Conversation Design as a Pedagogical Strategy in ESL Classrooms: Co-creation of a Chatbot by Beginner-level Learners in India

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Abstract

This study explores the use of conversation design as a pedagogical strategy in an ESL (English as a Second Language) classroom. The participants of the study are 14-year-old beginner-level learners of English who speak Hindi and reside in Hyderabad, India. Learners are tasked with collaboratively designing, creating, and testing a chatbot. Before attempting the task, learners are provided with a foundational knowledge of Artificial Intelligence (AI), conversation design principles, and the use of a no-code development platform that uses a GUI (Graphical User Interface) to design and test chatbots. The learners are allowed to make use of their own language, i.e. Hindi, to carry out discussions and design the English-speaking Chatbot. They are also required to test their Chatbot by having conversations with it. While several studies look into the use of chatbots of various kinds in language education, there is a significant gap in research related to the use of conversational user interface (CUI) design in language classrooms. The study demonstrates that integrating conversation design into a multilingual ESL classroom promotes engagement, contextual relevance, and personalized learning experiences, allowing learners to participate actively and take ownership of their language acquisition process.

Keywords: Artificial Intelligence, Chatbots, Conversation Design

Introduction

Artificial Intelligence (AI) has revolutionized various industries, including education. Chatbots, one the many applications of AI is a promising tool to enhance language learning experiences, particularly in language education. It has been attracting the attention of educators as a way of promoting language use, i.e. conversation partners. It has also been known to support teachers in various processes from material creation to adaptation and evaluation. Despite the growing interest in integrating AI technologies in education, educators and learners in the language classroom are not regarded as potential creators of context-specific tools for language learning. When it comes to chatbots, there is a new possibility for language educators and learners with no background knowledge of coding to attempt a design of conversational user interfaces (CUIs) for their language classrooms. This is made possible due to the relatively new phenomenon of no-code development of technology. There is still a lack of research on how various no-code platforms can be used in the language classroom such that learners may be empowered to perform real-world tasks using language, many of which are now based on

the creation and use of technology. This study aims to bridge this gap by exploring the potential benefits and challenges of incorporating conversation design into multilingual ESL classrooms, so as to make language learning more relevant to the advances of technology in the present era.

Literature review

There have been several attempts in the growing body of research such as the examples shown by La and Li (2011) that explore the benefits of incorporating technology and interactive activities in language education, but the use of conversation design in the language classroom appears largely unexplored. These studies highlight the potential of conversation design as a pedagogical tool to enhance students' speaking skills and foster meaningful communication in the English language classroom. Therefore, this review attempts to examine existing literature on the use of technology in language education, studies related to the use of chatbots in language education, and a comprehensive view on conversation design that can help us understand how we may incorporate elements of it in a language class.

The role of technology in language education

Technology and its use in education has been a topic of interest and research for many years. Numerous studies have explored how technology can enhance language learning and teaching, providing new opportunities for interactive and engaging experiences (E.g., Shadiev & Yang, 2020; Zhao, 2003; Ngo, 2024). Additionally, the integration of technology in language education has been found to improve students' motivation and allied affective factors that influence language learning (E.g., Wang et al., 2017; Tran et al., 2022). It has also been shown to improve learner autonomy and promote independent learning (Chen et al., 2020). Effectiveness studies have also shown improvement in proficiency in various language skills (e.g. Golonka et al., 2014). While the use of technology to support language education can be promoted in several ways, Puentadura (2006) argues that educators must aim to redefine learning tasks, that is to create novel tasks that were previously inconceivable without technology to truly transform learning. One such attempt is to incorporate conversational user interface design or a voice-based chatbot by learners in a language classroom.

Previous research on chatbots and language learning

A systematic review of the earlier studies conducted on the use of chatbots for language learning was attempted by Huan, Khe, and Luke (2002). Of the 25 studies reviewed, both web-based and mobile-based chatbots were considered, including those interface through Instant Messaging (IM) applications. In some of these studies, chatbots were readily available. Others considered the creation of task-specific chatbots. However, learners' design and development of chatbots was not considered. Further, we see that there have been studies focusing on English language learning and a few on languages like Chinese and Irish. It is necessary to note here that these, however, have not taken into consideration multilingual contexts where learners use multiple languages to communicate and enable effective negotiation of meaning.

Conversation design

In order to understand the process of conversation design for making a VUI, we must first understand the most basic component of this design, called an "intent". An intent defines the objective behind a user's input. Developers can effectively train the Chatbot to recognise and respond to various user commands by creating intents. It helps the Chatbot match the input to relevant responses that it has been trained to provide ("Rasa Glossary", n.d.). It involves identifying the specific goals and purposes of the Chatbot as well as understanding the potential user queries and responses. Language learners can create intents by mapping possible questions

that a person might ask to the ways in which the Chatbot could respond to them. It involves learners placing themselves in a hypothetical context of use and predicting the language structures that a person might use to negotiate meaning with the Chatbot and how they may vary. Intents can be created by mapping user queries to specific answers that the Chatbot can respond to, such that it fulfills user requests.

Conversation design focuses on creating natural and engaging conversations between the user and a chatbot. This may include both text-based interactions and voice-based interactions. They require a good understanding of user behavior, language structures, and the ability to provide relevant and helpful responses to the task that one hopes to accomplish. It also involves the need to test the Chatbot with multiple variations of input to ensure that it needs the needs and expectations of the creator. In this particular study we are taking into consideration the use of the relatively lesser-researched Voice User Interface (VUI). VUI is a technology that enables users to interact with a chatbot using voice commands instead of typing. It works based on AI-based technology such as speech recognition and natural language processing to accurately understand and respond to user commands.

Interaction Strategies for Negotiation of Meaning

Clavel-Arroitia (2019) presents 12 telecollaborative interactions based on Smith's (2005) Model of Computer-Mediated Negotiated Interaction which presents us with a corpus of interactional strategies used by learners while interacting with others over a teleconferencing platform to facilitate the negotiation of meaning. This model was in turn adapted from Varonis and Gass (1985) that studied the various interactional strategies used in face-to-face communication. In this study, we will try to see if we can observe any such interactional strategies occurring when learners interact with their peers and with a chatbot. The use of such strategies has been linked to the seamlessness of interactions as well as efficient task completion.

Research Questions

To bridge the gaps in the available research literature mentioned above, this study delves into the practical feasibility of teaching conversation design to learners in the language classroom. This includes considerations such as the need and availability of resources and infrastructure to support the use of such technology and potential challenges that students may face during this process. The researcher also observes the interaction that ensues from the learners in such an attempt and attempt to describe it. This paves the way for future research that can implement this across varying contexts and measure its effectiveness and outcomes. Therefore, the following two research questions have been identified for the purpose of this study:

1. What are the practical feasibility considerations, including resource requirements and challenges, associated with integrating conversation design as a pedagogical strategy in a multilingual ESL classroom with 14-year-old beginner-level learners?

2. What are the interactional strategies among ESL learners as they collaborate on designing, creating, and testing the Chatbot?

Methods

Pedagogical Setting & Participants

The study was conducted in two low-resource schools (referred to as school s A and B) in Hyderabad, India. The participants of the study were 20 students who were 14 years old and enrolled in grade 9 at these schools. The students were selected because they were all speakers

of the Hindi language and were at beginner level proficiency in English. The students were administered the tasks separately in both schools and observed.

Design of the Study

The research method used in this study is qualitative observational, as it is a relatively new field of study. There is a requirement to describe the efforts and the process of the integration of what is now considered a niche area of knowledge into language classrooms. This qualitative approach will allow for a deep exploration of user behaviour, ultimately informing the development of more effective studies to measure outcomes. By observing and analyzing the learners' process of designing, developing, and testing the chatbots, we can then identify various qualitative variables connected to the process of developing a good user experience and feeding into language acquisition.

Data collection and analysis

The procedure of the study involved four steps:

   i) The introduction of conversation design as a pedagogical tool in the classroom,

   ii) The administration of a translanguaging-based chatbot design task,

   iii) The development of the Chatbot by the learners, and finally,

   iv) the testing of the Chatbot by the learners.

Prior to the data collection and analysis, it is necessary and implied that the researcher spend sufficient time familiarizing learners with the use of digital devices and the process of interacting with a voice-based chatbot so that we can presuppose the level of digital literacy that may be required to carry out the tasks. In the case of this study, the learners were given opportunities to interact with chatbots that provide experiences such as interactive stories and role-play such that they are aware of the mechanics of using and talking to a chatbot. Once this stage is completed, the researcher then moves towards the steps specifically pertaining to this paper, where the learners attempt to design and develop a chatbot of their own. The lesson plan used to conduct these stages of the study is provided in Table 1.

The learners are given a few minutes to interact with the Alexa smart speaker. They are given the option to ask Chatbot questions in any language of their choice to recap how human-machine interaction works. This is done in addition to earlier sessions conducted on interacting with an interactive story robot and a role-play robot, which is beyond the scope of this paper. However, it is pertinent to note that learners at this stage have already been exposed to talking to chatbots but not to designing or creating one.

After the warmup, providing instructions and modelling, learners are provided with a graphic organizer that the learners use for the translanguaging-based chatbot design task. Once the design stage is completed and learners have successfully created a paper-based design of three intents for their chatbots, learners commence the actual practice of using a no-code environment named Voiceflow to design, develop, and test their own Chatbot in the classroom.

Table 1.

Lesson Plan for Implementing the Task on Co-creation of the Chatbot

Warmup Learners take turns talking to Alexa to familiarize themselves with human-machine voice interactions.	10 minutes
Instruction and Modelling The researcher introduces the tool. The Researcher presents a model of a chatbot with three intents and demonstrates how it works.	10 minutes
Translanguaging-based Chatbot Design Task (Guided Practice) Learners use a Graphic Organizer to design the Chatbot. Learners work as a group to design three intents in Hindi and the responses for the same also in Hindi. The learners translate the intents and responses to English with guidance from the instructor.	10 minutes
Development of the Chatbots (Guided Practice) Learners use the Graphic User Interface to map out the chatbot conversation flow. Learners type in the intent data sets and responses to train the Chatbot as modelled earlier.	10 minutes - Mapping the Flow + 10 minutes - Typing and Training
Testing of the Chatbot (Independent Practice) Learners take turns asking questions of the Chatbot and testing its responses. Learners suggest possible revisions to intents for improvement.	10 minutes

To understand these processes better and answer the research questions given in the section, participant observation and a researcher journal were used as data collection tools. After the data collection process was completed, thematic analysis of the notes was used to draw conclusions from the data obtained. Specifically, efforts are directed towards identifying the presence of various interactional strategies used by learners to collaborate with their peers and accomplish the task.

Findings and Discussion

Based on our observations from this study, we can answer the first research question thus: There is an essential digital literacy prerequisite, which includes systematic familiarization with digital devices and voice-based chatbots through interaction. There are also the resource requirements, though minimal, which include one or two laptops (depending on class size), and internet access infrastructure. The feasibility of such a task also relies on pedagogical scaffolding, which was implemented through a structured progression from basic interaction to design and supported by materials for translanguaging-based tasks and clear instructional sequences. In spite of such a scaffolded approach, this study also brings out some challenges faced in the implementation of this task such as managing the quantity and quality of multilingual interactions, facilitating peer collaboration alongside human-machine interaction, transitioning from conceptual to technical development, and monitoring individual learner progress. These areas can be studied further in the future.

To answer the second research question based on the participant observation and the thematic analysis of the researcher journal, we present some patterns observed in our preliminary data

which are briefly explained in Tables 2 and 3. The categories of interactional strategies emerge from the classroom observation and researcher journal analysis. Though this is a short-term study that looked into the administration of just one chatbot design task in two schools, we are able to observe many of the interactional strategies that were put forward in Clavel-Arroitia (2019), such as comprehension checks, repetition requests and repetitions, clarification requests and clarification, asking questions to a peer or to the researcher, peer-correction, code-switching, and the use of gestures.

In addition, we also see the emergence of new categories of strategies directed by learners towards the design of a conversational agent. We have attempted to visualise these strategies in figures 1 and 2. These new categories include:

    i) User centeredness

    ii) Flow

    iii) Language Structure

    iv) Context Awareness

    v) Refinement

Descriptions of what these strategies entail, and examples observed from student interactions have been tabulated as a result of this study, provided in Tables 2 and 3. In addition, to these, the observations, the research also provides a frequency count of how many times these strategies were observed in the learners' interactions during the administration of the task. This can give us insights into how often these various strategies are used by learners when they interact with each other while involved in conversation design across the three stages namely, design, development, and testing. These insights and their possible implications are discussed further in the discussion section.

Before we proceed to discuss the implications of the results we have summarized above, we need to first make some clarifications on the categorizations made from observation. The data presented are a result of thematic analysis carried out based on the researcher's observation and journal. This is not exhaustive and only covers the observed strategies the learners use for interaction and conversation design. Moreover, these categories have been assigned based on the context of the conversation; hence, these categories are not mutually exclusive. For example, consider one of the examples given in Table 2.

    Kaise bole? Can you give me the details?

    How do we say it? Can you give me the details?

Here, we can see that this has been categorized as learners' use of language structures to design what the Chatbot would say. However, we can also consider this as an example of the use of code switching as an interaction strategy. Therefore, we can say that the categories mentioned here are not mutually exclusive and the researcher has made an effort to place such utterances into the category which could be the closest match.

Now, we can try to compare how learners have used these various interaction strategies across the three stages of the conversational design task. In the design stage, considerable code-switching takes place. As the learners were given a graphic organiser to first design the intents in their own language, i.e. Hindi, it seems logical that this would be the case. As an extension, we were also able to observe code-switching in the following stage, i.e. development. We also see that the 'Use of Gestures' has the highest observed frequency in the design and subsequent stages. As beginner-level learners, this interaction strategy plays an active role in the learning environment. The data reveals that the highest average value (27.5) observed among the

interaction strategies is in the development stage. This may signify a large amount of interaction taking place between the various learners at this stage. This could also indicate that the learners put a lot of effort into collaborating with their peers in the development stage. We also see that the 'Use of Gestures' reaches a maximum value (63) at this stage, showing that in addition to verbal communication, the learners effectively employ non-verbal communication also during this stage to negotiate meaning. While peer correction was quite low in the design stage, it increases notably in this stage, signifying that the learners actively provide feedback to their peers in this stage. It fosters an environment of collaboration and peer feedback among learners. We also observe a high range of observed values (58) in this stage, showing that varied interaction occurs at this stage. We could ascribe this to learners engaging in active problem-solving at this stage.

In the testing stage, the learners are shown to have generally low frequency of interactional strategies. This is possible because they are involved in asking the robot questions. The lowest average value of interaction strategies observed is seen here. Therefore, it might be worthwhile for future studies to probe this further and try modifying this stage to stimulate peer interaction. In addition to these, we also observe the least use of 'Asking a question to a teacher/researcher' as learners collaborated with their peers and sought help from each other. This is particularly visible in the frequency of 'Peer correction' observed.

Now, let us discuss the conversation design strategies observed. Figure 2 illustrates the application of different Conversation Design Strategies like 'User centeredness', 'Flow', 'Language Structure', 'Context Awareness', and 'Refinement' under 'Design', 'Development', and 'Testing'. The learners appear to focus on 'Language Structure' the most when it comes to conversation design, across all three stages with the frequency peaking in the testing stage. While this focus on structures can be beneficial for language learners, further attempts need to be made to adapt this task to facilitate more balance among various conversational design strategies, possibly via explicit instruction. Though we see that the lowest frequency is observed for 'Context Awareness' occurring mostly in the design phase, the attempt made by learners to consider the potential context in which the Chatbot might be used is noteworthy. Similarly, we see that during the design phase, the learners paid some attention to 'User Centeredness'. As language learners, this can aid in the development of appropriacy in language use. In comparison to the interactional strategies used with peers, we see that the conversation design strategies show higher variability in the design phase rather than the development phase due to overtly evident reasons. Likewise, we see a higher focus given to conversation flow during the development phase as the learners were quite keen on designing a coherent chatbot.

Table 2.

Conversation Design Strategies.

Category	Explanation	Example Utterances
User centeredness	This category of actions involves learners' attempts to consider a hypothetical Chatbot user of the Chatbot and their needs.	*Aghar phone kho gaya tho woh model poochenge phone ka.* If we lose our phone, they would ask us about the model of the phone.
Flow	This category of actions involves learners' attempts to ascertain a logical flow in the conversation that they design.	*Iske baad ye aayega na, intent?* Wouldn't this intent follow this one?
Language Structure	This category of actions involves learners' attempts to use appropriate language structures for the creation of intent data sets and their responses.	*Kaise bole? Can you give me the details?* How do we say it? Can you give me the details?
Context Awareness	This category of actions involves learners' attempts to address the contextualized needs of a hypothetical user of the Chatbot.	*Agar bandhe ka phone ghum ho gaya Begum Bazar me tho woh kaise bolega angrezi me?* How would a person say that he lost his phone in Begum Bazar in English?
Refinement	This category of actions involves learners' attempts to refine or reformulate the intent data set and its responses to improve the perceived quality of the interaction.	*Isse acha aise bolthe na?* Isn't it better if we say that instead?

Figure 1.

Frequency count of conversation design strategies used in communicating with peers
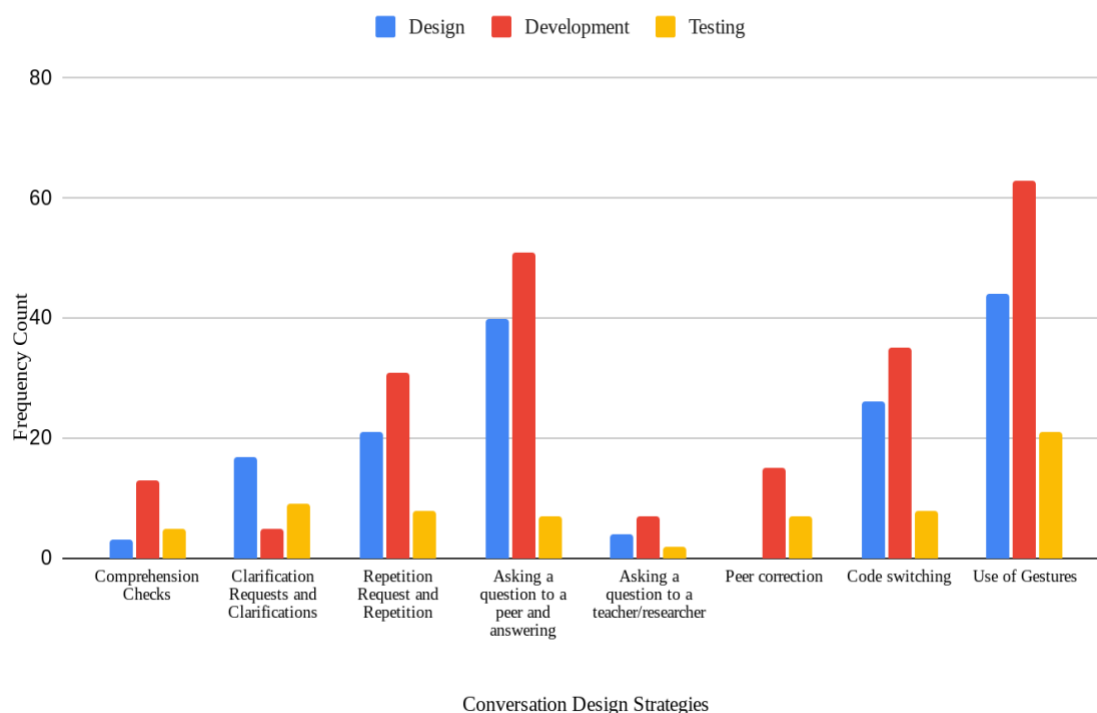
Figure 2.

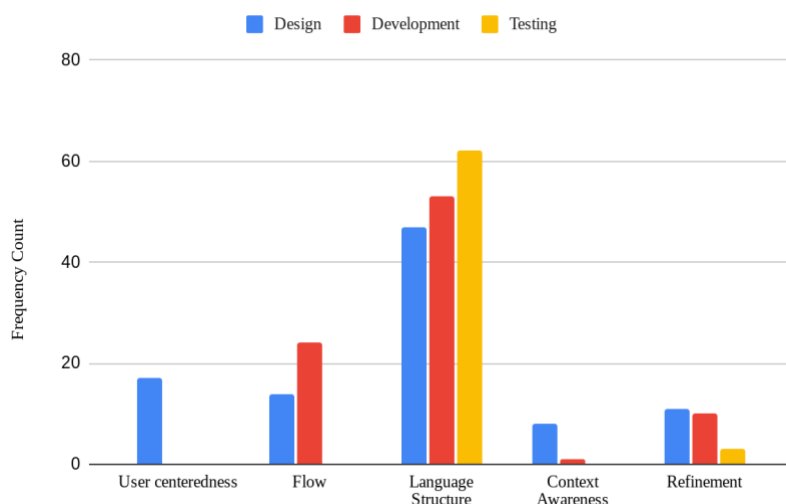Frequency count of Interactional strategies used in communicating with peers

Table 3.

Categories of Interactional Strategies Observed.

Category	Explanation	Example Utterances
Comprehension checks	These are statements or questions used to check if the interlocutor has been able to comprehend what was said earlier.	*Samjhe?* Did you understand?
Clarification Request and Clarifications	When the speaker is unable to understand something said earlier, they seek clarification from their peer, to which the peer responds by offering one.	*Aisa kyu karte?* Why would we do that? *Aise hi karti Didi[1] bhi.* Elder sister [researcher] does it the same way.
Repetition Request and Repetition	When the speaker is unable to understand something said earlier, they seek repetition of the same words spoken earlier to which the peer responds with a repetition.	*Phir se bhol, phir se bhol.* Say it again, say it again.
Asking a question to peer	This category consists of questions asked by the participant to a peer which is neither a clarification nor a repetition request. It is used to facilitate the completion of the task.	*Iske baad kya karna hai?* What should we do next?
Asking a question to the teacher/researcher	This category consists of questions asked by the participant to the researcher when the group required additional support.	*Ye chala gaya Didi[1], ab kya karen?* This has disappeared, elder sister [researcher], what do we do now?
Peer-correction	Offering a correction to something said earlier by a peer.	*Nahi, muje patha hai. Aise nai karte.* No, I know this. This is not how it is done.
Code-switching	Change from one language to another.	'I lost my phone' *matlab mera phone kho gaya* 'I lost my phone' means my phone went missing.
Use of Gestures	Non-verbal facial cues, hand gestures, and body movements used to convey meaning.	Hand movement while demonstrating the flow of the design.

Conclusion

This study has attempted to bring a novel way of bridging technology use and language learning by attempting to introduce learners to the practice of conversational user interface design. This preliminary study sheds light on various interactional strategies used by the learners to carry out the task as well as strategies employed to create the Chatbot. However, further research is required in this area, especially to improve learners' attention to context and user-centeredness. The task introduced here can be adapted and modified as per varying contexts to support the development of various interactional strategies and language skills.

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