

Cloud Implementation to Assist Teachers of English to Speakers of Other Languages in HEI's in Sultanate of Oman

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Abstract

Cloud Computing has been implemented in diverse fields and sector, including education sector with a very good success rate. The cloud deployments enhance the learning experience and provisions appropriate IT resources critical for a specific learning environment. This research study exploits a service model to deliver appropriate learning resources to foundation students and teachers that otherwise is not available with the current cloud service architectures. Language should not be a barrier to learning, teaching subjects in English to those who are not native English speakers, most of the times is a challenging job especially in circumstances where the English Language is introduced late in the school academic curriculum. There are several challenges faced by students, and teachers. Several mechanisms have been suggested and adopted to deal with such situations so that student learning experience is not affected in a significant manner, and at the same time, teachers are also not facing problems while explaining concepts or topics to students. This research paper is a study on helping teachers and students in these situations by providing cloud-based knowledge base related to TESOL (*Teachers of English to Speakers of Other Languages*), repositories, and apps that may help and assist teacher and students.

Keywords: Language Cloud, cloud for English, TESOL Cloud, L_raaS, LangHelpCloud, cloud for HEI's, Cloud for Education.

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1. Introduction

Cloud computing has been utilized for past several years in various implementations to yield tangible and non-tangible benefits that are significant and revolutionary. Cloud computing has undoubtedly played a vital role in the past several years for Information Technology evolution and has contributed positively in the expansion and modernization of IT infrastructure and services. Cloud computing has been implemented in higher education institutions (A.González-Martínez, L.Bote-Lorenzo, EduardoGómez-Sánchez, & Cano-Parra, 2015) as well to yield benefits. Several models and service architectures proposed for higher education institutes to provide appropriate cloud services as per the specific requirements of higher education institutions (Bhat, Singh, & Singh, 2017). Cloud computing has undoubtedly offered economic benefits to higher education institutions however, higher education institutions have also faced certain hurdles economically to adopt cloud computing (Zameer, Pandow, & Singh, Economic hurdle for implementation of cloud computing in higher education in Sultanate of Oman, 2017). Cloud computing yet has played a significant role in assisting higher education and provide technological aids and tools beneficial for variety of circumstances, subjects, delivering teaching & learning support technologies to both students and teachers and other significant aspects of higher education. Cloud computing has overall contributed in higher education however; we have also witnessed some specific implementations of cloud computing for particular subjects for the benefit of the faculty member to deliver in an efficient manner as well as to student for better comprehension of concepts (Naidu, Bhat, & Singh, 2019) (Zameer, Naidu, & Singh, Emerging Trends in Expert Applications and Security, 2019). Cloud computing also, referred to as on-demand computing which provides computing resources as services like any other utility service however, it has gone through various moderations and modifications from past several years to find its implementation in broad spectrum of fields and areas and education sector, especially the higher education has undoubtedly gained a lot from cloud implementations. Cloud computing can be utilized for providing essential teaching and learning resources to students and faculty members of English especially it may be doubly beneficial with non-native speakers of English Language. The non-native speakers do have certain limitations as far as Language command and understanding are concerned; however, Language should not become a barrier to learning. This research takes into consideration the needs of students and faculty members of English and it takes their feedback and responses as an input to enhancement and delivery of cloud services, which may significantly benefit students as well as teachers through the teaching and learning process. The research study is conducted in phases or stages, stage 1 takes the responses of students and analyzes the responses to extract the requirements of students and faculty members and tries to understand the resources that can be beneficial for students and faculty members which may leverage from a cloud service specific for English learners and tutors. Stage 2 consists of the service framework of the cloud that may deliver the expected benefits to overcome and decrease the hindrances of the learning process and to enhance the learning experience. Stage 3 will consist of the feedback which may be collected from the users (both students and teachers) of the cloud who have availed the services to check the efficiency and appropriateness of the framework for students and teachers of English primarily non-native speakers. Stage 3 will also provide us clear indications of the future scope and enhancements that can take place to the framework with the current limitations. The three-stage approach would be beneficial for the future enhancement of the services as well.

2. Literature Review

There is a considerable research done in the past to check the appropriateness of cloud service architectures and their deployment in diverse fields. Several cloud architecture have been proposed in the past considering the specific organizational requirement and situations. Cloud computing offers three basic service architectures (Mell & Grance, 2011) which are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). There are several other cloud service architectures that have been proposed by the researchers in the past related to various cloud services for specific requirements of a particular organization. There is clear evidence from the literature that variety of service models have been proposed to meet the specific requirements of a particular organization or group of organizations belonging to a particular field or area of expertise. Some of the service models that have been proposed by researchers are Robot as a Service in cloud computing (Chen, Du, & M. García-Acosta, 2010), Communication as a Service for VANET (Garai, Rekhis, & Boudriga, 2015), everything as a Service (Duan, et al., 2015) and Learning Resources as a Service (Bhat, Singh, & Singh, 2017). These proposed service models have enabled different perception of cloud service that can be provisioned based on the specific requirements of organization or situation. Some of the research work that has been conducted in the past to avail discrete service architecture for delivery of specific cloud services are (Bhat, Kameshwari, & Singh, 2020) which is related to the deployment of MathCloud meeting specific requirements of certain academic fraternity, a similar study has been conducted by Alexander et al., for MathCloud platform which enables wide-scale sharing, publication and reuse of scientific applications as RESTful web services. A unified interface of computational web service based on the REST architectural style is proposed (Afanasiev, Sukhoroslov, & Voloshinov, 2013). Few more examples of implementation-specific to different subject areas is also seen (Zameer, Naidu, & Singh, Emerging Trends in Expert Applications and Security, 2019). There are several studies that have been conducted to provide a specific cloud environment suitable for a specific situation and user groups based on their requirements, especially in higher education institutions where we have diverse characteristics of users who may seek entirely different cloud services that may be based on the subject area. Therefore deployment of a unique service architecture that can yield specific services beneficial for a particular group of users. In a similar manner even apart from implementations that are in the industry may have specific requirements and service that needs to be provisioned to the users can be provided with a discrete deployment of cloud services as indicated with the studies above. There are various studies that have been conducted by researchers in the past related to service models and the need for improvisation and conception of new service models apart from basic cloud service models which are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). The deployment of the service models will result in the provisioning of services that may not be directly possible with the basic cloud service models.

3. Methods

Stage 1 collecting responses and analyzing data

This section consists of the questionnaire given to various students and teachers of the English Language in a higher education institution who belonged to different levels in the foundation program. The questionnaire was designed to reflect the individual aspirations of students and teachers for access to specific kinds of resources, which may enhance the teaching and learning experience in an effective manner. The questionnaire was given to faculty members and students

of English courses, and approximately 59 respondents provided information for five different aspects of resources that are currently available to them in terms of IT infrastructure. The inputs were based on the Likert Scale from 1-5 with values ranging from Strongly Agree-Strongly Disagree. The results of the data that was analyzed using SPSS is shown below with a table and diagrams.

Table 1. *Statistics of Questionnaire*

Statistics						
		Current IT infrastructure is providing sufficient feature for Language Students and Teachers, and no further improvisation is desired	Existing Infrastructure is appropriate and facilitates Flipped teaching and learning in English Language courses	The IT resources provide Artificial Experience by providing database resources and experiences of senior faculty members in the English Language	Current Infrastructure is appropriate and facilitates the features of Virtual Reality and Augmented Reality to enhance the learning experience in Language courses	Existing Infrastructure effectively provides access to the latest applications and tools that are available for assistance in Language courses for Improving the learning experience
N	Valid	59	59	59	59	59
	Missing	0	0	0	0	0
Mean		1.75	1.81	1.76	1.58	1.80
Maximum		3	3	3	3	3

Table.1 provides comprehensive statistics of the questions that were provided to the respondents as a part of the questionnaire. The statistics reveal that on a Likert Scale, the results are not so convincing as the mean of all the questions is less than or equal to 1.81, and the maximum value that has been recorded in any of the questions posed is 3. This implies that all the respondents either strongly disagree or disagree with the problems that have been posed, with some of them being neutral. There are no respondents out of 59 who strongly agree or agree to the questions. This provides a sense of understanding that mostly the academic fraternity in English Language courses collectively believe that the infrastructure provided currently is not sufficient and appropriate. The individual question response is depicted with the bar chart shown below for each question.

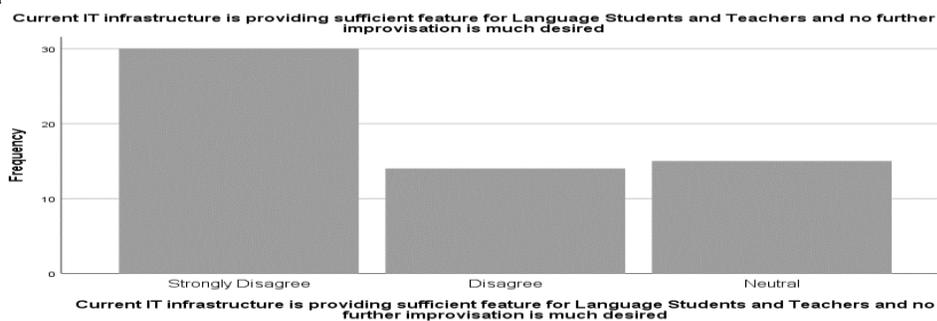


Figure 1. Current IT infrastrucur

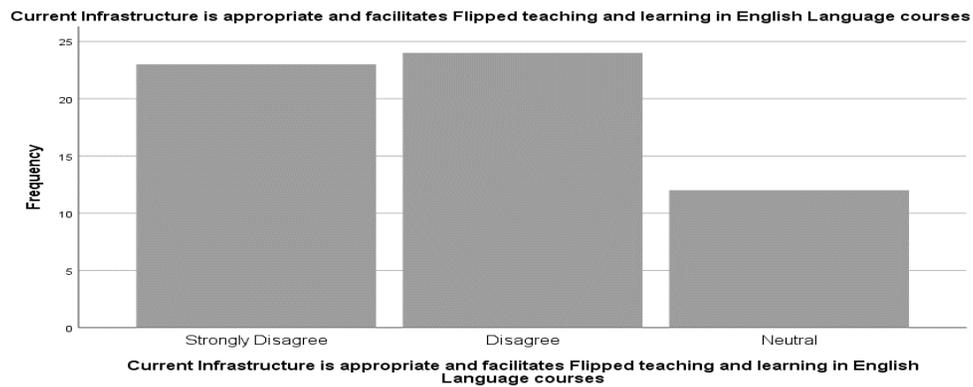


Figure 2. Flipped Teaching

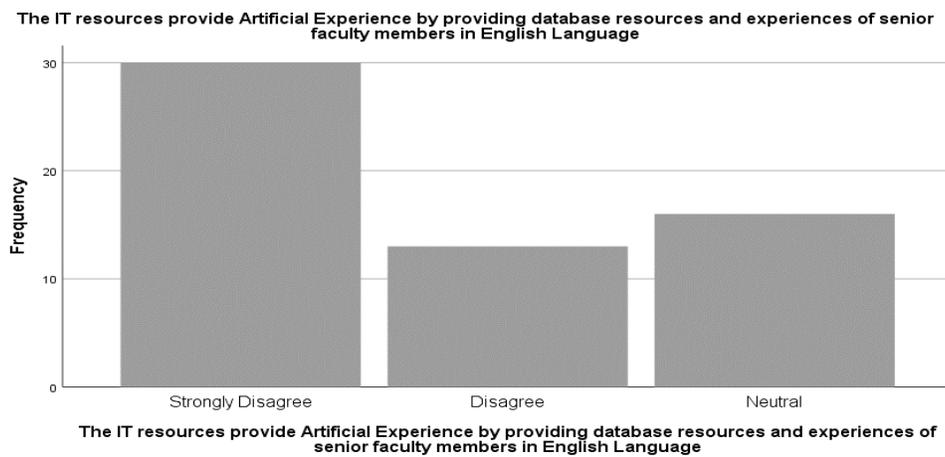


Figure 3. Artificial Experience

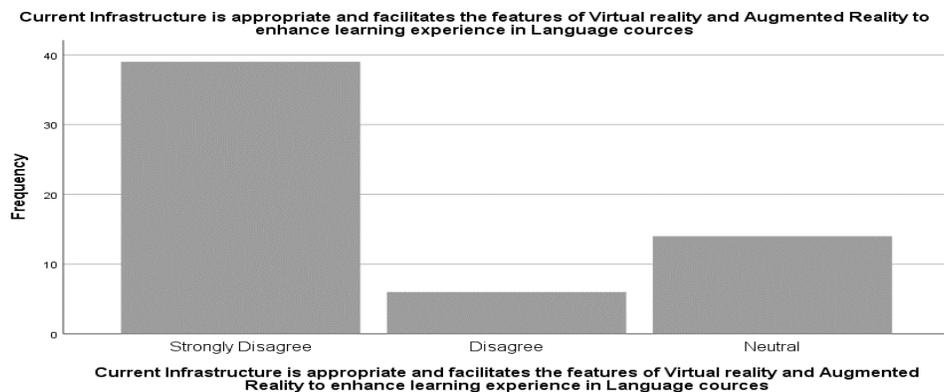


Figure 4. Virtual and Augmented Reality

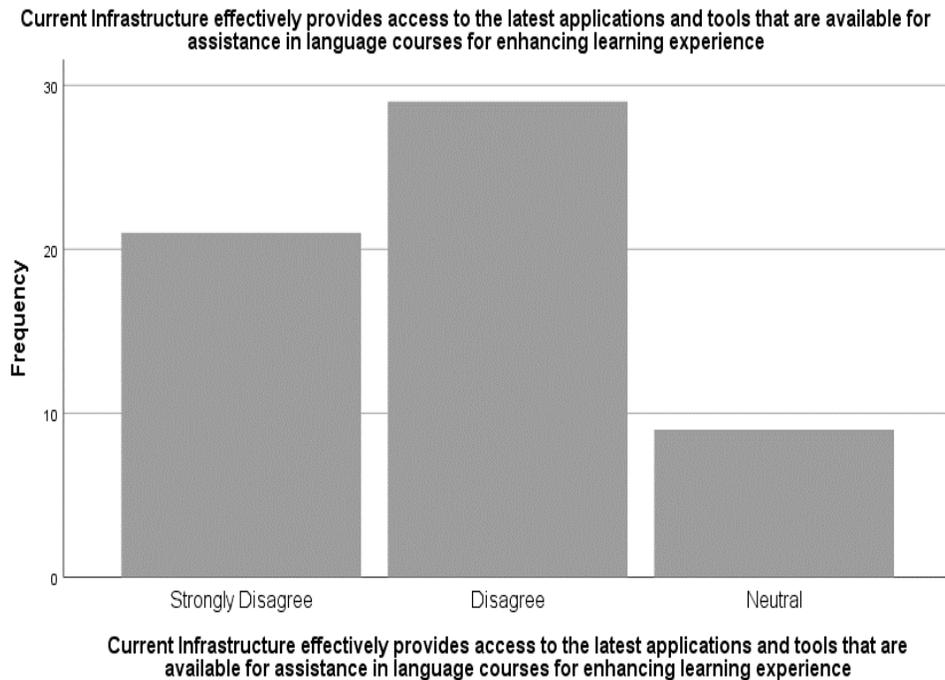


Figure 5. Latest Applications and tools

The analysis of inputs received from students and teachers of English courses indicates that there is a vast scope for improvement of these services, and lesser satisfaction level is found in the academic fraternity towards the IT resources and technological aids that are currently available and at disposal to them. The skewness of the responses also indicates that the reactions are clustered significantly on the left-hand side of the arithmetic mean. The analysis entirely and comprehensively suggests the requirement for enhancing of IT infrastructure and services and technological aids and tools that can be used in language courses for enhancing the learning experience. The upgrades and the cloud framework to accommodate these IT features and technical aids are discussed in the next section of the proposed framework.

4. Stage 2 Proposed Framework for Cloud appropriate for English Language

As it is evident from stage 1 analysis that IT infrastructure and services currently available to the students of English language is not sufficient and appropriate to meet their requirements comprehensively, it is imperative to allocate and deliver IT services to students of English language that specifically enhances the learning experience, and support teachers, and students of the English language especially the non-native speakers. This stage of research proposes a cloud framework or a service model which specifically takes into consideration the requirements of English language courses, students and faculty members and provisioning of services appropriate to English language is done. The proposed framework is explained with the below-provided exhibit.

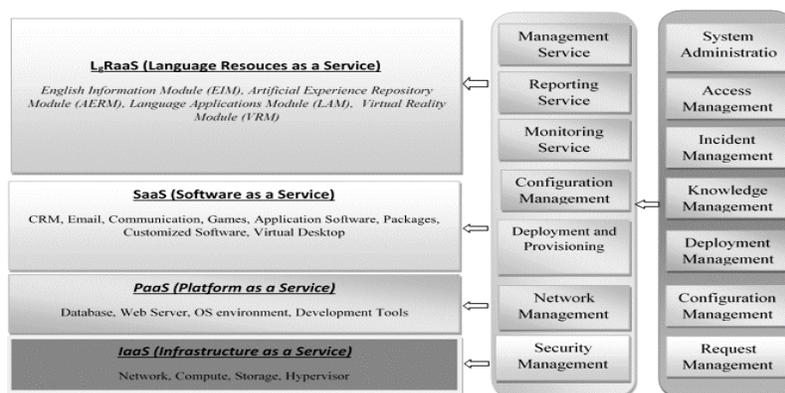


Figure 6. Cloud Architecture providing L_gRaaS (Language Resources as a Service)

Figure 6 provides a framework/ service model that may deliver services to the students and teachers of Language courses as appropriate to enhance the learning experience. The service model includes the layer specifically for services which are desired for Language courses. This layer, which is referred to as L_gRaaS (Language Resources as a Service) consists of different modules that enable features that are selected for the Language courses by the students and teachers. The layer consists of four modules, which are English Information Module (EIM), Artificial Experience Repository Module (AERM), Language Application Module (LAM), and Virtual Reality Module (VRM). Before going for the explanation of these modules, let us look into some previous and recent research that has been done in the related field by the academicians and researchers to establish the problem and provide an optimum solution for the same. According to (Bhat A. Z., BhatMeer Inspirational Model for Student-Centered Teaching and Learning, 2012), there is a need for the creation of Artificial Experience in the education sector, especially the higher education, where experiences of senior faculty members in the form of delivered lectures, prepared lecture notes, specialized and specific examples for teaching a particular concept, teachers comments for explaining specific concepts and related material can be gathered in a database and would be very useful for teachers who will deliver similar kind of topics in future. A parallel arrangement can be made for the Language courses, and cloud services can be implemented for that; the artificial experience module will be responsible for protecting the experience of senior and experienced faculty members, and these resources can be made available to new faculty members and academicians. In a similar manner, the English Information Module (EIM) would have comprehensive solved examples of English-related material on millions of topics with a variety of data like videos, audio, slides, text, etc. The availability of these resources would inspire students to deeply understand the concepts related to a particular topic for lifelong learning. It is undoubtedly essential to inspire students besides providing appropriate teaching and learning resources (E & R, 2002) (Bhat A. Z., Inspiring Creative Minds, 2013). Virtual reality and Augmented play a critical role in modern education, and higher education, in particular, has benefitted a lot from these advanced technologies (US Patent No. US3050870A, 1961) (Freina & Ott, 2015). In the recent past, virtual reality has facilitated an excellent technology for better comprehension of various critical and challenging concepts. The virtual reality has also reduced the novices to very minutely and closely observe certain aspects of topics that were not possible; otherwise e.g., an automobile engineer getting access to critical resources, a learning surgeon

getting access to the patient virtually, and similar kind of stuff (Wickens, 1992). The teaching and learning applications and tools are now often used in various subjects for better comprehension of lectures. These tools and applications effectively contribute towards a better understanding of concepts; however many faculty members and academicians are finding it difficult to avail the benefits of these tools and applications due to unavailability. The cloud with Language Application Module (LAM) will provide access to modern devices and applications that are being used in the related teaching and learning area, which would benefit both students and teachers. The LAM will also provide the guidelines and demo videos for using these applications and resources effectively in a particular setup of a classroom.

Cloud computing in the recent past has been utilized for a variety of different purposes (Ahmed, 2016) (Dang, Piran, Han, Min, & Moon, 2019) (Bhat A. Z., 2018) (Zameer, Saqib, & Ahmed, 2019) (Bhat, Shuaibi, & Singh, Virtual private network as a service—A need for discrete cloud architecture, 2016). Recent research shows that cloud implementation has been done in healthcare, government, education, Marketing, e-commerce, and several other fields. Cloud computing has been very useful in facilitating the latest technologies and resources vital for the functioning of innovative systems. It has played a crucial role in providing availability of resources, which is very critical in the current scenario, availability in modern times means 24x7, and cloud computing has proven utmost vital in providing resources without any downtime (D.Rauta, B.Gardas, & Priyadarshinee, 2017).

The above cloud architecture is beneficial for higher education institutions that are having foundations studies and deliver Language courses at the onset of a diploma or a bachelor's degree. The cloud architecture provides specific features that are desired by the students and teachers of Language courses. Figure 6 shows three service models that are typically used in cloud computing, which are IaaS (Infrastructure as a Service), PaaS (Platform as a Service), and SaaS (Software as a Service) (Mell & Grance, 2011). The last layer shows L_gRaaS (Language Resources as a Service); this layer is a part of SaaS however, it is responsible for the delivery of specific services to the students of Language courses that are not otherwise available to the cloud users. The Language Resources as a Service considers the particular requirements of students and teachers of Language courses and enables the provisioning of infrastructure, applications, tools, repository, resources, and any hardware & Software that may be essential for the enhancement of Language courses. The users of such cloud services from Language courses can avail of different resources depending upon a specific topic or subject matter. The availability of these resources certainly enhanced the satisfaction of students and faculty members, which is reflected from the survey results that were collected and analyzed. The survey results are shown in the next section of the result analysis.

5. Findings

The result analysis indicates that students and faculty members of Language courses have attained a lot of features and are much more satisfied in various aspects. The statistics of the survey that was conducted post-implementation of the cloud features with the respondents who were provided the cloud services is shown in the below-provided table.

Table 2. *Statistics of Questionnaire after Cloud Implementation*

Statistics						
		Existing IT infrastructure is providing sufficient feature for the Language Students and Teachers and no further improvisation is much desired	Existing Infrastructure is appropriate and facilitates Flipped teaching and learning in the English Language courses	The IT resources provide Artificial Experience by providing database resources and experiences of senior faculty members in the English Language	Existing Infrastructure is appropriate and facilitates the features of Virtual reality and Augmented Reality to enhance the learning experience in Language courses	Current Infrastructure effectively provides access to the latest applications and tools that are available for assistance in the language courses for improving the learning experience
N	Valid	59	59	59	59	59
	Missing	0	0	0	0	0
Mean		3.66	3.85	3.92	3.63	4.14
Maximum		5	5	5	5	5

The mean of the statistics for the questionnaire shows the value of 4.14 maximum and 3.63 minimum. The skewness indicates that the responses are significantly clustered on right side of the arithmetic mean, which suggest that most of the responses have either agreed or strongly agreed to the questions asked and, there are individual reactions which are neutral however very few reactions have indicated that they disagree or strongly disagree to the questions about the satisfaction of IT services and technological aids. As far as the individual reactions are concerned, the question about the applications and tools has been able to score a maximum mean of 4.14, which on the Likert Scale is an excellent value that can be interpreted as a high level of satisfaction from the respondents. Again the question that is related to Artificial experience has been able to achieve the score of 3.92, which certainly is in the category of excellent as well as far as the Likert scale is concerned. The question related to Flipped learning achieved the mean value of 3.85, which again is very good. The two inquiries pertaining to overall IT infrastructure and Virtual Reality have gained the lesser mean value of 3.66 and 3.63 respectively; however, on the Likert Scale, these values are still positive. The individual results of each of the questions asked in the questionnaire are provided below in the form of bar charts which represents each of the questions asked in the questionnaire after the implementation of cloud services and for which users (Students and Teachers) have provided their inputs after getting access to these services.

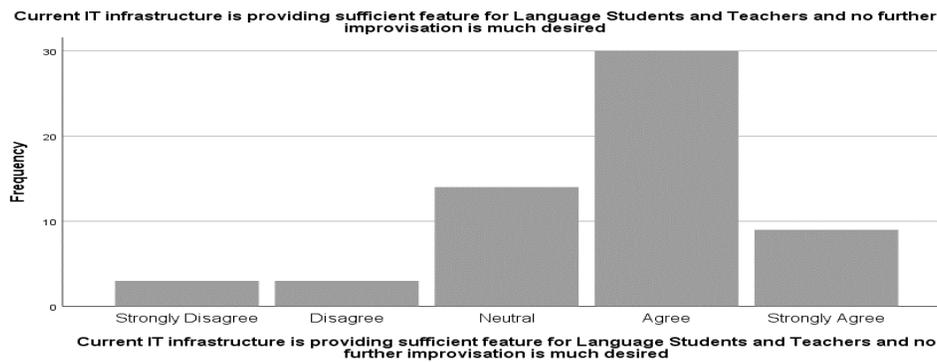


Figure 7. Current Infrastructure

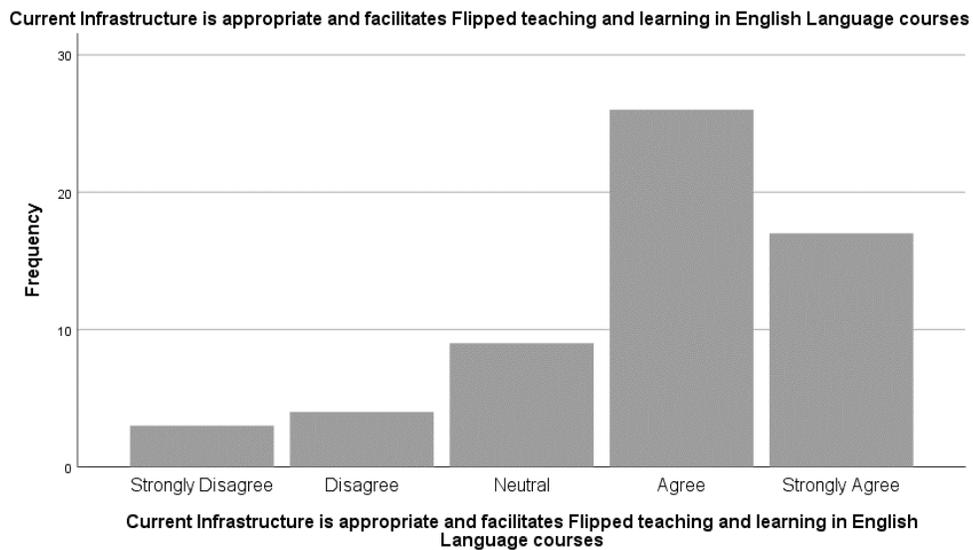


Figure 8. Flipped Teaching

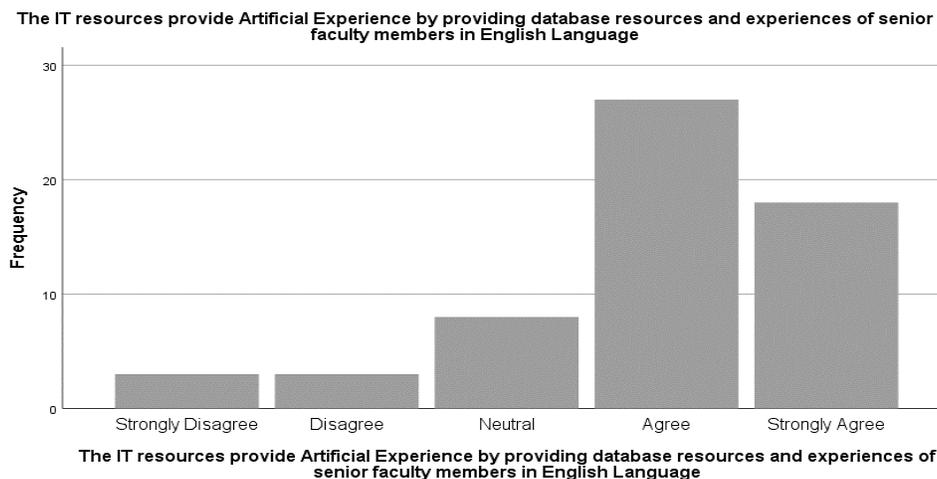


Figure 9. Artificial Experience

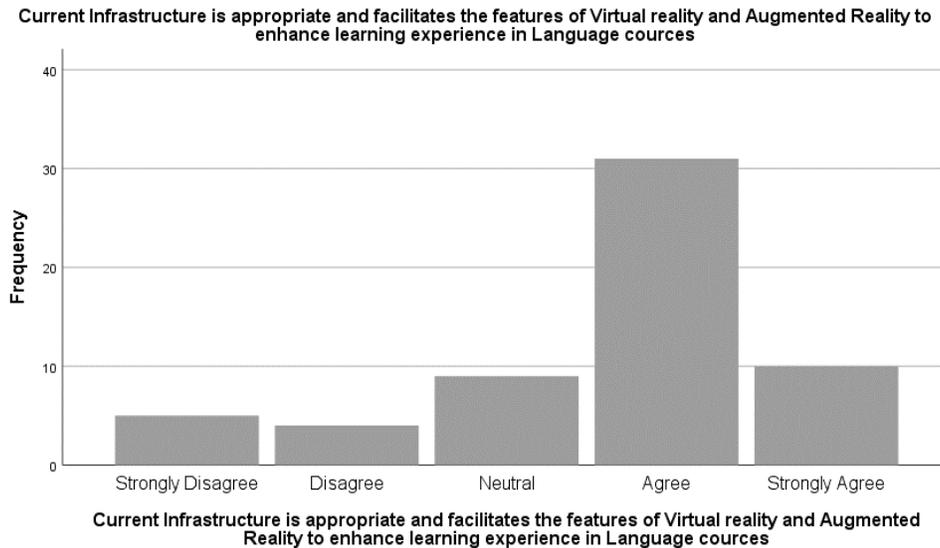


Figure 10. Virtual Reality

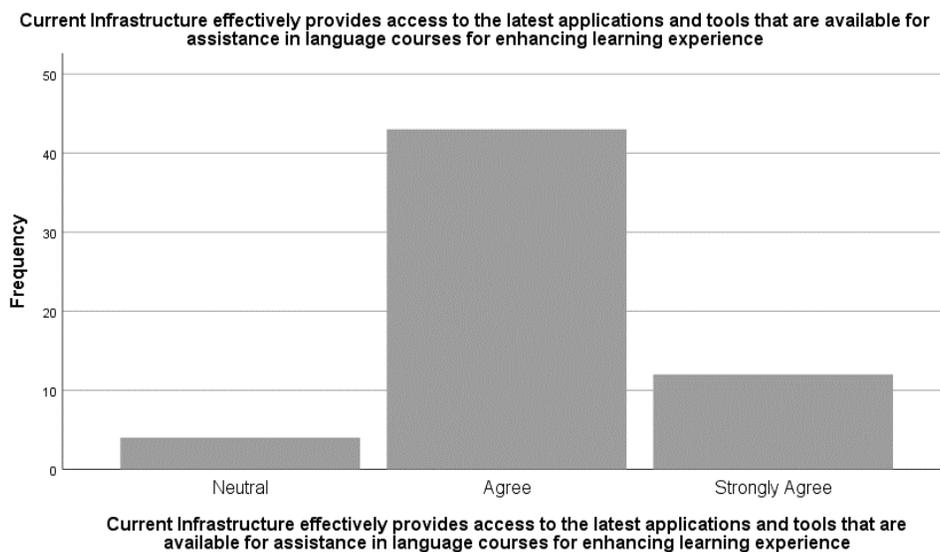


Figure 11. Latest Applications and Tools

The analysis reveals that the satisfaction level of students and teachers has significantly increased due to the cloud services that were offered appropriate to the Language courses. All the responses to different questions have shown significant improvement in terms of satisfaction levels and benefits that students and teachers have yielded from the cloud services.

As indicated in the literature review, the enhancement of cloud services can take place by the deployment of discrete services that can be provisioned to users seeking specific IT services related to their field of expertise, the results obtained from this research study reveal that enhancement of

services can happen if appropriate cloud architecture is deployment. The results reiterate the findings that are completely consistent with the literature findings.

6. Conclusion

Cloud computing has emerged as innovative 21st-century technology in the field of Information and communications technology and has revolutionized the IT world. The support of this incredible technology for innovative technologies like big data, the internet of things, AI, and other technologies is significant. All these technologies may not be effective to isolation. Cloud computing has also contributed to other sectors like healthcare, education, e-commerce, e-governance, aviation, marketing, and most other major areas. Cloud services and technologies have evolved, and have been moderated and altered to yield specific benefits for various implementation scenarios in different fields. This research paper presents a situation of desired IT infrastructure, resources, applications, tools, and repository by students and academicians of English Language in higher education institutions, and it presents a case study that was conducted on a sample population of 59 students and academicians from a particular higher education institution. The research has shown a positive impact of cloud services provisioned for a specific group of Language courses fraternity. The analysis after implementation reveals that cloud services specifically for the English Language students and teachers would yield significant benefits to enhance the overall teaching and learning experience. The research has a vast scope for future development and further study, as there are certain limitations of this research work. This research study is an effort to contribute towards the learners and teachers of English, mainly non-native speakers, by providing them appropriate learning resources with the delivery of technological aids using cloud implementation.

7. Limitations of the Research Work

The research work which has been conducted to measure the effectiveness of the cloud implementation for providing services to Language courses has shown a positive result which indicates that cloud services model specifically for Language courses is desired and enhances the satisfaction levels of users; however there are some evident limitations of the research study which includes and are not limited to the following.

- i. The Sample size of responses is not significant to infer that user satisfaction in any other academic environment will attain the same answers as achieved in the current research study. The number of reactions need to be enhanced, with the inputs coming from a diverse fraternity of academicians and students belonging to different institutions, and various courses of English Language.
- ii. The questions that were posed to the students and teachers were limited to certain aspects of teaching and learning may need a comprehensive review based on the inputs provided by the academicians, teachers, and experts in the related field to make them more thorough and useful to ascertain the critical information that would be useful not only in the addition of more services to the cloud architecture however to the appropriateness of this research study holistically in other environments as well.
- iii. The overall development of a cloud framework appropriate for Language courses may require an in-depth, minute and meticulous study taking into consideration the diverse nature of Language topics and subjects taught at various universities, colleges, institutions, and academic establishments. The comprehensive research

- study may include a diverse set of problems faced by students and teachers, desired resources based on the diverse nature of requirements, different levels of students and teachers, and their specific requirements. The meticulous research study would not only require monetary resources, however, but it will also need a dedicated research group with a diverse set of resources and multiple locations for the collection of data.
- iv. The significant research study would also require a qualitative feedback collection from experts in Language courses to effectively shortlist the service that would be part of the cloud framework. This would undoubtedly provide a broader prospect for the research study to be valid in a specific context or environment; however, it may holistically apply to the diverse fraternity of English learners and academicians.

8. Acknowledgment

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