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An Adaptive Framework for Making Use of Cloud Computing in Creating Virtual Learning Environment at Educational Institutions

Dr. P. Neelakantan
Professor of CSE
VNR VJIET, Hyderabad

Abstract

This investigation intends to give a Cloud Computing (CC) proposed structure utilizing Application programming interface (API's) to convey network and association of Software as a Service (SaaS) in Virtual Learning Environment (VLE) framework at higher education institute. The structure is received and actualized to improve the current VLE to address the incremental expanding of users issues and desires. Distinctive research's strategies and procedures are utilized to quantify the students and faculties fulfilment, and to gauge the effect of the selection of CC on business esteem for VLE as well. Further, the examination recognizes and investigates covering the hole between the progress of embracing CC as another innovation and the advantages of actualizing cloud procedures in providing instruction to the students. The discoveries of executing the embraced structure liken the investigation desires, where the users fulfilment fundamentally expanded contrasted and the current framework. The users found that the framework execution and reaction to their tasks are moved forward. In the interim, the users found that the new embraced framework make it less demanding for them to accomplish their academic exercises and objectives.

Keywords: Cloud Computing; Virtual Learning Environments; Software as a Service; Application Programming Interface

1. Introduction

Cloud computing (CC) started to be profoundly engaged globally with educational sector, educational institutions embrace Cloud computing models in their virtual learning frameworks not exclusively to exploit Cloud computing financially savvy, Cloud computing make it simple for adopters to improve their instructive experience through the arrangement of a considerable measure of administrations that can be gotten to whenever, anywhere with no worries about how the cloud and its services works, or where they are located. As well it helps the user to get rid of periodic maintenance operations to be handled by the service provider. In general, CC have three main deployment models public cloud, private cloud, and hybrid cloud, each model has its characteristics, as public cloud is available for open use by the general public1. One of public cloud benefits is that, it can be larger than a private cloud, and all the risks removed from customer shoulder to providers.

One of cons of the public cloud is the security and privacy issues, which is resolved in private cloud; the primary motivation behind the private cloud is giving the foundation more control over assets, their information and security[1].In this model the cloud framework can be possessed and overseen by the organization, an outsider or blend of them. The hybrid model simply is a combination of different private and public clouds, some resources provided in-house and others provided throw third parties.

As well, CC has three main services models: Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS). IAAS provide on-demand, pay-as-you-use access to infrastructure resources, including servers, storage or network devices[2]. PaaS besides infrastructure it provides operating system for developers (e.g. Windows Azure). SaaS provides a software's that is provided from a vendor and made it available for public use (e.g., Gmail, and Hotmail), is usually provided through a public cloud provider.

The examination review of the present framework found that there are a few issues confronting the current VLE such, trouble to react to user needs, absence of auspicious, satisfactory data about user needs, absence of user association, absence of constant correspondence among users.

The point of this examination is to display a Cloud computing based APIs to give SaaS joining the current virtual learning condition framework to consolidate a scope of administrations that enhances the VLE experience to address users' issues.
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2. Background and fundamentals

This section will briefly illustrate the application programming interface and virtual learning environment.

2.1. Application Programing Interface

API is stands for, a mechanism for code reuse[6].Code reuse permits broaden usefulness of programming and mashup benefits together that expand over the work, as opposed to beginning without any preparation with each software[6]. Application Programming interface that can permit correspondence and interoperate security, with the same or different applications on various environments or written in various dialects, without the need to comprehend, adjust the supplier code. The principle reason for incorporating APIs is to improve the usefulness of the expected framework. Web services API's development is usually done using Representational State Transfer (REST) and Simple Object Access protocol (SOAP) [8].

2.2. Virtual Learning Environment

Virtual learning environment enhances learning experience of students by a set of teaching and learning tools
Virtual Learning Environment (VLE) it can also called "learning platforms". It is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process3, including web based access to class content, grades, assessments, and other class tools.

Many university campuses around the world have adopted VLEs to create a virtual classroom where students and teachers share information. But, VLE can offer comparable instructing chances to conventional ones, which can be utilized to make more beneficial, upgrade, encourage, bolster traditional methods of teaching[12], yet there will dependably be the requirement for human collaboration. So VLEs ought not be viewed as a full substitution for teaching without physical presence. VLE frameworks encourages some instructive procedures for the educators and understudy in college (e.g., content administration, correspondence, cooperation, organization, planning of the syllabus).

3. Related work

This research field has a lot of related contributions Al-Zoube4 Presented web-based virtual and personal learning environment solution based on Cloud Computing which combines a wide range of services that create an interactive tool for education based on services available in the cloud. Sultan[5] provide Google Apps (Education Edition) solution at the University of Westminster as Cloud Computing platform service instead of the old used email system, cloud services helped to fix two problems,

that the sent messages by the college to the understudies individual messages was dealt with as spam and were being obstructed on numerous events, storage issues google furnish them with 7 Gigabyte of free storage to every user, and another issue that made the college to receive this arrangement is the financial reasons, the cost of utilizing Google Mail was actually zero.

Sclater[9] looked at between the services gave by some of VLE frameworks, as specified Sclater outline that Moodle framework give larger part of the elements of a VLE however it will be weaker if instructive foundations does not exploit the cloud free servicesprovided from(e.g., google apps for education).

Khedr[10] used a case study to explore the impact of the adaption of the three dimensional analyses model: (Student – Staff – University) on e-learning implementation and evaluation. The study found that e-learning can be cost effective solution, and provide better opportunities for self-study.

Barker and Gossman[11] explore by their review the effect of utilizing Moodle VLE framework on learning, in view of three inquiries, if the utilization of a VLE positively affects student learning; and whether the utilization of a VLE expands students inspiration to learn. The huge discoveries done statistically report that the utilization of Moodle produces change in learning and inspiration to learn as revealed by the student participants..

4. Research Methodology

An adaptive framework is applied to meet the study aim, and descriptive statistics is used as a statistical technique. In addition a structured questionnaire is used as a tool for collecting primary data to analyze the quantitative data of the research and results is analysed through SPSS statistical software.

The main objective of statistical analysis part is to investigate students' and faculty members' satisfaction regarding the existing Moodle VLE and after the new added features. Base on this objective, the sample was selected to represent the target population. The students' sample represented 1/5 of students' body in computer science & engineering department of VNR VignanaJyothi Institute of Technology, Hyderabad, India, while the sample size of the faculty members represented almost half of the faculty in the department.

The sample was not a probability sample however, the analyst endeavoured to speak to every one of the sections in the objective populace and the information have been weighted to mirror the genuine size of each fragment inside the focused on populace. Sections were characterized as far as the academic year and gender for the students and as far as academic position (Asst.professors, Associate professors and Professors) and gender.

Assessment of students and faculty opinion was carried out by undertaking two surveys. In the first, namely the pilot study survey, a sample of students and faculty were asked about the degree of satisfaction regarding the actual features of the old system. The second survey was carried out after explaining and introducing the main new features of the new system which included social Media activities (Facebook-Twitter), Google drive (docs, sheets, presentations), YouTube video streaming (e.g., lectures, content, experts, etc.), Web-Based Videoconferencing (Skype) , Audio Media (Sound Cloud).

Besides satisfaction was measured by means of five dimensions, that is, ease of use, usability, awareness, technical and accessibility. The same questions are posed to the users before and after the implementation of virtual learning environment to pare the satisfaction levels. This study applied the public cloud model and SaaS service model to integrate some new services to enhance current VLE system to increase user's satisfaction. Meanwhile this can't be called a hybrid model, because the current VLE system is already deployed in servers that is not applying CC concept on it.

this study used for experimental study Moodle version 2.7, the API's created using PHP scripting language, The functionality of new system is tested by making the system as local host which uses Apache HTTP Server to run the webserver under windows environment and database environment uses MYSQL.

The investigation adapted the Moodle as a standout amongst the most known and utilized VLE frameworks in colleges, It is where teachers transfer learning materials (e.g., power point slides, tests, hand-outs, assignments, links, video and audio)each lecturer assigning features and items according to what is most appropriate to the course needs. In addition, the students involved in the activities, only students registered and enrolled on a specific module are able to access the available course materials, they can asked to (e.g., submitting assignments, participating in discussions, contributing to wiki's or blog).

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5. Proposed framework

The proposed framework is outlined and actualized to serve the instructive procedure in a cost effective manner, through incorporating new valuable administrations with the present framework to make users more joined, and to complete their assignments in not so much time but rather more expert way that satisfy their requirements. As needs be this investigation mashup some valuable programming's APIs to improve the learning background for the two instructors and understudies, in like manner can be gotten to whenever at anyplace table 1 indicates new administrations of the proposed framework.

In the proposed arrangement online networking API's (Facebook, Google+ and twitter) has been added to enable users to get to the framework by their web-based social networking user profile data, to customize their Moodle encounter. Once the API is effectively approved the user, the framework will have the capacity to distribute users exercises to the news encourage and profile pages of Facebook subject to users authorization. Likewise users can add posts, comments, and likes to Moodle pages. To authenticate users access Facebook and twitter uses OAuth to provide authorized access to its API.

The course content and different materials can be transferred to the customary framework servers or, transferred and facilitated in Google Drive that have a ton of profitable devices (e.g., docs, sheets, introduction) this investigation picked google drive API to be incorporated to the present framework, which will give users a chance to utilize those gainful devices inside the framework pages, and likewise will reduce the amount of storage used to keep users files of users in the servers hosting the current system, as well will reduce the amount of upload traffic to the servers and switch it to the google drive cloud servers, which will help increasing the performance of the system. Another advantage for users is keeping their files for a longer period with using such service compared with the traditional one. Listed below some other applied services.

- YouTube API, used to play learning videos, instructor's tutorials, and also students can record or make their own videos and publish it into the Moodle context.
- Sound cloud API, is used for playing the audio media files, instructors could use it for voice announcements.
- Skype API is used for video calls between the users.

Feature	API	Provider
Signup, login	Facebook app-Twitter-Google+	Facebook-Twitter- Google
Comments on topics	Facebook(comment, like and share)	Facebook
Storage	Drive	Google
Productive tools	Docs, sheets, slides(Drive)	Google
Video Media(record and upload)	You Tube	Google
Video calls	Skype	Skype
Audio Media	Sound Cloud API	Sound cloud

Table 1: Features of the proposed system

Integrating the Cloud Computing techniques for delivering such services to enhance current VLE system will give more flexibility and functionality which solves some of the technical issues addition to increasing the usersatisfaction. There are main components in proposed architecture as shown in figure 1.

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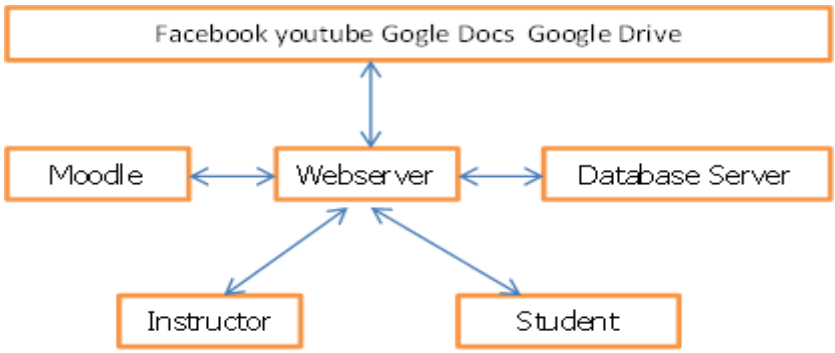

Fig1 : General overview of the proposed framework components

The proposed architecture is composed of the following components:

- **Users:** represents the academy faculty members and students that use Virtual Learning system content.
- **VLE:** represent the current Moodle system, which contains a Service catalogue: contains different types of services with detailed information about the additional access information, such as where the service is located and who can access this specific service. Likewise Monitoring: monitor user activity through the system services, works as event viewer, filter, and sort data.
- **Service provider:** represents the public cloud providers that deliver their SaaS to public use.
- **Public Cloud - SaaS "API's":** Each API function as a gateway that provides access to hosted services or tools on the public cloud and is generally based mainly on the REST and SOAP needed for the current system enhancement, likewise need to be secured by the academy, without having to give them to a third-party cloud provider to be under his control.

Web server: serve the primary web interface of the system and works as a middle tier, accesses the database server using the language of the database (MySQL) to retrieve and deliver the necessary content to the web server then sends this information to users via HTTP using HTML.

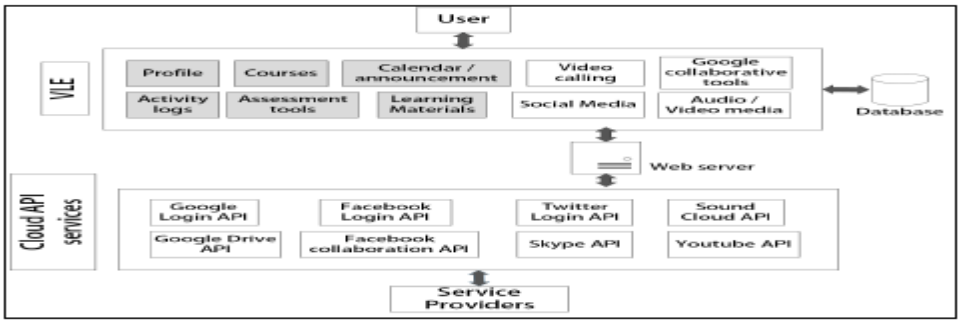

Fig. 2: Proposed framework architecture

6. Experimental study

This section is divided into two subsections, the first section describes the proposed system implementation, and the second section illustrates the questionnaire results.

6.1. Cloud-based VLE system

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As mentioned early this study mashup some cloud services to current VLE system, some screenshots of the implemented system shown in the next following figures.

The below Fig.4 represent a file picker for (e.g., assignment delivery, blogs for discussion) furthermore, also can be utilized over the framework pages, as appeared at the left user can utilize the accessible administrations, other than the customary framework server documents, there are new coordinated SaaS (e.g., Google Drive, Sound Cloud, and YouTube recordings) that need users login data to get to his coveted records.

After the user effectively login the supplier servers inquire as to whether he affirmed the reconciliation with the attractive framework, if the user acknowledge to enable the framework to see his records and reports in (e.g., Google Drive), as indicated by OAuth security to give approved access to its API. The user will have the capacity to utilize his records from Google drive inside the framework pages. Another new included component, the employee or the understudies, can record, transfer, or present through the YouTube record API, inside the framework pages without the need to go to YouTube page and afterward come back to the framework to utilize the connection which will reduce the steps used to use such service, and make the users focus in their core tasks.

6.2. Questionnaire results

The accompanying Figures and clarification demonstrate an example of the consequence of assessment finished amid the fall semester of the scholarly year 2017-2018. Figure 3 demonstrates the comparisons between the when sentiment in regards to the distinctive current highlights of the framework. There is an indication about significant increase in satisfaction for both students and faculty members in using the discussion board after adding the new features, as mentioned the number of students and faculty members that never used the discussion board in order decreased by 15 %, and 10.8 %, the satisfaction increased by 29 %, and 24.2%, the one's how neutrally responded decreased by 2.1 %, and 2.3 %, finally the dissatisfaction decreased by 11.1 %, and 11.1 % , that means that most of users that turned to be satisfied are the dissatisfied users , cause the percentage of users answered neutrally almost the same.

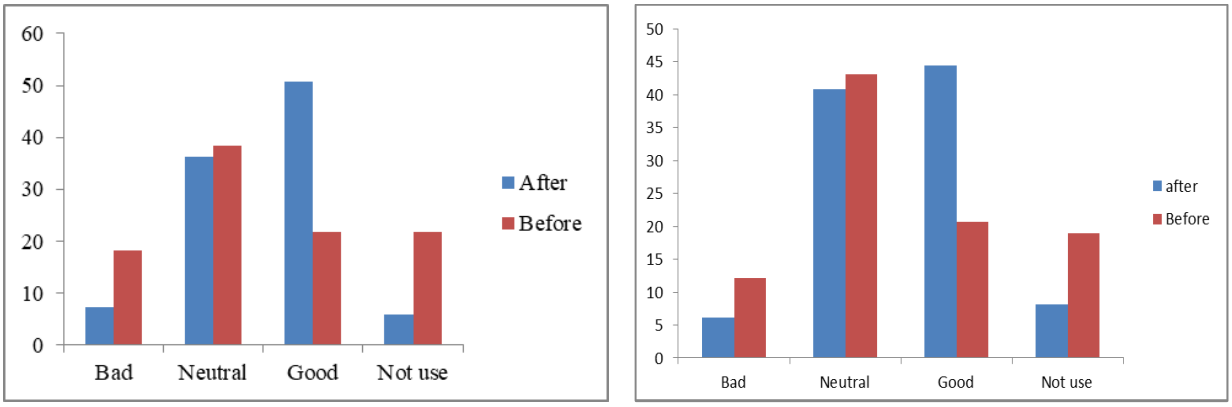
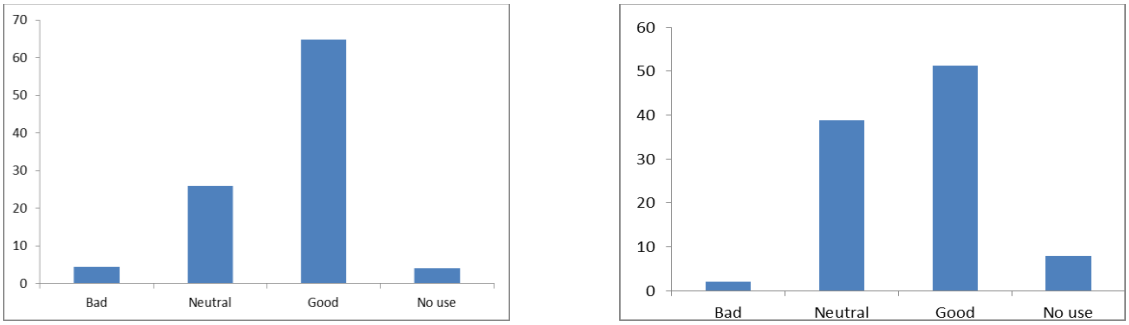


Fig 3 (a) students opinion asynchronous discussion forums (b) faculty member opinion asynchronous discussion forums



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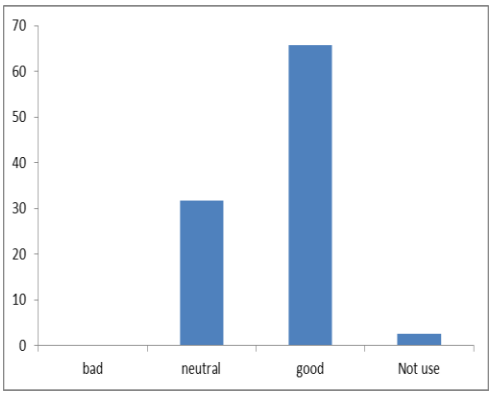
This part contains questions about the new added services (Social Media activities (Facebook-Twitter), Google Drive (docs, sheets, and presentations), YouTube video streaming (e.g., lectures, content, experts, etc.), Sound Cloud (Audio Media), and Skype Web-Based videoconferencing). The following figures show the rating of these features by students and faculty members.



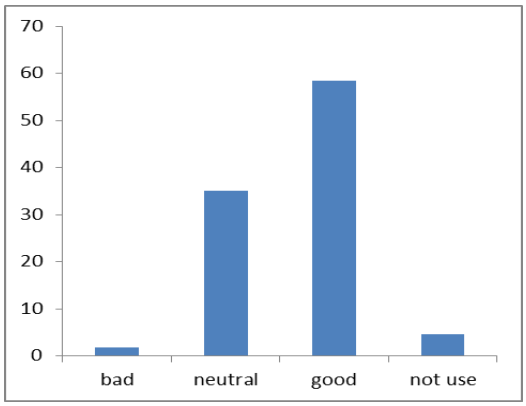
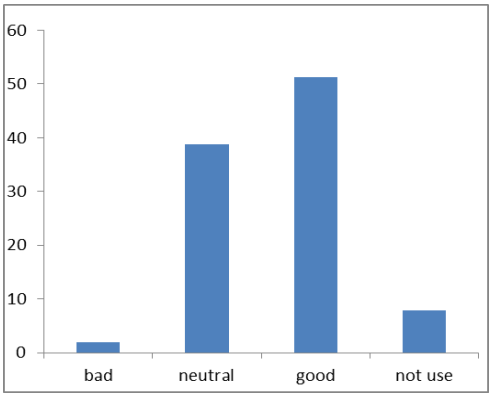
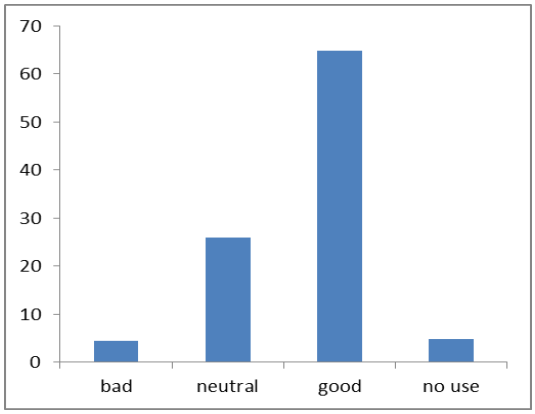
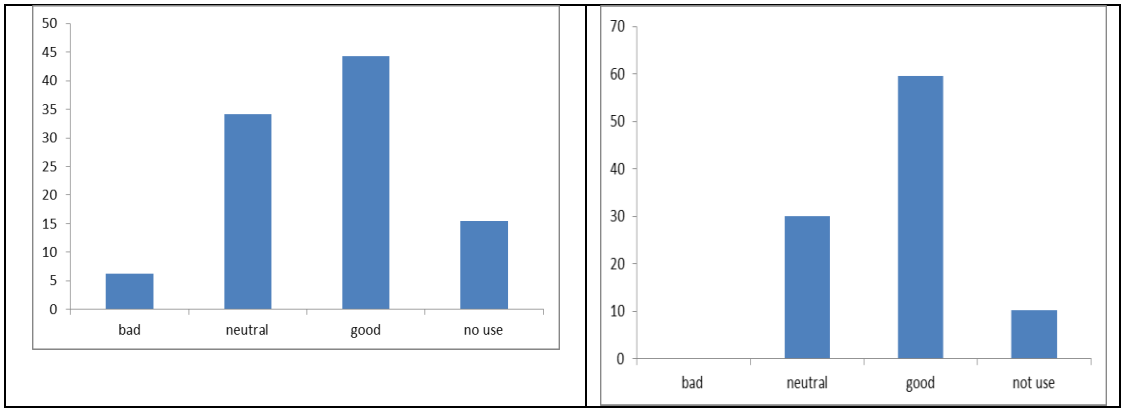


Fig 5(b) Faculty member opinion Google Drive(docs,sheets,presentation)







(a)Students opinion sound cloud audio media(b) Faculty member opinion sound cloud audio media

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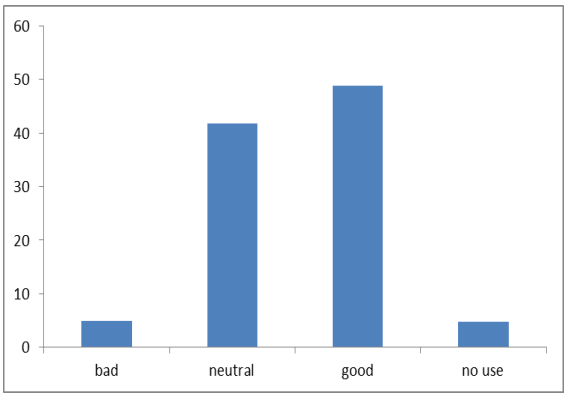
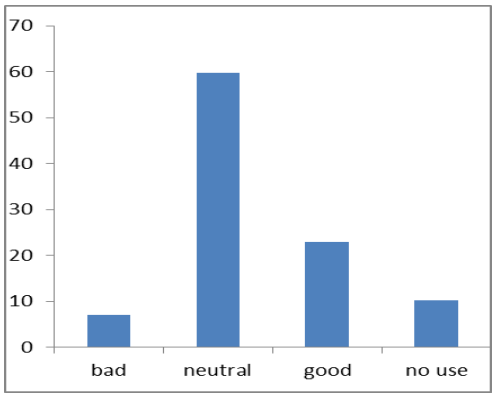
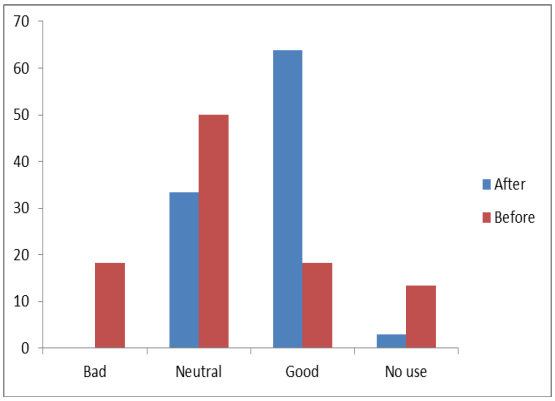
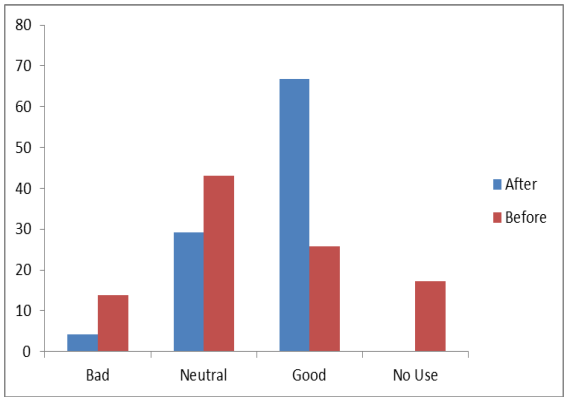




(a) students opinion of skype video conference (b) faculty opinion of skype video conference





8(a)Opinion of faculty member on overall VLE experience (b) Opinion of faculty member on overall VLE experience

7. Findings analysis and discussion

The discoveries of executing the embraced new highlights liken the examination desires; the discoveries demonstrate that there is a noteworthy increment in fulfilment in the correlation of when usage of the new highlights. The percentages of students who are happy with the general adjusted VLE are expanded. The scope of augmentation mounted from 40 % to 71 %. And, the critical decrease in the level of disappointment is run from 10 % to 2.9 %. In this way, it can be seen that the vast majority of the investigation is fulfilled of the entire highlights gave by the adjusted Virtual learning environment framework.

8. Conclusion

This examination is endeavouring to apply another proposed cloud-based structure to upgrade the exiting VLE framework. The discoveries of this examination found that the quantity of users that uses the VLE framework is low, too the correspondence between the faculty and students by mean of innovation is similarly low and isn't persuaded by the real facilities utilized by users in their day by day life, and users desires contrasted with the genuine article don't achieve the real users' needs. The exploration utilized an analysis through the usage of the new framework and utilized the inspecting test, it is a solid instrument to analyze and measure userfulfilment.

To conclude, the general discovering demonstrates that the fulfilment is fundamentally expanded toward the two sections of the focused on test (students and faculty members). Accordingly, it can be presumed that the execution of the cloud computing SaaS in VLE is relied upon to improve the framework usefulness other than meeting the expanding needs of user's, and amplify the advantages they increase through their online instructive experience.

References

1. NIST. The NIST Definition of Cloud Computing. Recommendations of the National Institute of Standards and Technology: NIST SpecialPublication *800-145. 7*; 2011.
2. IBM. *Defining a framework for cloud adoption. How common ground can help enterprises drive success with cloud computing; 2010*.
3. http://whatis.techtarget.com/definition/virtual-learning-environment-VLE-or-managed-learning-environment-MLE
4. Al-Zoube M. E-Learning on the Cloud. International Arab Journal of e-Technology Vol. 1, No. 2; 2009.
5. Sultan N. *Cloud computing for education: A new dawn? International Journal of Information Management*; 2010. p. 113-115.
6. Jeffrey stylos. Making APIs more usable with improved API design, documentation and tools; 2009. Master Thesis. p. 1-2.
7. Abu El-Ala N. S., Awad W. A., El-Bakry H. M. Cloud computing for Solving E-Learning Problems. International Journal of AdvancedComputer Science and Applications Vol. 3, No. 12; 2012. p. 1-10
8. Lee Peters, Jonathan Mortensen, Thang Nguyen, Olivier Bodenreider. Enabling Complex Queries to Drug Information Sources throughFunctional Composition; 2013. This article is published online with Open Access by IOS Press and distributed under the terms of theCreative Commons Attribution Non-Commercial License. ; 2013. p. 1.
9. Niall Sclater. eLearning in the cloud. International journal of Virtual and Personal Learning Environments; 2010 Vol.1, No. 1. p. 14.
10. Ayman El Sayed Khedr. Towards Three Dimensional Analyses for Applying E-Learning Evaluation Model: The Case of E-Learning inHelwan University. International Journal of Computer Science Issues; 2012 Vol. 9, Issue 4, No 1. p. 161-166.
11. Jenny Barker and Peter Gossman. The Learning Impact of a Virtual Learning Environment: Students' views. Teacher EducationAdvancement Network Journal Vol 5 (2); 2013. p. 19-38.
12. Ayman E. Khedr. Integration Model for Students Relation Management System to Improve Higher Education Communities Quality. The11th. International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government; 2012.