Chatbots in Educational Institutions: Challenges and Issues

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ABSTRACT
The research in the field of Artificial intelligence has been deepening day by day, Conversational Artificial Intelligence is the new buzz word. When Artificial intelligence is used to build software and programs that can engage in Natural Language conversation then the term conversational Artificial intelligence exists. Chat bots is one of the important aspects of conversational Artificial Intelligence. A computer program intends to make a dialogue between both human and machine via textual or auditory methods is called a chat bot. This research paper focused on various challenges and issues that transpire when chat bots are used in School Education System. The interesting results and facts so obtained are presented in this research paper.

General Terms
Artificial Intelligence customized learning, Big data analytic, Technology Mediated Learning, sentimental analysis, long term memory.

Keywords
Conversational AI, Educational Chat bots, Expert System, Human Computer Interaction, Virtual assistant.

1. INTRODUCTION
The growth of intelligent systems based on methods known from machine learning and artificial intelligence affects information systems in many areas. Every institution depends on Information and Communication Technology (ICT) for proficient service deliverance and cost-effective application of technological resources in these days and ages. Conversational Artificial Intelligence is the new buzz word. Chat bots is one of the important aspects of conversational Artificial Intelligence. Creator of the first Verbote, Michael Mauldin coined the term "ChatterBot" in 1994 to describe these conversational programs. Besides from imitating human interaction and amusing people, chatbots are helpful in various other areas such as in education, health, business and e-commerce, and entertainment. To promote products, ideas or services chatbots are used by organizations and governments on websites, in applications, and instant messaging platforms. The most important motivation for chatbot users is productivity. Although other types of motivations for using chatbots may include entertainment, social factors, and novelty interaction. Educational institutions have also been embraced by artificial intelligence tools. The use of Artificial intelligence in education is rapidly expanding. Thus, due to growing preference towards faster services and acceptance of Artificial Intelligence (AI) based tools in Education sector globally as well as in India, the Chat bots or Natural Dialog Systems marketplace goes to step up within the next decade. A Chat bot is nothing but an artificial intelligence (AI) based software program that by using natural language can simulate a conversation with the user with the help of messaging platforms, phone applications, and websites. Technically it is called as conversational user interface (CUI), which permits users to interact with the bot. User doesn't need to download any applications on their device while using chatbots. A chatbot is an artificial intelligence program and a Human–computer Interaction (HCI) model. The job of a chatbot is to provide human like interaction and assistance to the user. A chatbot can interact with users in various formats such as text and speech. The purpose of this paper is to open up various challenges and issues raised when chat bots are used in educational institutions to aid students, teachers and administration department.

2. CONDUCTING THE REVIEW
Alan Turing (1912-1954), detailed a procedure that was popularized as the Turing test. The goal of Turing Test was to determine whether a machine could imitate human conversation. Thus Turing Test is the foundation of Artificial Intelligence. Chatbots have the ability to emulate human conversations and thus automate services and reduce effort. They are increasingly becoming popular in several domains, including healthcare, consumer services, education, and academic advising.

The acceptance of educational chat bots is on the rise due to their capability to offer a worthwhile means to engage students and provide a customized learning experience. Chatbot implementation is particularly vital in online classes that include many students where individual support from educators to students is difficult. Chatbots can aid learning within the educational context. Various services that a chatbot can offer includes providing students with course content, assignments, rehearsal questions, and study resources. Moreover, chatbots may interact with students in person or support collaborative learning activities.

Existing literature review studies attempted to summarize current efforts to apply chatbot technology in education. For example, Winkler and Söllner (2018) focused on chatbots used for improving learning outcomes. On the other hand, Cunningham-Nelson et al. (2019) discussed how chatbots could be applied to enhance the student's learning experience. The study by Pérez et al. (2020) reviewed the existing types of educational chatbots and the learning results expected from them. Smutny and Schreiberova (2020) examined chatbots as a learning aid for Facebook Messenger. Thomas (2020) discussed the benefits of educational chatbots for learners and educators, showing that the chatbots are successful educational tools, and their benefits outweigh the shortcomings and offer a more effective educational experience. Recently several studies reviewed chatbots in education. Nitirajsingh Sandu and Ergun Gide from CQUniversity, Sydney, Australia in their research paper titled "Adoption of AI-Chatbots to Enhance Student Learning Experience in Higher Education in India" talked

about how education can benefit from chatbot development. In their research they found the factors that affect the adoption of chatbot technology in order to enhance the student learning experience in the Indian higher education sector.

Gwo-Jen Hwang and Ching-Yi Chang from National Taiwan University of Science and Technology and Taipei Medical University respectively in their study "A review of opportunities and challenges of chatbots in education" found out that the studies related to chatbots in education are still in an early stage. This study also suggested that there are few empirical studies investigating the use of effective learning designs or learning strategies with chatbots . This implies much room for conducting relevant research.

Namrata Bhartiya,Namrata Jangid,Sheetal Jannu, Purvika Shukla from Mukesh Patel School of Technology Management and Engineering, NMIMS University in their research work "Artificial Neural Network Based University Chatbot System" elaborated description of the design and implementation of a university counseling Auto-reply Bot that is capable of providing answer to queries related to the field of engineering at our university level.

E. Kasthuri, S. Balaji from Department of CSE, Professor, Francis Xavier Engineering College, Tamil Nadu, India in their research work "A Chatbot for Changing Lifestyle in Education" approached a typical way to design a chatbot for MATLAB practical dataset . Student can ask a question in the chatbot in the form of text then, the question is processed with Natural Language processing and deep learning technology.

Fabio Clarizia, Francesco Colace, Marco Lombardi, Francesco Pascale & Domenico Santaniello from DIIn, University of Salerno, 84084, Fisciano, SA, Italy, presented the realization of a prototype of a chatbot in educational domain. They designed a chatbot model to manage communication and furnish the right answer to the student .

Harry Barton Essel, Dimitrios Vlachopoulos, Akosua Tachie-Menson, Esi Eduafua Johnson & Papa Kwame Baah in theor research work "The impact of a virtual teaching assistant (chatbot) on students' learning in Ghanaian higher education" contributed in the emerging artificial intelligence chatbot literature to improve student academic performance . The discussed about zero-coding technique is used in their research work to develop chatbots.

3. CHALLENGES AND ISSUES IN IMPLEMENTING CHATBOTS IN EDUCATIONAL SETUP

Chatbots stands for "Chat Robots." They use artificial intelligence in order to simulates the human conversation with a user in natural language. While using in an educational setup the goal is not to swap the teacher with chatbots but to lessen the load of repetitive and low cognitive level tasks carried out by the teacher. This in turn increases her/his efficiency. It is very important to determine the intentions of using chatbots in educational institutions. Chatbots are used with Educational Intention or without educational intentions in an educational institution. They can work as virtual assistants/virtual tutors; exercise and practice programmes etc. to improve productivity when used with educational intention. Chatbots can be used to answer FAQs related to various elements of the syllabus/course, can handle many repetitive questions raised by students regarding project guidelines, deliverables, deadlines, grades, etc. when used without educational intentions. Following are the various challenges and issues that researcher critically found during their studies of using chat bots in Educational Institution.

Challenge 1: Chatbots lacks decision making capabilities

Initially the goal of creating a chatbot was to respond the simple questions of the user that only required factual information. As the time passed , the query of user became complex. So currently, chatbots are not able to answer complex queries as these queries required to answer multi-part questions or questions that require decisions. The same kind of complex queries may arise by the students. This often meaning chatbots will not able to answer such queries from the students. Thus the challenge is to develop the chatbots that have decision making capabilities. The chatbot lacks the nuance, critical-thinking skills or ethical decision-making ability that are essential for successful teacher. When it comes to more complex tasks or situations that involve multiple layers of decision making and approvals, chatbots may end up making the matter worse. Currently the chatbots are so smart that they make the use of data collected by combining natural language processing and machine learning methods in order to provide user with different types of information. In chatbots, the system is fed with natural-language data on historical user interaction, which is processed by an intelligent system that learns to automatically suggest answers back to the user in text format. Now the problem is how to improve the decision making capabilities of the chatbots. By improving data mining and machine learning techniques decision making capabilities of a chatbot are possibly improved. In this regard Big data analytic seems to be the solution of this challenge. Big data analytics describes the process of uncovering trends, patterns, and correlations in large amounts of raw data to help make data-informed decisions. Thus the solution is is to provide a chatbot based system to support the students that understand and use Big Data analytics and acts as a base of data-driven decisions in Educational Institutions.

Challenge 2: Chatbots are not able to provide Customized learning

Chatbots personalization is the term synonymously used to describe this challenge. Teaching is a challenge. Instructors often teach a class of forty or more students, making it difficult to give proper help and attention to each student. Every student learns at a different pace and in their own way. Educational organizations frequently experiment with new methods of teaching. Due to machine learning, there has been an increase is the use of artificial intelligence and chatbots in teaching and learning. Personalized attention to students advances their results as the instructors get to knowledge of the domain where the learners are fragile in. The availability of personal educators to individual students of different capacities can conceive larger number of professionals. Students can acquire deeper knowledge of their interests. Technology Mediated Learning (TML) is defined as "an environment in which the learner's interactions with learning materials (readings, assignments, exercises, etc.), peers, and/or instructors are mediated through advanced information technologies". Chatbot mediated learning is also considered as a branch of TML where the study can be personalized and students can dynamically use these bots for their learning. Some recommendations so that chatbots provide customized learning to their students are as follows:
A good way to personalize the dialogue even more is to design conversations and guide the students towards the answers. To get this, bots driven by artificial intelligence can understand natural language, regionalisms, and even typos. It is crucial in

order to offer a contextualized experience. Go ahead and create fun conversations. Surprise the students by using emojis, gifs, and images. Discover patterns in the learning process of the students so that chatbots can be personalized

Challenge 3: How to integrate chat bots to classrooms.

Chatbots, now a days are found almost in every website and mobile app, is now entering classrooms as well in educational institutions. Currently they act as a virtual assistant for the teachers. They empower teachers to supplement their focus more on the work that deserves their attention while automating the rest of it. The common understanding is that chatbots are reserved for business usage to deliver services to the customers only. On the contrary, they are perfect to be used in classrooms as well. Chatbots can make teachers more creative and also facilitate students to get immediate answers to their basic questions. It creates a win-win situation for all i.e teacher, students and administration of the educational institute. In a classroom standardized tests with uniform scoring models can be time-consuming to check. A chatbot can scan through answer sheets with an OCR system, match the student response against standard answers, and award the deserved score. The teacher has to interfere only when a discrepancy is raised by the student. A chatbot can be used to address general queries regarding the subject. It can answer basic questions and answers that the student might want to look up quickly. Chatbots can also be used in basic language learning. They can be used to teach students the translations for words, terminologies, right phrases to use, spellings of jargon, and so on. Chatbots can also create a customized learning plan that will enable them to achieve their educational goals. This saves a lot of time and effort for the admin staff who are otherwise required to spend time crafting individual lesson plans and curriculums for each student.

Challenge 4: Chatbots can misinterpret of human feelings and emotions

Nowadays, students are facing a lot of mental health problems due to a variety of causes like peer pressure, cyber bullying, academic stress, loneliness etc. Due to these reasons students are unable to grow well in their life, both emotionally and academically. They are also not able to obtain appropriate direction from experienced and knowledgeable humans to solve their personal issues. Therefore, developing a human friendly chatbot can help students to get the right guidance for their issues. Currently chat bots cannot detect the emotions, tone of voice or any other human expressions that are put forward in a message and this can sometimes confuse them into what they think the user wants. Thus it is a major challenge to built chatbots that can understand the sentiments of the students .Sentiment analysis is contextual mining of text which identifies and extracts subjective information from the source material. The main role of sentiment analysis is to find the real time emotion of the user of the chatbot. Thus the focus should be given to sentimental analysis area of the chatbot development so that they can solve both emotional and academic issues of the students.

Challenge 5: Certain chatbots are poor in memory and do not store past conversations

Certain chatbots have poor memory and hence they do not store past conversations. Since they are unable to memorize past conversations hence it is required that the users must have to type the same queries multiple times. Thus, it is important to be careful while designing chatbots and make sure that the program is able to comprehend user queries and respond accordingly. Earlier approaches used simple keywords & pattern matching methodologies, answering in a static manner irrespective of previous conversions. Thus while developing chatbots in educational setup, the idea is to find a way to prevent identical and very similar questions from being asked several times and to store the information of which questions have already been asked in a document database. Due to the fact that long-term memory is an integral part in human-to-human interaction and conversation one can concluded that in the pursuit of the next step in conversational bots, memory is of the essence. Thus the ultimate goal is to make educational chatbot system with long term memory.

4. CONCLUSION

The aim of this research paper was to explore the challenges and issues to implement conversational chatbots particularly in Educational institutions. In educational setup, since the chatbots interact with students so they must have decision making capabilities. These chatbots must also create a customized learning plan for each student that will enable them to achieve their educational goals. The interface of chatbots should be so simple that it is very easy to integrate them in the classroom directly to fulfill the needs of both teacher and students. They are also capable to understand the feeling of the students from the conversation so that good decisions that improve the students both mentally and academically can taken .Moreover chatbots must be provided with long term memory system so that past conversation with each student can save that in turn plays a vital role while taking and decision about particular student. It is also suggested that If data is not available in a static database then it will be fetched from online sources. By doing this response to all the queries of the student can be given. The chatbots developed on the basis of rule based approach may not be efficient in answering questions. Thus paradigm must be shifted from using rule based approach to machine learning approach. It is also found in this research that if chatbots are not designed effectively they can increase frustration of users which arises due to unsuccessful communication. Chatbots could be involved in performing various educational tasks like design textbooks, deliver course content, develop test questions and evaluate the answers, monitor online discussions etc. Thus, the effectiveness of chatbots depends on ability, creativity, and imagination of its developer. However, there is still a paucity of research which can confidently declare about the impact of use of chatbots in education. Hence, there is a strong need to explore more in this area.

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