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Usability Evaluation of Cloud Based Application

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ABSTRACT

The students mostly use web based services for achieving their goals in education. They need these services for different purposes. The usability aspect is a need to design these services to be more interactive in order to support the students at their work.

Google Docs is the link to the concept Software as a service i.e. a type of cloud computing. A web based application that provides online resource to the users for creating, editing and storing their documents online. The author particularly discusses it from the Student's perspective.

Usability evaluation of the Google Docs is to find the students needs and requirements and also to investigate the usability issues in Google Docs.

In this thesis the author is trying to uncover the usability and privacy related problems faced by the students. This is helpful in analyzing the Google Docs (Software as a service) and its importance, by considering the students perspective. Different usability methods and techniques are available for usability evaluation. The author adopted Think Aloud (TA), questionnaires and interview to evaluate the usability of Google Docs.

Keywords: Usability, Evaluation methods, Cloud based application, Interaction design Principles, Cloud computing, Software as a service (Google Docs).

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INTRODUCTION

Nowadays, web is gaining importance as a platform which provides different services and applications for facilitating the users. Further what are the significant aspects in developing these applications for student's perspective? How these services helps to gain maximum resources with less effort as Cloud computing offering to the users e.g. software as a service. This report is about the students needs and requirements regarding the software based services provided to them by Google through web. Here the word requirements concerned with expectation that system must have to do or its quality that user want. In addition to discuss and identify the usability issues in Google Docs and the importance of Software as a service (Google Docs) in students for using it. The author also describes the important role of usability in designing, evaluation, gathering the user's requirements regarding these applications. To create a good understating about the Software as a services and valuable role of usability against these services by conducting usability experiments. So this regard particularly focused upon the Google Docs intended for students work and identifying the problems while using it. Google Docs is software that provides web based services to the students for freely storing their documents files, organizing them, for harmonization, for carving up their files with each other while they are working on projects or creating new documents from scratch. With a network connection student can access his/her documents any time and everywhere without dependence upon a flash drive or other storage devices in his/her possession.

The purpose of this thesis project is to identify students' needs and requirements for Google Docs with reference to academic/research purpose as well as the usability issues. This report is structured into number of chapters sequentially.

- **Chapter 1** is about the background of the topic which we are going to study,
- **Chapter 2** is about the problem definition, aims and goals of this research work.
- **Chapter 3** discusses the methodology that we shall adopt to identify the problems, needs and students requirements during this research work.
- **Chapter 4** discusses the literature review and theoretical work
- **Chapter 5** is regarding the empirical work that we have done during the whole process of experiments for the research.
- **Chapter 6** consists the results are based on the experiments.
- **Chapter 7** is concerning with the discussion and analysis from the derived results.

1. BACKGROUND

“People are required to conform to technology. It is time to reverse this trend, time to make technology conform to people [48].” Software has become more complex in terms of features and functionality due to integration of various technologies for fulfilling user’s requirements. Consequently companies carry out innovations to fulfill these requirements by designing a system that is closer and explicable for the users. The users are increasingly unwilling to face difficulties in those applications that acquire user efforts. Role of usability is to make these products user responsive and design these products in a way to satisfy users during their use in an effective and efficient manner. The usability issues have augmented in the recent years due to enormous innovation of technological products for discussing the human factor. It is not only important in the end user products but also for those used in commercial and professional contexts [1]. Main requirements for information technology society are to design systems that can universally be accessed by the user and also fulfills his/her requirements. Easy and understandable interface creates a close relation between the users and web based applications because it is a key point for triumph of an application. The user interface of an interactive system consists of all those parts with which users come in contact physically, perceptually and conceptually [2]. Usability plays an imperative role in the web industry to make it more valuable and also refers as to how a system is usable by fulfilling the user’s requirements as. “Usability is being able to do the things you want to, not the things you have to [3].”

Peoples are not very much interested to work on desktop because they spent more and more time on the internet [51] and it is very expensive for users to buy such type of suite for offices, especially for students in managing their documents files related to academics. Google Docs not only diminishes the need for desktop storage memory but also lessens the need for a flash drive to store the data during travelling. Now Google Docs is a great innovation of Google Company for both academic and commercial levels is cloud based application [39].

The students use this online free application for different purposes e.g. in writing, editing and to share their reports with fellows for collaboration. To safe and organize them in the folder or to create their own directory, they can also use their contact list from Gmail for sending in two modes i.e. as collaborator or viewer. By using the Google Docs, the users can create new document files that support Microsoft Doc format plus other formats. They can also create presentations and spread sheets, save and download in different formats. Students specially want to work in a project collectively to share their ideas. The integration of technologies is helpful for students by accessing them free as Google Docs offer to users. These technologies offer different services and the use of a single interface is a major cause to reduce complexity and increase the interactivity by developing their interest through offering these services. The design and interface of an interactive system plays

an important role for creating familiarity and productivity of a product among the users in the market. That is why in designing of an interactive system the developer always has to follow the interactive designing principles. [2]

In this paper, the author will discuss student's requirements for an interactive application, the problems and the role of usability to find those problems that students face in Google Docs. Google, Yahoo, Hotmail and IBM are continuously attempting to facilitate the users through more innovations. Google Docs is a service connected to the concept of Cloud Computing, more about this connection will be explained in this report later. The author is going to evaluate these services from student's perspective and to gather the students' needs and requirements for academic/research purposes and how it could be more helpful for them. To evaluate the Google Docs, the author uses the Usability as a tool to perform an experiment on students using this application and to find out their remarks with usability testing and gather their requirements through interviews and questionnaires.

2. PROBLEM DEFINITION/GOALS

The chapter two comprises of different parts, in the first part the author discusses the student's problems during study and their requirements for achieving their goals. The second part deals with the research question that author would investigate in the research report. The third part deals with the results and goals, whereas the fourth part is concerned with the outcomes for which the author has undertaken this study.

2.1. Students Requirements

The uses of online applications are very common among students for searching the valuable information in their studies because it is a very cheap way for learning and utilizing these services for research and development. They need a consistent resource through which they can easily store their data securely and safely and can access it any time/anywhere. Mostly international students face the problems to save the collected information for research and education due to limited space at the university computers. There is a need for those services through which they can manage their files and secure them from risks and threats, connectivity, Lab/server maintenance inside the university, viruses, power failure and other damages. Group work is very common among the students according to their subjects to collaborate and share their ideas in report writing and for sharing it with their teachers for quick feedback rather than using printed copy or sending these via email. There is need of web services that can assist them during their educational activities. Due to the lack of their personal resources they can't purchase expensive books, software and hardware compatible to these softwares. So they want reliable, secure, and accessible services that can help them in achieving their goals and fulfilling their requirements.

The traditional methods for the development of software and web applications often results in difficulties and are unable to help the users for finding out the desire goals [5]. So the purpose of the usability evaluation is to focus upon the usability issues in Google Docs as well as for further improvements. [42]

Nowadays most of the companies provide Cloud bases resources/services over the Internet. [8] Today the clouding computing is rendering users with services to access hardware, software services and data resources while using the internet [6]. In computer science the word "broadcasting" means the computing at a remote location inside the cloud, either through your own computer or with any other device through the web using an internet connection. "The cloud is a smart, complex, powerful computing system in the sky that people can just plug into [7]." Google Apps provide the different products like the Gmail, Google Docs, Google calendar, Google talk for the end users to operate these

applications on their own computer desktop via internet. The Google Docs is a web based service consequently there is no need to download and install them on the computer.

The author is going to discuss, does the Google Docs support the students for academic purpose and what are their further requirements for improvements. The author also discusses the role of usability to ensure the effectiveness, efficiency and satisfaction for users regarding this application and for other necessities they feel to be in the Google Docs. By applying usability test and evaluation on Google Docs the author attempts to locate the student's interest and desire for the future. The author central purpose for this usability assessment is to discover the students pleasure with Google Docs system, are they satisfied with it? If not then what are their requirements for making it usable to increase their productivity by covering those usability issues. [9]

2.2. Research Question

1. What are the student's needs and requirements regarding the Google Docs to use it for academic and research purpose?

2.3. Goal/Results

The goal of this research project is to identify the student's needs and requirements regarding the Google Docs and get their suggestions for improvements by conducting the usability test, interviews and Questionnaires. The author also selects these techniques to find out the usability issues in Google Docs.

2.4. Expected Outcomes

Following are the expected outcomes:

1. Description of Usability and its importance.
2. Usability evaluation of the Google Docs
3. Analysis of student's requirements and usability issues on the basis of usability evaluation methods.
4. Validation of usability evaluation.
5. Discussion on the results

3. Methodology

Methodology means the systematic study of methods, principles or procedures for investigations in the concerning discipline the author has selected. This chapter defines the method and techniques for usability evaluation of Google Docs. [4]

3.1. Overview

The approach is to develop a case study on Google Docs is based on mixed methodology. This study is carried out in multiple phases. First phase is for literature review in order to understand the interface, interaction design concepts & principles and the function of usability. Further what is cloud computing, Google Docs and how to select the effective procedure for usability test and criteria for evaluation. In this mixed approach author use qualitative and quantitative methodology. Let’s see the meaning of qualitative and quantitative data “The qualitative research is concerned with studding object in their natural setting. A qualitative research is attempted to interpret a phenomenon based on explanation that peoples brings to them [10]” and for quantitative “The quantitative researched is mainly concerned with quantifying relationship or to compare two or more groups [10].” There are number of methods and techniques for usability evaluation but according to the research work the author will utilize the Think Aloud Technique and conduct the Questionnaire and interviews. In the context of evaluating the Google Docs and its interface assessment, it involves requesting the information about a Google Docs from the students. The questionnaire is mainly used to gather such information that helps the observer in the evaluation. Interviews are structured methods of inquiry which are used to gather information about student’s experiences and preferences about the Google Docs. The interviews create a close interaction with the users and observer and are helpful for eliciting immediate answers to questions that the observer asks during the interview. While the usability testing brings the user in close contact with the system and is helpful to find their thoughts regarding it. [11]

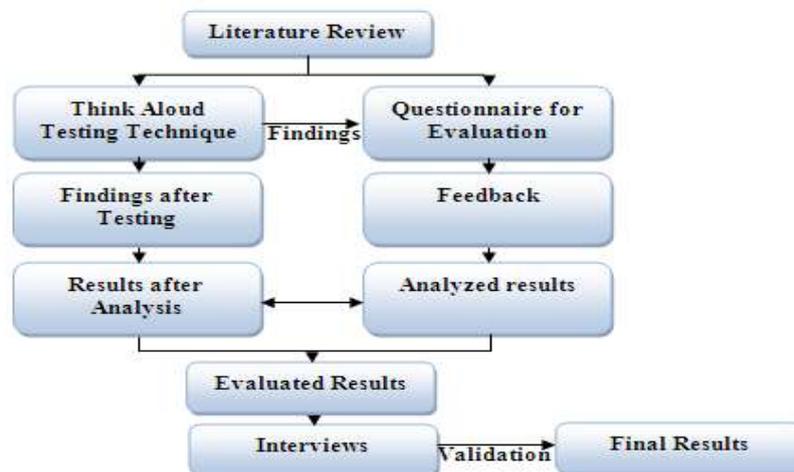


Figure 3.1 Adopted research methodology.

3.2. Literature Review

With regard to the concerned information need a literature review was done at the initial phase. The author deeply studied the cloud computing and about Google Docs? (Software as a service) is a web base application. Further to evaluate these services a study is needed regarding usability, its roles, available methods and techniques for evaluation. To find this literature the author has adopted a systematic approach. The author borrowed the books from BTH (Blekinge Institute of Technology) and Växjö University library and mostly used the (BTH) Electronic Library Information Navigator (ELIN) as net surfing tool to search the available literature on these topics and found important information from journals, eBooks, research report and different databases like the ACM, IEEE. There are three types of usability evaluation methods usability testing, inquiry both evaluation method involving the user participation and Usability inspection is based on experts [50]. Author used Think aloud for usability testing shows the task and work given to the students during the experiments on a system. While the use of interview to found users interest and for validation. Questionnaire was done for usability inquiry to evaluate the Google Docs and to cover some aspect for their point of view. [12]

3.3. Experiments

Author is going to use the Think Aloud techniques on Google Docs. In this technique participants have to perform number of tasks during the experiments and to verbalize their thoughts and experiences while interacting with the system. The observer has to observe and records their comments during the experiments. The author will select students from the University, who shall participate in the test. Study of Henderson found that the Think aloud identifying more issues on usability. [13], [16]

3.4. Questionnaire

Questionnaire is used due to a number of reasons; [53] because it is cost effective, evaluator analyzes the usability issues by user points of view and the last one is to make a reliable comparison on the base of data gather from Questionnaire. It is designed to check the reliability, interactivity and usability aspect. For the evaluation of the system the Questionnaires are most important tools to get the data from users, it is use since 1990 as cheapest tool for usability evaluation [15]. The Questionnaires are the qualitative approach for gathering the user's data and may be useful and cheap than any other approach. To design the evaluation criteria for Questionnaire the author take the guideline from different authors [12], [13], [50].

3.5. Interview

The author will take the interview from different students who use this application to get their personal experience, what they think about the Google Docs, their likes/Dis-likes and further requirements. This interview was supported with different types of questions. To design the interview the author will adopt all the guidelines [14] that are mentioned in the literature regarding the interview and note all the responses from the students. The author shall divide the interview into two phases, in the first phase the author takes formal interview from the students in the university and get their ideas about the Google Docs to select the important task for test. While in the second phase the author will particularly take the interview from the participants and also form other students after the experiment for validation point of view. [14], [41], [51]

4. Theoretical Work

In this chapter the author is going to discuss the usability and its role, moreover for creating a better understanding in general. Author will discuss interaction design and its principles. What are the important factors of designing to design an interactive system to attain the user requirements and their needs? What is Google Docs and the concept software as a service in Cloud computing?

4.1. Importance of Usability

Why the usability is important as the [15] states that "Usability rules the Web. Simply stated, if the customer can't find a product, then he or she will not buy it [15]." It is used to reduce the documentation, support and development cost, increase the user's satisfaction and efficiency [47]. The precise functional product is not sufficient to make it successful but its usability according to the users requirements make it more successful. It is an effective tool to involve the users in the development processes for developing an interactive system according to their needs. It is a key attribute of a product like its functionality because functionality shows the working of products while performing testing on the products functionality to test its productivity according to criteria for which it is designed and how people work in the product. It begins in the early stage of application or during product life cycle for user's experience. [17], [16]

The definition of usability or usability engineering by the international standardization organization (ISO) and other authors also defined it as "the effectiveness, efficiency and satisfaction with which specified user can achieve the specified goals in particular environment" [1], [2], [14], [15], [18], [20]. The use of an organization website gives complete knowledge and awareness about its services to its customers and users. The use of Google Docs is common all over the world for different purposes i.e. business as well as academic. An interactive system with high degree of usability has the following characteristics and goals: efficiency, learnability, errors, Memorability and satisfaction defined by Nielsen, J in his book the "Usability engineering".

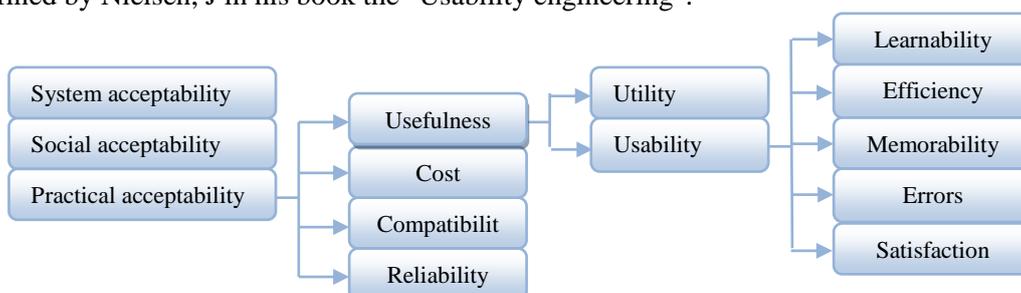


Figure 4.1 the above picture shows the Usability goals. [15]

There are some common usability problems in a graphical system, especially (web based application interfaces) faced by the users during working i.e. Ambiguous menus, Icons and nuclear step sequence. Lack of system anticipation and intelligence, confirmation, feedback, error messages, lack of help tutorials, documents, input, direct manipulation limits, highlighting and selection limitation, language that permit only in single direction movements. [16], [57]

4.2. Interaction design & Principles

Author is going to discuss what design is, what the interactive design principles are and why people like good and structured interface? An application with good interface creates good impact, awareness and understanding among the users for guiding them in multidimensional ways for achieving their goals.

4.2.1. What is Design and goal?

A good design builds the vision of the users, makes the business visible to the customers, and stratifies the business for achieving the users need with satisfaction. “Design is solving problems that cannot be formulated until they have been solved. The shaping of the answer is the part of the question [3]”. The W. O Galitz stated in his book “*The essential guide to User Interface design, an interdiction to GUI Design principles and techniques*” discussed about the design goals i.e. reducing the (visual work, intellectual work, memory work, motor work) and minimizing any instruction that becomes the burden on the user by technology. [16]

4.2.2. Design Principles

A number of design principles are normally referred as important to the development process. There are about 12 most important design principles in the book of "designing interactive system" [2] by David Benyon, Phil Tuner and Susan Tuner e.g. the visibility is to ensure that things are visible to users in the interface for creating better understanding. The consistency means consistent in the use of design features. Familiarity means the use of language, text to make system more familiar with the user. Affordance means arrangements in a way that creates clear understanding i.e. links and buttons show their meaning to user, Navigation supports the users to move everywhere in the system, Control gives access to the users, Feedback system provides quick feedback to users, Recovery means mistakes and errors from user are recoverable by them, Constraints stop them from inappropriate actions, Flexibility allows different ways to doing different things for learning purposes. Style of interface should be stylish and attractive to users, joviality of design of the system should be attractive and polite that makes friendly relationship with users. [2]

4.3. What is cloud computing?

Google Apps presents Cloud computing as an idea for future to provide the web based services for the users. There are different types of cloud computing shapes, software as a service, and hardware as a service. (Platform as a service / Infrastructure as a service) Google Docs is an example of software as a service. Let's take an overview of the cloud computing before discussing the Google Docs, what is cloud computing? the cloud computing means computing in remote locations (in cloud) instead of personal computers? The cloud computing is a strong, powerful and complex in sky users/people can just plug into and a burning issue nowadays because of its importance among users [21]. It is a style in which all the information technology related capabilities are providing services and transfer technology, data and software application from a local system thought network into Cloud. So the users can access these services and products anytime and anywhere. Means away from the desktop computer and at some other place form where the user can acquire these according to his/her demands. According to the [22] "the aims of the cloud computing is the migration of users", data and processing from Desktop PCs (client system) and corporate servers to the cloud. [22] It also defines by [23] why not just move all processing power to the cloud and walk around with an Ultra-light input device with a screen? The Cloud computing brought a lot of services i.e. database, storage, backup, data replication, data protection and maintain the security of the services. [23]

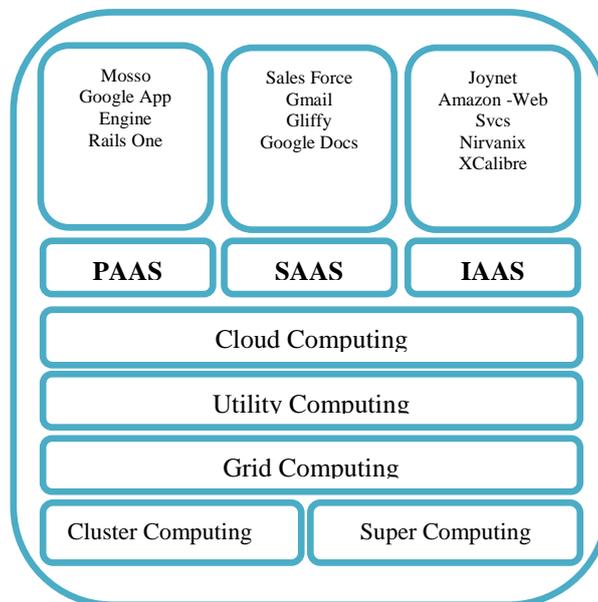


Figure 4.2 Cloud computing with different services / shapes [33]

There are different cloud shapes. The first one is Database as a service (Data center) means many companies have their own data storage in different location to support their business activities. Sun sparc served was an early data center like the Google which also has a strong data center to support their search engine and other applications. Today Google has more

than half million revolutionized data center models which are using the cheap technology rather than a power full mechanism. Some time the term cloud also described as self healing i.e. it recovers successfully if some server in cloud is down but it keeps on working continuously. That is why mostly the data center servers are located near the power stations. Many incoming organizations are going to the virtualization. The major vendors for virtualization VMware, Citrix are increasing their focus to increase the Virtue-Servers. The coming big invention is Cloud OS. The Google data center server is running their copy of OS to work together. They need abstraction layer of Intelligence software for effectively dividing of subtask and their allocation to the servers. But the best solution is a single server to utilize the resources of all the mechanisms called cloud OS. [23]

Let's see what is distributed computing? If we divide the task in to smallest parts and each job is executed concurrently somewhere in the cloud using free processing unit then we achieve best possible performance but in real time most jobs are mutually supporting. "Whether the cloud represents a data center at a single physical location or dozens, hundreds, or thousands of data centers spread around the world its speed and efficiency is limited by how intelligently it delegates responsibility". [23] The distributed computing started in the late 80's when most organizations reengineered their businesses to compete in the world market, so they need the distributed computing [24] Hadoop is a best step and a general frame work developed by Apache foundation and contains technologies like HDFS and Map reduce. [23]

The utility grid is also known as the infrastructure as services in which users are charged by utilizing the computer resources. It is also called as on-demand computing to reform the business model connected with IT products [25]. This model of computing is derived from the real world service model means that the users use services in daily life and pay against these services [26]. It is to selling the processing time mostly to universities, research center. As we discussed with enterprise organization, Google, IBM and Amazon have their own data centers so they are selling computer power, and storage. Amazons is the first to commercialize its cloud computing EC2. In which customer first create virtual image for software with provided tools then create instances of that image depending on their usage. There are three type of Amazon machine Instance (AMI). Recently IBM and Google are in collaboration developing utility grid for students by putting their dedicated server and run open source software and give the access to some universities [23], [40].

Platform as services or PAAS are generally hosted for web development. The Platform or partial environment is for developing program online. These services are editing the code, debugging, and development and also providing run time application management platform.

Google, Bungee Labs, Coghead, Etelos, LongJump, Rollbase and Sales Force are major SAAP providers. [27]

They support common programming languages like the Java, C, and PHP while others provide drag and drop facilities (GUI) to support software development. The Google support the programmer to work offline and after synchronizes their code online application while others provide support to the programmer for working online and provides tools to observe statistics for the usage of the development application, number of visitors, average time spend on the application while the visitors visit for a specific period of time, the key advantage, the developer will be informed about the crash. [27]

4.3.1. Cloud Computing Benefits

There are a number of advantages of cloud computing regarding the services.

4.3.1.1. Technical advantages

It is an easy way to handle in the peak load situations without need of any additional hardware infrastructures or equipment that would remain largely underutilized. All the Resources can be virtualized and presented to customers as virtual servers which they have to manage themselves. The second technical advantage of the cloud computing is regarding the data storage and its utilization and searching in the cloud that is not possible on the Desktop computer. The third technical advantage of the cloud computing is to use the resources on demand and also to recover and maintain them these recourses. [23]

4.3.1.2. Advantages for the User

The greatest advantage of cloud computing is to prevent the user from the traditional computing and the purchase of new devices and software. Through cloud computing users can utilize the hardware and software resources. The user has no worry about the configuration of the system, its storage capacity, capability, and allot of other matters they face while using a local system. They can get the latest and updated resources and services. [23]

4.3.1.3. Infrastructural advantages

Adopting a fast way to innovation in infrastructure and carrying the new ideas to unlock the new resources. The cloud computing allows the large companies to achieve a strong an efficient use of hardware/software that increase their profitability by improving their resources. This cloud computing also located in a position where the cost of the electric city is very low. [23]

4.3.1.4. Advantages for Companies

The cloud computing is very effective and has benefits for the small, novice, and medium level business companies to spent more money in designing their own infrastructure. While the large big companies are already moving to the cloud computing for reducing their cost, remote access, data protection and handling, easy way to accessing the data, real time collaboration and variety of other reasons that give them more benefits. [23]

4.3.2. Issues in Cloud Computing

There are different issues in the cloud computing as it is a new concept for computing. But two most important issues are as follows:

4.3.2.1. Privacy

The Privacy is a fundamental human right and not a privilege granted by authority. In fact it is required by each human being. [43] Privacy in cloud computing is found to be a major issue because Cloud needs high degree of trust among the users. [23]

4.3.2.2. Bandwidth

For the utilization of cloud computing application/services need a high speed with high bandwidth internet connection. [44] Lack of speed and low bandwidth are a cause for not accessing these services, so still there are a lot of questions regarding the cloud computing.

4.3.3. Software as a Service

Software as a service is form of cloud computing e.g. Google Docs. This term is used to provide software and application services to users as they need to access, are also defined as by [28] “Today, most of what we use the web on a day-to-day basis aren’t just web pages they are applications” [28]. Today’s web 2.0 is being used for delivering the software application services (SAAS) online with different web browsers. Shift of software service from desktop (Client) or personal computer to web brings many changes in methodologies such as application authoring, deployment and its usage. In this model software applications are no longer monolithic. Applications and processing of applications are segregated into distributed application logic and user interaction logic. Application logic and the user data resides on network cloud but interaction logic is delivering to user in the form of web pages user can view and interact with application by using web browsers. [29] As fundamental shift to cloud computing leads to the idea that who needs servers or desktops. The concept is internet enabled thin-client connected to cloud and moves all processing power to cloud, so in the web search engine was the first step in web-technology to the difference between web the client system does not need the space to work with its applications [23].

Ajax mostly uses desktop applications. The Ajax architecture is enhancing the user's integration with Web through Web browsers. There are many web application introduced with AJAX technology like the Google Map, Google Docs, Flickr. Ajax became more popular after adopting this technique by Google. AJAX model of communication brought with desktop facilities to the web application new changes in the web technology, and is a first step to the Cloud computing. [30] [31] E-mail was the first web application and is most used web services to communicate with others nowadays. The Google Docs, Adobe Photoshop Express are becoming popular in computing world on the Internet. These are free services to the users and are a big threat to those software companies whose major business is on desktop applications.

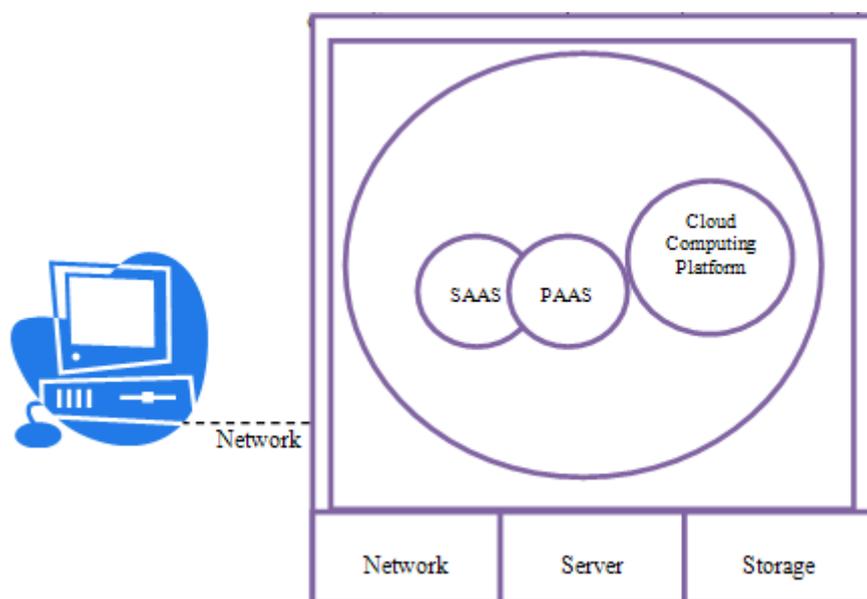


Figure 4.3 Example of software as a service [19]

The major advantage of these online applications is a decrease in the need for flash drives or the extra space for keeping the documents and files on desktop. You have your documents and other important data online, so it is reachable everywhere in world. [23]. SAAS is closing chapter of installation of software on local machine or there is no need to buy the new and updated version of application but the most prominent issues like privacy, security has in the SAAS because the users data is saved on the third party server. In the past SAAS application worked only when the user was online and connected with internet, but the Google introduced a Gear to the web application to save the data on the local web server and work in the file means it work in disconnected form. Google Docs use the Google Gear to save documents locally but still have limited accessibility. SAAS enable services provider to provide dedicated and customized services to users using common infrastructure. Great benefit of online software services is that service provider will be informed in case of bugs. Also service provider can get performance measures to improve their service. [32] Amazon web-services and Google Apps engine are promoting and enabling others to provide only

Software services [28]. Google Chrome new open source web browser is next step to SAAS. The given picture shows the cloud computing and its different cloud shape.

The important elements in information technology are true ability, valuable and economical contribution into cyber infrastructure. While the cloud computing broadens the cyber infrastructure and builds it to virtualization i.e. distributed, grid, utility computing, software services. It focuses on the services oriented infrastructure to facilitate the end users. [34] The Cloud computing in form of Software as a service are used by the users for rent or for free like in Google Docs as the students mostly use for academic and research purposes, while the businessmen use it for their business related activities. The Web2.0 is the part of Cloud and later will be presenting the most important feature for the web 3.0. [35]

4.4. Google

The Google nowadays considers itself as a leader in the search industry, online visiting industry for popular web based applications. Google has a popular word processing known as the Google Docs. The Google Company introduces web base application or debased software known as Google Apps having a package of Google Calendar, Gmail, Google map and many others. [37] The Google designed a vast data center after introducing technology that alternatively gives benefits to the company. The Google does not acquire from the user to install it and may need no space so the feature and products are going to be interdicted. It is still not very much popular as [49] Google Docs usage is only 1.6 million while the use of Microsoft is 500 Million systems and there is competition between both the companies for making money and more about to win the loyalty and attention of students.

4.4.1. Students Activities on Google Docs

Google provides a lot of web based services to people. They use these services for different purposes. These services are used for both academic and commercial basis like the most famous services are Google search engine, Google Maps, Google calendar, Google Gmail, hardware, enterprise, Google Docs, and many other services. The Google Docs is used in creating the word processor documents [37]. One of the suites for online applications that offered by Google for Collaboration of work. It is a web based software service that gives the facility of word Processor, spreadsheets and presentation to users. With the Google Docs the users can freely create their documents, upload their documents to save, edit, and support different format. The spreadsheet was one of first application of computer. While working on the spreadsheet you can also chat with the collaborator in the box in bottom. It is a way of collaboration to share their documents online at any time with sharing options for a group work. [37] [28] Last time I visited the Växjö University where the Library staff also use the Google Docs to share their comments on Library and for its improvement on a document

file. I also meet with some professor in BTH University who also use it because using this they can access their documents at home.

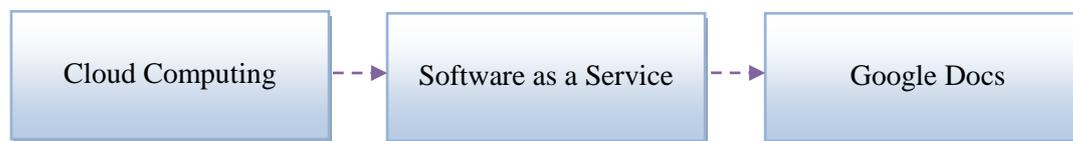


Figure 4.4 Shows the relation of Google Docs with Cloud Computing.

The Google Docs originated from, **Writely** and the **Google Spreadsheets**. The Product Writely was a separate Word Processor created by the third party software company known as Upstartle and launched in August 2005. Now Google Docs give features for mobile users to browse their documents on their mobile browsers and gives the facility to publish your documents onto the WebPages. It has a very simple interface that creates a close interaction with users and they can work very quickly. It provides a way to the students to work with it for academic and research oriented activities freely. Google Docs eliminates the need for collaboration with attachments and solves the attachments compatibility problems. The student shares the files with co-workers for collaborative editing on a project. So with this every one can access the online copy using Google Docs. When the editing is complete the users can also store the copy and export it also in the original format. [28]

It is used for both academic and business purposes but here we particularly discuss its use for students using it for academic or research based activities. It supports and assists the various types of students through different features in the same application. They access the Google Docs using any browsers with URL <http://docs.google.com>. With use of Google Docs the students can exchange the information and text based communication with their fellows and teachers for collaboration. Using this teachers can provide the guideline; comments to the students by sharing files features either to download or e-mail to the students. They can check the status of their assignments by viewing it with permission from the students. With the Google Docs students can also organize the work by date and in various folders on line. [36]In general, there are some general and common features of Google Docs for students for academic purposes as mentioned below: [28]

- **Group Collaboration:** The working on a single file at any project and create them for free. [28]
- **Track the work:** With the use of Google Docs where every member can track the work, ability and participation of every member in the group. [28]
- **Quick work flow:** To boost up the work flow and increase the productivity. [28]

- **Save and organize:** It provides the facility to the students to organize and save their data online without any risk to lose it from their personal computers. [28]
- **Publish your Documents:** You publish your documents so that it can be viewed by other users. [28]
- **Collaboration with teacher:** Students can also share their data with their teachers for guidelines and their productive comments on the report. [28]
- **Storage:** There is no need of more storage space on the desktop computer to create or store the documents file. [28]
- **Hardware:** No need to have the latest hardware in the desktop computer and compatibility issues while using the Google Docs. [28], [37]

4.5. Google Docs and Evaluation Methods and Techniques

The author is going to perform usability evaluation to gather student's requirements regarding the Google Docs. What is the contribution of Google Docs for academic / research perspective to boost up the educational activities for the students while they are working with Google Docs? How they can effectively use it to create, store, edit, and share their documents for academic purpose. With the experiments on students lying on the system and gather the chunk, and require to make it more usable as they are interacting with it and how to make these services more interactive and close to them.

There are a number of usability evaluation methods and techniques, mainly categorized in three types [15] depicted in the book "usability engineering", usability testing, Usability inspection and inquiry. The purpose of the usability evaluation is to test the products and services for users approaching and measure how effectual, resourceful and satisfied are the users while they interacting with it. The author uses the Usability testing/Inquiry to evaluate the Google Docs, during our experiments Think aloud technique is chosen. The goals of the usability testing are to test the Google docs for student's perspective. What, when and why to evaluate are all the questions belonging to usability evaluation. During the evaluation it is important to select the appropriate techniques for investigation.

4.5.1. Think Aloud Technique

The usability testing is type of usability evaluation approach that represents the participants and users working on typical tasks while interacting with a system (or the prototype) and the usability evaluators use the results to see how the user interface supports the users to complete their tasks. There are different methods used for usability evaluation but according to the surveys [14, 35] the think aloud techniques is familiar and valuable for usability testing used by the usability tester and evaluators. This technique was first time introduced in 1984 by Erikson and Simon to examine problems and its solutions that users face as using a

system but after that it is continuously used for human computer interaction [55]. Sometimes it seems very difficult and unnatural for participants to keep the steady stream for expressing when they are using the system but it is the most valuable method to evaluate the usability of a system. The main benefits of Think Aloud technique is better understanding of the participant's mental model and their interaction with products. Its second benefit is the way of expression the participants use in the experiments that incorporate into the products designing or also into documentation for improvements. [15], [3]

In the Think Aloud technique the participants have to perform a number of tasks in the experiments. During experiments, they have to verbalize their thoughts and experiences while interacting with the system and the observer observes and records their suggestions and comments on experiment. There are four minimum users participating in the test. The whole experiments are performed in the silent environments without any disturbance. [14], [16]

- **Advantages**

These tasks are performed in run time environment and all the values and comments are noted at the same time. [16]

- **Disadvantages**

It may be difficult to get all the participants think out aloud. [16]

- **Limitation**

According to [56], Testing is always an artificial way to test the product and test result do not prove the product/services work. The participant in the evaluation is rarely representative of the target population and the last one is that the testing is not always the best techniques to use.

4.5.2. Questionnaire

The questionnaire is well known for gathering the data form the users and is defined as "Questionnaire is a well known technique to collect demographic data and users' opinions" [14]. The questions to measure the user's satisfaction can be quite sophisticated such as the QUIS (Questionnaire for user interface satisfaction) method [54]. The Questionnaire is also like the interviews with open and closed ended questions. The Questionnaire is designed to be very carefully designed and give the clear meaning for which they asked. The benefits of the Questionnaires are that it gives more understanding to the evaluator about the topic in which they are asked.

In the open-ended Questionnaire the respondent is free to answers known as the subjective Questionnaire while in the closed-ended Questionnaire he/she is restricted to give the

answers of the question that are already mentioned known as the objective Questionnaire. One common thing in both the Questionnaire and interview is cannot be necessarily trust on all the users' answers or response again the question. [14], [15]

Mostly the Questionnaire are started with demographical and experience information, this back ground information of the users help the evaluator in finding out the range from the sample group and their experience and interaction with system. In designing the Questionnaire divide the long question in the short to facilitating the users, make the clear question and if you have mentioned closed question then increase the number of flexibility with number of possibilities. Avoid from the difficult question when use the scale then focus on the range is appropriate and also provide the clear instruction regarding the question. [14]

For Usability evaluation the use of Questionnaire due to number reasons: [53] repeatedly used in similar applications after completion of the design, cost effective, evaluator analyzed them by user's point of view and the last one is to make a reliable compression on the base of data is gather from the Questionnaire.

4.5.3. Interviews

The interview is a type of inquiry in Usability evaluation and is defined as "The Interviews can be thought of as a conversation with a purpose" by Kahn and Canell, 1957. The interview is based on the questions to be answered from the Users or is an ordinary conversation for some specific reason or motives. Interviews are used to collect the data from the users about the topic they are interested at. Interviews are also used to evaluate the usability of a system. [14]

There are four types of interviews 1 open-ended (unstructured) interview generate the rich data about the topic and are not predetermined, like a conversation, the interviewer go in to the considerable depth of the particular topic. Structured Interview is predetermined and they are more useful and appropriate when the interviewer is clear about the goals and he asks a number of related questions. 3 Semi Structure is a combination of structured and unstructured interviews while the small group interview is used in the social science research. The interviews depend upon the evaluation goals and also about the importance of the question to be asked. Each type of interviews has its importance according to the situation in which asked as for new ideas or new design with open-ended and to take the feedback for particular design then the structures interview in better. [14]

In conducting the interview avoids asking difficult, too many questions and also avoid from compound question and just divide them in to small phases. Use a clear language during the interview, avoid from the leading question and be attention during the interviews. These are

the common guideline for Interview conduction. In an interview the interviewer reads out question for the users and notes his/her response against the question. Ask the question in a natural way, encourage the users to answering and avoid agreeing and disagreeing with him while he is answering to the question. [14], [15], [51]

5. Empirical Work

This section is going to discuss the planning for usability testing and evaluation. The author uses the Think Aloud Technique for usability testing but before conducting the test. The author discusses the pre-test questions that are significant in designing and selecting the task list for experiments.

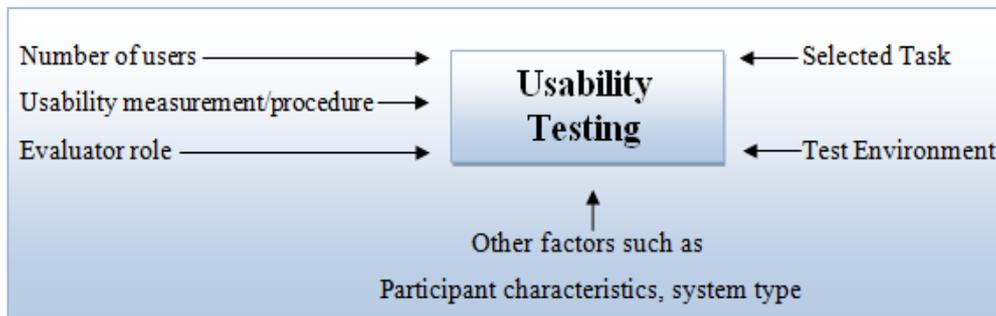


Figure 5.2 Adopted procedures for experiments. [53]

5.1. Usability Testing of Google Docs

Here the discussion is about the usability evaluation on the Google Docs; it contains the information about the assessment methods for usability. Students like and dislikes in Google Docs or their eagerness to work and their requirements. Does the Google Docs play its role en-route for helping the students for achieving their desired goals for academic and research purpose as they look ahead? The author conducts a usability test in the university and selects a number of students who have an IT related background. Before the test the author asks them some pre-test questions for general information about the Google Docs. After the test conduction there were some Post-test questions.

The post-test questions are exclusively designed for Google Docs functionality, usage and interaction with users. The whole test is perform in the University computer lab where the author acts as observer to observe the participants activation and record all the activities, participants observations, submission and expressions while they are interacting with the system in a digital camera. There were two groups of students, advanced and new users.

New Users: The students have no experience on Google Docs.

Advanced User: Students who is already acquainted with Google Docs

Table 5.1 Selected Participants

SR		Program	Male/Female
1	New Users	Computer Science/ Software Engineering	2/0
2	Advanced user	Computer Science/ Software Engineering	4/1

5.2. Test environment

The author selected the University computer lab for usability testing in controlled environments for better results by using same machine, web browser and connection speed. The participants had to perform the experiments on Saturday due to Weekend. The reason of selecting university computer lab is that mostly the university labs are free so the participants can give more concentration on the tasks due to calm environment. The participants performed the test in quiet environment on the same machine. The author also uses the recording camera for recording during the experiment. All the instruments were checked before the experiment to avoid from validity threats in data analyzing.

5.3. Pre-Test

The author conducted the pre-test experiment before conducting the actual experiment on the Google Docs. The purpose of this test was to gather maximum data and information, so in this regard two students selected from the computer science department who are already using this application. They used the Google docs during their Projects work to collaborate with each other in various academic activities. The pre-test was designed to find the important tools mostly students used in the Google Docs to determine the selection of productive criteria for execution of a usability testing and the chosen tasks design is optimal. The author wrote down all the necessary information and observation while the students were working on the system with Google Docs and took a short interview about the Google Docs. This information helped the author in the selection of tasks for Think aloud technique and to design a Questionnaire.

5.4. Test Conduction

During the conduction of usability test, the author got an understanding of how students interacted with Google Docs. The author used the Think Aloud technique to get information which was not possible to get with other method as the Preece in her book defined it as. The Think aloud is signification like in the visibility of operation and tasks and its recording, commands [14].

The participants came at their convenience and from the author a very quick welcome took place before starting the experiments, telling the users they needed to think aloud. To test the usability of docs.google.com the volunteer's students were asked to complete tasks on the Google Docs. The author gave the tasks list to each student that they had to perform during the usability test. According to the tasks list the students had to interact with Google Docs using the University Lab computer and performed the tasks that were given in the list. Before the experiment, the author gave a short consultation about the test and guidelines to the students. All the necessary information and instructions were also provided to the

students throughout the experiment. The experiment was performed in peaceful environment, so participants performed the test without any commotion on Google Docs with using the IE showing a blank screen in start. During the test, there was a need to measure the usability of Google Docs i.e. its services, accessibility and interactivity. The time given to each participant was noted before and after the experiment. When the students completed their tasks, there was a discussion about the experiment. These are the following tasks that were given to the students to perform in experiment. In designing and selection task is based on those area that were most intractable and according to the investigation [41].

Table 5.2 Test task list

LIST OF TASK FOR THINK ALOUD TECHNIQUE	
Task 1	<ol style="list-style-type: none"> 1. To login in Google Docs (http://docs.google.com). 2. Enter the Google ID for Login. 3. If you didn't have the Google ID then click on the button, get started for signup. 4. Fill the necessary in formations in the registration form to Google account.
Task 2	<ol style="list-style-type: none"> 1. After login in the file manager window, click on "New" button and select "Folder" option to create folder. 2. Save it with your desired "Folder" name. 3. Click on "New" button and select "Document" button to create the new documents file or upload the file form desktop system. 4. Click on "Untitled" option to give your desired "Document" name. 5. Enter the data and press "Save and Close" button while the advance users can also use the existed file. 6. Checked the new created document in the file manager window and press "Move to" button to move document in your desired folder. 7. Repeat the same previous procedure to create the presentation and spread sheet instead of Documents file. 8. In the file manager go to the search bar and type the query to search desired document.
Task 3	<ol style="list-style-type: none"> 1. In the file manager, select the created file. 2. To share the file, select the Share button and click on "Share as others". 3. Share the file as collaborators by giving with desired email Id. 4. Click on "Invite Collaborators" button. 5. In the new message window, type the message and press "Send" button.

	6. Again repeat the same procedure and invite as viewers.
Task 4	<ol style="list-style-type: none"> 1. In the file manager window, select the saved file to perform the additional task. 2. To view the hidden files click on link named “Hidden” from the left menu and same procedure for unhidden. 3. Select the file with check box and press the button “Delete” 4. Checked the desired file from the main window and go to the “More Action” button to “save as PDF” or any extension. 5. Logout from the Main window.

5.7. Recorded:

Test Participants were free to express their thoughts and ideas that they had in their mind. The observer noted and recorded is given below.

1. Time-spent on each task.
2. Usability problem/error for each participant.
3. Successfully completed/uncompleted task.
4. User satisfaction.
5. Their comments and feedback in the end of experiment.

5.6. Tasks Related Questionnaire

The author distributed the tasks related Questionnaires to the participants to measure their satisfaction level regarding the tasks that they had performed in the experiment. Were the instructions, information, instruments and material that provided to them was enough to understand the tasks and experiments. The questionnaire is given in the Appendix 1.

5.7. Questionnaire for Usability Evaluation

The author designed the questionnaire for participants and distributed it after the experiments. The author also sent some copies to other students who have also used the Google Docs for academic purposes. The questionnaire was designed to collect the users understanding and experiences with Google Docs. The author received about 21 responses from different students. The results and analysis of the Questionnaire is given in the next chapter. The Questionnaire was designed to measure the usability of the Google Docs and students requirements regarding it.

The author asked the questions in the questionnaire with selected criteria for Google Docs evaluation, Satisfaction, Simplicity, Learnability, Aesthetic, Completeness, Consistency,

Motivation, Error, Prevention, Memorability, Reliability/secure, Predictability, and Adaptation. The Questionnaire was designed with the entire possible question that supported the author to find out the students requirements as well as usability issues. There were two types of question in the Questionnaire i.e. the open-ended question and the closed ended question to collect the important information. The selection of question and criteria is adopted from the different authors. [12], [13], [50]

5.8. Interview

In the interview, the author asked questions to students about the selected application before and after the evaluation. The interview was taken from different students that comprised of both open-ended and close ended questions [14]. The author wanted to inquire about the students views regarding Google Docs. What are their needs and are they willing of such type of application in general way. It also contained the question particularly about the Google Docs performance and its drawback for student's point of view. The author gathered a lot of data regarding the Google Docs and student comments for improvements and validation. All the student response and answers regarding the Interview are given in the Appendix 3.0.

6. Results/Analysis

This chapter shows the results that are derived after analyzing the collected data from students with usability evaluation methods. There are two types of results that are given in this chapter first the result extracted from the Think Aloud (TA) in which number of students participated while the second results are derived from the questionnaire.

6.1. Tasks related questionnaire Results

After the experiment the author distributed the questionnaires among students who participated in the experiments for finding their satisfaction level against the information, instruction, materials and instruments that were provided to them during the experiment.

Table 6.1 Tasks related questionnaire

SR	Criteria		Level1 A	Level2 B	Level3 C	Level4 D	Level5 E
1	Satisfaction	1,2,3	5	2			

A: strongly agreed. **B:** Agreed **C:** Not sure **D:** Dis-agreed **E:** Strongly Dis-agreed.

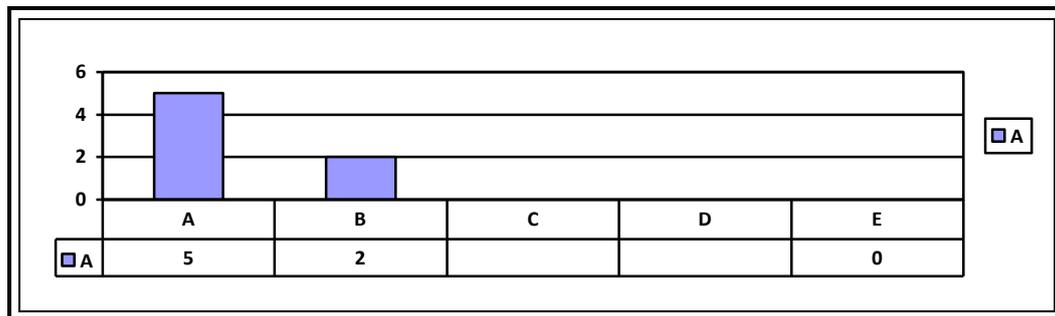


Chart 6.1 Graphically representation of table 6.1

The Chart 6.1 shows the level of student's satisfaction after the experiments. Here alphabetic values from A to E show the level of satisfaction. A & B bar inside the chart shows the level of satisfaction for available information and guidelines during the experiments. There are total seven students participating in the experiments and five of them are in the category of strongly agreed (A-bar) with the guide line provided to them in their experiments and two students are in category of just agreed as shown in the chart with B-bar.

6.2. Experiment Results

Seven students participated in the experiments had to perform the tasks according to the given time and schedule. The author recorded the participants' comments while they were talking during the interaction with the Google Docs in experiments and suggestions. In Think Aloud technique (TA) each participant individually executed the test in the University

Computer Lab. The author selected two types of participants in the experiment the group 1 were the advanced users and group 2 were the new users.

Table 6.2 Usability test result

Participants	Total time (Minutes)	Task 1 (Minutes)	Task 2 (Minutes)	Task 3 (Minutes)	Task 4 (Minutes)
Students 1 (New User)	38	6 / U	21 / U	6 / U	5 / C
Students 2 (New User)	39	7 / U	19 / U	7 / U	6 / U
Students 3 (Advance User)	20.5	0.25 / C	16 / U	2 / U	2 / C
Students 4 (Advance User)	15.7	0.20 / C	11 / C	2 / C	2.5 / C
Students 5 (Advance User)	17.35	0.35 / C	13 / C	2 / C	2 / C
Students 6 (Advance User)	29	1 / C	23 / U	1 / C	4 / C
Students 7 (Advance User)	13.40	0.40 / C	10 / C	1 / C	2 / C

The above table shows the result and statistics of each participant who performed the experiments on Google Docs. The new users did not complete all the tasks in given time while the advanced users also had the time variation. The author noted the time against each task and the number of errors, successfully completed and uncompleted tasks in the experiment.

6.3. Experiments Observation

In this part of chapter the author discussed the results that he got after analyzing the data from the users. In the task 1: the five students completed the task timely and two students failed to complete the task on time. Task 2: three students completed the task and four students failed to complete it. Task 3: The four students complete the task and three could not complete within the given time or due to any error occurred as they were performing the task. Task 4: Only one student left the task uncompleted. The student's performance during the experiments is given in the graph below.

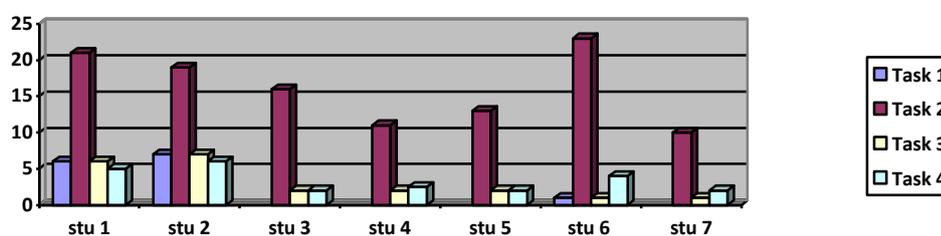


Chart 6.2 Graphical representation of table 6.2

Task 1:

- The author found that the login page was very simple and provided the complete guideline to the students for login. To create ID for Google Docs is easy but the problem that students faced on Google Docs was after completing the account form

about the verification message, it took much time and without any confirmation access to carry on.

Task 2:

- Students created the new folder to store the files very simple and satisfactory. But student failed to save the files in any folders, it also does not show its location after creation when the other spot is chosen.
- The practice to change the file name is not very much clear at the time of creation.
- The procedure for new documents is not very much consistent because the students like to open in the same window moreover to go next page.
- To upload a document some time give error message temporary interruption.
- There is deficiency in user control especially in the spreadsheet. Word Editor does not have sufficient tools that students need to work, design, editing for graphics.
- The students can't resize the tables; limited fonts and size are available.
- There is no save and close button in Spreadsheet editor as in the Google documents and Google presentation. With change of system and browsers some time language setting repeatedly changes. There is no help provided inside the editor that guides at run time.

Task 3:

- The students easily select the file to share it with each other but it is not very much consistent due to number of supplementary proceedings.
- The students like search bar to search their documents very quickly.

Task 4:

- The students select the file for additional tasks. The button name "hide" and "unhide" not clearly give its meanings and purpose.
- For deletion the selected file in the file manager windows some time bestow the systems errors.
- The way to save the file in PDF format some time crashes the system.
- Some time the system generates error "system response time error" while students save some data in Google Docs account.

6.4. Experiments Analysis

The results that the author attained in 6.1 in tasks related questionnaire helped the author to validate the usability experiment from the user's perspective. The findings of the author is going to demonstrate that Google Docs is a great innovation by Google for students to save their data and access it anywhere even they are travelling using internet.

- By using the Google Docs students can edit and create new documents, presentations and spread sheets freely. It is designed especially for collaboration to share the data and to work collectively in a project to share ideas. The interface of the index page is very simple and helpful by providing the maximum guideline how to login and create new ID for Google.
- The students like its features predominantly its contents list which can be automatically added from Gmail. It is way to store the data online and protect it from viruses that can damage the data.
- There is no need to buy the costly desktop applications and latest hardware for compatibility. Most of students like the search bar to search their documents quickly and the feature to get file in various file extensions and format. Google plays an important role in providing the services to students for academic purpose. After the experiment on Google Docs to evaluate the usability problems from students the author found demerit as mentioned below:

6.4.1. Severity assessment

- During registration process for new users it is simple and quite visible but the system could not detect and verify the user e-mail during registration and without any authentication the user can enter in to the Google Docs and also confirmation message takes time.
- The available interface of Google Docs for working is not very much consistent as studied that the inconsistency creates problem for users to interact with system.
- The editor for word processor provides only the limited tools for working, as the students desired some advanced tools. It is difficult for students to create and formulate their documents specially. There are inadequate drawing tools because the students mostly have to create some graphics table. Selection of colours is also limited, no page rollers and divider are available for the text formation, and the use of contents is also not very much useful for the students to work easily.
- Google Docs still does not support the docx extension file format that mainly students used while working in the university computer and the limited size of file is allowed to upload documents. Spell checker or dictionary is not very much proficient as it is available in the Microsoft office to correct spelling.
- The file didn't remain at the same location while sharing it with other students. The entire way must be more efficient and easy for sharing the file and consistent with single step for sharing. The search bar searches the file efficiently but the students acquire in expanding the search criteria to find directory and other articles and reports that are help full for them in productive way.

- The layout for creating the spreadsheet is not the same as for documents or power point. It doesn't contain the user control for working because there is no proper link and way to save and close it.
- Sometimes the system does store the data while the students working with a file and give a message like the system response time error and some time give a message temporary services interruption during uploading a document.
- The help provided in the Google Docs is adequate for understanding and there no link for swift feed back in case of some problems.
- There is no drag and drop facility to upload more than one document at the same time.
- The documents does not remain their original shape and settings when the students upload and import them in Google Docs e.g. text format, graphics and table structure and also there is no proper tool to reshape and adjust the columns and rows in table.

6.5. Questionnaire Results

The author follows the procedure to design the Questionnaire according to the research work. The author sends Questionnaires to students for the evaluation of the Google Docs by e-mail. The author received only 21 responses from students. The students have different thoughts and thinking regarding the Google Docs, but mostly they have the relative comments very significant for the evaluation. The author designs the criteria for questionnaire according to the guide line taken form literature [12] [50].

Table 6.3 Questionnaire Feedbacks

Criteria	Question	No of Response	Level 1 Strong-Agree A	Level 2 B	Level 3 C	Level 4 D	Level 5 Strong-Disagree E
Satisfaction	1,2,5, 13, 18, 23	21	17%	24%	25%	29%	5%
Simplicity	8,9,10,11	21	19%	30%	28%	13%	10%
Learnability	15,16	21	33%	31%	24%	7%	5%
Aesthetic	21,22,24	21	13%	28%	38%	19%	2%
Completeness	6	21	5%	33%	38%	19%	5%
Consistency	25	21	24%	14%	24%	28%	10%
Motivation	3,4	21	21%	24%	31%	14%	10%
Error Prevention	12	21	10%	47%	24%	14%	5%
Memorability	14	21	28%	48%	14%	10%	0%
Reliability/	20	21	10%	19%	24%	34%	13%

secure							
Predictability	7	21	10%	5%	38%	29%	18%
Adaptation	17,19	21	31%	29%	12%	23%	5%
Total			18.416	27.666	26.666	19.916	7.333

A: strongly agreed. **B:** Agreed **C:** Not sure **D:** Dis-agreed **E:** Strongly Dis-agreed.

The above table shows the percentage of the student’s response against the criteria that the author had chosen for usability evaluation of Google Docs and also to find their requirements and comments for the importance of Google Docs in their education / research activities. Each criterion is comprised on one or number of questions. The author calculates the percentage of each.

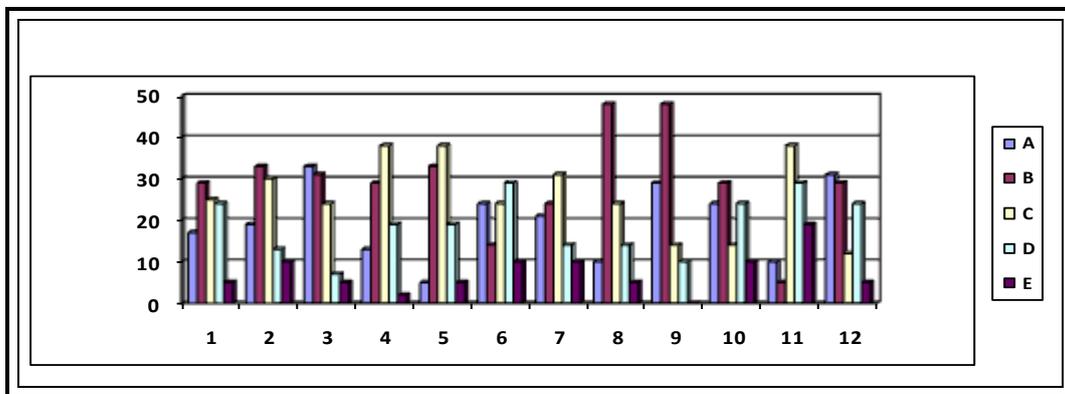


Chart 6.3 Graphically representation of student Feedback

This chart depicts the weightage in graphical format where the given numeric values from 1 to 12 shows the each criterion and alphabetic values from A to E describe the scale of the agreeing and disagreeing of the students against the given Questionnaires.

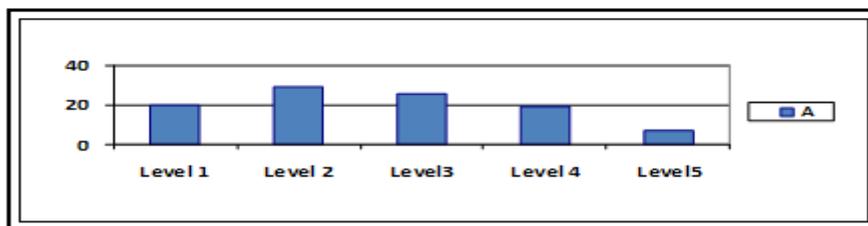


Chart 6.4 Overall results of Questionnaire

A: strongly agreed. **B:** Agreed **C:** Not sure **D:** Dis-agreed **E:** Strongly Dis-agreed.

The chart 6.4 shows the overall response of the students concerning the Questionnaires. Average 20 percent students are strongly in agreeing with statements in the Questionnaires while the 29 percent are agreed and 26 percent students are not sure. In disagreed statements the percent of the students is 19 percent and 7 percent students are in the category of strongly disagreed.

7. Discussion

7.1. Discussion

In gathering the student requirements and after analyzing the results taken from the investigation the various issues and difficulties came to light. To sum up, this case study showed the careful usability, evaluation of Google Docs to find the usability problems in the system and students requirements against these problems and services. The author used the Think Aloud technique and questionnaires for Usability evaluation. The author derived results and statistics through the usability testing and Questionnaires. The interviews helped the author to meet their requirements. In this chapter the author will discuss the results, finding from evaluation methods. The first part of this chapter depicts the discussion on the selected criteria while the second part is about the validation of data.

7.1.1. Satisfaction

The author in the questionnaire calculated the satisfaction about the system from students. The satisfaction means, how pleasant was to use the system? The system is fit for the users to work and also to ensure the acceptability according to the literature review. The students are not very much satisfied with Google Docs while they were working. It does not attain the student's requirements, as they wanted to obtain from it. They wanted it to be more useful by accumulation and functionality. The system provides only the basic tools for working, consequently not attaining the students requirements e.g. editing tools, drawing tools, limited fonts, size of fonts is also a major drawback for formal writing and search criteria, these are basic requirements of the students to design a good documents while they are working on their projects. One more factor regarding the student's dis-satisfaction the system response time is very slow that reduces the overall performance for working. Students don't want to store their personal data on the online space due to **privacy issues** as discuss later in 7.1.2.

7.1.2. Reliability/Secure

Reliability is concerning the privacy issues/accessibility the most of the students don't want to store their personal data online at remote location where they have no control over the information to be secured. According to the statistics collected from students feedback author has come to know that most of the students don't want to store their personal data at online space. The ratio of students concerning privacy issues is 47 % who don't want to store their data on line. And 29 % students are agreed who have no privacy or security issues regarding storage of their data on remote location while the 24 % students have no comments on this issue.

So the students are not sure about their personal data that at which location it is being stored whether it is secure or not. They still have doubts in their mind about privacy issues. That is

why mostly students prefer the desktop applications to store their personal data. Security and privacy issues regarding data are the main hurdles for students to store their personal data on cloud computing based applications. The second issue is the accessibility because these applications depend upon the availability of internet and bandwidth available to them. Web based applications give slow response as compared to desktop applications so definitely these applications need more bandwidth to get maximum benefit from these applications. Due to privacy/bandwidth and limited tools in Google Docs student not use it consistently is big threat for author to evaluate the desired results.

7.1.3. Simplicity

Most of the students are satisfied with Google Docs because it is quite simple to use and have only the relative information to communicate with application. It also provides meaningful information to interact with it for users.

7.1.4. Learnability

Learnability means the system is designed in a way that the first time users interact with system and easily perform the basic level tasks. In case of Google Docs students can easily perform the tasks by attaining the Learnability from the system. Students are satisfied with the Learnability of the system.

7.1.5. Aesthetic

Aesthetic means do not contain the irrelevant and rarely needed information that may be distracting users when they are performing task. In case of Google Docs aesthetic means all the information is presented in a meaningful way to support the user for performing the task. But some icons are not very clear as they are hide and hidden and its purpose.

7.1.6. Completeness

In the case of Google Docs students are satisfied with the existing tools on system to complete their tasks for editing, sharing, creating and searching their files from the store location. But sometimes it shows the system time error when the file size is increased.

7.1.7. Consistency

The consistency means the similar tasks to achieve the preferred action. The system does not provide the consistent layout for working, as the students require it for sharing, creating new documents because the lack of consistency in the system is a major problem and complexity for the students using the system.

7.1.8. Motivation

The system supports the students in the selection of correct action to execute and complete their task they want. According to the questionnaire most of the students agreed that the system motivated them while they are going for some action.

7.1.9. Error Prevention

In case of Google Docs the system supports the users to prevent from the error. They can quickly recover the mistake e.g. if they mistakenly share their documents with strange person so in this case it provided a support to stop it by sharing. But sometimes it is difficult to use the Undo because it takes some time.

7.1.10. Memorability

In case of Google Docs the system is memorable after using it; the users can again easily establish the proficiency with it. It also supports the simplicity and Learnability of the system. According to the questionnaire, students are satisfied with memorability of the system.

7.1.11. Predictability

The Google Docs is not fully predictable because students does not meet the acquire outcome as they need from it. Most of the time in creating the documents, editing and designing they didn't meet desired outcome from it.

7.1.12. Adaptation

Adaptation means it can only understood in the context of users. The students are willing to adopt the system because it provides them a facility to collaborate with each other for projects or to share their ideas; it also provides them facility to manage and create their documents and access them anywhere. The great facility for students to communicate with each other using a word processor for team work but they can also share their research work or assignment with their teacher for comments. By using this feature they can publish their documents for all to share their ideas. That is most interesting facility that interact the student to adopt the Google Docs.

7.2. Validation

The data validation in mixed methodological research is based on the type of chosen research strategy for the course of action that the author has mentioned in his research proposal. The most part of this research report is comprises of qualitative research to get the students requirements for the Google Docs. The author adopted the criteria for validity proposed by the Guba and Lincoln. [38]



Figure 7.1 Adopted procedure for validation

The four criteria for the judgments i.e. Credibility, Transferability, Dependability and Conformability are used for validation.

7.2.1. Credibility

Means the results based on qualitative research are credible from the participant's point of view, the participants judge the result of the qualitative research. So in this regard the author gave the interview of the 14 students in the appendix1 [38].

7.2.2. Transferability

The transferability means the results can be applied in other contexts. The Zoho writer is also a word processor that provides the same services and tools to users like Google Docs. The possible threats are that students mostly use the desktop application for working and rarely they use the Google Docs / Zoho word processor when they working on the projects so they have limited experience. One more threats is that the Google Docs does not support the Docx extension while in case of Zoho it does not allow to import the PDF format and to save it. Some other threats like all the participants have the same cultural and educational background may effect on the results. [38]

7.2.2. Dependability

Dependability means the changing in time and setting affects to results. So the researcher has to define all the changes with respect to time and settings. The author selects the students from the university and performs usability experiments on Google Docs in the University on weekends and the test is conducted at the same time in sequence but separately. The author sends the questionnaire to the students and after analyzing the system in the experiments. [38]

7.2.3. Conformability

Conformability means the other researcher confirms the results that the author attains after the usability evaluation. The author notes the entire finding and results from the usability

evaluation in documentation format and follow the rules and guidelines are given in the literature or books to design a usability test and questionnaire for users. [38]

Moreover to validate the experiment, the results attain in testing are also similar to the results that author attain from questionnaire.

8. EPILOGUE

This part of the thesis contains conclusion, recommendation on the base of usability assessment and future work.

8.1 Conclusion

The purpose of this research work is to identify the student's needs and requirements regarding the Cloud based application (Google Docs) as well as the usability issues. To explore the Cloud computing its importance and benefits for students in education, the author has selected the Google Docs. The Usability evolution conducted with students from the university and the use of literature for understanding and possible support for usability evolution. The selection of students was based upon their previous experience in Google Docs. The students were divided into two groups to evaluate it for both experts / novice's user's point of views. The whole experiment was performed in the University where information and guide lines were provided to them and careful consideration was undertaken to keep the environments controlled. Finally the author compared results taken from the Usability testing and questionnaire to evaluate the Google Docs. The results were validated for Google Docs with student's interview.

From answers to the research questions author analyzed that the Google Doc is a great innovation by Google. It helps the students in academic activities but still is not providing the feature that they need to full fill their requirements and craft it as trustable for students. To make its more effective for students, there is a need to support the system (Google Docs) with advance features rather than basic features that acquires more effort. That alternatively reduces the efficiency and makes the users unsatisfied while working with it.

8.2. Recommendations

The question in this research report to be explored is regarding students need and requirements for achieving their desired goals from this web based application. To find these requirements from students, author selected the Goggles Docs and its importance for students in their educational activities. In this regard the usability testing is conducted with students from the university, in addition to the use of questionnaires and interviews for possible support during investigation. The analysis of the results showed that the Google Docs is a great innovation by Google that contributes for attaining the students' requirements. It aids the students for their long term benefits in the form of rich and smooth flowing text, in the past it is also known as word documents preparation used for the creation of any print able documents. But there are still some issues for creating improvements in the Google Docs concerning the students.

- Registration for the first time must acquire the email confirmation and authentication to continue it.
- Most of the students did not consider it as reliable resource to store their personal information on the Google Docs due to privacy and accessibility issues; they always prefer to store their personal data on their own computer and leave it as a trustable source for storage. This is main reason and threat for author in searching for valuable information.
- They require it to be more consistent in file share and in creation of new files. The students want all the process within the same interface. The spreadsheet interface has less user control.
- There is no availability of advance tools for creating; editing and colour selection must be improved so that the students can work efficiently by utilizing the entire feature.
- In writing of academic and report there are sometimes the mathematical formulae, citation these are not supported by the Google Docs. Limited font's style and size is also a major drawback for formal writing while the page roller and page divider are not available.
- There is need for improvements in the processes of saving and uploading the documents as sometimes it generates the system response time error. Some time documents are not deleted from the server while publishing cause a privacy issues.
- Students need capacity for uploading the documents file more than 500 KB because the Google Docs not allow them to upload the Documents file having size more than 500Kb.
- There is need for rectification in function because some time formatting of text is distressed when Google Docs auto save the data. While working online and reading page, some changes occur then the cursor leap to the top.
- There is no help provided inside the file manager interface for understanding as normally it is available mostly inside the software and desktop application.
- The students needs if e-mails with attached documents are also included in the Google Docs in separate folders so they can manage their received documents or by integrating it with Google Scholar for expanding the search criteria in the Google Docs.

8.3 Future Work

The findings are very important for improvements in Google Docs for making it a trustable cloud based application. Further to improve the Usability of Google Docs, there needs to uncover and solve the privacy issues for attaining the users trust. The author is interested to

cover these privacy and accessibility issues in future work and should try to explore the gap between existing web based technology for integration. To design an interactive application that provides valuable services to the users for academic purpose.

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Appendix A: Tasks Related Questionnaire

Below the table shows the number of statements used for participant's satisfaction about the experiment.

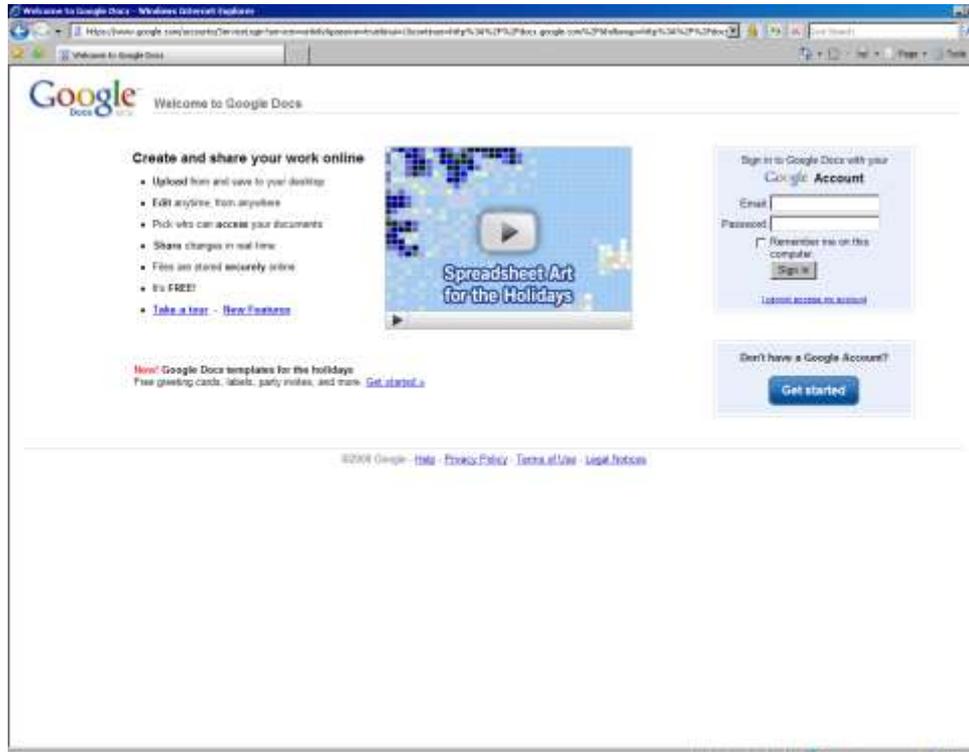
Sr	Tasks Related Questionnaire	STRONGLY AGREE A	B	C	D	STRONGLY IDSAGREE E
1	I am satisfied with the ease of completing the tasks in this scenario					
2	I am satisfied with the amount of time it took to complete the tasks in this scenario					
3	Overall, I am satisfied with the support information when completing the tasks					

Appendix B: Questionnaire for Usability Evaluation

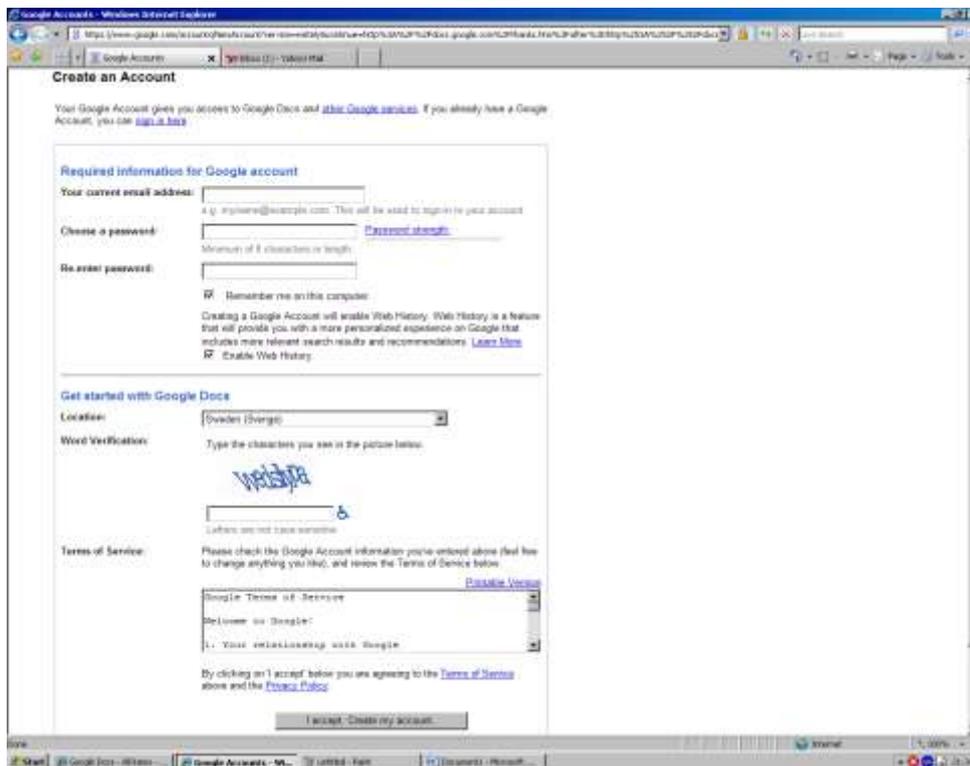
Below the table shows the number of statements used for evaluation.

Sr	STATEMENTS FOR QUESTIONNAIR	STRONGLY AGREE A	B	C	D	STRONGLY DISAGREEE
		1	2	3	4	5
1	It helps me to be more effective					
2	It helps me to be more productive					
3	It gives me more control over the educational activities					
4	It makes the things easier that I want to accomplish easier to get done					
5	It saves my time when, I use it					
6	I meets my requirements when I am working on it					
7	It does everything, I would like to do and expect from it					
8	It is simple to use					
9	It requires only the fewest steps possible to accomplish what I want to do with it					
10	Using it is effortless					
11	Both occasional and regular users would like it					
12	I can recover from mistakes quickly and easily while using it					
13	I can use it successfully at every time					
14	I easily remember how to use it					
15	It is easy to learn to use it					
16	I quickly became skillful with it					
17	I would recommend it to a friend.					
18	It works on the way I want it to work					
19	I feel, I need to have it					
20	Is it reliable and secure to safe and store your data files online					
21	Organization of the information remain the same on every page					
22	Reading characters on the screen very effective					
23	Over all reaction to application is satisfactory.					
24	Designed for all levels of users					
25	Does the system remains consistent					

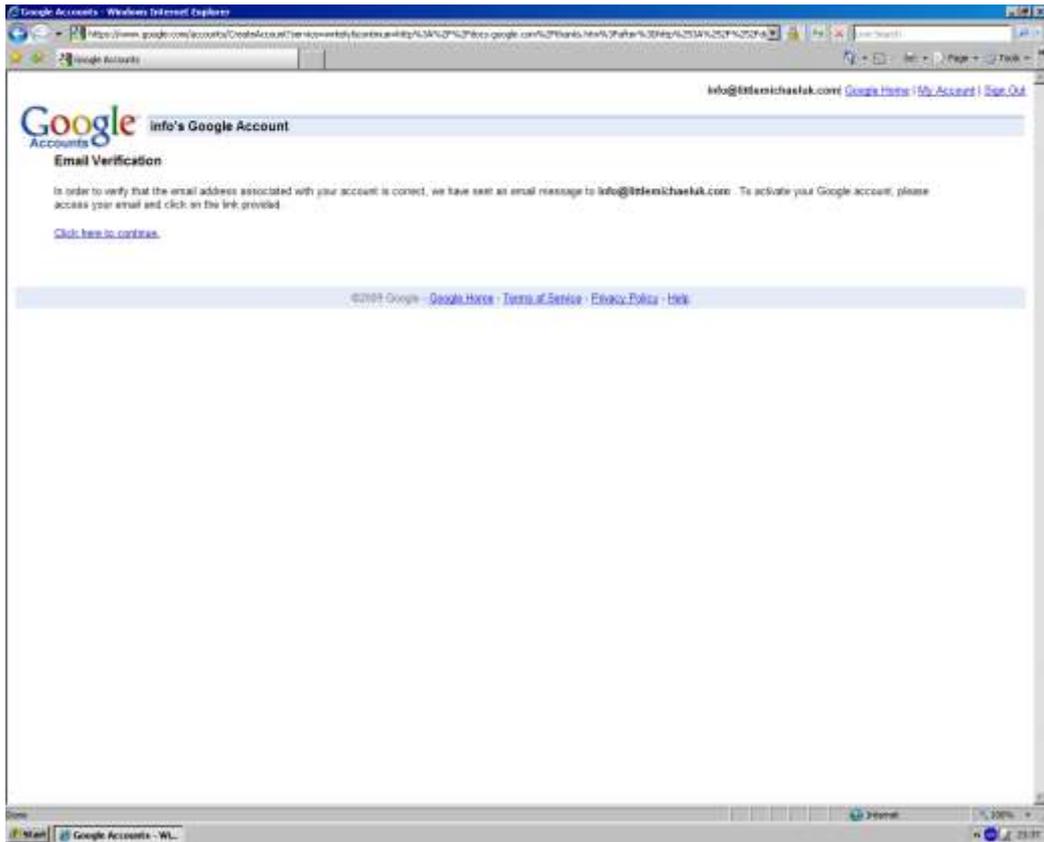
Appendix C: Screen shots of Google Docs



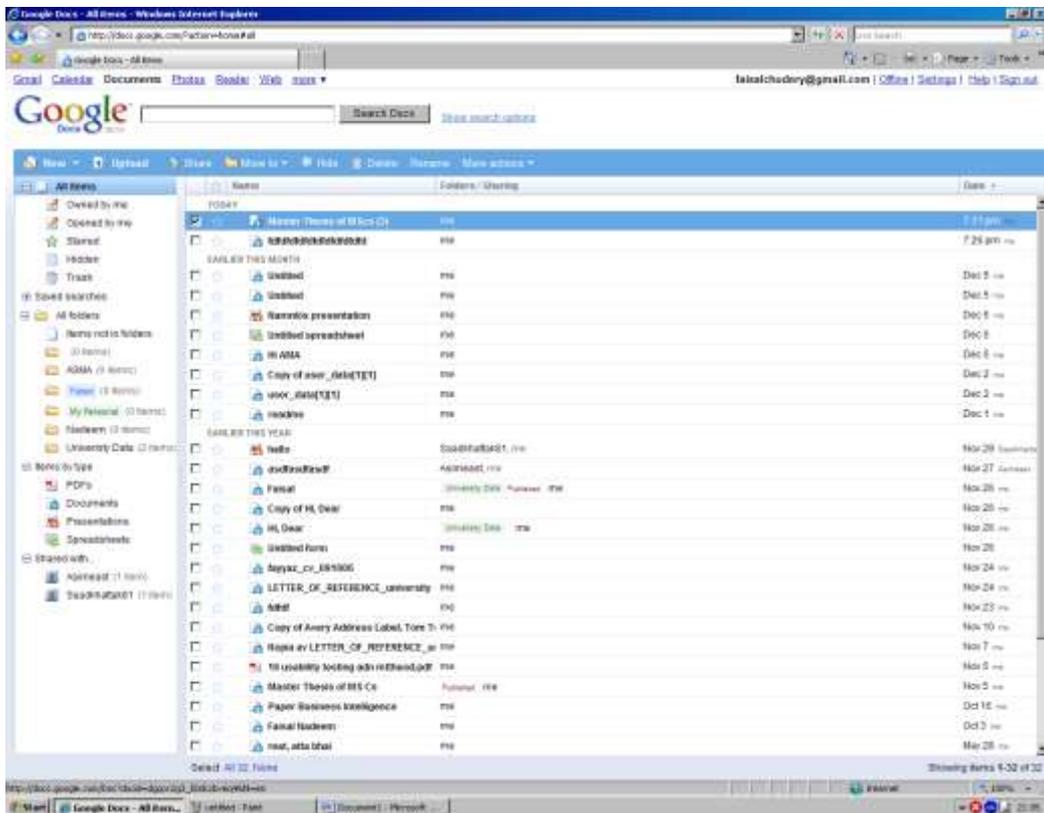
Screen1. Login Page



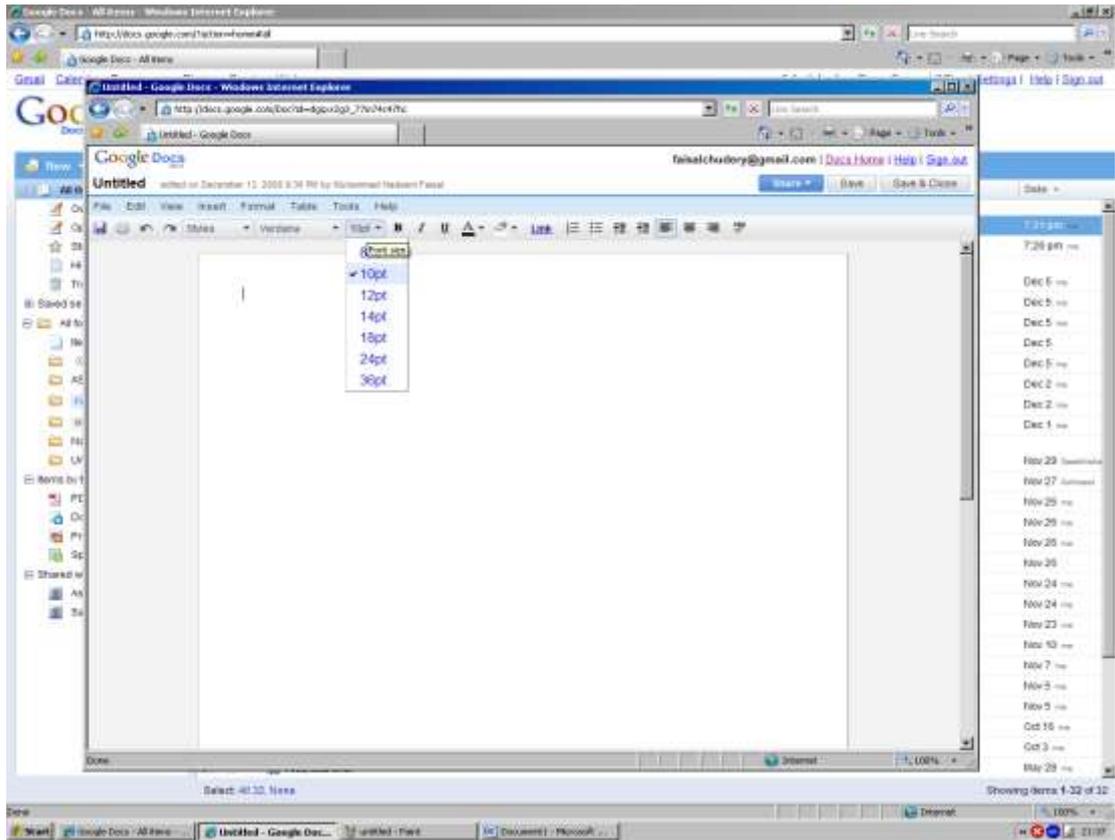
Screen2. Page for creating new ID



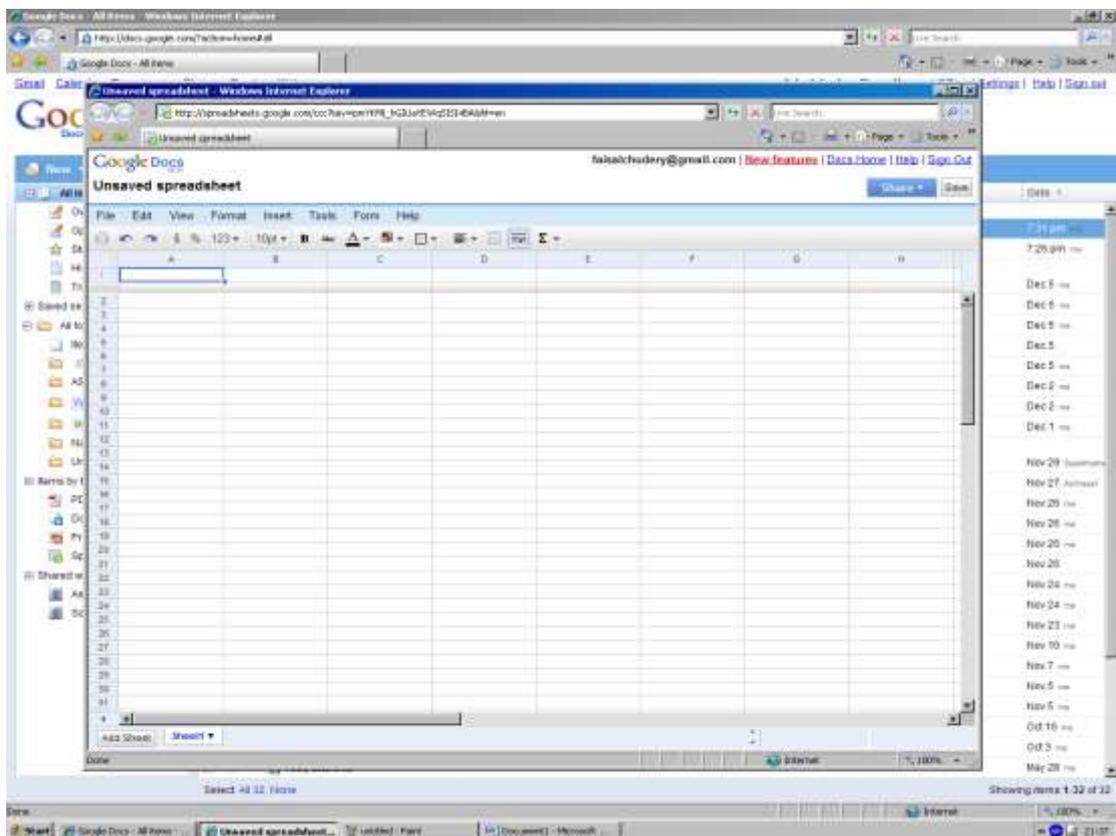
Screen3. Showing the verification message and to continue to Google Docs.



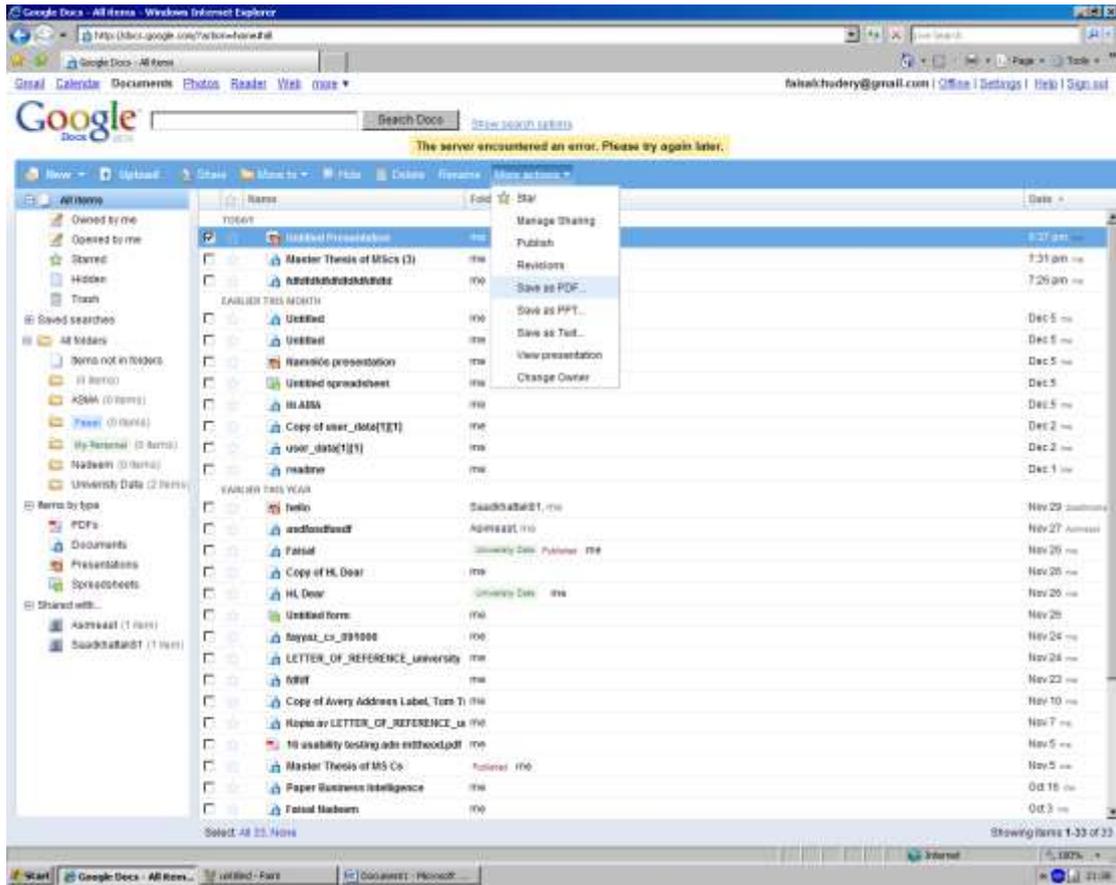
Screen4. File Manager Window in Google Docs



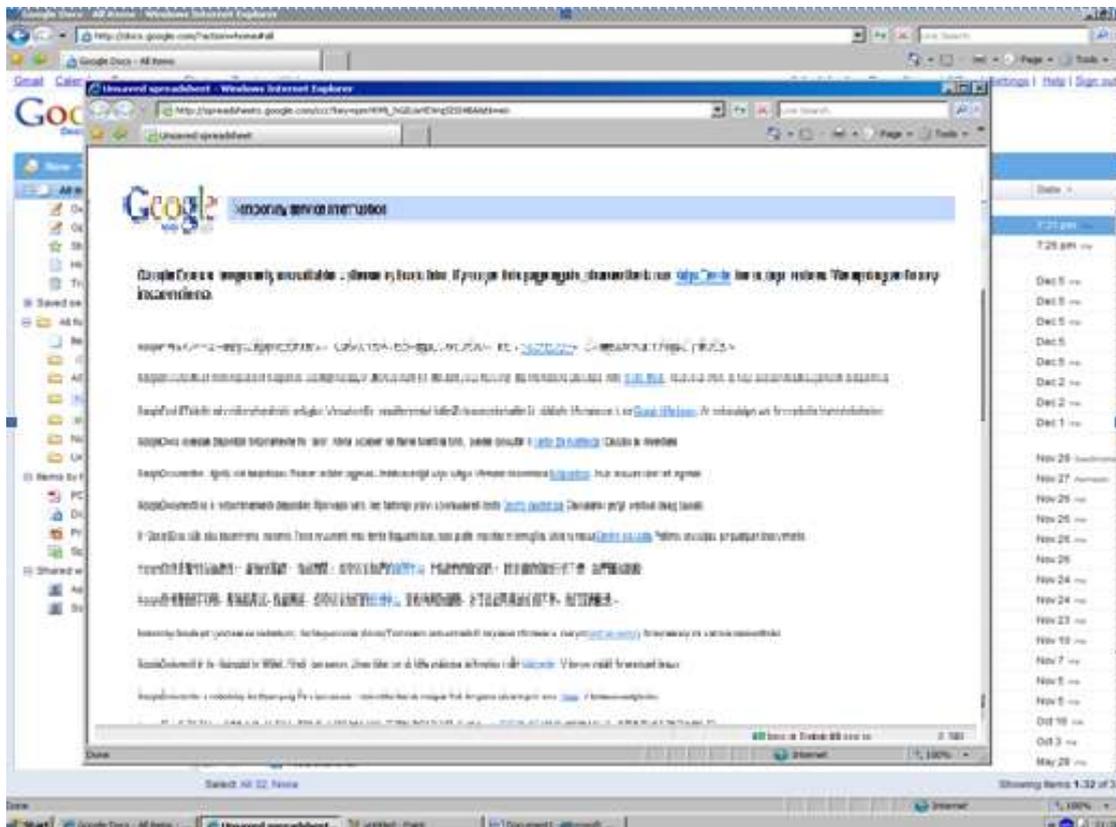
Screen5. Word Editor



Screen6. Spread Sheet Editor



Screen7. File Manager



Screen9. Temporary Interruption Message

Appendix D: Interviews

Student 1

Q: What was your first impression of the Google Docs?

Ans: certainly it was new application for me and therefore it is considered different for me regarding of many aspects like document should be maintained with internet facilities at same time and we would have the opportunity probably to get the PDFs, Documents, presentations, and spreadsheets using the Google docs environments. It is newly, moderate and strange environment for me at the first time.

Q: What is your purpose or needs to use the Google Docs?

Ans: It is indeed important to use the Google docs for purpose of PDFs, Documents, presentations, and spreadsheets as well we could share our document through internet with our friends. The most interesting thing is to make the file inside in this Docs environment instead of to use the MS office packages.

Q: What is the most interesting thing you find in this Google Docs?

Ans: The most overwhelmingly interesting things that we have found in Google documents are the utilization of the MS office packages inside and share our file at the same time with friends through internet facilities.

Q: Which one is most difficult/not understandable part on this Google Doc?

Ans: Perhaps I don't have faced any difficulties but some time we have the problem to find out the possible button or file or folder in order to carry out our job. It means its environments is developed little bit difficult to understand and operate the specific business and must be consistent.

Q: What are the benefits of the system in your opinion?

Ans: The interesting things which is very important is the saving of any file into different aspects and other hand we would have to be considered significant for educational purpose because we have the opportunities to acquire many aspects of this Google docs inside rather we have to go to open or use other environments like MS word, PDF etc.

Q: What are the drawbacks of the system in your opinion?

Ans: The hindrance or drawbacks where we have thought is the sharing of the file with friends if it should be had in one application not like gradually it opens the window for several businesses or purposes. Is our data is protected or save

Q: What are your further requirements regarding the Google Docs?

Ans: Yes being Student's we have several requirements to utilize we would like that it should be include the all those facilities where we he to need for development purpose like these facilities are available in the MS word. We need the database aspects little bit just the

connection to access the database accessibility and also to cover the maximum privacy issues.

Q: What is your opinion to improve this online application for academic purpose?

Ans: For educational purpose the current status of the Google docs is considered more significant but for the online purpose different modifications or adjustments should be made for example if we have the accessibility to acquire all knowledge where we don't have the accession of the institutional environments. We could have to understand easily the online expectations of the teachers. It should be included the requisition where it is considered important for the distance learning education as well as in institutional education system. The Student's should be had all those requirements where an institute provides to them online. If we have to make more modify the Google Docs for the educational purpose then it be proved one of the crucial application package in future for the Student's. And the document form the Gmail automatically add inside the Google Docs

Student 2

Q: What was your first impression of the Google Docs?

Ans: Good opportunity to work online. No need to purchase "MS office".

Q: What is your purpose or needs to use the Google Docs?

Ans: My need is to save the data all time and I access it when I want it.

Q: What is the most interesting thing you find in the Google Docs?

Ans: I can work with "Document", "Spreadsheet", "Presentation" and "Form" file at one time in one application.

Q: Which one is most difficult/not understandable part on this Google Docs?

Ans: Formatting of text and number of option but not in proper form.

Q: What are the benefits of the system in your opinion?

Ans:

- This is free facility to work online.
- Reliable source to save data but online.
- Full fill the basic need of the user.
- User can access it, anywhere and anytime.

Q: What are the drawbacks of the system in your opinion?

Ans:

- No graphical presentation of the options and services.
- Difficult to manage text of the documents.
- Some time system doesn't save the data, it provides the message, and server is busy.
- Very limited help is available, how to use Google Docs and it must be consistent.

Q: What are your further requirements regarding the Google Docs?

Ans:

- Graphical presentation of the option and services.
- Manage the data in more proper form
- More easy to use Google Docs

Q: What is your opinion to improve this online application for academic purpose?

Ans: Need more graphical presentation, how to use different options.

Q: What type of guideline you need to make it more understandable?

Ans: Present the help when user selects the option.

Student 3

Q: What was your first impression of the Google Docs?

Ans: It was very good, before this, I need online office service like “MS Office”.

Q: What is your purpose or needs to use the Google Docs?

Ans: Google Docs is the good facility to work online, no need to worry, lose data. We can work online. We can online manage document in different folders, we can upload different type of document. Google Docs is not providing full office facilities but it is providing a lot which I need.

Q: What is the most interesting thing you find in this Google Docs?

Ans: The most interesting thing is, I can work online anywhere and anytime and my data is available all time.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: Formatting of the documents is the difficult task as compare to “MS office”

Q: What are the benefits of the system in your opinion?

Ans: It is free. I can use it in anywhere and anytime. No need to worry hardware specifications.

Q: What are the drawbacks of the system in your opinion?

Ans

There are some drawbacks when I use it for example:

- Some time it is difficult to find out recent file, to search it, it is require refresh the “all items” link.
- Formatting of text is difficult as compare to MS office.
- Some time it is difficult to use “undo” option.
- Some time it is very hard to save data, Google Docs response, server is busy.
- Some time formatting of text is disturbed when Google Docs auto save the data.
- The documents creation and sharing is not very much consistent.

Q: What are your further requirements regarding the Google Docs?

Ans: Due to more requirements, it is necessary Google Docs provide more option to organize and formatting the text. For example: past special, insert shapes, WordArt, table and chart, justify the paragraphs. Little bit improve the documents protection.

Q: What is your opinion to improve this online application for academic purpose?

Ans: Provide more option to manage and use Google Docs.

Q: What type of guideline you need to make it more understandable?

Ans:

- Advertisement of the Google docs.
- How to use Google docs when I use it.
- Educate me when I use any function. For example: Google Docs provide help text on the right side when I press any function to use it.
- There is link for Gmail where the documents automatically add in Google Docs

Student 4

Q: What was your first impression of the Google Docs?

- a. I felt that now I don't need to copy all of files to usb or other storage areas. It's would be helpful in group work.

Q: What is your purpose or needs to use the Google Docs?

- b. My purpose is to store all of my important files on Google docs so that I can access my files anywhere in secure manner

Q: What is the most interesting thing you find in the Google Docs?

- c. We can store all types of files separately and organize well.

Q: Which one is most difficult/not understandable part on the Google Docs?

- d. I don't understand the purpose of hidden files.

Q: What are the benefits of the system in your opinion?

- e. It's helpful to share file more quickly and easily. You can share files that help in group work. You can organize your files well.

Q: What are the drawbacks of the system in your opinion?

- f. Shared files would be misuse.

Q: What are your further requirements regarding the Google Docs?

- g. I want to see its interface like windows and there should be more efficient search feature.

Q: What is your opinion to improve this online application for academic purpose?

- h. For the academic purpose Google need to add some educational tool like dictionary (computer dictionary, medical dictionary). Google should also add academic search related features. There should be some feature to help in group work like make your group on Google docs.

Q: What type of guideline you need to make it more understandable?

- i. The interface is very nice and easily understandable but Google should make upload feature more efficient. It should be like you copy and paste your documents. Google should provide a short email address instead of complex to send or store files into docs.

Student 5

Q: What was your first impression of the Google Docs?

Ans: As computer Student's I can easily to utilize and communicate the site.

Q: What is your purpose or needs to use the Google Docs?

Ans: The many purpose you can place your documents easily, any format, something like personal drive of your personal computer.

Q: What is the most interesting thing you find in this Google Docs?

Ans: The most attractive that I like i.e. Items by type.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: Share document it's difficult to understand and not in consistent way.

Q: What are the benefits of the system in your opinion?

Ans: Form any documentation point of view like a thesis, projects, survey, and Presentation its Play a good role.

Q: What are the drawbacks of the system in your opinion?

Ans: Its same look like as email

Q: What are your further requirements regarding the Google Docs?

Ans: Setting the interface as look like window XP...such as start menu select the Specific documents or go to exit document as save in the specific folder

Q: What is your opinion to improve this online application for academic purpose?

Ans: Section wise division and cover the criteria for privacy.

Q: What type of guideline you need to make it more understandable?

Ans: It is hard to define but the upload fine it's easily can understood.

Student 6

Q: What was your first impression of the Google Docs?

Ans: Good impression. Was amazing

Q: What is your purpose or needs to use the Google Docs?

Ans: It helped me in group assignments

Q: What is the most interesting thing you find in this Google Docs?

Ans: Online sharing and track changes.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: Can't say anything because I haven't used its all features to tell about it

Q: What are the benefits of the system in your opinion?

Ans: Time saving, knowledge sharing

Q: What are the drawbacks of the system in your opinion?

Ans: While working online and reading page 1, and some changes occur then the cursor jump to the top, then you have to scroll down, it's teasing. I mean inconsistent.

Q: What are your further requirements regarding the Google Docs?

Ans: To import export every type of files. Support programming tools and files. More toolbar, like editing tools, drawing tools etc

Q: What is your opinion to improve this online application for academic purpose?

Ans: To add some standard template for writing like IEEE or ACM etc

Q: What type of guideline you need to make it more understandable?

Ans: Learning CDs or online Demos.

Student 7

Q: What was your first impression of the Google Docs?

Ans: Good

Q: What is your purpose or needs to use the Google Docs?

Ans: Usability and more space

Q: What is the most interesting thing you find in this Google Docs?

Ans: Simplicity

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: Very easy, one can understand all things

Q: What are the benefits of the system in your opinion?

Ans: You can preserve important documents and in case of your data crash at your hard-disk. You can take it from here

Q: What are the drawbacks of the system in your opinion?

Ans: You can only upload files not folders or two big files

Q: What are your further requirements regarding the Google Docs?

Ans: I can upload a zip folder and can make it my online database by having lot storage space

Q: What is your opinion to improve this online application for academic purpose?

Ans: Connect it with different universities and published article databases

Q: What type of guideline you need to make it more understandable?

Ans: Usability good, so no need of that. Just need of increasing more features

Student 8

Q: What was your first impression of the Google Docs?

Ans: It's a great opportunity for me to work remotely from anywhere so first impression is good.

Q: What is your purpose or needs to use the Google Docs?

Ans: I can work remotely and can work when sometimes I don't have Microsoft office installed at some ones pc or my own pc.

Q: What is the most interesting thing you find in this Google Docs?

Ans: We can easily share our files and data with others.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: I did not find any one which I think is difficult for me.

Q: What are the benefits of the system in your opinion?

Ans: We can work anywhere, save our files and share it with others.

Q: What are the drawbacks of the system in your opinion?

Ans: As we all use Microsoft office so if we compare it with that it's still not up to mark. Many features still we can't find in Google docs. When we want to open two or three files every file is opened in a separate browser window.

Q: What are your further requirements regarding the Google Docs?

Ans: It must be equipped with more options. Its interface must be improved and should be easily understandable for common user that is not much familiar with computer.

Q: What is your opinion to improve this online application for academic purpose?

Ans: It must have some extra features to satisfy user's requirements.

Student 9

Q: What was your first impression of the Google Docs?

Ans: Google has the reputation of secure, fast and reliable services, and I signed up instantly.

Q: What is your purpose or needs to use the Google Docs?

Ans: I don't have to carry my documents and copies with me everywhere. ICT enabled services are available everywhere, so I can download and print anywhere, as needed. Moreover, I can let anybody I want to have a look on my documents, which may be necessary in a critical situation.

Q: What is the most interesting thing you find in this Google Docs?

Ans: That service is free and secure. Then I have my documents with me where ever internet is available, so I'm paperless.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: I don't find any, so can't comment.

Q: What are the benefits of the system in your opinion?

Ans: If used properly, it can save me from much trouble, especially when I'm traveling and don't have required documents and my laptop with me.

Q: What are the drawbacks of the system in your opinion?

Ans: If somebody has security related information like passport and banking documents and carelessly attempts to use this service from a public place, chances of identity theft is there.

Q: What are your further requirements regarding the Google Docs?

Ans: Login should have to be secure, and graphic password entering mode should be Available like some banks has deployed so you just click and don not type, which Enables to escape key loggers at public and un secure places

Q: What is your opinion to improve this online application for academic purpose?

Ans: Don't have to carry thesis in pen drives all the time, then no need to go to supervisor every time, they can have a look on ongoing progress while online. Similarly, writing groups can collaborate and see what is going on, and who is writing what.

Q: What type of guideline you need to make it more understandable?

Ans: It is ok; don't think I will need any guideline to work with it

Student 10

Q: What was your first impression of the Google Docs?

Ans: It is helpful and more easily to handle all the documents. Using the Google docs I handful to use the BOX for the same purpose. But when I start using the docs Google it has a lot of options which satisfy all my needs.

Q: What is your purpose or needs to use the Google Docs?

Ans: The main purpose is that I can quickly upload my documents and my documents are secure from virus.

Q: What is the most interesting thing you find in this Google Docs?

Ans: The most interesting thing I find in the Google docs that the popup window to save my documents.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: The most difficult part is to hide the documents each time I am confused with the two options HIDDEN and HIDE.

Q: What are the benefits of the system in your opinion?

Ans: In Google docs I can save large among of data in a hurry and it does not take to much time to upload the file.

Q: What are the drawbacks of the system in your opinion?

Ans: The main thing is that the Google talk service if this feature is available here then I can also communicate with my friends and family in the same window of the Google Docs.

Q: What are your further requirements regarding the Google Docs?

Ans: I suggest that the drag and drop feature is available there then it is more helpful to upload the large number of files in a single click.

Q: What is your opinion to improve this online application for academic purpose?

Ans: In my view if this service is link with some other third party service like IEEE, ACM etc then this will be more helpful for the academic.

Q: What type of guideline you need to make it more understandable?

Ans: No idea in my view its working perfectly.

Student 11

Q: What was your first impression of the Google Docs?

Ans: Great innovation

Q: What is your purpose or needs to use the Google Docs?

Ans: To be able to access my documents and edit them anytime

Q: What is the most interesting thing you find in this Google Docs?

Ans: Ability to save in different formats

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: Updating docs

Q: What are the benefits of the system in your opinion?

Ans: Mobility, easy distribution

Q: What are the drawbacks of the system in your opinion?

Ans: Inability to open saved diagrams and possible parameters for defined security

Q: What are your further requirements regarding the Google Docs?

Ans: Accurate rendering of images

Q: What is your opinion to improve this online application for academic purpose?

Ans: Image rendering, support more characters

Q: What type of guideline you need to make it more understandable?

Ans: Tooltips and an animated assistant

Student 12

Q: What was your first impression of the Google Docs?

Ans: It was good but first time it was hard to understand the different functions of Google docs to perform. It was looking very different but not complex to creating, modifying and sharing documents with friends.

Q: What is your purpose or needs to use the Google Docs?

Ans: I use Google Docs to prepare simple word documents, presentation and excel sheets. But for effective word documents and presentation I have to use Microsoft word, Power point and Excel sheets. But benefit of this Google Docs is that I can share these documents

with my group members. I can work here online and document is saving online. I don't need to attach or email.

Q: What is the most interesting thing you find in this Google Docs?

Ans: Preparing and sharing Documents online is most interesting part of Google Docs.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: There is no difficult part in Google Docs.

Q: What are the benefits of the system in your opinion?

Ans:

- a. I can work on documents online.
- b. I can share documents with friends.
- c. Can prepare Word, Excel and Power point documents.
- d. It is easy to interact with its interface.

Q: What are the drawbacks of the system in your opinion?

Ans: The system performance overall during accessing and manipulating documents is good while preparing documents, it does not support professional Microsoft Word drawing tools, Effective Microsoft power point presentations and Excel Spread Sheets not solving and supporting Mathematical Formulas bar.

Q: What is your opinion to improve this online application for academic purpose?

Ans: Google Docs should be more users friendly so that user can feel no obstacle to access, read and write documents. It should have more functionalities of word and should be able to share documents in more appropriate method. It should be similar like hotmail or yahoo mail.

Q: What type of guideline you need to make it more understandable?

Ans: User interface should become simpler.

Student 13

Q: What was your first impression of the Google Docs?

Ans: Looks user friendly, where I can easily upload my documents and can share with others.

Q: What is your purpose or needs to use the Google Docs?

Ans: Its provide the facility to save our data online instead of saving of desktop , anywhere we can access data , can share it with others.

Q: What is the most interesting thing you find in this Google Docs?

Ans: If we share our folders with others, we can see any updating in data online.

Q: What are the benefits of the system in your opinion?

Ans: We can save data online; no need to worry how much capacity hard disk has to save data.

Q: What are the drawbacks of the system in your opinion?

Ans: We must need internet to access data, if some where there is no facility of net, some where there can be bandwidth problem to access data, what will be in that case.

Q: What are your further requirements regarding the Google Docs?

Ans: Functions should be consistent and error free.

Q: What is your opinion to improve this online application for academic purpose?

Ans: Functions should be consistent and error free. Links should be simple, meaningful and on left side, easy to access and understandable.

Student 14

Q: What was your first impression of the Google Docs?

Ans: The first impression was good to use the Google docs. Because Google docs is providing to us online create documents facility.

Q: What is your purpose or needs to use the Google Docs?

Ans: You keep your record online. Any where you want. You can access your document online. Google Docs is online, so I can access my documents from home, from school, from work during my lunch break, wherever. This isn't really so important to me since I bought a laptop, since I'm now carrying my computer around everywhere, but it's nice to have an online backup. It's also nice that I can now access my documents even when offline.

Q: What is the most interesting thing you find in this Google Docs

Ans: the most interesting thing is that you can hide your personal documents in Google docs.

Q: Which one is most difficult/not understandable part on the Google Docs?

Ans: it is little bit difficult if new user used it. Some option is not clear visible.

Q: What are the benefits of the system in your opinion?

Ans: you keep your file online database. But it's nice to have an online backup.

Q: What are the drawbacks of the system in your opinion?

Ans: some function is not easy to understandable. You will do more searches for desire function.

Q: What are your further requirements regarding the Google Docs?

Ans: in my opinion make it more users friendly.