SOEN 6841: Software Project Management

Winter 2024

PROBLEM IDENTIFICATION

FOR

AI ENHANCED EDUCATIONAL CHATBOT

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Submitted to:

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1. Problem Identification

Title: AI Enhanced Educational Chatbot for Personalized Learning

Objective:

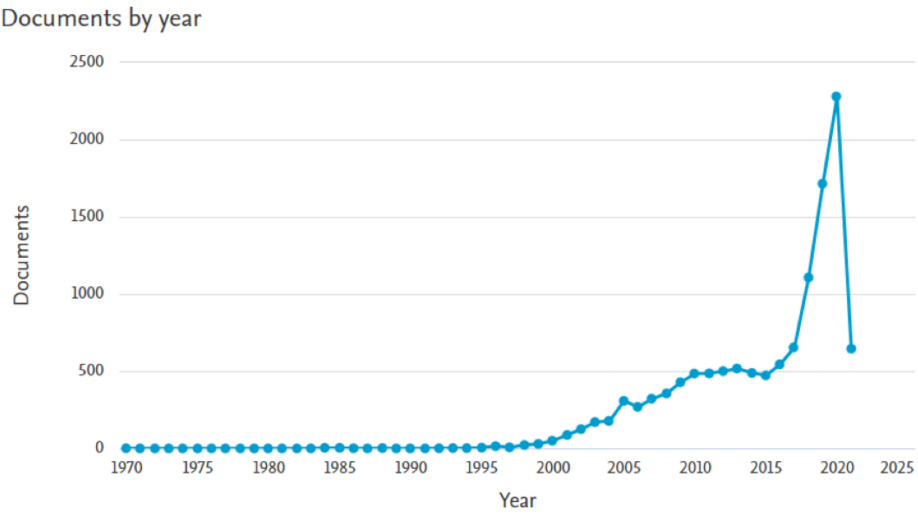
Traditional teaching methods struggle to address the diverse needs and learning styles of students, sometimes leaving many behind. This issue is worsened by the increasing size of classrooms and educators' limited ability to deliver individualized attention. With the rapid advancement of technology, students are increasingly accustomed to personalized experiences, creating an increasing expectation for education to adapt and provide unique experiences. An AI-enhanced chatbot in education can help to solve this problem by assessing each student's learning styles, preferences, and areas of difficulty. This chatbot can function as a virtual instructor, offering focused explanations, additional resources, and customisable learning paths based on each student's unique requirements.

Content:

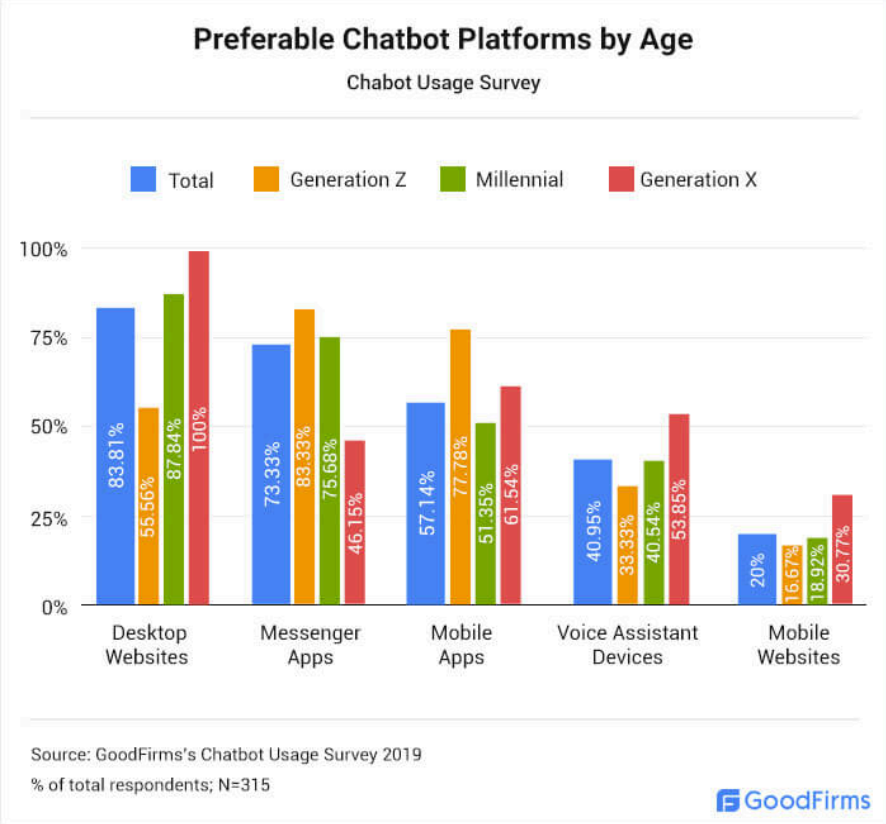
Problem/Opportunity Statement:

The major difficulty in education is to personalize student involvement and help, which frequently fails to satisfy individual learning demands. Traditional teaching methodologies frequently fail to meet these needs. AI can help us develop an educational chatbot that provides personalized assistance, resulting in a more effective and inclusive learning environment. The chatbot we intend to develop will meet customized learning needs, provide immediate assistance outside of class hours, explain complicated ideas, aid in retention and revision, improve time management, provide feedback and assessment, and provide access to educational resources. It will also stand out from other chatbots by employing innovative algorithms to evaluate individual student progress, learning preferences, and difficulty regions. The chatbot will enable real-time communication between children, parents, and educators, addressing immediate learning requirements and concerns. It will also offer extensive evaluation features to continuously evaluate student performance and comprehension. Thus, we feel that developing an AI-enhanced chatbot for individualized learning solves a major need in education today. By using artificial intelligence to provide targeted support and assistance to students, instructors, and parents, we can create a more effective and inclusive learning environment that optimizes the potential of every learner.

Chatbot usage surveys



Increasing number of documents processed by chatbot each year



Chatbot usage survey - Age groups

Project Scope

Project Inclusions:

- Implemented real-time communication capabilities for students, instructors, and parents.
- AI algorithms are being developed to give personalized learning paths and adaptive learning opportunities.
- Collaborative learning capabilities and immediate evaluation systems have been incorporated.
- Implementation of ethical AI technologies, transparency in data usage, and data privacy protections.
- Provide a separate component for educators' continued professional development, such as materials, workshops, and AI-related training, to assist them enhance their teaching abilities.
- Ensure that many languages are provided in order to accommodate a diverse user base.
- Integrate with existing assessment and grading systems used by educational institutions to improve evaluation efficiency.
- Allow instructors to tailor the chatbot's content and capabilities to their specific teaching styles and curriculum requirements.
- Configure analytics tools to monitor user engagement, performance, and usage patterns.

Project Exclusions:

- Hardware buying and setup.
- Marketing and promotion activities extend beyond project stakeholders.
- Network infrastructure changes.

Deliverables:

- Product Initiation Report
- Market Research
- A detailed paper defining the chatbot's functional and nonfunctional requirements.
- Architecture design document outlining the high-level system architecture, components, and interactions.
- Create an AI chatbot with all of the requested characteristics and functionalities.
- User interface designs and wireframes representing the chatbot application's layout, navigation, and visual features.
- Test plans define the approach, technique, and test cases for functional, regression, and performance testing.
- User manuals, instructions, and tutorials describe how to use the chatbot application.
- The support plan outlines how to report problems, seek assistance, and download software updates.

Project Constraints:

- Time limits for project completion
- Budgetary restraints
- Acquire third-party resources.
- Technical limits for AI algorithm development and integration.

Project Charter

Project Objective:

The AI-enhanced educational chatbot seeks to overcome the limitations of traditional teaching methods by assessing each student's learning styles and preferences. It can function as a virtual instructor, offering personalized explanations, resources, and learning paths based on individual requirements.

Project Team

- Project Manager
- Software Developers
- AI Specialists
- User Experience (UX) Designers
- Quality Assurance (QA) Testers

Stakeholders

- Students
- Teacher
- Parents
- School Management
- IT Department

Project Timeline:

- StartDate: Feb 11, 2024
- End Date: March 30, 2024

Risks:

- **Technical Challenges:** Complexity of AI algorithms.
- **Data Privacy and Security:** Security weaknesses may allow for unauthorized access, data breaches, or the exploitation of sensitive user information.

- **Ethical AI Use:** Ethical considerations, prejudices, and unexpected effects from AI algorithms may have a detrimental impact on the chatbot's acceptance and trustworthiness.
- **Integration concerns:** The implementation of new educational systems, platforms, and infrastructure may result in compatibility concerns, data migration challenges, or workflow impediments.
- **Scalability and Performance Issue:** As the number of users starts to grow and their demand increases , scalability and performance concerns may arise which will result in poor response times, system unavailability, and sometimes resource limitation may occur as well.
- **User Interface:** Confusing user interfaces, no definite hierarchy of UI and a lack of user engagement features can all contribute to low user satisfaction and adoption rates.
- **User Adoption:**The user may not be unwilling to utilize the software but may find it confusing to use the features.

Stakeholder Analysis:

Identification of Stakeholders:

1. **Students:**

   Interest: Although there are numerous chatbots available, none of them are specifically engineered for educational objectives; our attention is directed towards students as the principal consumers. Our chatbot endeavors to facilitate effective learning by providing individualized assistance around-the-clock. The system places a high emphasis on safeguarding data privacy and ensuring an intuitive user interface.

   Student Concerns: specifically those pertaining to data security, privacy, and the dependability of educational materials. In order to mitigate these concerns, the chatbot has implemented stringent security measures to guarantee a secure educational setting. We endeavor to address the distinct requirements of each pupil by providing a customized and protected educational environment, so as to achieve this objective.

2. **Tutors/Instructors:**

   The benefits of this software development initiative are more pronounced for educators in comparison to the students. By providing an automated assessment system and facilitating effective communication between instructors and students, the system substantially reduces the time required by tutors. Tutors are granted access to an all-encompassing progress report that details the academic performance of each individual pupil.

   Furthermore, by autonomously uploading content, the system optimizes the examination question generation process, thereby conserving the time and effort of tutors. The objective of this customized methodology is to improve the overall pedagogical experience for educators, maximizing productivity and enabling them to devote greater attention to individualized student assistance.

3. **Parents:**

   Parental Interests: Parents desire timely notifications regarding their child's academic advancement, comprehensive explanations of the educational assistance rendered, such as individualized study plans and supplementary materials, and consistent updates regarding assignments and accomplishments.

   Matters of concern: Parental apprehensions regarding data security are evident, with an emphasis on the necessity for strong safeguards to secure sensitive data, including academic records and personal information. Parents are intent on receiving transparent information regarding the handling and sharing of their child's data, as privacy is a major concern. Furthermore, concerns regarding the potential ramifications of technology on the welfare of students are prevalent. These concerns encompass issues such as excessive screen usage and the efficacy of digital learning approaches. It is imperative to address these concerns by implementing transparent communication practices and effective

privacy policies in order to establish parental trust in the educational chatbot enhanced with artificial intelligence.

4. **School Management:**

   Interests: Optimizing resources and enhancing educational outcomes are areas of interest for school administration. The implementation of the system facilitates streamlined administrative procedures and improved communication, which results in favorable evaluations from both students and instructors. Enhanced organizational efficacy is a significant area of interest.

   Concerns: School administration is primarily concerned with the scalability of the solution, the initial investment, and the training demands. Critical factors to be mindful of include the acceptance of the new solution throughout the educational ecosystem and the assurance of a seamless integration with pre-existing systems. It is crucial to acknowledge and resolve these concerns in order to obtain the backing and dedication of school administration regarding the integration of the AI-powered instructional chatbot.

5. **IT Department:**

   The IT department is concerned with the scalability and effectiveness of the AI-enhanced pedagogical chatbot's implementation. The organization's objectives are to ensure compliance with technological benchmarks, smooth integration with pre-existing systems, and a solution that is in line with its comprehensive technological infrastructure.

   The IT department is primarily concerned with technical obstacles, system upkeep, and possible integration complications. Their objective is to guarantee the software solution's technical integrity, security, and maintainability. It will be imperative to resolve these concerns and offer comprehensive support in order to secure the IT department's cooperation and support during the development and implementation stages.

Relevance to Software Solution:

By providing an interactive, individualized, and effective learning environment, the creation of an educational chatbot powered by artificial intelligence directly addresses the identified issue. The primary objectives are to accommodate the varied requirements of students, enhance instructional procedures, and facilitate streamlined dialogue among stakeholders.

Initial Thoughts on the Scope of the Software Solution

1. **Feature Set:**
   - Adaptive learning paths based on individual student progress.
   - Real-time communication between students, teachers, and parents.
   - Automated assessment and feedback mechanisms.
   - Integration with existing learning management systems.

2. **Technological Considerations:**

    - Utilization of natural language processing (NLP) for effective communication from given prompt and fetching out the best possible results.
    - Implementation of machine learning algorithms for personalized content recommendations.
    - Mobile and web platform compatibility for widespread accessibility.

3. **Training and Support:**

    - Development of comprehensive training materials for stakeholders and continuous testing of the software.
    - Ongoing support and regular updates to ensure system relevance and security.

4. **Pilot Implementation:**

    - Consideration of a phased rollout to address initial concerns and gather feedback from the users.
    - Continuous improvement based on user experiences and changing educational needs.