

Virtual Laboratory Development To Improve Student Performance In Modern Classroom

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Abstract- Now a day's world is moving towards the digitalization. Most of the field are upgrade and improve their standard by using digital technology and digital devices. Now digital devices are mostly used and easily available[1]. So, mostly all fields are connected with the digitalization. It is also reaching in the education fields. Virtual lab is concept in which computerized learning is performed. In this paper, the computers or laptops are needed to connect Internet, using Internet learning, Text, image, audio, video format data is easily get on the internet. But practical data is not as much we get on internet. To improve the practical knowledge virtual lab is needed[3]. In this paper we design system that perform practical virtually using virtual laboratory. Virtual lab is used in UG, PG, Biotechnology, Engineering, Research field and also in other fields.

Keywords- Learning, Modern Classroom, Simulation, Virtual lab, Online Access.

I. INTRODUCTION

Virtual lab is an approach of the learning virtually. Virtual laboratory is kind of educational technology supports an improved individualized learning that met rural and urban educational needs with high level of flexibility and reduced the concerns regarding time and space [1]. In the Existing or previous learning system teachers are teaching to the student but sometime if any query to any student they are not comfortable to ask the query to teachers, that time this concept is not clearly understand to student[3]. Sometimes the student or laboratory user want to access the laboratory but predefined schedule for the lab or lab is allocated for another user, in this situation user cannot give the more time for laboratory work or practice because of laboratory schedule. Also limitation of time is present at opening and closing the laboratory[2].

If any one user want to practice at home then equipments of the lab are very costly, that are not possible to user purchase them. Sometime laboratory time is assign to user but by any reason user cannot attend that practical then that practical completely loss to the user. If any user does not understand the concept and user want to perform the practical repeat then this is also restricted[5]. These limitations of

previous system are solved by the Virtual laboratory. Virtual lab having the features is as:

Easy to use and handle: virtual laboratory are easy to use and handle because we can see the laboratory as physical and how to use, what to do in the practical, theory related to practical are provided to the user[4].

Free of Cost: Virtual laboratory are free of cost. It does not take any charges to work in it. Virtual laboratory use having only requirement of the computer or laptop with internet connection. User can perform any experiment at any time when user wants, user does not have to pay for any instrument or as like teacher. So virtual laboratory reduces the cost of user, and virtual laboratory can use by any user without paying any cost.

Easy to Access: Virtual laboratory provide the feature as easy to access. Normally we have to take admission or make the application for using the laboratory, wait if any other is working in the laboratory. But in virtual laboratory just user have to do registration by filling some information, this process is done within minutes of time and then user have to provide username and password using these username and password user have to login and laboratory is ready to use. It is very simple method and easy to access. Anyone can do it.

Highly available or Available at any place: Virtual laboratory is highly available, it means when and where user wants to access the virtual laboratory at that place and time location lab is access and available. It is not restricted by time. User can work in virtual lab from home, garden, classroom or any place. Virtual lab also use while travelling. In the rural area laboratory is not available, using virtual lab rural area can reach to the learning and connected with education.

Save time: Laboratories are at one position or location user have to go at that location and use the laboratory at that time user have to travel then travelling money and travelling time is also spend, using virtual lab travelling time and cost are reduced. User can utilize that time to learning.

More focus on learning: Virtual laboratory are easy to use, easy to handle, easy to access, available at anytime and anywhere also reduces the travelling cost and travelling money, laboratory is free of cost so user can focus on the learning more time.

High performance: Virtual laboratory are easy way of learning so user are upgrade their knowledge, so performance of user and students are increases. Using virtual laboratory performance of user are high than the previous system.

Increase interest of learning: In virtual laboratory guidelines are provided, instructions are given, flow of working are check and suggest correction, graphical representation so interest of learning is increases.

II. PROBLEM STATEMENT

To design and implement web enabled learning modules suffer from absence of teacher and peer interaction. The concept grasping power of students would vary based on their surroundings and the perceptions that the students have derived over a period of time.

Literature Survey

Virtual Labs Improve Student's Performance in a Classroom, Rakhi Radhamani, Hemalatha Sasidharakurup, Gopika Sujatha, Bipin Nair, Krishnashree Achuthan, these authors are work on the virtual laboratory, they are explain the concept of virtual laboratory for improving the students performance in classroom[1]. Their purpose of developing the virtual laboratory is to analyze the role of Biotechnology virtual laboratories in integrating student's learning ability and introducing it as an effective instructional tool in biotechnology courses [1]. Their virtual laboratory work is related to the biotechnology field, Biotechnology laboratories are contains the equipment are very costly in a corer rupees, it is very expensive so reduce the cost and student learning is increase[1]. In these the usage analysis and surveys indicated that biotechnology virtual labs are significant elements in adaptive learning process in blended classroom environment[1].

In The VALUE @ Amrita Virtual Labs Project Using Web Technology to Provide Virtual Laboratory Access to Students, Krishnashree Achuthan, K. S. Sreelatha, et.al these authors are work on the virtual laboratory, they are explain the concept of Virtual Labs was initiated to provide laboratory-learning experiences to college and university students across India who may not have access to adequate laboratory facilities or equipment[3]. Amrita Vishwa

Vidyapeetham University (Amrita University) is part of a consortium of twelve institutions building over two hundred virtual labs covering nine key disciplines in science and engineering[3]. Amrita Vishwa Vidyapeetham University design and develop the virtual laboratory for science and engineering student , that includes the chemical science, physical science, biotechnology engineering, electrical engineering, mechanical engineering, electronics and communication engineering, computer science and engineering fields[3].

In Effective Virtual Laboratory Content Generation and Accessibility for Enhanced Skill Development through ICT, Tanuja Sheorey and Vijay Kumar Gupta, authors are explain the virtual laboratory concept for the focus to emphasize on enhancement of skill development through ICT, using standard virtual laboratory content generation and making them easily accessible across all the student population[2]. In this they are work for on-line quizzes and project based assignments in each virtual experiment will scale-up conceptual understanding and discovery based learning, unlike verification based conventional experiments[2].

III. PROPOSED SYSTEM

In this system implement virtual laboratory to the engineering students for various department. It can provide complete learning process to the students.

IV. SYSTEM COMPONENT

User: User is the important component of the system. All system is design for the user. User satisfaction, understanding, learning are the main objective of the system. User uses the system number of input required to system are given by the user. Output given by the virtual laboratory understands by user. Main goal of user is improve knowledge, learning, and practice.

Virtual Laboratory: Virtual laboratory is the main component of system. Virtual laboratory is middleware between the database and user. Virtual laboratory take the input from the user and perform specific function on given input, processed data show to the user as an output. Major function in the virtual laboratory is simulation. Simulation is the concept in which user can show the output simultaneously on the basis on what steps we perform. Virtual laboratory also interact with the database, data for the store in database are provided through the virtual laboratory. Data which is retrieve from database are also interacting with virtual laboratory.

Main aim of the virtual laboratory is user satisfaction; user should understand the concept and agree with the generated output. Output of virtual laboratory must be accurate.

Database: Database is the collection of the related data types. For storing the similar type of the data record database is used. In the virtual laboratory data are stored in the database and when user need then data is retrieve from the database. Database can be updated by performing the actions. User activity are also stored in the database, database is main resource to provide data to virtual laboratory and user. Database has to select particular data which user want to access and show to user.

V. SYSTEM ARCHITECTURE

Following figure shows the architecture of the virtual laboratory.

User: User is who is used this system. First roll of the user is do the registration, In this user have to fill the registration form using the attributes like name, email id, address, mobile no, department, year and password. This user filled data is stored in the database. After the registration is successfully done then user has to login using username that is as email id and password that are provided by user at registration time. If user fills the correct username and password then and only then user can access the system.

In this system we are consider for engineering department, in that user have to choose the department like computer, mechanical, civil, E&TC and so on. After that user have to choose the year like first year, second year, third year or last year, In selected year have the two semester first half and second half user choose any one from that.

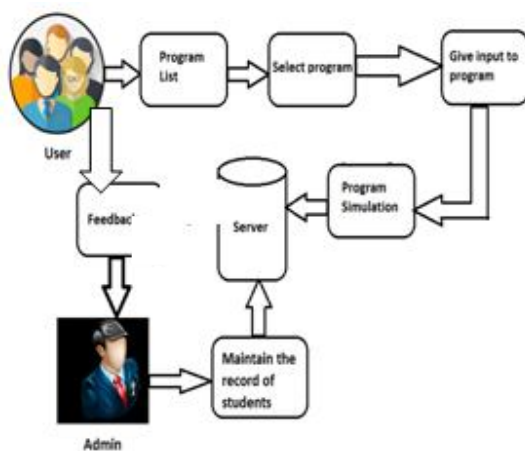


Fig.1 System Architecture

Program List: First user seen the different department, in this department different years are present like SE, TE, BE. In this year two semester are present. User has chosen any one semester then each semester having the different subjects and practical. After semester choose list of practical subject are shown and after selecting particular subject list of practical are shown to the user. User have to select particular practical that user wants to perform.

Input to Program: In this system programs are predefined that should not enter by user but user has to provide the input for the programs, In this validations are provided to entered input. If user entered wrong input then this input is not accepted and what type of input should have to program are given as hint to user and also example is also provided into the hint. For example if program of two number addition and user provide the input like one number and another alphabet or symbol then instructions are suggest to the user. That should correct input to the program and program generate the correct output.

Program Simulation: Program simulation is nothing but step by step execution of the program. If the program are complex that are not easily understand to the user, like looping and jumping branching part of the program that time user are confused and not well understand the functionality of the part of code or conditional statement are how much time execution is done. This difficult problem are avoided and clear using simulation part, in simulation part step by step execution are shown to the user and what is done with the input and code are showing graphically that are easy to understand to the user, this increase the performance of the students. This part is also increase the interest towards practical and coding.

Server: Server is important part of the system. Server store the data of user like user details, login data, programs, execution, and feedback of student, student records this all data is stored in the database. Server also store and retrieve the information to user and also for the administrator. Server response to the each request of the user. When user want to access the virtual laboratory user can access through url address <https://vlabsjcoe.org> then server show the content of the virtual laboratory.

Feedback: Feedback of the user is taken from the users to understand the Is the system is user friendly or not? And what are the difficulties are arises to the user that are user can send through the feedback. Also different suggestions can suggest user for the improve the performance of the system. This feedback form is visible to the administrator.

Admin: Admin part is handle by the one person, all higher priorities are provided to the administrator. Administrator is not like simple user, it has higher rights, admin can control to the users. Admin can also check the records of the users.

VI. MATHEMATICAL MODEL

Let S be the whole system
 S={ I, P, O }
 I-input, P-procedure, O-Output
 I = { Q0, Q1 }
 Q0= Select Department, Year and Semester and subject.
 Q1= Give input as per program.
 P={ P0, P1, P2, P3 }
 P0= Show semester wise experiment list.
 P1= select the particular program.
 P2=clicking on theory button will show the theory of the program.
 P3 =clicking on simulation will show simulation of the program.
 O=(S)
 S=Giving accurate output of each every program.
 Success condition: Gives accurate output for every program.
 Failure condition: If input not given as per required then system will fail to give accurate output .

VII. RESULT ANALYSIS

We are developed a virtual laboratory for our college. This virtual laboratory is publically access by anyone. This laboratory can access using the url <http://vlabsjcoe.org> . If the internet connectivity is available and we are enter above the url address then successfully virtual laboratory is open and ready to use. We get the results of our project is in correct sequences. And simulation part showing the correct flow of the program and its execution. Following are the snapshots of the virtual laboratory.

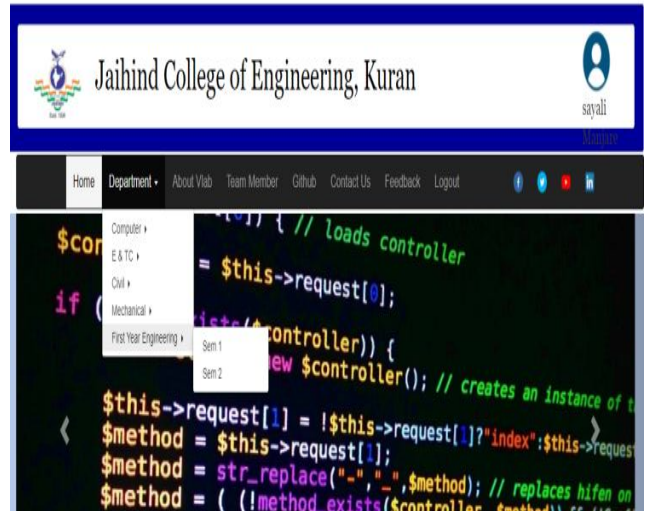


Fig. 2 Home Screen



Fig.3 Programming Screen

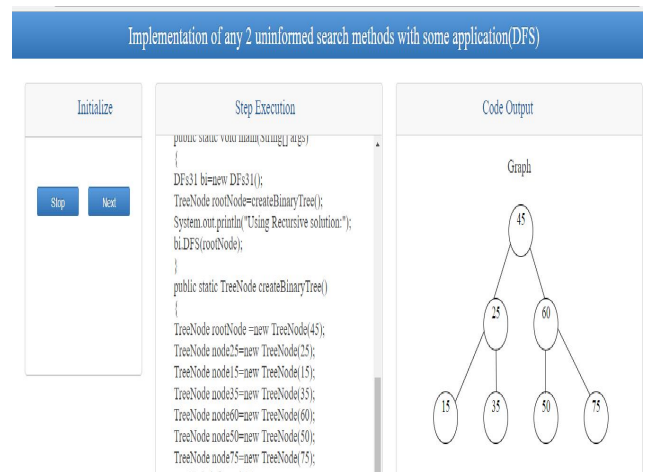


Fig.4 Simulation Screen

Fig.5 Feedback Form

VIII. CONCLUSIONS

Virtual lab is presented a solution for developing and innovate new ideas. Virtual lab is easy to use, and understanding. It can be use by any user 24*7 anytime, anywhere. It can be used multiple times, perform one experiment or practical more than one time, until we want to satisfy or understand the concept. Virtual lab for student are more effective and results in the improving understanding level and knowledge, also clear the concepts of virtualization to students. It is user friendly. User can easily handle. No time limitations for work or study. It increases the interest to the students towards practical work and laboratory assignments. Limitation of the virtual laboratory is must be a internet connection.

IX. FUTURE WORK

Virtual lab is a wide concept, so in this, we can add more future work scope. We are developing a virtual laboratory for our college that is Jaihind College of Engineering, Kuran. In this only we develop a first year engineering part and some part of the computer Engineering. Remaining department of the college are for the future expansion. This is a future work of our project. Virtual lab can be extended in the school, colleges, in research and development field, also in the chemistry, medical, electronic, mechanical, Electrical engineering fields also. It has more advantages so future work is increasing in Virtual lab Field.

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