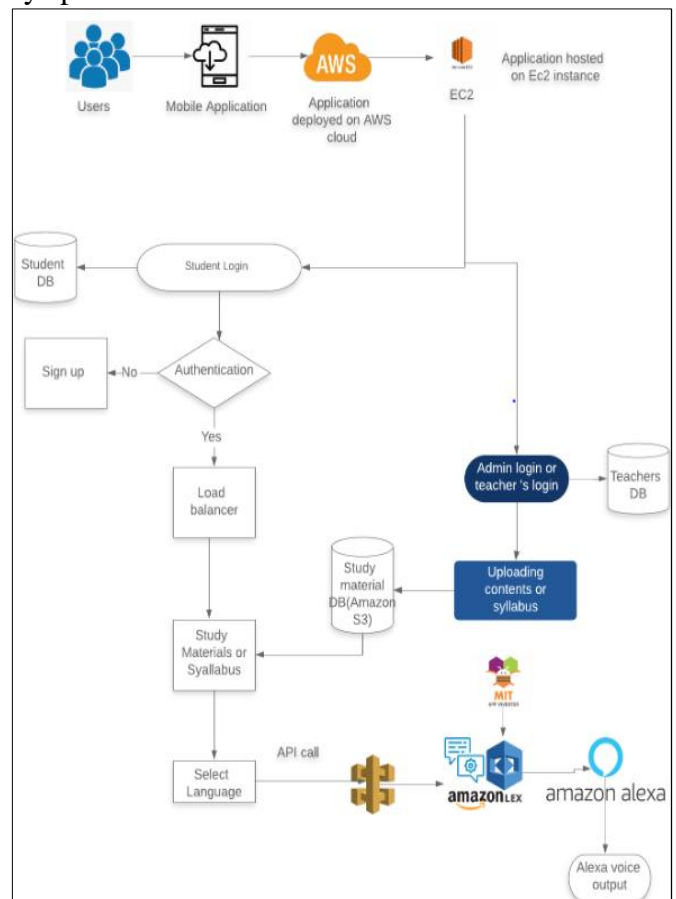


Fig. 3 Technical Architecture

Technical Specifications: The user will be accessing the mobile application that will be deployed on the **AWS cloud** in the **EC2 instance** and it will be also available on play store for downloading the application. While accessing the application there will be two sides **teacher and the student login**. By buying our product, the teacher's login will be provided by the institution, once the login is given the login credentials will be stored in the database and it will be retrieved and checked whenever the login is made. The teachers will upload the study materials to **Amazon S3** through **API call** which will be done programmatically using **Python**.

On the other side students will register for studying in an institution and will be provided with login credentials. When this process is implemented there will be huge number of students will be registering in the institution, so the traffic on the student's side will get increased, to avoid this network traffic there will be a **load balancer** that allows the application to manage the traffic.

When a student wants to study the material uploaded by the teacher it will be retrieved from S3 storage using the API call. Then the conversational AI is trained using the MIT app inventor, in this text block is created where it is used to generate English words by using neural network. Then voice user interface (VUI) manages the interactions with Alexa, in these VUI are turned into JSON and sent into the Amazon developer console. The end points are translated into java script and send to Lex. Thus, the VUI we created in the MIT app inventor will be transferred to the Amazon developer console which Lex will access it and give as a voice output from Alexa. Where Lex is used building Conversational interfaces into any kind of applications using text or voice and it powers Alexa. Once it is retrieved, students can select the language and get an output in the form of voice with the help of Alexa. This is done through an API call to Amazon Lex which in turn is connected to Alexa. Since AWS Lambda is pre-build integrated with Amazon Lex it is not necessary to integrate Lambda individually [10], [11].

Prototype build instructions: Key steps to build a prototype:

- The first step is to create a front-end application for the students, and it is developed using angular.js and backend we used python programming language. The MongoDB database is used.
- Next step is to train the Conversational AI in MIT app inventor by uploading the text block into the MIT app and the VUI will be uploaded in the amazon developer console.
- And the blocks will be transferred in the form of JSON documents. Then the end points will be translated into java script which will be accessed by the Amazon Lex.
- The S3 buckets are accessed to store the information and study materials that teachers upload to the students.
- And Identity and Access Management (IAM) for giving rights to the uses.
- Application will be developed by integrating Amazon Lex with the output speaker Alexa has in it.



Fig. 4 User Interface

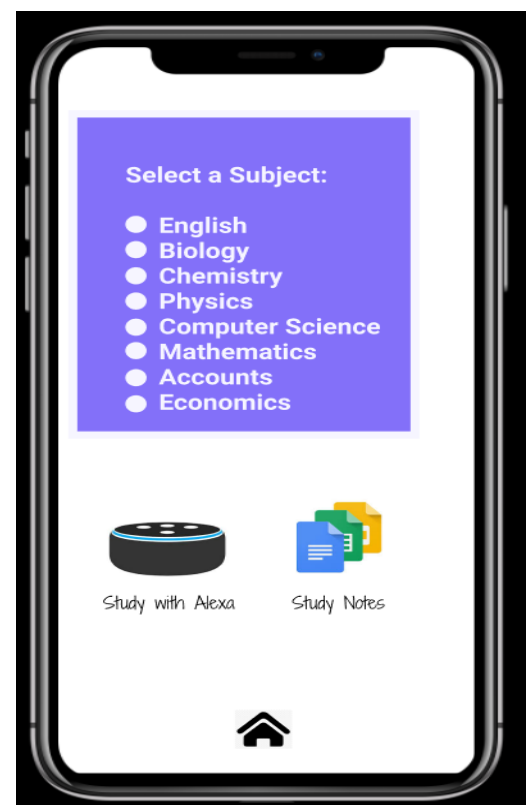


Fig. 5 Features

- Finally, Alexa will provide the output as a speech to the students and the interaction can be made by students using it rather than students.
- This is our minimum viable product (MVP) an “Anywhere Education” application with version 1.0 with e-books, weekly assignment and quizzes. This will be deployed on AWS cloud in the EC2 instance.

BUSINESS PRACTICE: BUSINESS MODEL

This section lays out the evidence for the purpose to validate the business model such that it is extremely innovative and unique to serve the expectations of the customer segment. Also, it comprises of specific market partners and channels to aid in sales such that our product could be investable, commercial or profitable [12].

Testing and Validation: We can validate our Minimum Viable Product (MVP) for our project in the following ways:

- Number of New Signups: This approach will help us to validate our MVP, by knowing the user’s interest in our solution. As the increase in number of signups, the more validated our MVP will become.
- Crowdfunding with explainer videos: This approach will result well as our product serves females of rural areas in continuing education, therefore by this approach we can gain many institutions and foundations working for free education to raise the funds for developing our product and we can attract many investors by showcasing a short video demonstrating the features and working of our solution.
- Landing pages: We can display the product’s main features in this approach and then ask people to sign up in order to check their interest as well as track their behaviour regarding how they interact on the page [13].

Key partners: There are several foundations across India and globally where students of rural areas are provided with free education. Some institutions like Agaram foundation, Bill and Melinda Gates are non-profit organizations who work with government, academic institution, private sector and development organization with a focus on rural areas, to provide

free education to rural school students, especially girls who do not attend school due to poverty and insecurity. The emphasis is on millions of students impacted and weighted down by poverty and a massive population that remains unaffected by well-meaning actions such as the right to education and a broader gender gap where women between the ages of 14 and 17 did not attend school. Therefore, these can be our key partners.

Marketing channels: Choosing the appropriate marketing channels will aid us to procure that return on investment. For our minimum viable product, we emphasize following channels[14]:

- Strategic partnerships with non-profit organization or institutions providing education and working in same field have larger partners, thus can add credibility to both having win-win partnership.
- Landing pages with explainer videos of our product can gain many types of customers.
- Sending Emails that address the UUR of our product to desired person or foundation can be relevant and cost-effective channel.

Revenue & Resources: We will be considering a Freemium model in which users will be provided with 3 weeks of trail and then they have to pay for the extension as shown below [15]:

Freemium to Premium	Our Proposed Solution
What it is →	It is a conversational AI assistant
What’s free →	3 weeks free trial
After the trial version:	
What’s premium?	
4000 speech requests	Cost per request: \$0.004 Number of requests: 4000 requests Total= \$16.00
1000 text requests	Cost per request: \$0.00075 Number of requests: 1000 requests Total= \$0.75
Total:	\$16.75 (Amazon Lex charges for 4,000 speech and 1,000 text requests)

Table 2 Revenue stream

Cost Structure: The core resources are classified into four types such as Physical resources which includes tangible things like equipment or buildings, Intellectual resources consists of intangible resources like patents or brands, Human resources includes employees who delivers creativity along with knowledge and Financial resources which all businesses must have, in essence cash and credits.

In our solution that is Conversational AI Assistant, resources required for the designing, development, backend, product manager and quality assurance will be conversation actors, content writers, marketers, artificial intelligence team which comprises of software as well as speech engineers [16] [17].

UNIQUE VALUE PROPOSITION

UVP describes our product 's benefits in a unique way, where the customer is drawn. Our product is one of a kind by making more students to pursue their studies by accessing our application while sitting at home. It also performs the part of interaction with students that makes them more interactive and interested in the classes rather than the teachers. So, the UVP will be “Facile learning and interaction with students while at home”.

Sum of all technical and business benefits: Since it is a B2B requirement, the teachers and students where benefited by using our applications. Students no need to attend their classes on site, and we have multi-language features so that students can listen to their classes in the language of their choice and there will be no work for teachers to prepare to teach their students because of our trained conversational AI that we developed to communicate with the students, we have also added quiz's and free English courses for students which will boost up their knowledge apart from studies. Also, there will be no storage issues faced by the institutions since we are providing with unlimited S3 storage buckets.

Key differentiating market factors: The key factors that makes our product more valuable is the use of Conversational AI, like Amazon Lex and Alexa where it makes easy for the students to interact with the technology rather than with teachers. And the use of Lex technology provides deep flexibility and functionality of NLU (Natural Language Understanding) and ASR (Automatic Speech Recognition) which gives very lively experience to the students. Since we can access the application

anywhere, students do not need to follow the school timings like other video call classes or webinars, instead they can access the applications themselves.

Alignment with customer/user segment and requirements: As per our user and urgent requirement Girls in rural India between 14 and 17 years old are discontinuing their education because of poor transportation facilities and very high school fees that were not affordable to their parents. So, we have developed an application by integrating with Conversational AI systems, by this we were able to solve the addressed problem by satisfying the unique value proposition which reduced the workload for both students as well the children.

CONCLUSIONS

Using Conversational AI assistance in the education field would be a good choice for the students to develop their knowledge. Particularly for female students who are in rural areas discontinuing their education due to mental health conditions and poverty at the age of 14 to 17. To solve this problem, we have developed an application powering conversational AI which will make it easier for girls to pursue their education by sitting at home. By connecting with non-profit institutions that are ready to provide free education to rural students, we have been able to deliver our applications to a wider range.

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