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Distributed Server Based Simulation Interface For Ahead of Experiments

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Abstract:

In this era of information technology is usually preferred to be used as a significant tool. This tool plays a major role in engineering and scientific areas. This paper dilates on the necessary preliminary steps which are to be observed before getting to use of engineering laboratory. In the recent years, there is much advancement in computational methodology of Engineering and Technology. This paper proposing the distributed server based web enabled interface which used for ahead of their real-time experiments. The lab experimental devices will be synchronized with local PC which is controlled by the distributed server. The distributed server is providing the accessible accounts to the end-users through the web browser to do their practical experiments from anywhere and from anytime. This environment will give the synchronized flexibility to end-users such as students to practice their experimental scenarios before they start the real-time experiments in the provided labs. This methodology suggests a simplified approach for the practical experiments in Engineering Laboratories by easily accessible to everybody, whose are having the workable knowledge in engineering laboratory and can also be extended to complicate and complex practical problems by using computer applications. This approach is user friendly and suggests that the failure cases can be reduced in the practical experiments even it may be a failure of fuses or wrong connections in ECE labs. Then the final output will show erosion results. From the wrong results, the dropout or wrong assumptions in the technology can be rectified very easily in short period of time limit. It is proposed the web site enable solution, so students to use the engineering laboratory 24 X 7(24 hours all 7 days).

Keywords: Distributed Server (DS), Simulation Interface (SI), end-users (EU), Personal Computer (PC), physical experimental devices (PED, anywhere and anytime (AWaAT), Electrical & Electronics Engineering (EEE), Experimental Application (EA), 24 X 7(24 hours all 7 days).

1. Introduction:

It is observed that the period before the birth of 20th Century, various teaching methods such as demonstration, lecture etc [5] were attempted in order to enable the students to understand the concepts. The Engineering Laboratory aims at equipping the end-users with acquaintance and assistances in practical technology which can be practical directly in enterprises.

The proposed Laboratory experimental works have been appropriately identified. They provide virtuous investigation and improvement plat forms suiting to the requirements of the Industry [1]. The virtuous investigation and improvement environments deliver the end-users with

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

compulsory exposure to the existing essentials and administrative supervision to the upcoming technical trends.

This paper highlights the importance of the practical research-laboratory in the training of Engineering and IT. Research labs are synonymous with technical enquiry.

The formation of regular laboratory training in engineering instruction was first introduced by Liebeg [2]. At the end of 19^{th}-century, the study of engineering, disciplines and technologies had become popular world-wide environment. The objectives underlying the use of lab-activities can be realized only when the students follow the procedure stipulated below:

1) Note the Experiment details and objectives.
2) Identify the engineering problems and build co-related questions.
3) Categorize of characteristics through assessment of transformations and likenesses by the observation.
4) Measure formulas and quality controls.
5) Manipulate materials and data.
6) Formulate equations, hypothesis and laws.
7) Make the goals/conclusion/decisions based on only established facts.

By keeping these points in their minds, the students become motivated to understand experiment machine performance and, thereby they become highly interested in engineering laboratories.

2. Paper Objectives:

The main objective of the laboratory experimental process [5] has provided here some steps to help students in:

- Observing what occurs to the primary of the procedures when they are related to another machine or device source by learning the real-time environment and also end-users will come to understand how the devices will modeled, facilities that are not fully present in conventional methods.

- Exploratory the performance of electrical and electronics based devices to evaluate the extent to which the basic device models [5] represent actual performance and to quantify some of the important second order effects.

- Acquiring the knowledge of measurement techniques and experimental procedures in core electrical and computer engineering applications.

3. Working Methodology:

Through this experimental application (EA) exposure, the students get the expected primary information or details of the experiments such as experiment title, details and objectives, experiment connections (internal and external) with individual components, quality controls,

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

formulation of equations, hypothesis and laws. Furthermore, manipulating materials and data, and also making the goals/conclusion/decisions based on established facts.

The supervisor can store the complete information about the EUs: his registration number, name, course id, department name, and semester. Moreover laboratory should be identified such as: Digital Lab, Circuit Lab, Power Lab, Communication Lab, Control Lab, Computer lab and so on. Here, the supervisor has the authority to enter the new student details, and has the power to operate and exercise options such as to modify, to find and also to delete the student detail. All these information can be stored in the backend database server.

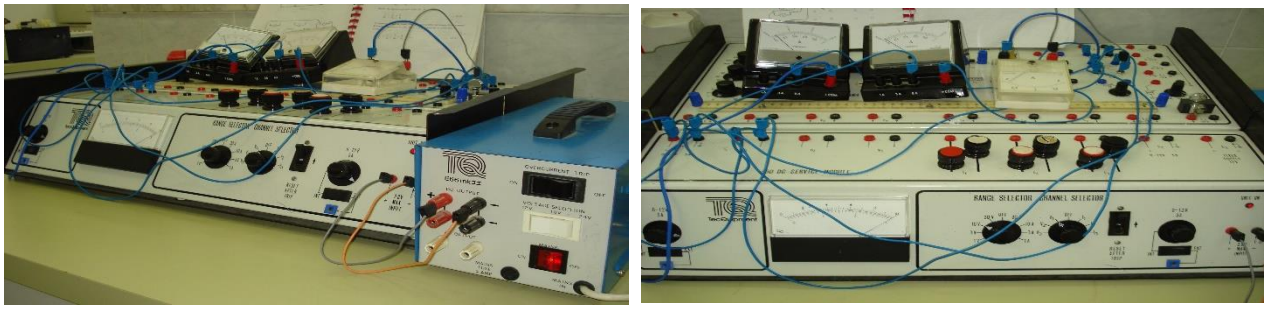

Fig. 1. a) & b) Physical Connectivity of the Experiment:

The figure 1, a & b depict the complete experiment as seen in the equipment photographs. But these photographs themselves may not help the students to understand the complete idea of the experiment. Students vary a lot in terms of their grasping power and analytical bent of mind. Some have high degree of grasping where as others just average observers. There are a few others who because of their inhibitions and hesitations don't come forward to raise their doubts and get them clarified. This category of students experiences a lot of discomfort and uneasiness while involving themselves in real time lab experiments. This approach precisely aims to help such variant student categories.

3.1. Distributed Server (DS) based Simulator and Experimental Application (EA) Stages:

The Distributed Server (DS) based Simulator can be provide the environment by specifying the following stages which are used by EUs:

- End-users can register their names in their laboratory by specifying the related to technical contents. The distributed server (DS) can synchronized the end-users data with the login credentials.

- The physical experimental devices (PED) will get connected with all required simulation based connections as shown in the figures fig.2 and fig.3. These simulated connected can be controlled by the local interface PC which is managed by the DS. DS can provide the web-based simulator which is experimented by the EUs from anywhere and anytime (AWaAT) as shown in the figure fig.4.

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

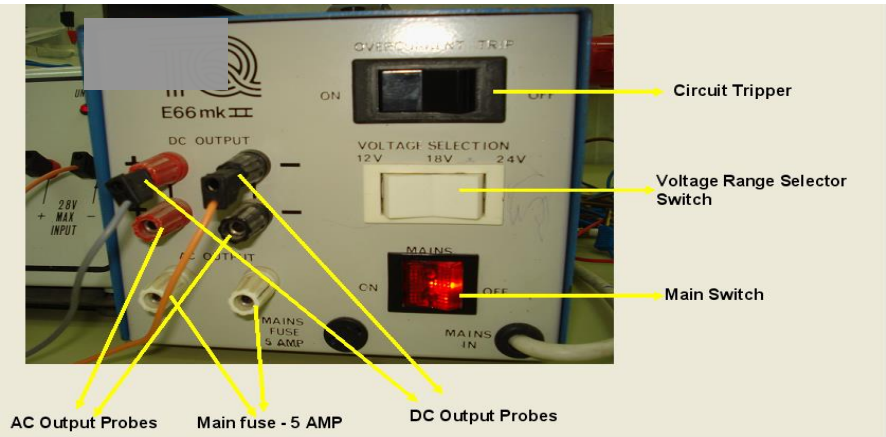

Fig 2. Physical Connectivity of the Internal Experiment with individual names.

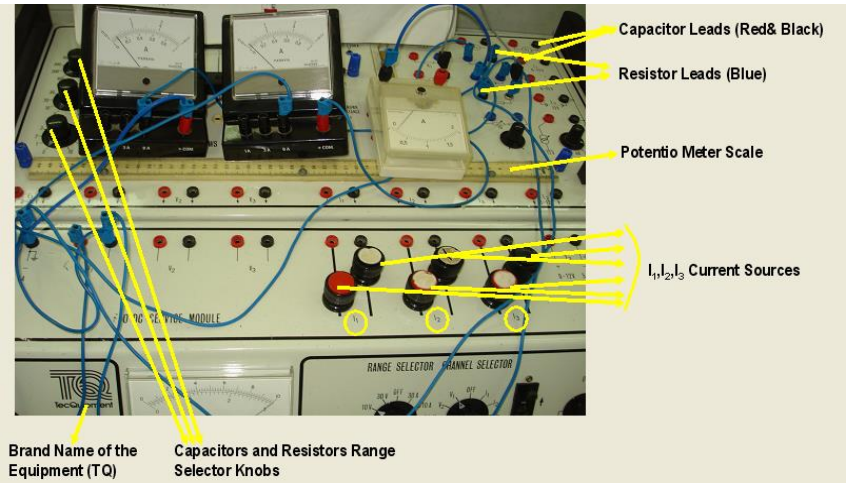

Fig. 3 c. Physical Connectivity of the External Experiment with individual names.

- The provided Login credentials can be used by the EUs from AWaAT throughout 24X7. The EDs can get access to the complete information about the experiments and also status of the experiments which they had done in their laboratories. The distributed server (DS) simulator assign allow the EUs to start and end the experimental applications (EA). The server can record the EAs scenarios along with the number of errors occurred, success rate, start and end-time.

- In the real-time situation, the supervisor can assign the experiment to the individual students, and then the students can do their experiment with the help of supervisor's demonstration regarding the experiment and then with the help of what they have observed or learnt by using this approach of DS based simulation interface application, such as experiment connections, formulas, pictures and figures. At this stage, this application can be more helpful to the students.

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

- At the end of the laboratory, the supervisor will explain to the students their experimental status. The status of the experiment will be shown as:
    i) Successfully completed
    ii) Partially completed
    iii) Completed with wrong result.

- Those who gained the second and third results have to repeat the same experiment again and the new experiment cannot be assigned until they finish the previous assignment with accepted good result.

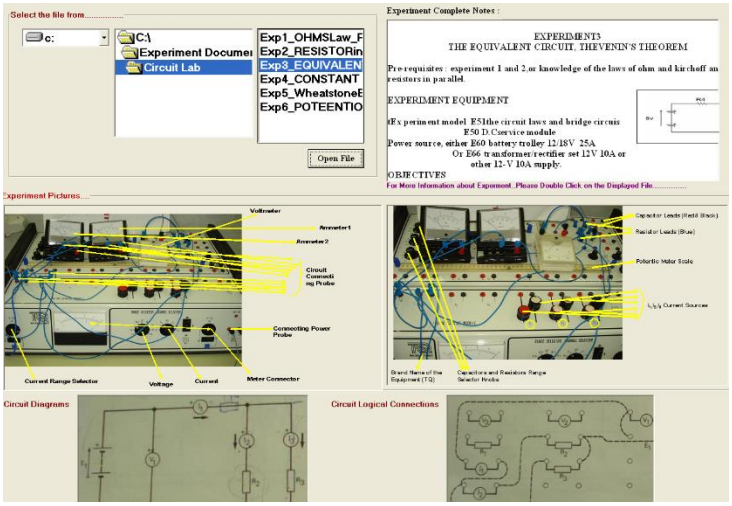

Fig. 4. Full Description about the Laboratory, Faculty and Status of the experiment.

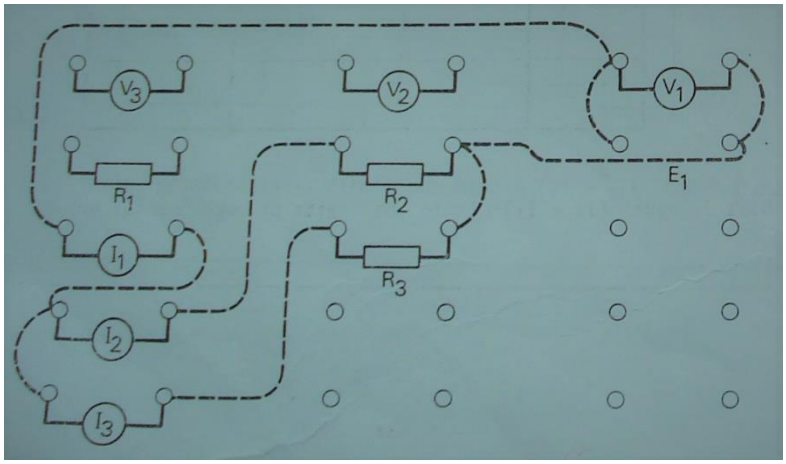

Fig. 5. Circuit logical Connectivity.

The above-mentioned details are right now being implemented successfully in our laboratories. This methodology proves to be more effective and more accurate in terms of helping the students and the supervisors alike in deciding, organizing and conducting the practical real-life experiments for their industrial needs.

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

3.2. Advantages of Distributed Server (DS) based Simulator and Experimental Application

Through this suggested approach students gain many advantages. This application was successfully implemented in ECE and EEE Laboratories. It yields to very good results such as:

- End-users such as students can get the idea regarding their experiments before they are going to do the real-time experiments in the ECE and EEE laboratories. End-users can check the actual experimental equipment, internal, external & physical connections, objectives & goals of the experiment from labs and from this methodology application.
- Failure cases are reduced in the practical experiments even if it is a failure of fuses or wrong connections. Then the final output will show erosion results. From the wrong results, the dropout or wrong assumptions in the technology can be rectified very easily in short period of time limit.
- End-users can compare the Laboratory equipment with given notes, formulas, equations, tables, figures and pictures in this application. This comparison can be helpful for students in industrial real-time equipment.
- This single approach related application can also be implemented for other Engineering departments and department sub branches.
- Every transaction can be stored in the database server and also web server.
- End-users can retrieve information and experimental details in 24 X 7.

4. Comparative Analysis:

Table 1: Comparative Study about Degree of Involvement / Average Performance of the Students Prior and Post to this Application.

Degree of Involvem-ent	**Average Performance of the Students Prior to this Application**				**Average Performance of the Students Post to this Application**			
	Experiment Selection	Connections	Interaction with Doubts and Questionnaires	Final Result	Experiment Selection	Connections	Interaction with Doubts and Questionnaires	Final Result
High	70-85%	60-85%	60-85%	80%	80-90%	85-90 %	85-90 %	95%
Mediocre	50-65%	50-60%	50-60%	65%	75-80%	85-90%	85-90%	90%
Low	< 50%	< 40%	< 40%	50%	80-90%	80-90%	80-85%	85%

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

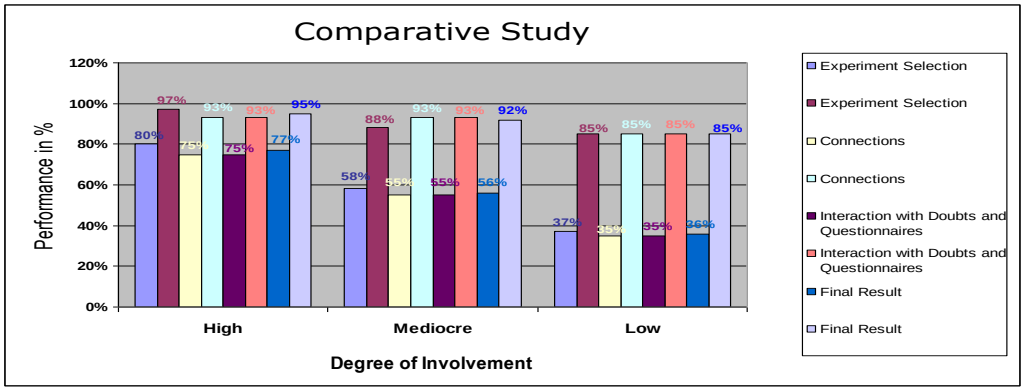

Fig. 6. Comparative Study graphical variation about Degree of Involvement / Average Performance of the Students Prior and Post to this Application depends with Degree of Involvement wise.

According to our expectations and from our experience Table1 has shown the comparisons between the degree of involvement of the students in their laboratories before and after implementation or usage of this research methodology. It can be seen that there is a clear improvement in their understanding level and conduction to the lab experiments.

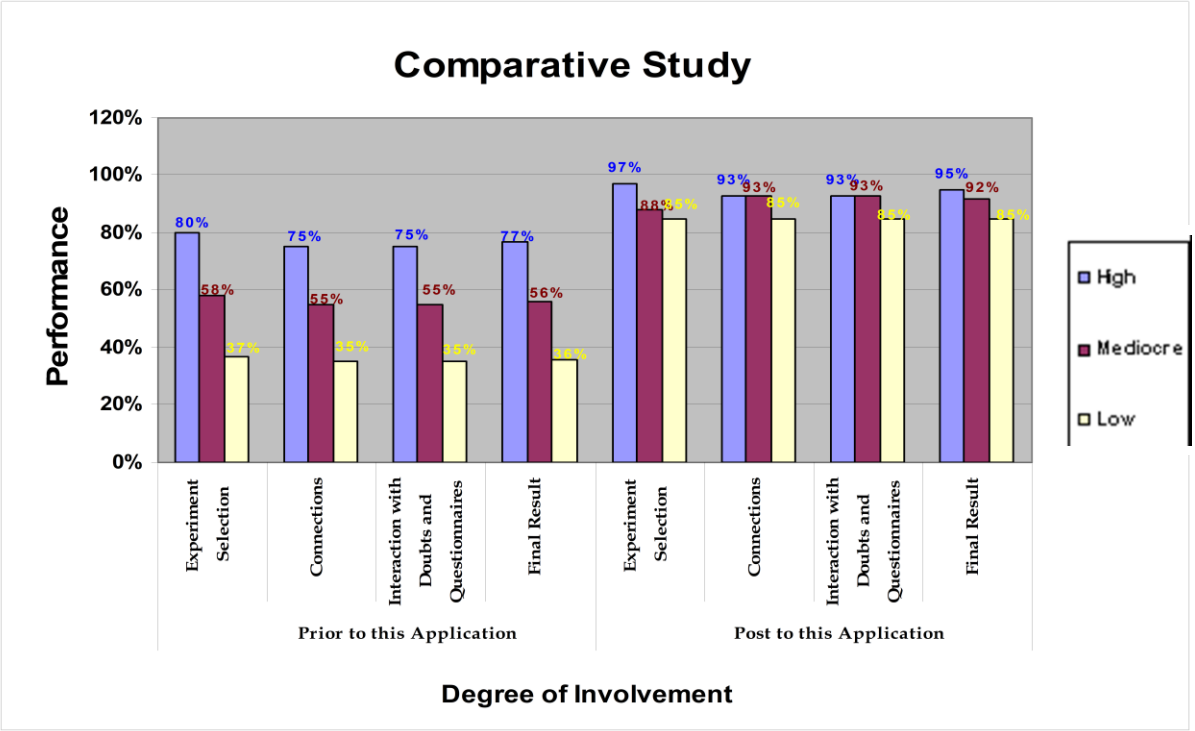

Fig. 7. Comparative Study about Degree of Involvement / Average Performance of the Students Prior and Post to this Application

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

5. Conclusion:

The Engineering laboratory work depends upon good planning of the lecturer concerned in terms of adequate preparation, supply and availability of equipment and learning materials. This environment will give the synchronized flexibility to end-users such as students to practice their experimental scenarios before they start the real-time experiments in the provided labs. Through this methodology end-users can get the over view idea of experiment before going to do their experiments in their laboratory. According to our expectations and from our experience this research methodology can help the end-users to develop their critical and practical skills by providing them with a better insight into their different fields. With this every lab session which inspires, stimulates and sparks the ingenuity of students', would provide the right condition for solving an academic and technological problems.

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