

# **Educational AI Chatbot for Integrated Learning**

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**Project-1**

## **1. Abstract**

The use of chatbots in educational processes is relevant, where point communication with each student on common issues is required. In this report, I have put forth an idea of developing application based chatbot which will provide personalized learning through the concept of a virtual assistant that replicates humanized conversation as well as book appointments to get tutoring based on the availability of tutors in particular areas which will help students to get their clarifications cleared as well as help the tutor to bring home bacon. The objective of this paper is to analyze the difficulties and challenges that students often face while getting the information regarding the content of the subject, study materials and homework help and various other clarifications which will provide the solution to these problems with the implantation of the Application based chatbot in educational field will reduce the pressure as well as solve students queries as per their convenience. Henceforth, this study aims to add to the current body of knowledge on the design and development of application by introducing a new collective design strategy and its pedagogical and practical implications.

Index terms: Artificial Intelligence, Chatbots, Integrated Learning.

## **2. Introduction**

The education industry has been technologically advanced long before the pandemic. Chatbots are nowadays used just to answer basic queries which would be a mundane task for a human being when asked to daily. Although Chatbots have existed for a long time, they are getting better due to the availability of data, better computing power and open-source coding platforms. In developed countries, the schools are mainly focused on traditional tutor-centered approach in which students are in a constant effort to keep up, and cope with the rapid pace of the modern educational process still dominates. However, such an approach cannot adequately address the challenges of the digital era, which requires special knowledge and skills from students and tutors to exploit the capabilities. Many factors have led the chatbots across domain and industries.

The paper presents an application based chatbot with artificial intelligence, which allows automating the process of passing the norm control by students-answers questions, gives the necessary content asked by the students, can connect a teacher to send more answers-consultations, and if the students are not happy with the virtual teaching then they have access to book appointment for learning based on the location they are in and learn accordingly, this application registers all events that occur. The chatbot selects the answer based on a given list of possible answers, using ranking technology. This application will serve best by streamlining interactions between students and tutors, where it helps bridge the gap and ensures that all students have the opportunity to succeed by providing access to educational content and assistance through a chat platform and can be a valuable supplement to student's education.

## **3. Problem statement**

Taking a school, universities or rural students for that matter, few points can be listed. Student's must visit the college in order to get their doubts cleared. When a student gets a doubts or queries, where they either call the concerned lecture or visit the college. For students living far away, it is impossible for them to visit and hence they rely on calls. But on weekends no officials are available so the student must wait until time comes. Many a times officials get busy on other calls which prevents any other student from getting their queries resolved. This leads to lot of time waste along with monetary losses. Travelling and calling are always in exchange of costs incurred.

Disturbances in communication channel can cause loss of information. It might happen that when lectures

or teachers are swapped, the information passed can become ambiguous. Not only these, but also students need to go through the whole content of the syllabus in order to get a specific information which can be tedious.

Personal tutoring is a nightmare in Rural areas. This is due to the fact that there is no such platform for fulfilling Demand-Supply. Students have to travel far places for institutions for private tutor. Same with the case of Teaching Community, though both Students and Teachers belongs to same place. We will not be aware of the solution even though if we have it our next door.

#### **4. Gauging Customer, Market & Business needs**

When we launch this kind of platform, it is very much necessary to know the potential customers, their buying habits, target market, ability to pay, etc. Also, it is also important to understand the competitors, their strength and weakness. As we focus mainly on remote areas, we don't see much competition

As far as Market is considered, India has the greatest number of villages. Rural population in India was reported at 64.61% and Quality in rural Education especially Government school is a challenge. Private run schools are already money machines. Accessibility and Affordability to Quality Education is the key concern.

Innovation is one thing that has no end and it's important that stakeholders like Government, Content Experts, Technology Firms, Users, Teaching Community etc. to collaborate and invent cutting edge technologies and methods to facilitate the sector's meaningful growth.

We see the repetitive business coming through tutoring, either monthly or yearly. As education is considered to be investment, especially in Mid class people, there are high chances that parents will opt if we set the right quality and cost. Also, we have to make sure that the moral policies are taken into consideration when we do the marketing.

#### **5. Target Specifications and Characterization**

- Virtual Personal Tutoring

Not all students can understand and learn in same way, some may even have disabilities. To cater to the needs of every student it helps with all the study materials whenever they need it.

- Student Support

This application based chatbot can be a great help in providing excellent student support and delivering instant solutions to students queries and doubts.

- Teacher's assistant

Most of tasks done by teachers are repetitive and tiresome. It can also help them in keeping of student's attendance or sending out assignments to students. It can also help them to send notes and recordings of that lectures that were recorded for the absenteeism.

- Assessment and evaluation

Assessment is crucial for students where they can analyze their scorecards as per results generated by AI chatbot. Whereas teachers can completely rely on technology and gauge students based on

reports generated and tutor them accordingly.

- Proactive assistance

This application based chatbot in the education industry can be thoroughly trained to proactively help students with the answers. Assistance on update with new module to the syllabus, tests to be conducted or even send personalized messages to students.

- Student engagement

Amidst virtual learning during the pandemic, student engagement has reduced. student-student interaction and student-teacher interaction, both have reduced to hit the rock bottom. Teachers are trying to bring out their best so that students understand the subjects well.

Students can engage continuously interacting with the application based chatbot and clarify their doubts instantly. They can also create groups for respective subject to exchange information about assignments, deadlines, presentation etc. Engaging with each other can help them in creating a better environment for studying and learning.

- Book appointment for tutoring

If the students are not comfortable with the virtual learning method, one can book appointment for the tutor who is available at that particular time and learn effectively.

This application based chatbot provides all the assistance that student needs but cannot replace the personal interaction and individualized attention that a teacher or tutor can offer.

## **6. External Research**

Below mentioned are the sources for reference that can be referred so as to understand the need of the educational chatbot in industry:

- [1] O. A. Yudin, I. A. Yudin, Writing a chatbot assistant for entering a higher educational institution. Modern science: Actual problems of theory and practice, Series: natural and technical sciences 6(2) (2019) 117-122. <https://ceur-ws.org/Vol-3027/paper120.pdf>
- [2] <https://towardsdatascience.com/chatbots-natural-language-search-cc097f671b2b>
- [3] <https://www.ijariit.com/manuscripts/v4i3/V4I3-1155.pdf>
- [4] J.C. De Oliveira, D. H. Santos, and M. P. Neto, "Chatting with Arduino platform through Telegram Bot," 2016 IEEE International Symposium on Consumer Electronics (ISCE), Sao Paulo, 2016, pp. 131-132
- [5] <https://www.itechart.com/blog/how-do-chatbots-really-work>

## **7. Benchmarking alternate products (comparison with existing products/services)**

The existing educational chatbot do not have an option of booking appointments for tutoring. The most they do is interact with Student. Course queries, Teaching assistant, Student feedback and engagement,

admission process, Students sentiments are few of the features available in Chatbots as per the need. Detecting student location and booking nearby tutor for online/offline discussion is something which doesn't exist. And moreover, our focus is more on Rural Sector where student lack personal tutoring.

## **8. Applicable Patents (Patent of Tech/Software/Framework etc. to use in your Product/Service idea)**

- Patents of ML algorithms.

## **9. Applicable Regulations (government and environmental regulations imposed by countries)**

- Data protection and privacy regulations
- Govt Regulations for small businesses
- Employment Laws
- Regulations against false advertising

## **10. Applicable constraints**

- **Lack of human interaction:**

Basically chatbots, in particular AI chatbots, lack human interaction which students deem to be crucial, these cases range from needing extra assistance with an issue to getting frustrated when the chatbot does not immediately recognize the problem.

- **Complex questions:**

Findings suggest that the major drawbacks of a chatbot is that it is incapable of comprehending complex questions that include personal details. Chatbots have been trained to only understand what they have been taught. They are unable to comprehend the context of humans, which is a significant gap that can result in a dissatisfied custom.

- **Limited information**

The chatbot provides the user with very limited information. It usually resides within a small chat box on the webpage, it tends to keep the information limited to not strain the user with a lot of information that one would otherwise receive on a full-fledged webpage. Students often need and want more information rather than just a small straight-to-the point answer, especially for making important decisions. In this instance, they would rather go to the webpage with the full description of the topic they are looking for directly.

- **Limited vocabulary:**

The students tend to find different topics using keywords and phrases, to which chatbot may not perform properly, where it will not pick up on the keyword/phrase used as input. The chatbot is programmed using words and synonyms as keywords to find a topic. however, when the student is looking up a topic using a word that has not been programmed the chatbot would give an error or it would give a message which was fed by default previously.

- Continuous data connection. Updating databases with continuous data collected to make the model more efficient day by day

## **11. Business Model (Monetization Idea)**

I put forth an idea of generating a mobile application where it provides answers for user's inputs. This application charges a monthly or annual fee for access to premium features, such as personalized recommendations or additional functionality. Or can display advertisements to users and earn money from clicks or impressions. It is important to note that, regardless of the specific method, it must comply with relevant laws and regulations regarding data privacy and monetization. Additionally, the earning money will depend on factors such as its functionality, user experience, and the demand for its services.

## **12. Concept Generation (Process of coming up with the idea)**

With the introduction of National Education Policy 2020, it emphasizes on the need to generate awareness as well as conduct research on various aspects of the emerging disruptive technologies. Application based chatbots are one of the disruptive technologies which is finding its way into the industry. Education is the key to Nation's growth, having my roots in the rural area where the technology is yet to set its footprints to attain digital literacy, students have missed on getting a quality education. I tried tutoring few students, key challenge is with respect to identifying the students who were having the need or vice versa.

All these made me think about a Platform especially in remote village which connects the gap between tutor and students with Technology and Infrastructure in hand. We can make this still better by implementations of AI Chatbots. However, things are possible to change if we thrive towards designing a space that provides equitable digital resources where the tutor and students can engage in creating digital awareness which would lead to the progression of the whole community.

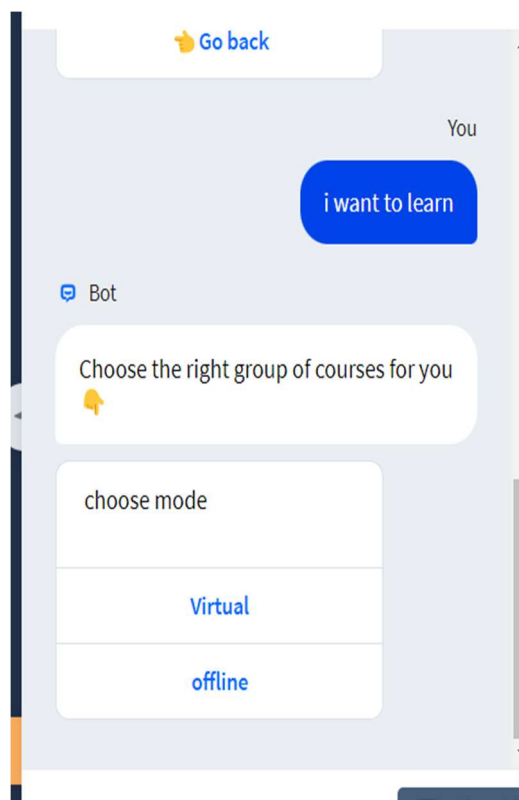
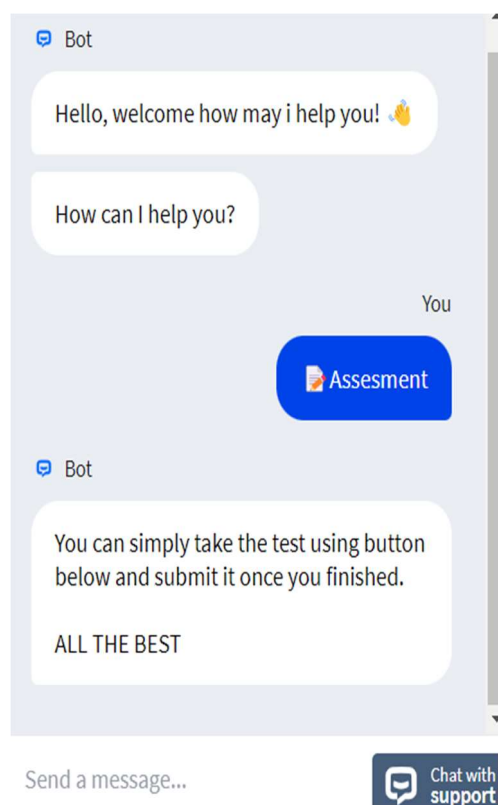
## **13. Concept Development (Brief summary of the product)**

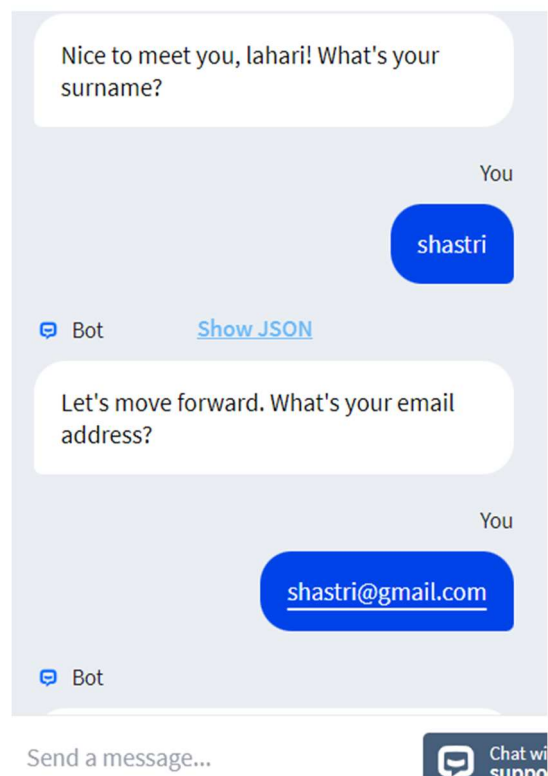
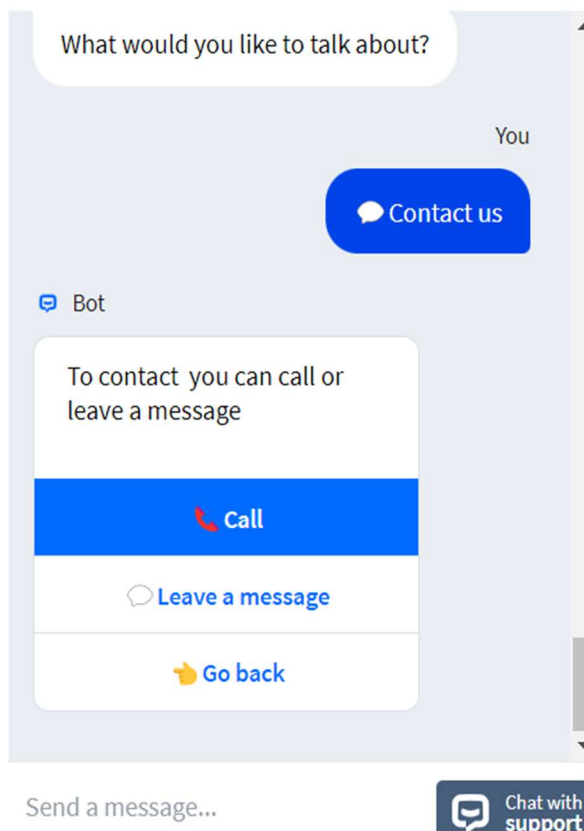
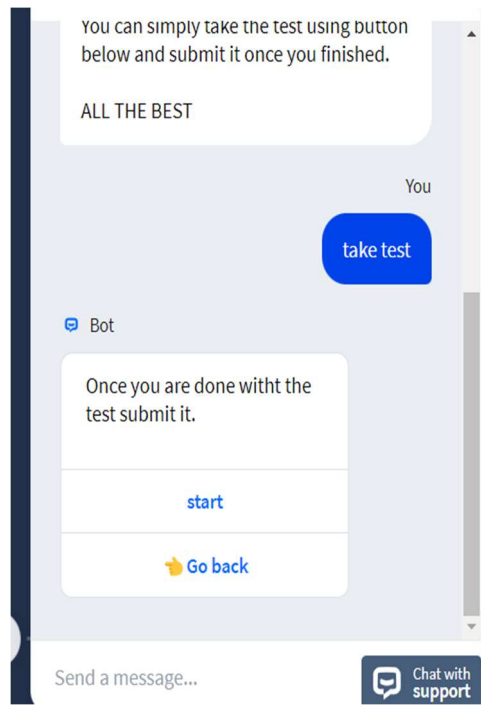
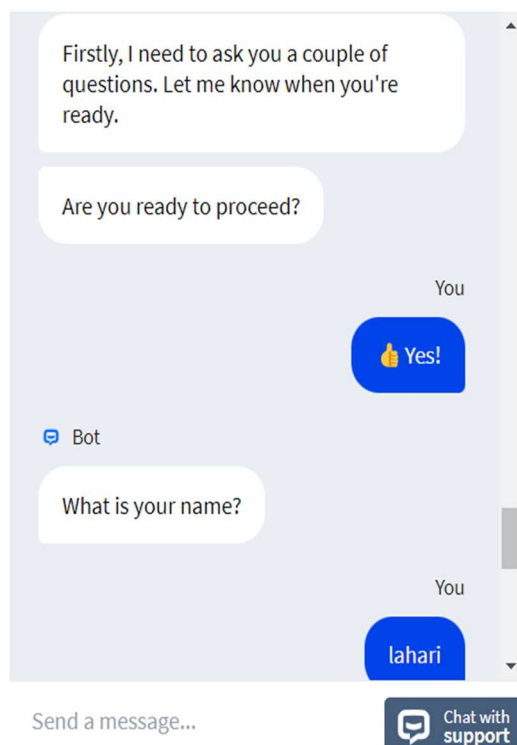
Chatbots have been gaining popularity over the years and can be seen on almost every website we visit. They are being increasingly used by businesses for customer support and are predicted to improve customer service for many industries in the coming years. And, of course, with AI in the picture, it only makes sense to introduce well-functioning chatbots. I put forth an idea of building an android application based chatbot, where the interaction takes place between teachers and students.

This Chatbot is developed using chatterbot algorithm that is a python library that makes it easy to generate automated responses to a user's input. The proposed system is an internet application that provides answers to the queries provided by the tutors. Users will put the questions through the chatbot that is used for chatting, questions can be related to the subjects, syllabus, course details, doubts regarding subjects. The answers depend on the user queries. The users do not need to go to the college for enquiry always. The user can also opt for virtual mode to clear his doubts. If one is not satisfied with the virtual tutoring then he is given with the option of opting with offline tutoring where one can book appointment for lectures, based on their location, here the application detects the location automatically and further asks regarding timeslot one needs to get tutored. The framework answers to the queries of the user as

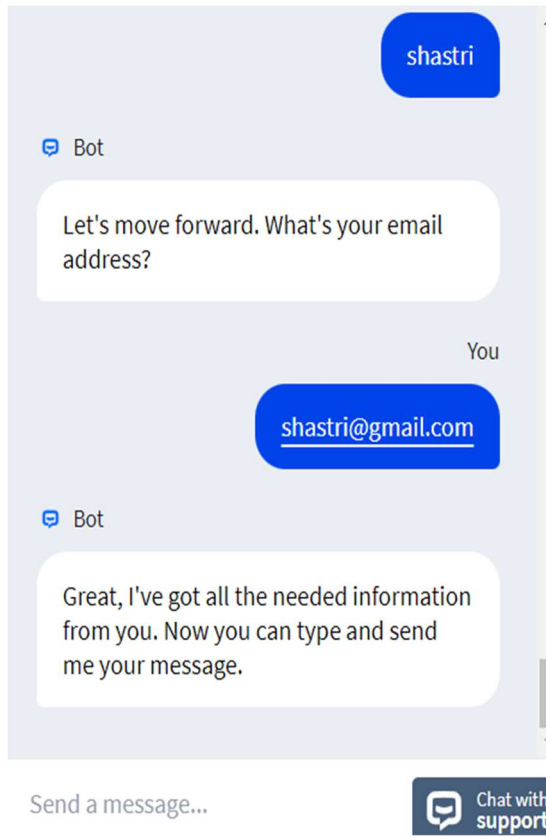
though it is replied by the individual.

The proposed system simply takes the query from the user which can be a student or teacher, the chatbot will match the queries of the student or teacher with the knowledge base and the appropriate response. The users can raise any questions which he wishes. The Chatbot system answers to the query as if it is answered by the real person. This chatbot guides the students throughout the process with just a click on the chatbot. This application also provides assessments or even just an old-fashioned test or quiz, exams can induce anxiety in both students and teachers. While there is no love lost for them, tests are a reality. Students need help tackling them effectively and confidently, and teachers need help getting students prepared, especially for studying at home. This application is designed in such a way that it prepares for test and gives students the targeted practice, reference resources, and study skills they need to conquer high-stakes tests. It also gives reports based on the tests which uses classification algorithm of machine learning. In its very basic form, given a question posed by a human in natural language, the bot replies with its corresponding answer, preferably also in natural language. This service, if implemented successfully, will be very important for students to learn and tutors to earn and be breadwinner of the family.

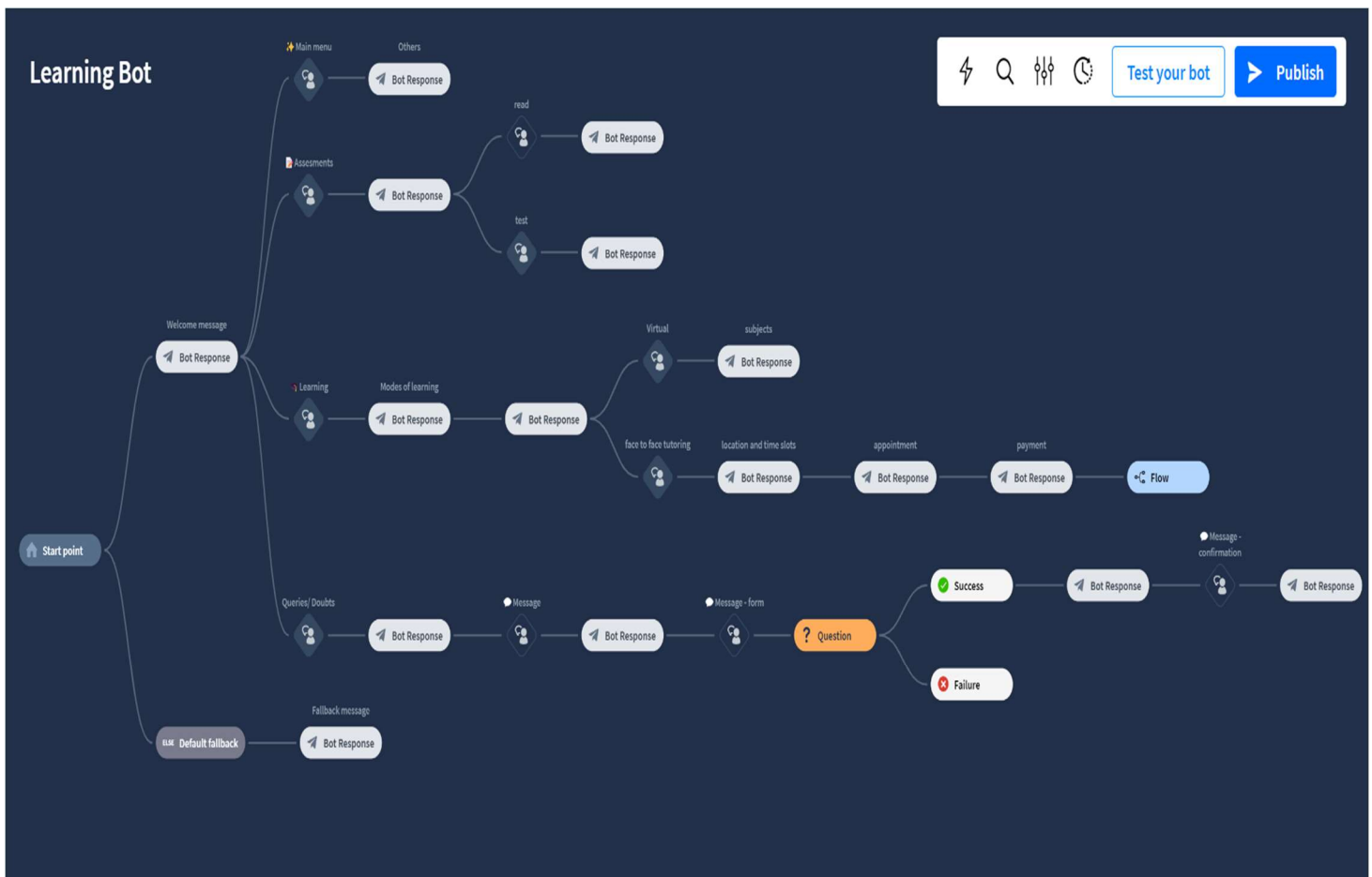








## 14. Final Product Prototype (With Schematic Diagram)



## 15. Product Details

- **Algorithms, framework, software, etc. needed**

### 1) **Naïve Bayes Algorithm**

The Naive Bayes algorithm tries to categorize text into different groups so that the chatbot can determine the user's purpose, hence reducing the range of possible responses. It is crucial that this algorithm functions well because intent identification is one of the first and most important phases in chatbot discussions. Because the algorithm is based on commonality, certain terms should be given greater weight for specific categories based on how frequently they appear in those categories. It allows the classification of intent, phrasing of text data.

### 2) **Support vector Machine**

SVMs perform exceptionally well with text data and Chatbots. It is one of the most widely used algorithms for classifying texts and determining their intentions. In a regression task, an SVM algorithm will take a set of labeled training data and learn a model that can predict a continuous output value for new, unseen data. Compared to newer algorithms like neural networks, they have two main advantages: higher speed and better performance with a limited number of samples (in the thousands). This makes the algorithm very suitable for text classification problems.

### 3) **Natural language processing (NLP)**

It helps your chatbot analyze and understand the natural human language communicated with your users. Chatbots are able to understand the intent of the conversation rather than just use the information to communicate and respond to queries.

- **Team required to develop**

ML Engineer

Data Analyst, preferably a Business Analyst to understand the need of the business

- **What does it cost?**

The cost will be finalized after the model is built. The cost factor comes into play when the model reaches the deployment stage.

## 16. Conclusion

The main objective of this application based chatbot was to develop an effective conversation which will identify user questions or queries and answer accordingly. It could be involved in performing various tasks like design textbooks, deliver course content, develop test questions, and evaluate the answers, monitor online discussions, and tutor students. This ensures that when an ambiguous or irrelevant input is detected, the bot asks the user to rephrase the question appropriately. Such

implementations will make interactions with Chatbots of the future indistinguishable from human interactions. With development of these application based chatbot in schools, universities can engage with the prospective students right from the point of admission to making learning fun for them. The potential uses for chatbots are endless, and with advances in natural language processing and machine learning, chatbots will only continue to become more sophisticated and valuable for businesses as well as other industries.