

Sustainable Future: Transforming Education via Virtual Lab

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Abstract— The teaching learning scenario all over the world bringing the new platform of learning in virtual mode has been changed due to COVID-19. It's a blessing for the practical lovers who could not perform the experiments. In this paper statistical data is presented before the usage and feedback taken from the students on the basis of various practical's performed by higher education aspiring students via Virtual lab.

Keywords: Virtual Lab, Simulations, Blended Learning

I. INTRODUCTION

Virtual Lab is Computer based activity where anyone can perform the experiments via simulations as well as explore abstracts and concepts without stepping into the laboratory physically. Virtual lab can be defined as the laboratory available at virtual platform which can be accessed 24*7 hours. An experiment under Virtual lab has been so constructed that it provides all practical related basic and fundamental information like Aim, Apparatus needed to perform it, Principle, Theory and Procedure. The lifeline of the virtual lab is simulation, which provides a real lab feel. Further it provides pre and post practical quizzes along with reference material.

The first and foremost object of the virtual labs is to cater the students pursuing studies via higher education and to enable them to learn the concepts at their own pace. The data presented in reference to the virtual labs established by the Ministry of education (MoE) under the National Mission of Education through ICT. It provides the complete learning management system comprising the study material, animated demonstrations and self-evaluation [1].

II. OBJECTIVES BEHIND THE VIRTUAL LAB

Virtual laboratories interface to help in growing our skills. Also, a rich and interactive interface will deliver smooth and flexible e-learning experiments as well remote access to labs in various disciplines of Science and Engineering and to share costly equipments and resources providing the experimental result through the computer interface which can also be plotted graphically. Virtual Lab provides an opportunity of blended learning as well as provides unlimited time to repeat experiments for practice at your pace explaining complex concepts and procedures in a simulating way. The most important part of the Virtual labs is simulator which enables the students to yield the results of the particular experiment by providing an approximate version of the 'Real World Experiments.

III. OBSERVATION AND RESULT

This study reveals the usage and impact of virtual performance of experiments on virtual labs via the concept of simulations. To test whether the young generation took this as a good initiative and how much they get benefited by this blended learning approach which is accessible 24*7 hours at no cost. A high seek has been observed in the usage of virtual labs after the scenario of shifting of offline learning to virtual platforms.

As an innovative approach virtual lab provides a complete blended learning environment providing the students a complete study material related to concerned experiments like theory, pre- test and post-test quiz which makes the complete sense of distance education. A survey conducted amongst the students has been presented here.

IV. ANALYSIS OF THE DATA PRESENTED

The impact of virtual lab can be encapsulated by presenting the comparison of the simulations versus the actual lab environment. More than 30% of the students have submitted their agreement that simulation of the experiment provides the real laboratory environment.

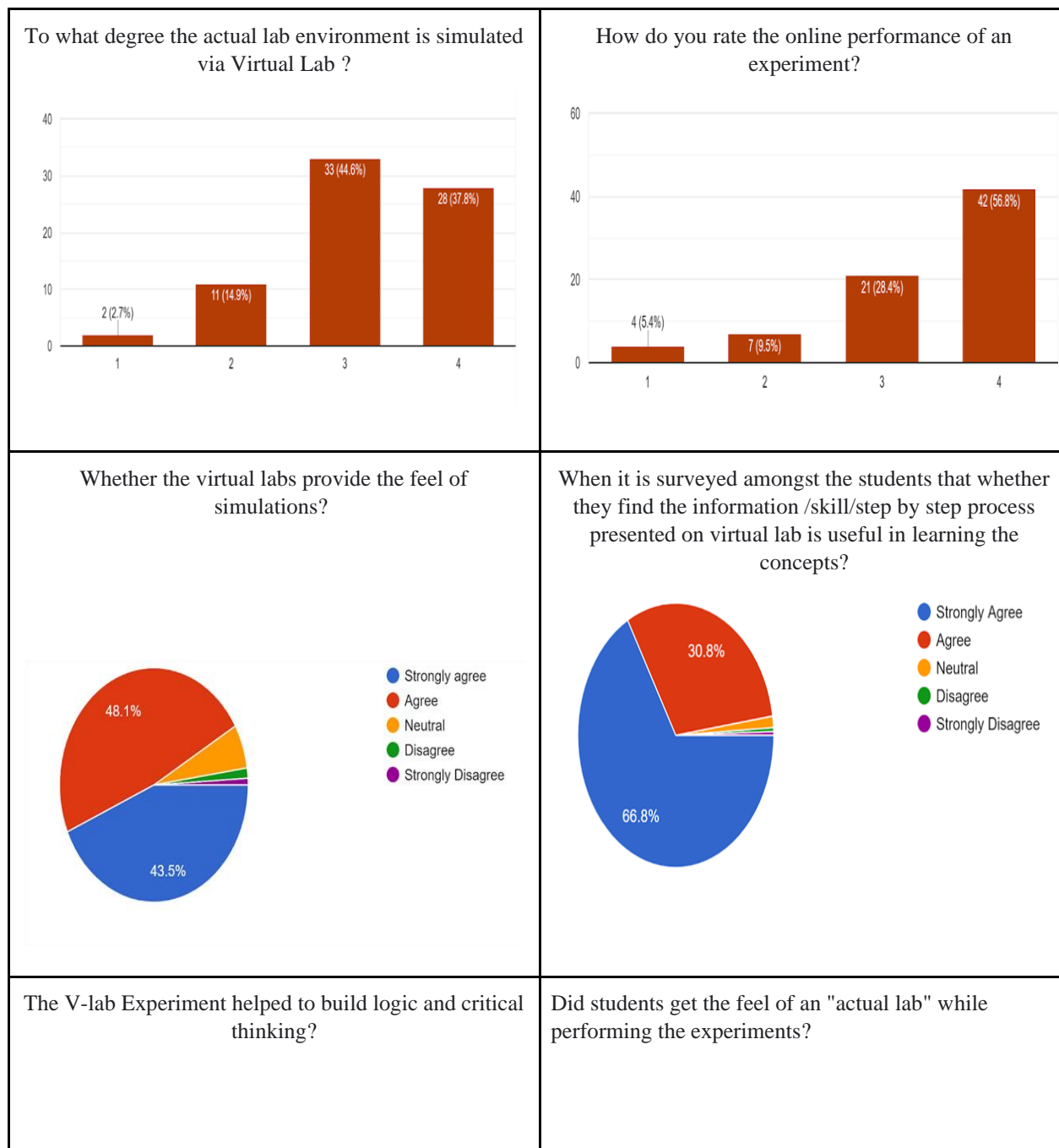
As students are the only role player of the approach of virtual laboratory experiments.

The young generation is grading the virtual laboratory's online performance could be taken as a positive side. They agreed that it is an approachable platform via the online mode as more than 40% of the students are satisfied with this kind of online simulations.

Practical laboratory is the place where the students observe the things lively whether it is about chemistry, botany or other practical subjects and learn the things by observations. And the students appreciated this kind of learning as they got the opportunity to learn and observe the topics via the simulations. Almost 50% of the students got the feel of a real laboratory via the simulations provided for the concerned experiment.

Information provided in the virtual lab related to the experiment is helping a lot to the students in understanding the basic concepts. Almost 70% found the study material useful in their learning.

The importance and utilization of virtual labs could be observed when the students get a real feel of laboratory atmosphere. 77% students are validating the importance of simulation by getting the feel of an actual laboratory while performing the experiment on the virtual lab.



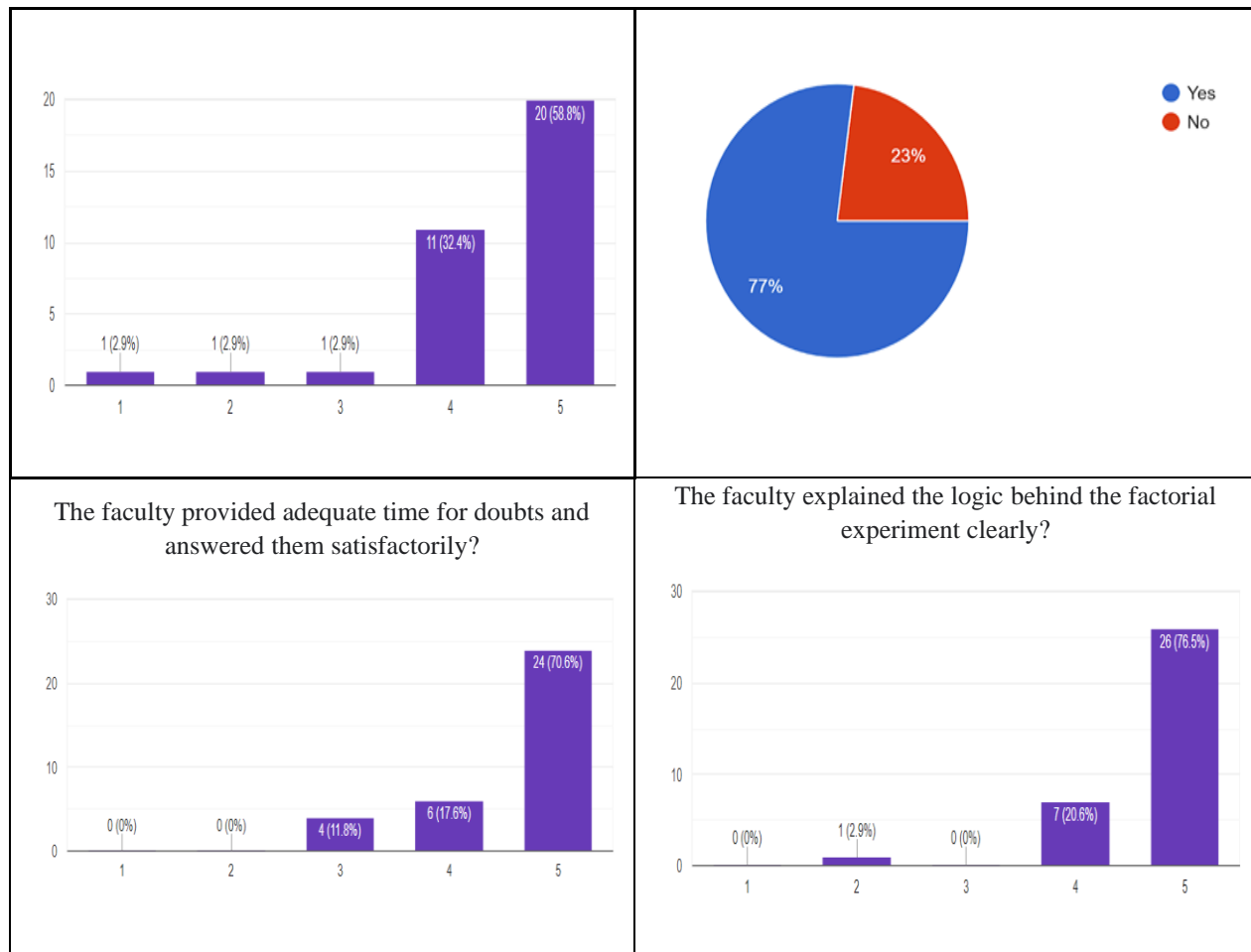


Table 1: Technology Acceptance Model questionnaire for evaluating usage of virtual laboratories across criteria

The importance and role of a virtual lab is not only just taking the readings via the simulations and achieving the results, but also to inculcate critical thinking and to develop logical thinking.

Students strongly agree that the virtual lab platform is definitely developing critical thinking among them either it might be in the Form of pre or post test quiz.

V. VALIDATION OF STUENT’S ACCEPTANCE OF VIRTUAL LABORATTORIES IN EDUCATION- QUESTIONNAIRE BASED ANALYSIS

This paper summarizes the acceptance criteria of the students of the usage of virtual lab in the form of the questionnaire taken from the students. The survey conducted among the college/University students indicated that the virtual lab has emerged as a very good learning platform connecting to actual laboratories.

More than 70% of the students appreciated it and lodged their comment excellent to it. Students submitted the feedback as they are enjoying the new approach and performing the experiments in the comfortable environment and getting in touch of new learning style and knowledge.

VI. CONCLUSION

Analysis of statistical data clearly reveals that there is a transformation from traditional platforms to online teaching methodology. It is a well recognized fact that prior to COVID-19, all Universities around the world were approaching the concept of hands-on experiments in the laboratory. But the scenario just shifted to the virtual mode either with reference to Theory papers or Laboratory experiments. Students/users accepted this concept in open hands taking the advantages of learning via simulations in the time of a man-less teaching learning environment.[2]

Presently, a great Role has been played by virtual laboratories in laboratory skill training.

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