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Z-Test-Based Analysis for Validating the Effectiveness of NPTEL E-Learning Modules

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ABSTRACT

The article proposes use of a z-model to validate learning progress after experimenting on student performance. A statistical map of z-values is used to calculate the z-value. This paper is divided into two parts. First it examines the students' learning outcomes in various computer science and engineering (CSE) subjects during regular classroom instruction as well as examines the students by an interactive learning model in which traditional classroom instruction and e-learning modules are combined. Then the second part administers a related exam to the same group of students. Z-test is used as a tool for evaluating the results. Based on the findings, the authors found that student performance increased dramatically after incorporating an e-learning module into their classroom instruction. The e-learning module has now been introduced into the classroom. Each subject would have a separate test paper with a higher degree of difficulty. It has been found that there is a substantial increase in the learning outcome of the students after applying the proposed approach.

KEYWORDS

Confidence Level, E-Learning, ICT, NPTEL, Z-Value

INTRODUCTION

Any student's academic success is directly and indirectly linked by the teaching and learning methods employed in the classroom. Student's academic success is also directly proportional to the student's knowledge of various subject topics and research materials (Landan, 2017). Any scientific or engineering challenge necessitates a simple analytical interpretation of the problem and its solution, so it is critical that students comprehend each topic of science and engineering. The student must be taught in an imaginative and straightforward way so that logical interpretation of the subject and its real-world applications (Sarkar, 2012), (Mahmud, et al., 2012) become clearer. Earlier it

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was impossible due to two factors: first the limitations of formal teaching and second the lack of e-learning tools. Both of these arguments are no longer valid since a variety of e-learning modules are now available and being used by students at a variety of institutions. Students and teachers can use e-learning modules such as NPTEL, Course Era, W3School, Wikipedia, etc. (Sinha, et al.,2019), (Lee, et al.,2014), (Islam, 2016).

Now-a-days, the teaching and learning environment is not limited to a physical instruction in classroom because information and communication technology (ICT) provides accessibility to all types of people (learners or students as well as teachers). Now-a-days 'learning on demand' and 'mobile learning' (Park, et al., 2012) are the actual requirements where users can access any educational facilities wherever, anywhere, or wherever they need them. Previous researches have shown that by incorporating ICT into the classroom will improve both teaching content and student learning outcomes. The current study verifies the change in learning outcomes when e-learning is being used over the traditional learning, using pre-test and post-test tests with a cohort of postgraduate students in computer science and engineering (CSE) with the same level. Ten subjects of CSE have been selected for the experimentation, with two sets of question papers planned for each subject. The second series of questions are more challenging than the first. The pre-test is given after the students have been using traditional learning in each subject, and their success is evaluated. The post-test, on the other hand, is provided after the students have been taught using e-learning materials, and their success is assessed using the second set of papers. The z-values are calculated on solution scripts for each set of question papers, and it has been observed that using e-learning content to supplement conventional teaching yields a better result in learning outcome.

The remainder of the paper is divided into the following sections: Section two contains a short overview of the literature, accompanied by section three which contains the objective of the paper, and part four describes various materials and methods used to evaluate the performance of the student, Section five of this article provides outcomes of the paper; section six describes analysis of the experimental results finally section seven includes the concluding remarks of this article.

LITERATURE REVIEW

Author (Wang, 2014) created the GPAM-WATA EL evaluation-centered e-learning framework using a web-based two-tier diagnostic assessment. Teachers may use this e-learning framework to administer two-tier screening assessments, dynamic assessments, and e-learning assessments. The elements on the customized complex evaluation are linked to the questions that students don't get right. Through responding to these chosen instructional objects and receiving prompts, students may learn more. This study discovered that customized dynamic evaluation, which is accessible in GPAM-WATA EL, is more successful in optimizing the student learning outcomes.

Author(Sahasrabudhe, et al., 2014) demonstrated that media selection should be based on the need and level of the student. Textual content is helpful in some cases, but richer media, such as film and animation, have proportionately higher learning efficacy in others. They proposed an applied research paradigm and empirically validated it to investigate this disparity of comprehension. Their findings suggest that the learning domain of the curriculum and the learners' learning styles moderate the association between media preference in an e-learning programmers and its efficacy.

In an e-learning method, Authors (Dascalu, et al., 2014) suggested an intelligent solution that uses the Particle Swarm Optimization algorithm. They focused on forming optimal study communities of learners from various domains. This research was carried for adult education community building techniques. The proposed algorithm was implemented in an e-learning environment with the aim of forming self-contained educational groups and eventually becoming a trainer. According to the authors, various quantifying metrics, such as background variance and correlations between learners' types of interests, within a society and between classes, can have a beneficial impact on the development of learning groups. Each participant involved in the study must create an account and