



E-Learning for Simulating the Behavior of AJAX

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Abstract: Education is essential to everybody to lead their life efficient. In this modern world, many new technologies are emerged to make the things better. One such technology is Computer and Internet. Now-a-days, the computer and internet are the two essential things which play an important role in our life. So, in order to make education computerized and also make it easy for students, E-Learning is the only solution. E-Learning is the technique which made the education online that educates the person only through online without any manual guidelines. It is important to explain everything clearly. To make this process, we use the artificial model called Simulation. Simulation is another technique used in E-Learning to provide an artificial model to explain the concept experimentally. In this paper, we implement the simulation model in the E-Learning technique. This can be done to explain the AJAX concept. AJAX is the acronym for Asynchronous Java script And XML. In this paper, we propose a method to simulate the concept of AJAX in E-Learning technique. Thus this paper provides efficient proposed method to explain the AJAX with simulation model in E-Learning technique.

Keywords: AJAX, Artificial Model, Computer, Education, E-Learning, Internet, Manual Guidelines, Simulation.

I. INTRODUCTION

Learning makes a man perfect. Education is the stepping stone to lead a successful life. This education is computerized and it leads to E-Learning. E-Learning is the technology that provides education electronically or systematically. To explain the concept clearly, simulation is taken into account. This E-Learning can be of two types with respect to the implementation of Simulation model, such as Static and Dynamic.

In **Static Model**, only one approach is taken into account. That is, no inputs are taken into account to simulate the process. Just a kind of approach is considered. Thus a static model does not interact with the user. For example, In Static model, if the architecture is built for addition of two numbers and it is tested with the inputs such as 15 and 25, only just add these numbers and provide the same result always (i.e) 40. No other inputs are taken into account and the explanation of the process is somewhat difficult.

In **Dynamic Model**, the process is more different and almost more contrast to the static model. In this model, different approaches are taken into consideration. In this approach, same model is used to provide response to different approaches. It performs differently, by interacting with the user to get the input. Based on the input, the model provides different approaches. For example, In dynamic model, the architecture is just built in order to accept all kinds of inputs such as 15 and 25 or 13 and 12 or 15 and 15 and so on. For these inputs, this model shows the memory allocation process and also provides better result such as 40 or 25 or 30 and so on.

Thus this paper uses the most advanced model such as dynamic model approach to explain the simulation model of E-Learning. In this paper, the technology such as **AJAX (Asynchronous JavaScript And XML)** is taken to simulate its process in E-Learning. Thus this paper proposes better solution for simulation and E-Learning.

For developing Web Applications, we just use HTML to design the web page. In order to process the page, scripting evolves. In this scripting, there exist two types:

- Client-Side Scripting
- Server-Side Scripting.

In these two types, some difficulty occurs. To overcome those difficulties, AJAX evolves. The explanation about these three technologies is as follows:

A. Client-Side Scripting:

This Client-Side Scripting is used to process the client request in Web Browser itself. The client provides their request in a web page. The server processes the request and produces the response to that same page itself. The client's information is not necessary to be retrieved by the server. When it is simulated, it contains some what difficult.

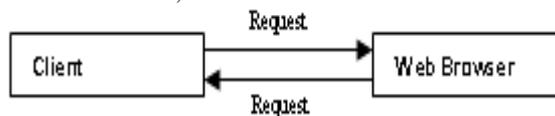


Figure-1: Process of Client-Side Scripting

B. Server-Side Scripting:

The Server-Side Scripting is used by the client to create the web application with respect to server processing. In this type of scripting, the process is carried out by the web server instead of web browser. In this case, the client and server are appeared to be two phases. The client sends request in first phase through the web browser. The web browser redirects the request to the server. The web server processes the request and provides response to the client in the second phase. The result is displayed in separate page of web browser.

In Server-Side Scripting, the server processes the request and provides response in another page. Thus the request and response are placed in two different pages which will be seemed to be difficult. To overcome this difficulty, **AJAX** technology is evolved.

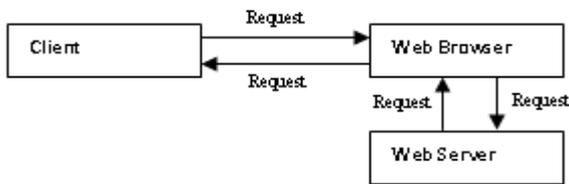


Figure-2: process of Server-Side Scripting

C. Ajax:

- It is a technology, not a programming language.
- It is used to enhance the web application, that is used to create fast and dynamic web pages.
- It is used to update the web page asynchronously by exchanging data with server behind scenes.
- It is used to update part of web pages without reloading the whole pages.

AJAX is also a Server-Side Scripting, but it does not show the server processing to the client. Thus it seems to be easy.

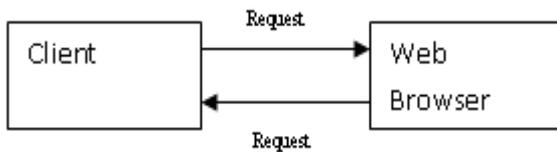


Figure-3: process of AJAX

Thus, based on the importance of AJAX technology this paper proposes a new method to implement the AJAX technology in the E-Learning Process.

II. RELATED WORK

To implement the concept of simulation model to explain the functionality of AJAX in the E-Learning technique, we analyze the works done by other researchers which are related to E-Learning. The papers we referred are given below:

In paper [1], the aim of the journal was to help them better understand each other's role in the overall process of education and how they may support each other. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to Educational Technology & Society and three months thereafter. The scope of the journal was broad. Following list of topics was considered to be within the scope of the journal: Architectures for Educational Technology Systems, Computer-Mediated Communication, Cooperative/ Collaborative Learning and Environments, Cultural Issues in Educational System development, Didactic/ Pedagogical Issues and Teaching/Learning Strategies, Distance Education/Learning, Distance Learning Systems, Distributed Learning Environments, Educational Multimedia, Evaluation, Human- Computer Interface (HCI) Issues, Hypermedia Systems/ Applications, Intelligent Learning/ Tutoring Environments, Interactive Learning Environments, Learning by Doing, Methodologies for Development of Educational Technology Systems, Multimedia Systems/ Applications, Network-Based Learning Environments, Online Education, Simulations for Learning, Web Based Instruction/ Training. The motivation for the paper [2] discussion was to look at the cognitive and logical rationales of e-Learning objects, which resided in computer-based e-Learning artifacts. E-Learning objects, the system to which they belong, and the sequence of messages that form a discourse between the system and its

environment are inseparable. Altogether, they formulate the "Universe of Discourse" (Wieringa, 2003, p. 14). When we talk about systems, we equally refer the discourse to e-Learning objects because they were the "workers" of the system. E-Learning is "a combination of content and instructional methods delivered by media elements such as words and graphics on a computer intended to build job-transferable knowledge and skills linked to individual learning goals or organizational performance" (Clark & Mayer, 2002, p. 311). The sciences of instruction, learning, and knowledge were intricate and the "e-" before "Learning" adds another dimension of complexity while paving new learning paths for e-Learning.

In the paper [3], entitled "Web Intelligence and AIED", Vladan Devedzic, surveyed important aspects of Web Intelligence (WI) in the context of AIED research. WI explores the fundamental roles as well as practical impacts of Artificial Intelligence (AI) and advanced Information Technology (IT) on the next generation of Web-related products, systems, services, and activities. The paper [4] surveys important aspects of Web Intelligence (WI) in the context of Artificial Intelligence in Education (AIED) research. WI explores the fundamental roles as well as practical impacts of Artificial Intelligence (AI) and advanced Information Technology (IT) on the next generation of Web-related products, systems, services, and activities. As a direction for scientific research and development, WI can be extremely beneficial for the field of AIED. Some of the key components of WI have already attracted AIED researchers for quite some time – ontologies, adaptivity and personalization, and agents. The paper covered those issues only very briefly. It focused more on other issues in WI, such as intelligent Web services, semantic markup, and Web mining, and proposes how to use them as the basis for tackling new and challenging research problems in AIED.

In paper [5], Web 2.0 was a new buzzword being used in the Internet these days. The concept had become popular after the discussion was made in 2004 between O'Reilly and Media-Live International. Although most people claim that Web 2.0 was the second phase of the World Wide Web development, it was not apparently clear what it means and what it takes. However, the proponents of Web 2.0 formulated the seven principles characterizing the current practices which are explored. This paper presented the process of implementing the concepts of Web 2.0 in E-Learning by integrating different tools into the concept which will help users learn fast and interact effectively while using E-learning website. In this paper[6], it describes a simple heuristic approach to solving large-scale constraint satisfaction and scheduling problems. In this approach one starts with an inconsistent assignment for a set of variables and searches through the space of possible repairs. The search can be guided by a value-ordering heuristic, the min-conflicts heuristic that attempts to minimize the number of constraint violations after each step. The heuristic can be used with a variety of different search strategies.

In paper [7], an e-learning system based on Ajax has been developed. Ajax enables Web users to upload user commands and download new information without the need for a page refresh. Various e-learning tools called "SQL on Ajax," "Hint display by Ajax," "Page display by Ajax," etc. are proposed in this paper and implemented in the proposed system. SQL on Ajax, a statistical tool to obtain test score statistics, is introduced to realize a useful and expedient statistical method without any page refresh.

In the answering subsystem, with Hint display by Ajax, when a correct answer was not received, a hint was provided just below the answer field in a textbox on the Web page without a page refresh. Moreover, when creating a test question on a Web page, the entire training page containing the Web forms for entering the answer was also displayed concurrently on the same Web page (Page display by Ajax). In this paper, methods to effectively apply Ajax to such e-learning systems as well as the advantages of such applications are discussed. The system configurations and processing procedure of Ajax are also presented.

The paper [8], proposed Weblog or Blog is common for the people in the world nowadays, including who works in the education field. People use it because of the easiness. Some of lecturers use it to share their class meeting material to their students. Others use it to share their documents or presentations of research and workshop. They also can upload the multimedia contents to the Blog for describing the knowledge more detail. However, the Blog features are not the same with the Learning Management System (LMS) features. The LMS software usually provides the facility to do the eLearning activities, such as giving a quiz to the students, sending the assignments to the lecturer, and grading the assignments. Blog does not provide those eLearning features. It needs additional elements/widgets provider to provide the eLearning facilities. By combining the eLearning widgets from several providers to the Blog, people should get the benefits from the easiness of using the Blog and easiness of providing eLearning activities. Presently, there was no widget provider who was really support eLearning activities to their Blogs. Users have to combine several widgets from different providers to give all the eLearning services in their Blog. This paper will explain the technical side to provide the eLearning supports for the Blog. The design of those supports should offer the facility to upload a course material, creating a quiz or an assignment, sending the answer, and grading the assignments. However, it must not change the characters of Blog which was easy to use by everyone.

The purpose of the paper [9] research was to develop in router configuration learning using e-Learning in Computer Laboratories subject. Router configuration learning is an interesting and important part of study in Computer Laboratories subject. The main objective of this laboratory was to make the student's skill on the router configuration. The e-Learning on router configuration was divided into four topics which are the router topology, setting up router, static route, and dynamic route. The sample group of this research was eight bachelor's degree students who studied in computer of engineering education program, Department of Engineering Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang. Students were taught, learned, and used on the development of the e-Learning on router configuration. The result of this research is indicated that the achievement score of students on score on the e-Learning is higher than the before achievement score of students at less than 0.01 in significant statistical level.

The paper [10] introduces a way of implementing the learning style theory in the field of eLearning. Since 2010 the three-year project "A flexible model of the ICT supported educational process reflecting individual learning styles" has been running at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic.

In paper [11], using Ajax in the web application was becoming popular now. It was a new approach of web

application that closes the gap between desktop application and classic web application. Ajax was able to deliver all web contents better, smarter and richer using only technologies that are already installed on the majority of modern computers. To use this technology, a student does not need to change his/her web browser. The benefits of Ajax can be adapted by E-learning to serve a distance examination faster and more convenient to the students. Only the specific part will be requested to E-learning web server. It will reduce E-learning web server load and reduce the data transfer from students' computers. If the students access the examination in the same time, they can access the examination faster than usual from their computer.

In paper [12], all in all, the XoMashup component comprises a personal web application mashup page, which was useful for self-directed learning, but can also be utilized in other application areas. Addressing the iCamp project, this mashup solution was a first approach towards the iCamp space. As a next step, it was planned to extend this web application mashup with a semantic layer to recommend tools and tool combinations for given learning activities. Further, the semantic model should be refined in terms of analyzing the user interaction.

In the paper [13] entitled "What can the Semantic Web do for Adaptive Educational Hypermedia? (invited)", Alexandra Cristea, argues that "Semantic Web and Adaptive Hypermedia come from different backgrounds, but it turns out that actually, they can benefit from each other, and that their confluence can lead to synergistic effects". Towards this direction the paper demonstrates how LAOS, an Adaptive Hypermedia (authoring) framework can be used in the context of the Semantic Web.

In the paper [14] entitled "The New Challenges for E-learning: The Educational Semantic Web (invited)" Lora Aroyo, and Darina Dicheva, outline the state-of-the-art research on Semantic E-learning and suggest a way towards the Educational Semantic Web. They propose a modular semantic-driven and service-based interoperability framework and related ontology-driven authoring tools. The challenge of the next generation web-based educational systems was to support user-friendly, structured and automated authoring, balancing between exploiting explicit semantic information for agreement and exchange of educational information, and on the other hand, collecting and maintaining the information semantics.

In the paper [15] entitled "Ontology Enabled Annotation and Knowledge Management for Collaborative Learning in Virtual Learning Community (invited)", Yang, Chen, and Shao propose a framework for ontology enabled annotation and knowledge management in collaborative learning environments. Personalized annotation, real-time discussion, and semantic content retrieval are the three main elements of the proposed semantic web services.

Henze, Dolog, and Nejdil in their paper [16] "Reasoning and Ontologies for Personalized E-Learning in the Semantic Web" propose a framework for personalized e-Learning in the semantic web and show how the semantic web resource description formats can be utilized for automatic generation of hypermedia structures. They investigate a logic-based approach to educational hypermedia using TRIPLE, a rule-based query language for the semantic web.

In the paper [17] entitled "Ontology-based Organizational Memory for e-learning", Abel, Barry, Benayache, Chaput, Lenne, and Moulin present an ontology-based document-driven memory which was particularly adapted to an e-learning situation. They provide a thoroughly discussion of a learning organizational memory

and they focus on the ontologies on which it was based. Their research work was situated at the crossroad of three domains: knowledge engineering, pedagogical design and semantic web and they provide interesting insights. Moreale and Vargas-Vera in the 18th paper entitled “Semantic Services in e-Learning: an Argumentation Case Study” outline an e-Learning services architecture offering semantic-based services to students and tutors, in particular, ways to browse and obtain information through web services. They present a proposal for a student semantic portal providing semantic services, including a student essay annotation service. In the paper [19] entitled “Semantic description of Educational Adaptive Hypermedia based on a ConceptualModel”, Papasalouros, Retalis and Skordalakis present how the outcomes of the Conceptual Design stage of a method for developing Adaptive Educational Hypermedia Systems can be encoded using RDF-based ontologies. They focus on the development of a tool for the translation of OCL rules to RuleML to facilitate the automatic transformation of UML models to Semantic Web descriptions beside XSL Transformations. The second character was participation from the users on the knowledge collaboration. It reminds the users about the trust that was given to the internet users like in the Wikipedia. They can share their knowledge in the Wikipedia, an encyclopedia based on the web which was developed by the internet users over the world. The content was characterized by open communication, decentralized authority, freedom to share and re-use, and dynamic interactivity [20]. Based upon these surveys, this paper is proposed with much better simulation model.

III. METHODOLOGY

A. Proposed Method

The main objective and goal of this paper is to make the student’s learning process easy and to make them to understand the functionality of AJAX. To carry out these, we have to propose a model called simulation model to explain the process of AJAX. It acts as visual material for the student to gather the knowledge about the process. The aim of the proposed method is to explain clearly about the functionality of AJAX by creating simulation model in E-Learning technique.

The summary of the proposed method is as follows: **AJAX** is a technology which follows a server-side scripting with some features. The features of AJAX are as follows:

- Unlike Server-Side Scripting, when using AJAX, the response for the client’s input is displayed in the same page of request. It does not move on to a new page for response.
- Due to this feature, the client can acquire different outputs by providing various set of inputs, in less time.
- When using AJAX, the page is not completely refreshed by the server processing. So it is termed as **Partially Post back**.
- Due to partially post back feature, the client can able to retrieve a particular data from the page, or he can able to process the particular portion of data

These features are only belongs to AJAX not in Server-Side Scripting. The server-side scripting functions same as the AJAX. But it produces the output to a new page, which will be difficult to the client to process different data. Based on the importance of AJAX, it is necessary for the students to learn about its functionality. The E-Learning system is the most popular learning system in this computerized world.

Considering the importance of this scheme, the technology AJAX is simulated to explain the functionality in the E-Learning system. This is proposed in this section efficiently to make the students to gather much more clear idea about it. To explain the concept much better, the proposed method proposes an example to explain using AJAX and also differentiate it with the Client-Side Scripting and the Server-Side Scripting. In the addition of two numbers and produce the output, the process is explained in all the three techniques. In Client-Side Scripting, the client provide input in the first page, the web browser itself process the request and produces the result to the client. The server is not necessary in this case. While processing, the page is fully refreshed. In Server-Side Scripting, the client provide their input in the first page, the Web Server processes the input and provide the result in another page. In this case also, the page is fully refreshed while processing. While implementing the AJAX technology, the client can able to refresh a portion of the page due to its partially post back feature. Thus the client can able to retrieve the response in the same page where they provide the input. Thus, the client can save time in processing multiple requests.

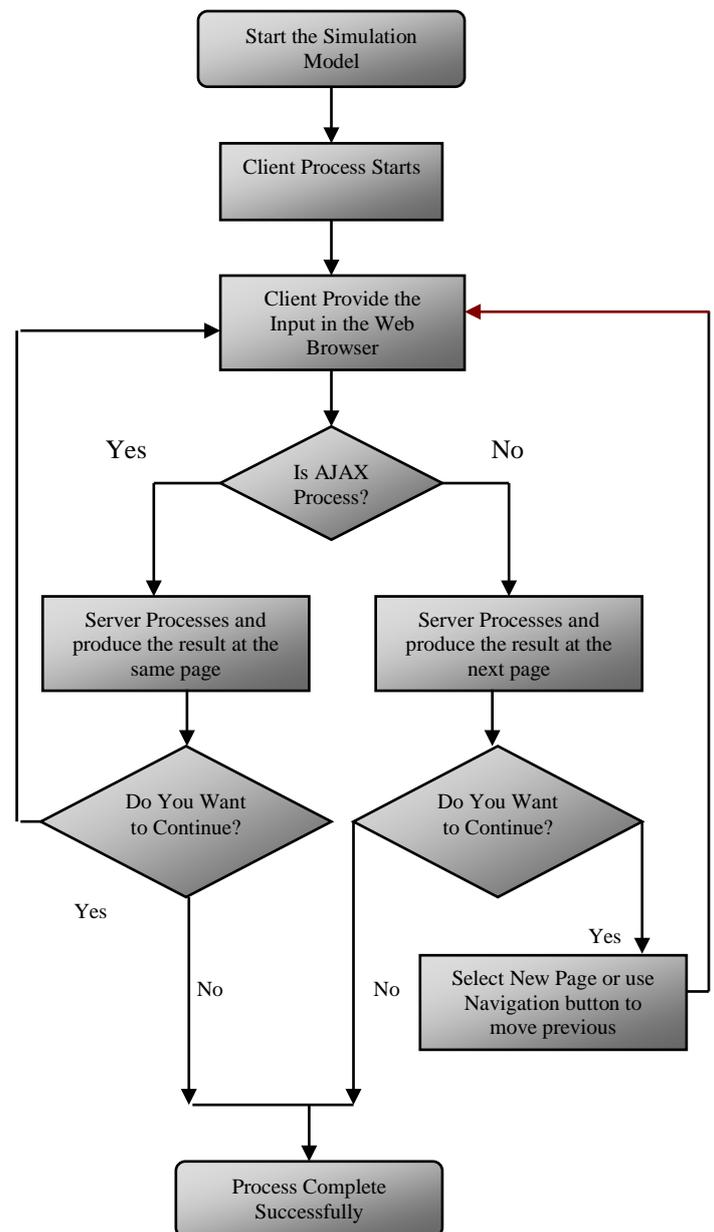


Figure-3: Diagrammatic Representation of the Model

The diagrammatic representation of the simulation model is shown above. It also adds additional feature such as it can make the user to be free from clicking the button to start the process as in Server-Side Scripting and Client-Side Scripting. But AJAX can provide interactive response in accessing the page. One of the applications of AJAX is in validating the controls, where immediate response is needed. This interactive experience is made by tabbing the controls. Thus the AJAX provides better functionality in E-Learning System.

In E-Learning system, when the user provides the input, they can get immediate response and a much more interactive experience is made. Due to this, the waiting time for the processing of server is avoided and which helps the E-Learning System can be accessed by more number of users than before. The proposed method provides an procedure to explain the AJAX technology.

B. Procedure

The procedure contains the step to create a simulation model and to explain the process of the AJAX through this model. The procedure shown below:

- Step-1: The Simulation model is created with necessary attributes such as client, server, and web browser and so on.
- Step-2: The user enters into model and makes use of the web browser.
- Step-3: The user provides a set of input in an appropriate location.
- Step-4: The input is shown to be processed by the server through this simulation model.
- Step-5: The process is carried out in the same page itself. Thus the AJAX functionality is shown to the client.
- Step-6: The client can get their response from the server.
- Step-7: All these process are carried out in the request page itself. Thus partially postback is shown to the client.
- Step-8: The user can make use of the simulation model to process multiple requests.

IV. EXPERIMENTAL RESULTS

The E-Learning technique for implementing the functionality of AJAX is proposed in this paper. The experimental set up is done by taking some students to explain the functionality of AJAX by simulation. To verify that the E-Learning technique is much easier for the students to understand, first we explain the concept theoretically. And then the concept is simulated as a model to propose in E-Learning. The students got much clear idea about the AJAX technology. Also various models are proposed to explain the functionality of Client-Side Scripting, Server-Side Scripting and the AJAX functionality. These can be done to show the difference between all the concepts and to explain how the AJAX works better to solve the problem.

This experimental setup is carried out among the students in P4 processor with AJAX software. The students are provided with the notebook to note down the functionality of Client-side scripting, Server-side scripting and the AJAX functionality. The processing time is noted down and finally it helps them to make a conclusion about the best technology.

Thus the experimental set up is made and the result is verified which shows that E-Learning has more importance in future.

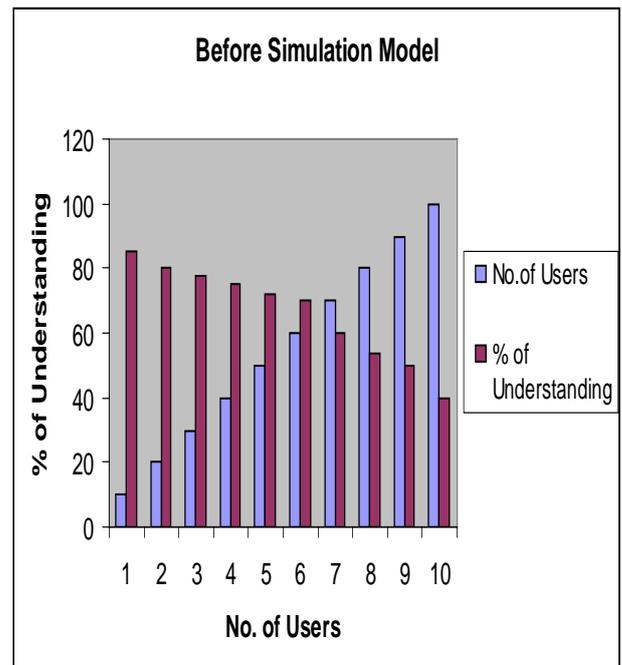
V. STATISTICAL DATA

The statistical data is collected for the E-Learning process of AJAX among the students. Taking a set of students, we have to make a analysis to provide a statistical report of their understanding capacity in order to gain the knowledge through the simulation. In a class room, nearly 100 students are placed to carry out our process.

First, the students are provided with a theoretical demonstration of the Process of AJAX and its functionality. After this demonstration, the understanding capability of the student is noted. The data table and the chart during the session of theoretical explanation of AJAX is shown below:

A. Understanding %, Before implementing the Simulation model

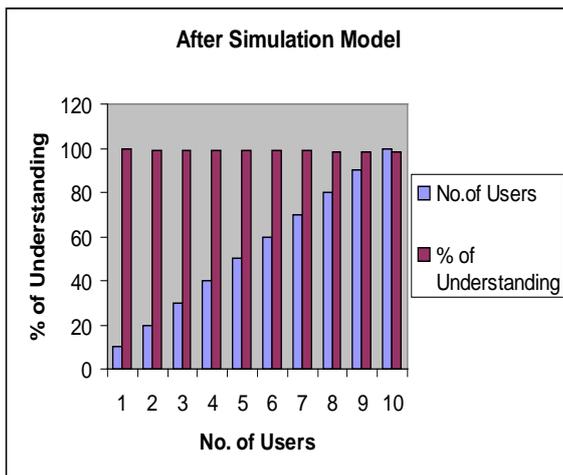
No. of Users	% of Understanding
10	85
20	80
30	78
40	75
50	72
60	70
70	60
80	54
90	50
100	40



Then, a simulation model is placed to make the students understand about the process of AJAX. After getting placed the model, the student is instructed to listen the process by providing their inputs. The input is taken and processed by the simulation model, and finally an output is produced. Through this, the functionality of AJAX is shown to the students. The data table and the chart during the implementation of Simulation model is shown below:

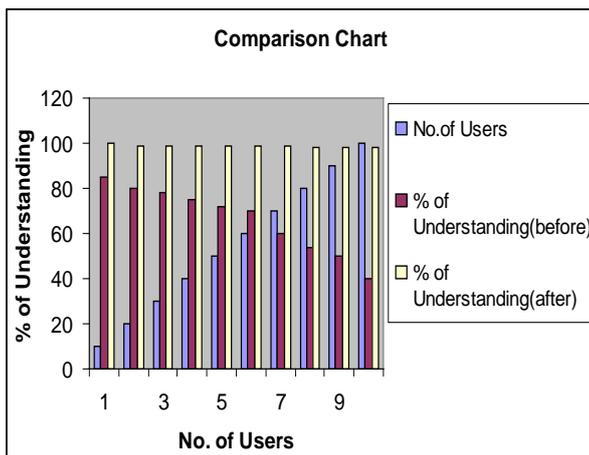
B. Understanding %, After implementing the Simulation model

No. of Users	% of Understanding
10	100
20	99
30	99
40	99
50	99
60	99
70	99
80	98
90	98
100	98



C. Comparison of (a) and (b)

No. of Users	% of Understanding (before)	% of Understanding (after)
10	85	100
20	80	99
30	78	99
40	75	99
50	72	99
60	70	99
70	60	99
80	54	98
90	50	98
100	40	98



VI. CONCLUSION

The aim of the paper was to provide a virtual education to the students which will help them to learn and understand the concept easily at any time and at any place.

In this paper, the E-Learning concept is used to simulate the functionality of the AJAX. The simulation model works well to show the functionality of the AJAX technology to the students who are interested in virtual education. Moreover, in this computerized world, most people wants to learn from their place itself through internet. In this case, the technology E-Learning paves the way to fulfill the user requirements.

In future, the E-Learning technology is used to simulate all functionalities which help the students to get much better knowledge. The simulation model is designed to process various request and produces the response. Thus this paper proposes such a method to explain the functionality of AJAX.

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