# A LEAP TOWARD OPTIMIZATION: SHOULD TEST CENTERS AT EDUCATIONAL INSTITUTIONS BE CENTRALIZED OR SHOULD THEY REMAIN DECENTRALIZED?

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*Abstract: In this paper, we introduce a formal approach to customizing test centers for educational institutions. The paper formulates a mathematical method to reveal the size of a test center according to the number of students in the institution under consideration and the number of registered classes. To address the problem presented in this paper we analyzed some existing test centers using the distributed system approach and compared them to the proposed centralized test centers. We compared the two prototypes intellectually, economically, and operationally. The concluding mathematical formula would easily help any educational institution to optimize their spending efficiency and in advance without compromising the test quality.*


**Keywords** *Centralized systems, decentralized systems, computer-based testing, educational institutions*

## I.     INTRODUCTION

Centralized and distributed systems have been investigated by researchers in many fields. Our investigation is directed toward distributed and centralized test centers. In this paper we aim to find out whether test centers at educational institutions should be centralized or remain decentralized. We investigated the problem economically, operationally, and intellectually. Then we compared our proposed model with an existing one drew conclusions accordingly.

Our hypothesis asserts that the centralized system should outperform the distributed system economically and operationally. The intellectual impacts are beyond the scope of this paper; however, we have provided some literature which addresses this intellectual problem. We claim that a solution to the problem addressed in section 1.1 is feasible, with high efficiency and accuracy, when implementing our proposed prototype discussed in section 3, without harming testing quality.

We claim that there is a feasible solution which strongly supports our hypothesis regarding the centralization of test centers. Extensive research was carried out and more than a hundred papers were carefully investigated. We investigated papers which compare computer-based tests (CBTs) with paper-and-pencil tests (PPTs). Advantages and disadvantages of centralized and decentralized centers were explored. Other systems such as personalized systems, peer to peer (P2P) systems, and codified systems were investigated in relation to test centers' efficacy. The paper explores the impacts of each system on the regulation and management of students' tests at educational institutions. We developed a mathematical formula which can be used for any educational institute to find the size of the test center for a particular institute. Several experimental examples have been provided to demonstrate the efficiency of the formula and its economical advantages. The paper highly recommends the implementation of e-testing and shows the amount of manpower wasted in the existing systems. This