Voice Assistant as a Modern Contrivance to Acquire Oral Fluency: An Acoustical and Computational Analysis

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Abstract

A number of methods have been experimented to improve fluency and accuracy of second language learners in English. In acquisition of fluency in oral communication, the second language learners have many obstacles such as lack of exposure and lack of opportunities. Focus on the skills targeted and individualization of attention are needed to accomplish the objectives. The objective of this article is to enable second language learners to gain fluency in English through the use of Voice Assistant in L2 classrooms. A number of Voice Assistants were experimented to find out the suitable application for the study. The study was carried out in a university in India to find out the effectiveness of Voice Assistant for enhancing fluency. The hypothesis was tested with forty students. Pre-test and post-test were conducted to find out the fluency level of the Experimental and the Control Groups through audio analysis. The data was analyzed to indicate the significance of the method. The progress of the learners experimented with Voice Assistant was most encouraging, and they found this method quite appropriate and easy too in acquisition of oral fluency.

Keywords: artificial intelligence, language learning, oral fluency, second language acquisition, voice assistant

1. Introduction

Oral fluency in English is one of the most essential skills for second language learners to get themselves engaged in academic, professional and social contexts (Rossiter., et al, 2010). Generally, in Second language (L2) classes, one's command over English is judged on his/her level of oral fluency. It is considered as an indication of one's wide exposure to language, and the impact that exposure makes to gain fluency has rightly been observed by one of the researchers (de Wolf, 2017). Learners endowed with fluency in oral communication face no obstacles or difficulties while delivering their thoughts and ideas, and fluency projects learners as effective communicators (Yang, 2014). It is the constant demand in the global market for good communicators that has resulted in a number of methods being experimented in English Language Teaching (ELT). In spite of various methods being applied, the L2 learners continue to face difficulties in acquisition and application of language skills (Shen, 2013). According to a study carried out by Derwing, Munro & Thomson (2008), there was no significant improvement in the fluency level of Second Language learners, notwithstanding the fact that they spent more than 25 hours in ESL classes per year. Thus, it could be understood that implementation of some appropriate method, besides wide exposure and practice, is the need of the hour. As far as development of skills is concerned, it could be more of training than of teaching. The role of teachers as facilitators and trainers in L2 classes is significant. However, individualization of instruction is not possible in the absence of the required 'Teacher-students' ratio.

Technology is an added advantage for the L2 leaners to achieve the targeted skills without much difficulty (Ahmad, 2016). Notably, Computer Assisted Language Learning (CALL) has gained wide attention in L2 classes, but it has not yet been updated much to fulfill the learners' requirements. One-way mode of instruction is being used in CALL as a medium of communication, but with lack of intelligence and natural language processing. There is no scope for inter-communication and interaction. A language teaching computational device should be interactive or dialogue-based (Kannan & Jayalaxmi,. 1995). One cannot acquire language skills by merely knowing the meanings of words and rules of language, but it is rather acquired by means of constant practice (Rahman, 2021). Learners need a computational device with the access to interact verbally and meaningfully as well, in order to have practice and communicate in a language. It is undeniable that language skills can be developed in a free and congenial atmosphere, and use of Voice Assistant (VA) through Artificial Intelligence (AI) facilitates acquisition of language skills in remarkable ways. Use of VA in L2 classes prompts learners to give instant responses too. It has also been observed by one of the researchers that speaking to AI actively engages learners in the process of communication (Underwood, 2017). Use of VA could be an appropriate aid for improving oral fluency, but its usage as a tool has not yet gained wide popularity.

Use of VA for enhancing oral fluency of L2 learners provides them opportunities to listen to speeches with natural accent and proper pronunciation. VA with AI technology has become very affordable (free on online stores). VA, with its affordability and easy access,

greatly contributes to high quality learning, and its application in countries like India will offer learners immense benefits in view of the fact that the number of language trainers is quite inadequate. It provides the access to speak different languages, and the number of languages spoken by VA is on a constant rise (Tsourakas, 2021). VA can be used as a tool for enhancing oral fluency of L2 learners. More research must be conducted to evaluate the use of VA in ESL classroom on the ground of technical advancements.

In language teaching-learning, VA is a new paradigm. Albeit considerable amount of research on implementation of VA in L2 classes, there is a lack of literature to interpret the use of VA from enhancing skills such as fluency, accuracy, pronunciation, vocabulary, phonology and pragmatics. This research paper makes an in-depth study on fluency by measuring its quantitative variables: Speech Rate (SR) and Utterance Length (UL). And this study could open gates for further research on the other neglected sub-skills of languages.

1.1 Research Hypothesis (Alternative)

Hypothesis (Ha1). Learners of the Experimental Group for whom VA was being taught had significant improvemnet in oral fluency compared to the Control Group experimented with the conventional methods of teaching.

1.2 Research Questions

RQ1: Is there any significant difference in the results between the Experimental Group and the Control Group in Speech Rate (SR)?

RQ2: Is there any significant difference in the results between the Experimental Group and the Control Group in Utterance Length (UL)?

2. Review of Literature

2.1 Theoretical Background

2.1.1 Voice Assistant

VA with AI is a smart digital assistant that uses Natural Language Processing (NLP) to communicate with the users via voice recognition and speech synthesis. Based on the commands made by the user, VA can provide relevant information. And it is integrated into many devices such as computers, mobile phones, tablets and laptops. “Voice control is the next evolution of human-machine interaction, thanks to advancements in cloud computing, AI and the Internet of Things (IoT)” (Terzopoulos & Satratzemi, 2020). The excessive use of mobile phone in the last ten years has led to use and popularity of Voice Assistants in smart devices such as Google Assistant, Apple’s Siri, Bixby and Amazon Alexa. Use of these VA based intelligent applications is on a constant rise. It is regarded by one of the researchers that use of VA will become inevitable in course of time, in the light of the excessive use of smart phones (Terzopoulos & Satratzemi, 2020). And unlike chatbots, it could not only display text on screen but also interact with users through voice support. And use of VA for enriching oral fluency, besides enabling learners to achieve the targeted skills, will pave way for further research to promote the process of communication. Many researches embedding VA with language teaching-learning have been carried out over the past years.

2.1.2 Oral Fluency

The word ‘fluency’ is derived from the Latin word ‘fluentem’ meaning ‘to flow’. The meaning of fluency differs from ‘perspectives of subjects from sociolinguistics to psycholinguistics’ (Quan, 2016). ‘Oral fluency’ has not attained global acknowledgement in terms of any standard definition. The oft-quoted definition is “Fluency is the ability to speak or write a language easily, well and quickly” (Cambridge Dictionary, 2022). In oral communication, ‘fluency’ is referred to as “the ability to produce spoken language without undue pausing or hesitation” (Quan, 2016). Oral fluency is defined by Rossiter et al. (2010) as a performance phenomenon that is related to “flow, continuity, automaticity, or smoothness of speech”. With various definitions, oral fluency has multiple assessment criteria. Most of the researchers have relied on temporal variables of fluency such as speech rate and utterance length to calculate oral fluency (Sandoval, n.d.) To encapsulate, oral fluency is the free and spontaneous flow of language naturally, while speaking.

2.2 Empirical Background

A research study carried out reveals the fact that the second language learners were able to understand Amazon echo (VA), and in return, their language, despite variations in their accent and pronunciation, could also be understood by the specified VA. The study included students with different first languages such as French, Mandarin, Arabic, Hindi, Tulu, Marathi and Gujarati. The paper suggested that the use of VA might considerably increase the willingness of L2 learners to enhance their language skills. However, the study threw light on the breakdowns that occurred out of thousand interactions between the specified VA and the learners, mainly due to mispronunciation of words. Nevertheless, as observed by Mousalli & Cardoso (2020), the pronunciation of learners could be corrected or perfected instantly by effective use of VA. Another researcher conducted an experimental study with seven boys and three girls, and it was observed that with the use of Google assistant, the involvement of students on the activities conducted had increased. The students were found involved in attempting and answering the questions, while using the specified VA. The results convey that this technological tool has added impeccable value to the learning process. The same study lists out the limitations and privacy concerns of VA; Voice assistance such as Google assistant, Amazon Alexa and Siri were not created with the sole intention of being used for educational purposes. When it is used as an educational tool, it might have some pernicious effects, if misused. In case of ethical and moral issues, its use for educational purposes may turn out to be perilous with its disadvantages, and hence it is advisable that these tools be used under supervision (Sing et al., 2019).

To ensure the communicative capability of VA, an experimental study was conducted with four university level students from Japan. Each participant interacted with Alexa (VA) for 20 minutes. After collecting and analyzing three sets of data, the results revealed the fact that

the specified VA had taken 50 percentage of learners' command accurately, whereas the result was at a high percentage of 90 when the comprehensive ability of VA was tested. The findings of the study demonstrated that the language learners consider Alexa a potential and useful tool for learning a language. The researcher has observed that there is a need for additional research in this field (Dizon, 2017). According to Dizon (2020), "Due to several reasons, including anxiety, lack of time, or more reluctance, students may not make the required efforts to interact with another speaker". In order to make them overcome the obstacles in learning process, a quasi-experimental study was conducted with a group of 10 for a duration of 10 weeks. The experiment laid stress on finding out the effectiveness of VA in language learning. On completion of the study, it was found out that VA had helped the Experimental Group gain more proficiency in second language learning than the Control Group. Meanwhile, the research suggested the need for future studies in VA and its effective application for acquiring language skills. A similar study found out that 67.55% of students were willing to use a specified VA and around 40.61% of students were said to have viewed that the VA retains the attention of the users and stimulates their imagination. The study asserted that the uniqueness of an intelligent VA is its ability to converse in natural language using NLP (Babic, 2018). VA such as Alexa has been used as an e-learning tool to support different language needs which resulted positively with an improvement of 10% (Zhao et al., 2020). Another researcher conducted a study in Thailand with 275 users comprising both native and non-native speakers of English to test the effectiveness of VA. The study showed no significant difference between the two groups, and it was a positive outcome for the second language learners in using VA. Though there was no significant change in the results of the usability of VA, it was observed that the native speakers had more satisfaction than the non-native speakers, especially, when the user was involved in a dialogue-based scenario.

Various studies across the world are being conducted on incorporating VA such as Amazon Alexa, Google Assistant, Siri, Cortana and Bixby into language teaching and learning. Albeit variance in applications, the researchers mention similar limitations such as words uttered being misunderstood, limited support of other language, inability to distinguish between multiple voices, repetition when not understood, and privacy concerns (Pal et al., 2019). Besides, its influence upon students at various levels is being tested. According to a study carried out by a researcher on the relationship between VA and children aged between 6 and 10 years revealed the fact that children are quite playful during the interactions with their (intelligent) machine, but excited over its use (Festerling & Siraj, 2020). Research was also conducted with the middle and the high school students to study their perceptions towards VA's 'intelligence, friendliness, aliveness, safeness, trustworthiness, human likeness, and feeling of closeness' and the result was similar to that of the previous one mentioned. Students felt that the specified VA (Alexa) was more intelligent than what they assumed it to be, and they started to feel closer to Alexa (Van Brummelen et al., 2021). After in-depth review of literature, another researcher has said in his article that VA can be used as an instructional tool that can be used according to individual requirements of learners. The paper delves into the usage of AI tutors in some educational institutions in various forms (Incerti, 2017). With much research in the field of Applied Linguistics using VA as a tool for language acquisition and its correlation to major language skills, the sub-skills of language have not been much focused on. This paper aims at bringing out the effectiveness of VA for acquiring oral fluency, one of the sub-skills of speaking.

2.3 Review of Voice Assistants

2.3.1 Enhancement of Oral Fluency and the Requirements

There are several methods to enhance learners' oral fluency, but a wide exposure to language through suitable environment, language tools or trainers over a period of time would make the whole process swift and purposeful (Derwing et al., 2008). The language tool used for the purpose needs to be an efficient conversational agent to serve as a partner. There are some requirements to ensure the productivity of the tools being used. One of the research objectives of the study is to find out the application that meets the requirements.

2.3.2 Identification of Voice Assistants on Playstore

Android's Playstore was opted for instead of Apple's App store because of the number of Android users in the world and the market it holds. Playstore is the official application purchase bank of Android. It, thus, contains a number of Voice Assistants. Apps that topped through search engine optimization when typed 'Voice Assistant' were filtered, as it had high chances of getting more views and downloads. Among the selected apps, VA with more than 500,000 downloads was chosen for test. The selected apps were again filtered on the basis of their ability, affordability, availability of NLP and compatibility in order to identify the best app that could be used as a language learning app. Table 1 contains 34 applications that were filtered based on their downloads.

Table 1. Shortlisted Voice Assistants on Playstore

S.NO	APPS	S.NO	APPS
1.	Google Assistant	18.	Voice Search Assistant: Personal Assistant
2.	Amazon Alexa	19.	Jarvis Artificial Intelligent Personal Assistant
3.	Robin – AI Voice Assistant	20.	Auto Voice (Joaomged)
4.	Qualcomm Voice Assist	21.	Voice Search (Raspberry tool)
5.	Voice Call Dialer	22.	Voice Call Dialer – speak to call
6.	Extreme – Personal Voice Assistant	23.	Alex for Alexa app
7.	Vani Dialer – Answer calls by your voice	24.	Rafiq Arabic Ritual Assistant
8.	Voice Search -Speak to text searching Assistant	25.	Voice Search (V.K.D)
9.	ELSA speak: English Learning App	26.	Best Voice Search (V.K.D)
10.	Voice Search – Fast Engine, Voice Assistant (UX apps)	27.	Laura (Tilde Global)
11.	Voice Access (Google LLC)	28.	Let Your Mobile Speak!
12.	Ultimate Alexa	29.	Voice Answer Lite (Sparkling apps)
13.	My Assistant (Heaveen)	30.	Home Assistant (Home Assistant)
14.	Voice Search (Preeti Devi)	31.	Voice Search Ask (RMapps.980)
15.	Voice Search Assistant 2019 (Apps den)	32.	IELTS speaking Assistant
16.	Assistant Trigger (AirPods battery and more)	33.	Voice Dialer (Happy Apps House)
17.	Sirius – Assistente Virtual	34.	Replika: My AI Friend

2.3.3 Requisite Features in Voice Assistants for Language Learning

A VA should be able to uphold and maintain certain requirements indispensable for learning a language. Thus, every app was individually tested by the researcher to find out the user friendliness, ability and capability of the app. The intelligent VA should have a good history of regular updates, and must be popular among the people so as to be accessed through the ratings and number of downloads that it has. Concurrently, the user-experience, friendliness, and review of the app will be taken through the ratings provided by the reviewers of the app. The needed features and requirements of an app to assist the language learning classrooms are (1) Artificial Intelligence (figure 1), (2) free of charge, (3) Million plus downloads on Playstore, (4) Four plus ratings on Playstore, (5) Review of Literature, (6) Voice Support (Voice recognition and Voice synthesis), (7) Accessibility, (8) NLP (Natural Language Processing).

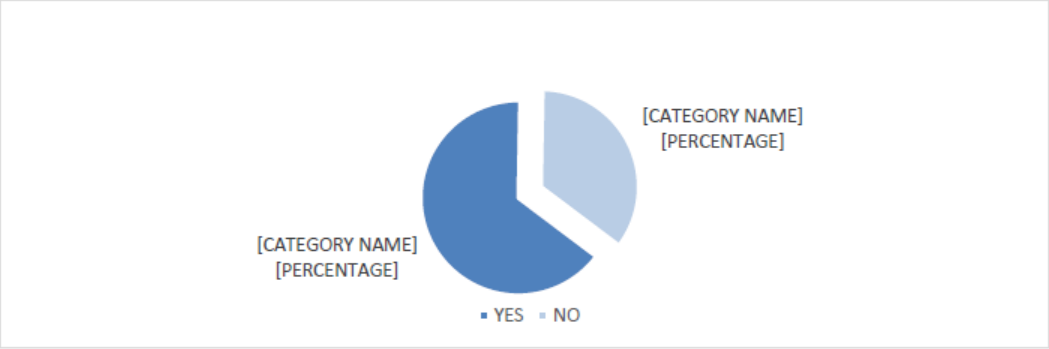

Figure 1. Number of apps with Artificial Intelligence

The VA that is to be selected should be built upon AI rather than on pre-set data. In figure 1, 35% of the apps that were embedded with AI are represented through a pie-chart. Rest of the apps which fall under the other 65% were not empowered with AI and so the usage of these non-AI apps in ESL classrooms may not yield the expected outcome. Its addition is crucial to implement the suggested idea. The quality of the apps was accessed through users review and ratings. Ratings of the apps were collected from Playstore intending to filter the apps of disrepute among the users. Ratings and reviews (figure 2) enabled the researcher to know the user-experience, friendliness, and feedback about the particular app, but certain apps with a few hundred downloads and good ratings were neglected for their being used and reviewed by a very limited number of people.

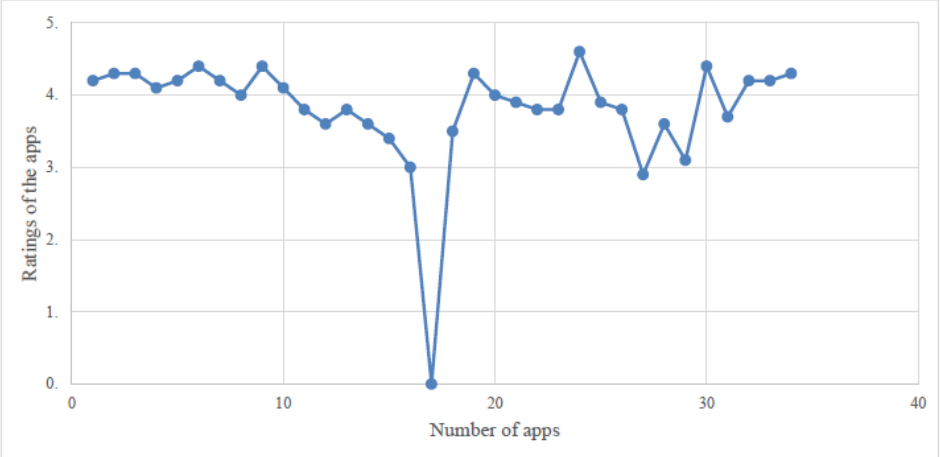

Figure 2. Ratings of the identified apps

Figure 2 represents the number of apps and the ratings that it holds in Playstore. The vertical line denotes the ratings of the apps on a scale of five and the horizontal line denotes the apps. Most of the identified apps were rated above average. Apps that had got four plus ratings by the user were selected to filter the apps which the users found less satisfactory.

To measure and evaluate the availability of features in apps, each app was downloaded and tested individually. In figure 3, the number of apps with the specified features has been presented. It depicts that the number of apps that have the potential is a very few. Out of 34, only 10 apps have Natural Language Processing (the base for natural conversation). Most of the apps with voice support had only Voice Recognition, but with no computations of NLP or AI.

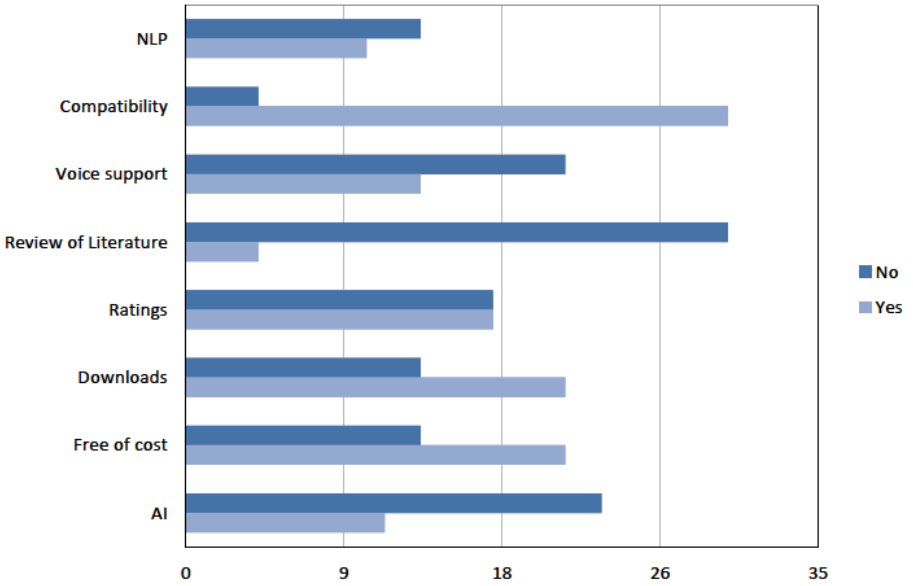

Figure 3. Features available on the shortlisted apps

Most of the apps that were identified did not have the required features. Nevertheless, many apps did not perform according to the description mentioned on Playstore. On a scale of 8, only four apps have more than six features. The four apps with most number of features are Google Assistant, Amazon Alexa, Robin AI- Voice Assistant and Replika: My AI Friend. Many studies that were conducted previously support the usage of two apps; Google Assistant and Amazon Alexa. Through review and analysis of many VA, it has been found out that Google Assistant and Amazon Alexa are the two apps in possession of all the required features.

3. Methodology

3.1 Participants

As Research Assistant (RA) in English of a University in India, the researcher carried out the study in the class assigned with a strength of

54 students of 1st year engineering students. Of 54 students, 40 students (Male: n= 22 and Female: n=18) were involved in the study on the basis of their comprehensive ability in English. They were then randomly categorized into two groups; the Experimental following the Voice Assistant-based language teaching, technological approach (n=20) and the Control following the traditional methods (text based activities) of language teaching, conventional approach (n=20). These students had enrolled for an eight-week course offered in English during Winter Semester 2022 with each class for a duration of 90 minutes per week.

3.2 Research Design

The experimental research design (Figure 4) was intended to statistically prove the significance of the study and the difference in performance between the Experimental and the Control Groups. The oral fluency level of the Experimental and the Control Groups was carefully evaluated through acoustical and coding computations, and it was manually rechecked too in order to avoid any computational errors. The statistical difference between the two groups in the results obtained through evaluation determined the effectiveness of VA on oral fluency and the development in the fluency levels through conventional approach.

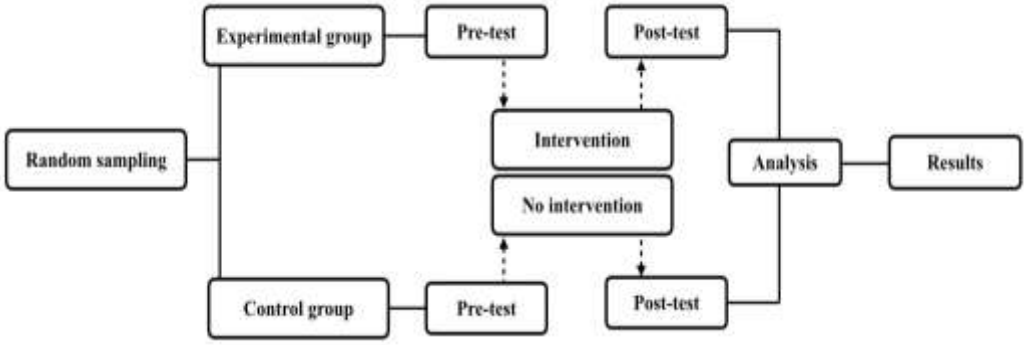

Figure 4. The Experimental Research Design

3.3 Instrumentation

Instructions on the usage of VA (Google Assistant) were given to the students involved in the study, besides a brief introduction on Google Classroom: an app that was used to collect and keep record of the progress of the participants' on the prescribed activities and to ensure that they have worked on VA. Only the 'Teacher's Portal' had access to all the students' information of the work progress. In order to collect the primary data, IPad's 'Voice recorder' app was used. The primary data (audios) collected was transcribed manually into text. The texts were loaded into a python code (appendix 1) that identifies the number of syllabus and the number of words in the given string. The primary texts were then fed into PRAAT software to acoustically analyze the number of runs (pauses, hesitations, filler words) in the speech.

3.4 Research Procedure

The primary data were collected as audio recordings. The purpose of collecting audio samples was to evaluate the learners' oral fluency in English. The Experimental Group (EG) followed the activities designed for language acquisition through VA and the Control Group (CG) followed the conventional method of teaching. Both the groups followed two different approaches to language learning for a duration of eight weeks. The work progress of the students was constantly monitored through 'Google classroom'. On completion of the course, a post-test was conducted for the Experimental and the Control Groups.

3.5 Data Collection

Quantitative data analysis was used to statistically analyze and measure the oral fluency level of the students trained through VA and the conventional method respectively. BBC measures were used to extract the numeric data from the collected audio samples; Speech Rate (SR) and Utterance Length (UL) are the temporal variables through which oral fluency can be measured (Sandoval, 2022). Participants were asked to fill a questionnaire via google forms before pre-test through which the researchers collected details such as age, gender, medium of instruction (English; n=40) and course opted for by the participants.

Pre-test and Post-test were designed based on IELTS speaking test to evaluate oral fluency. Test takers were given flash cards which instructed them to talk on a particular topic (How Are Your IELTS Speaking Scores Calculated? | IDP IELTS, n.d.). One minute was the time given to the students for preparation to speak for one minute. The SR and UL for the quantitative analysis were extracted from the audio samples of the individuals.

3.6 Variables

In this study, the researcher evaluated the impact of an independent variable (Voice Assistant) on a dependent variable (Oral fluency).

3.7 Oral Fluency Measures

According to BBC, two of the most reliable factors for measuring oral fluency are 'speech rate' and 'utterance length' (Sandoval, 2022). The temporal variables used for the study were also adopted from De Jong and Perfetti (2011). Speech rate can be measured through

identifying the amount of language produced over time. 'Syllables Per Minute' (SPM) was calculated to measure SR. Utterance length was measured by identifying the number of disfluencies and hesitations during continuous sounds.

Speech Rate (SR) is calculated by counting the total number of syllables produced over the time and dividing it by the duration (minutes) of the speech. The speech was transcribed into text manually. As shown in figure 5, the manually transcribed text was loaded into a python code given in appendix 1. To ensure the reliability of the results through python, the researcher manually cross-checked the syllable dictionary.

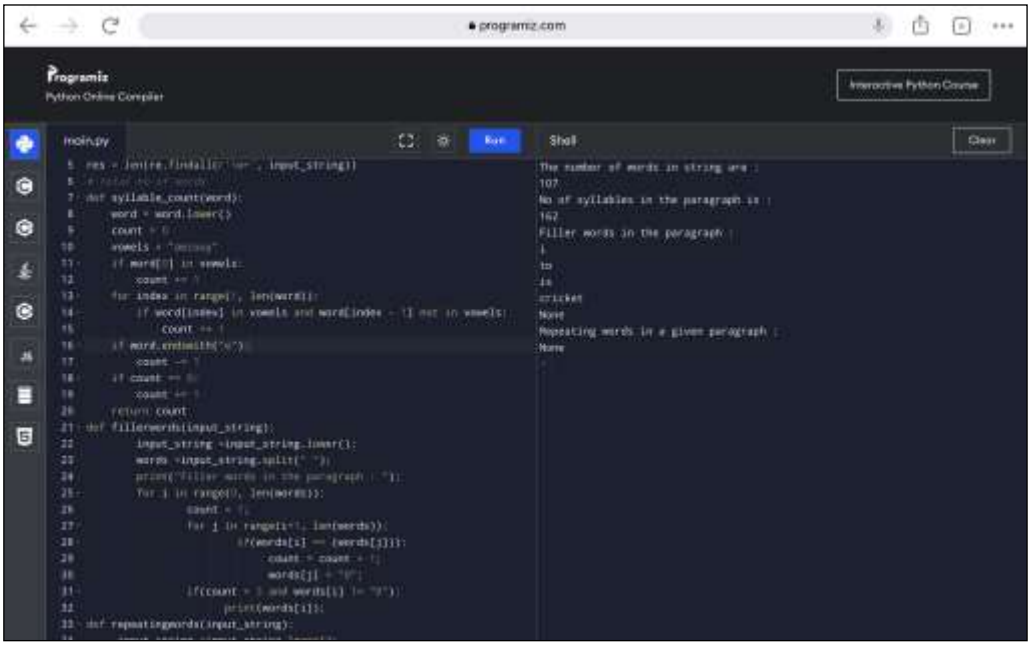

Figure 5. Python code used to identify the number of syllabus

Utterance Length (UL) is calculated by dividing the total number of syllables by the total number of pauses and hesitations (silences). Filled pauses (e.g. 'um', 'ah', 'mm') and unfilled pauses of 0.3 seconds or more were considered pauses or hesitations (Towell et al., 1996).

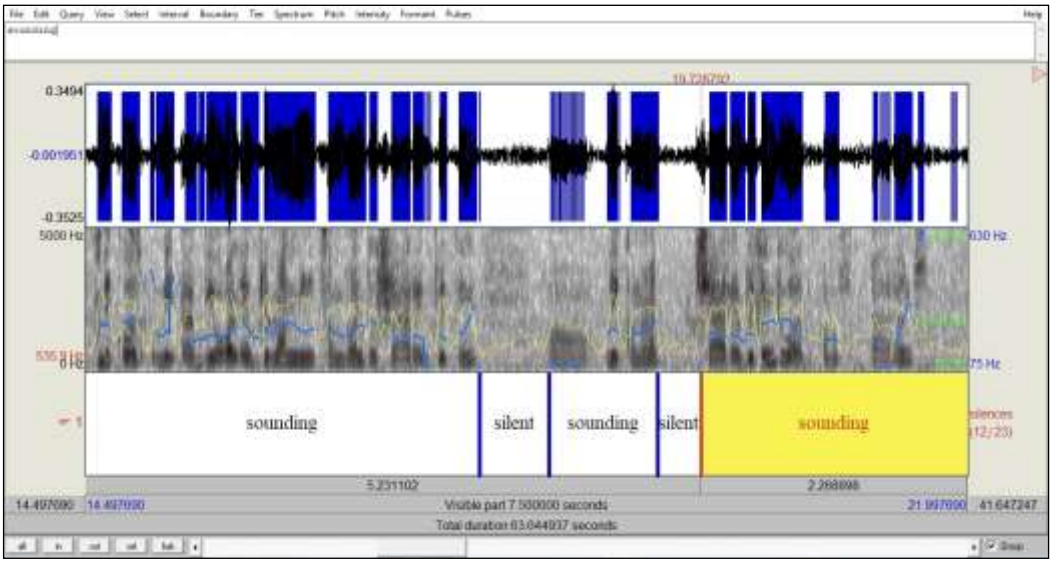

Figure 6. Automatic identification of silences through PRAAT Script (Tier 1)

All the collected audio samples were acoustically analyzed using De Jong and Wempe's (2009) PRAAT script. The PRAAT script automatically identified all unfilled pauses. The timeframe of pauses was set to 0.3 seconds and the sound altitude was set according to the acoustics of the room and the disruptions in the audio samples. A default of audio altitude below 20dB was set to identify and mark the portions as 'silent'. As given in figure 6, the audio samples were again aurally and visually looked over before the results were

analyzed.

4. Data Analysis

The research used descriptive data analysis to analyze the quantitative data collected from SR and UL of both the Experimental and the Control Groups. A normality test was conducted before hypotheses testing to verify the normality of data. Then, to find out the impact of the said method, a two-tailed paired t-test for dependent samples was conducted to measure the difference in pre and post-tests of SR and UL. One-way ANOVA (Welch's) was taken to investigate the variations of different levels on the dependent variables. The tools that were used to statistically analyze the collected data were DATATAB (DATAtab Team, 2022)and SPSS.

Table 2. Test for normal distribution of Speech Rate (SR) and Utterance Length (UL)

		Statistics	p
SR	Kolmogorov-Smirnov	0.11	0.707
UL	Kolmogorov-Smirnov	0.15	0.274

The normality test based on Kolmogorov-Smirnov interprets that the p-value above (0.05) signifies that the data has been normally distributed. The distribution is more likely to be normal in Kolmogorov-Smirnov interpretation, when the difference between the maximum is at the minimum. As given in table 4, the normality test of SR resulted with a p-value of (0.707) and UL with a p-value of (0.274). In both SR and UL, the p-value (.707 > .05; .274 > .05) is interpreted to be distributed normally.

5. Results

5.1 Analysis of RQ1

Is there any significant difference in the results between the Experimental Group and the Control Group in the Speech Rate (SR)?

Table 3. Descriptive statistics of t-test for paired samples (SR)

	N	Mean	Std.Deviation	Std.Error Mean
Pre-test SR	40	113.63	20.31	3.21
Post-test SR	40	129.65	17.7	2.8

The Pre-test SR's mean value was lower (M = 113.63, SD =20.31) than the mean value of the Post-test SR (M = 129.65, SD =17.7). The growth in the mean value is proportional to the overall improvement in the SR of the participants.

Table 4. T-test for Paired samples of SR

	t	df	P(2-tailed)	Lower limit	Upper limit
Pre-test SR – Post-test SR	-8.39	39	<.001	-19.89	-12.16

A t-test for dependent samples showed that the difference between pre and post-tests SR was statistically significant, t(39) = -8.39, p = <.001, 95% Confidence interval [-19.89, -12.16]. The p-value of the hypothesis testing was (0.05 < .001), indicating that there is a significant improvement in the SR of the post-test from the pre-test. Therefore, the null hypothesis is rejected, and the alternative hypothesis has been accepted.

Table 5. Group Descriptive (One-way ANOVA)

	Group	*N*	Mean	Std.Deviation	Std.Error Mean
Pre-test SR	Experimental	20	136	15.8	3.54
	Control	20	123	17.3	3.88
Post-test SR	Experimental	20	111	22.1	4.95
	Control	20	116	18.6	4.16

A two-factor analysis of variance with repeated measurement was made to test whether there was a significant difference between the groups of the Control group "Pre-test SR and Post-test SR" (repeated measures) with respect to the experimental group. A significant difference was found between the pre and post text of the experimental group. However, there was no significant difference between the pre and post-test of Control group.

Table 6. One-way ANOVA (Welch's)

	F	df1	df2	p
Pre-test SR	6.322	1	37.7	0.016
Post-test SR	0.518	1	36.9	0.467

"Pre-test SR and Post-test SR " in relation to the dependent variable, p=.476, and an interaction between the two variables Group and "Pre test SR and Post test SR " in relation to the dependent variable, p=<.001. Therefore, there was no significant difference between the pre-test of both the Experimental and Control Groups. However, there is a significant difference between the Experimental and Control Groups in the post-tests (figure 7) .

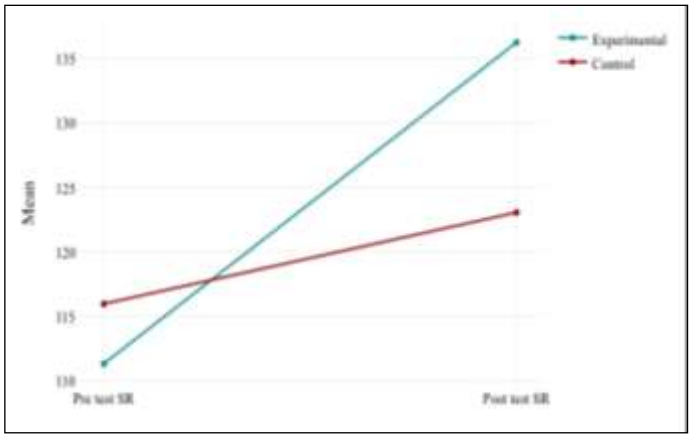

Figure 7. Pre and Post-test SR of the Experimental and the Control Groups

5.2 Analysis of RQ2

Is there any significant difference in the results between the Experimental Group and the Control Group in the Utterance Length (UL)?

Table 7. Descriptive statistics of t-test for paired samples (UL)

	N	Mean	Std.Deviation	Std.Error Mean
Pre-test UL	40	2.71	0.56	0.09
Post-test UL	40	3.34	0.58	0.09

The Pre-test UL's mean value was lower (M = 2.71, SD =0.56) than the mean value of the Post-test UL (M = 3.34, SD =0.58). The growth in the mean value is proportional to the overall improvement in the UL of the participants.

Table 8. T-test for Paired samples of UL

	t	df	P(2-tailed)	Lower limit	Upper limit
Pre-test UL – Post-test UL	-8.44	39	<.001	-0.79	-0.48

A t-test for dependent samples showed that there was a significant difference, if calculated statistically among the pre and post-tests of UL, t(39) = -8.44, p = <.001, 95% Confidence interval [-0.79, -0.48]. This results in a p-value of <.001 , which is below (0.05) the required p value for significance. The t-test result of post test is, therefore, significant when compared to the result of the pre-test and thus the null hypothesis is rejected. Thus, the alternative hypothesis has been accepted.

Table 9. Group Descriptive (One-way ANOVA)

	Group	*N*	Mean	Std.Deviation	Std.Error Mean
Pre-test UL	Experimental	20	2.62	0.566	0.127
	Control	20	2.79	0.561	0.125
Post-test UL	Experimental	20	3.57	0.581	0.130
	Control	20	3.12	0.508	0.114

A two-factor analysis of variance with repeated measurement was made to test whether there was a significant difference between pre and post-tests UL (repeated measures) of the Control Group with respect to the pre and post-tests of the Experimental Group. A significant difference was found between the pre and post-tests of the Experimental Group. However, there was no significant difference between the pre and post-tests conducted for the Control Group.

Table 10. One-way ANOVA (Welch's)

	F	df1	df2	p
Pre-test UL	0.933	1	38.0	0.340
Post-test UL	6.715	1	37.3	0.014

"Pre-test UL and Post-test UL " in relation to the dependent variable, p=.340, and an interaction between the two variables Group and "Pre-test UL and Post-test UL " in relation to the dependent variable, p=<.001. Therefore, there was no significant difference between the pre-test of both the Experimental and Control Groups. However, there is a significant difference between the Experimental and the Control Groups in the post-tests (figure 8) .

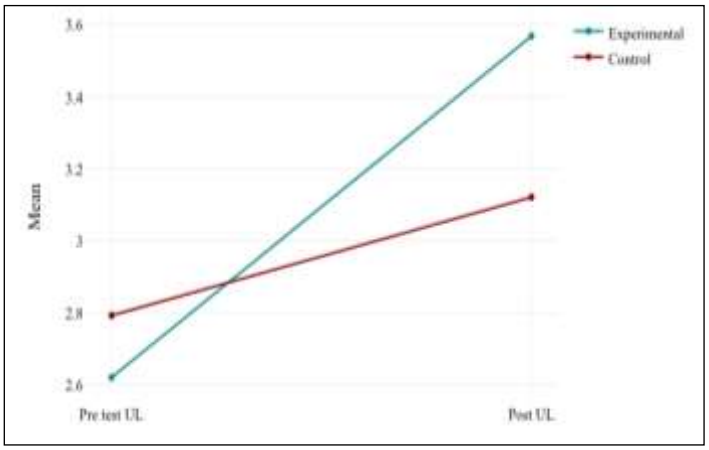

Figure 8. Pre and Post-test UL of the Experimental and the Control Groups

6. Discussions

The statistical analysis of SR and UL reveals the fact that the use of Voice Assistant in language classrooms has proved to be effective in L2 classrooms. The mean value of SR has increased from (M=113.63) to (M=129.65). The significance of the improvement was further supported with the p value of (<.001). The learners who could produce an average of 113 syllables per second were able to produce 129 syllables per minute in the experimental group, whereas the students of the Control Group had a slight improvement from (M=116) to (M=123). Like SR, the UL of the participants also had a significant improvement in the Experimental Group (M = 2.71 to M= 3.34) when compared to the Control Group (M=2.79 to M=3.12). The significant improvement in both the temporal variables of measuring oral fluency signifies the overall improvement in the fluency of the participants of the Experimental Group. The results of both SR and UL signifies that the null hypothesis (H01) has been rejected and alternative hypothesis (Ha1) has been accepted. The learners were able to effectively communicate with a machine through natural language. The outcome of the research can also be attributed to the extended use of VA by the learners in and outside classrooms. Apart from language learning, VA provided the learners with the required data, and it acted as a personal assistant as well. With these benefits, the researcher was able to monitor the learners' interaction with the machine accurately through the record of their interactions with the VA which were instantly saved to the cloud. The implication of VA had its own limitations. Though VA has evolved enough to ape humans, it has not reached the level of replacing humans (teachers/ facilitators) in language classrooms. For instance, VA could not make out the meaning of an ambiguous sentence, which a human could do. To resolve this, some researchers suggest ways of bringing the teachers and the AI together (Marks, 2019). The implementations to be made through language tools in L2 classrooms should be pre-planned and well-executed. Either by using the suggested application (Google Assistant and Amazon Alexa) or other efficient applications, the researchers in future could help the L2 learners enhance their language skills.

7. Conclusion

The study briefs about the importance of fluency in oral communication and the need to acquire it. The study tested its hypothesis to enhance oral fluency of the learners by incorporating one of the most advanced tools of the technological arena. Among multiple applications of digital tools, the research aimed to identify the most appropriate VA for learning a language and to test its effectiveness in acquiring oral fluency. With identification of the required features and through filtration, it was ascertained that Google Assistant was the most suitable application for learning a language. The overall outcome of the research experiment which includes conduct of tests, evaluation and statistical analysis bears testimony to the fact that the specified VA is an effective and appropriate tool for enhancing oral fluency of L2 learners. There is a commendable improvement in the speech rate and utterance length of learners, reflecting their overall fluency levels. It was also observed that VA enhances the ability of the learners to comprehend and understand the second language. Betterment in pronunciation was further observed among the participants. This paper has its focus only on oral fluency, but VA could be used to develop other language skills. The observation of improvement in a sub-skill could initiate the researchers to work on all other major skills and on the overall aspects of speaking. Unlike computer labs in language classrooms, applications that are used via smart phones are easily accessible and they provide learners with ample opportunities to learn and engage in the targeted language. Further researches could be carried out on the integration of AI-based technological tools such as Chatbots, Virtual Assistants, Intelligent robots in ESL/EFL classrooms.

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Appendix A

```
# Online Python compiler (interpreter) to run Python online.
# Write Python 3 code in this online editor and run it.
import re
input_string = "Enter the given string in this box"
res = len(re.findall(r'\w+', input_string))
# total no of words
def syllable_count(word):
    word = word.lower()
    count = 0
    vowels = "aeiouy"
    if word[0] in vowels:
        count += 1
    for index in range(1, len(word)):
        if word[index] in vowels and word[index - 1] not in vowels:
            count += 1
    if word.endswith("e"):
        count -= 1
    if count == 0:
        count += 1
    return count
def fillerwords(input_string):
        input_string =input_string.lower();
        words =input_string.split(" ");
        print("Filler words in the paragraph : ");
        for i in range(0, len(words)):
                count = 1;
                for j in range(i+1, len(words)):
                        if(words[i] == (words[j])):
                                count = count + 1;
                                words[j] = "0";
                if(count > 3 and words[i] != "0"):
                        print(words[i]);
def repeatingwords(input_string):
    input_string =input_string.lower();
    words =input_string.split(" ");
    print("Repeating words in a given paragraph : ");
```

```
    for i in range(0,len(words)-2,3):
        if((words[i] == words[i+1]) and (words[i+1] == words[i+2])):
            print(words[i])
print("The number of words in string are : ")
print(str(res))
print("No of syllables in the paragraph is : ")
print(syllable_count(input_string))
print(fillerwords(input_string))
print(repeatingwords(input_string))
```

Appendix B

Table 11. Activties conducted

S.No	Activities
1	Google Assistant as a Dictionary
2	Google Assistant as a translator
3	Idiom translation
4	Check your pronunciation
5	Personal Interaction
6	Teach me English
7	Interpreter mode
8	Imitate the Assistant
9	Sentence Formation
10	Information Gathering

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