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## DMAIC Analysis of Educational Institutes in Pakistan

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**Abstract:** *Pakistan is growing interest in implementing DMAIC in educational institutions to promote both quality and effectiveness. To teach learners about Six Sigma, the education sector is extremely important. Educational institutes don't want to adopt new technologies teaching methods or assessment strategies and fear of the unknown can make people resistant to trying something new or different they did not use proper training for the students and teachers thus, they didn't have any idea regarding the Six Sigma project, hence management wind up the training. Six Sigma and the education sector now have gaps in innovative learning styles, quality management, novel classroom learning methods, and effective teacher behaviour. A popular method of quality improvement Six Sigma is to be applied in a study using the DMAIC (define, measure, analyze, implement and control) criteria.*

**Key Words:** Reliability analysis, regression analysis, hypothesis testing, before and after implementation of Six Sigma

### Introduction

Six Sigma is an educational approach that focuses on creating effective learning environments, developing students' character, and setting high standards of instruction. Teachers can assign essays on specific subjects to their students, which can then be presented in class for debate using multimedia tools such as projectors and webinars. This teaching method helps students improve their reasoning, writing, and communication skills. The current quality improvement strategy has also introduced the value-based concept as an alternative to the Six Sigma standard. This approach emphasizes self-control, empathy, emotional development, and a sudden expression of excellence. The DMAIC technique is quite helpful in analyzing and optimizing

internal operations. The DMAIC method comprises a five-phase cycle that aids in enhancing quality. Because it is growing in popularity for addressing problems related to quality, Six Sigma is frequently used in its implementation. On the other hand, it is practical for consistently enhancing both the quality and analyzing the processes and helps in lowering operational expenses.

Educational institutions can adopt superior management and continuous improvement practices by taking a cue from the Six Sigma corporate model. To increase productivity, Six Sigma is a technique and statistical approach. It entails measuring every step inside the educational institution using qualitative as well as quantitative methods to reduce defects in the educational process and handle concerns with

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student staff and management performances, and service compliance. Through the creation of value for the students they serve and the maintenance of their reputation, this strategy can help institutions improve operations along the full quality chain. Applying Six Sigma techniques may be a key accelerator for educational institutes as it provides a roadmap for turning data into understanding and reveals opportunities for major improvements in innovative learning styles and student satisfaction. It's important to keep in mind that Six Sigma is an important education sector effort and should be seen as an essential component of the quality process rather than as a replacement for the current quality measures. By focusing on new measures and using technology for ongoing improvement, Six Sigma can achieve important achievements. Staff and students need to understand the strategy, resources, and tactics to promote academic engagement. The intellectual development inside educational institutions is necessary for the successful adoption of Six Sigma ideas and methods, which may have significant managerial implications.

In Six Sigma, the DMAIC (Define, Measure, Analyze, Improvement, and Control) method plays an important role. It provides a structured approach to problem-solving, which can be applied to various situations, including a classroom environment. Six Sigma is an approach that aims to improve the quality of education by enhancing the curriculum, students' conduct, and the overall school environment. The use of audio-visual aids such as projectors and video calls can assist students in researching particular topics, which can then be discussed in class. This method helps to improve students' writing, presentation, and critical thinking abilities. The critical quality approach, which emphasizes value concepts related to Six Sigma requirements, is now becoming a standard practice for ensuring quality improvement in education. This approach has the potential to promote disciplined behaviour, better outcomes, emotional growth, and humanity. The DMAIC process is the Six Sigma methodology that is most frequently applied. Several apply this to find solutions for challenges and correct

mistakes the educational institute faced the problem which affected the management, students and teachers.

## Literature Review

They use Six Sigma models to assess the effectiveness of the learning environment and the preparedness of the instructional staff to provide engaging lessons. Scholars and school administrations have been focusing on this area for a long time. With the help of efficient classroom management strategies, educators can minimize actions that hinder students' ability to learn and boost those that help students learn individually and in groups. (Gupta et al., [2018](#)). A sustainable curriculum that effectively addresses crucial 21st-century skills is also essential for schools. Greater collaboration between individuals working in educational management is necessary to successfully run any educational program (LeMahieu et al., [2017](#)). Imagination and creativity are two critical factors that ensure the institution's success and progress. The administration should make every effort to improve the school's teaching and learning methodology. Variables such as social, psychological, or environmental factors can affect student success in education, and each person and country has different variables (Mitra, [2004](#)). To create a blended learning environment that simulates the real world, the use of technology in the classroom should be increased, allowing students to engage with technology in meaningful ways consequently, is essential for businesses to concentrate on enhancing, regulating, and upholding the standards of the products they produce by creating an appropriate quality system (Kanigolla et al., [2013](#)). The DMAIC approach represents a few of the Six Sigma techniques that could be used to identify flaws or minimize their impact. There are numerous areas in the education industry where the Six Sigma technique is used to get the desired and improved results (Mehrabi, [2012](#)). Training could be improved by implementing Six Sigma approaches in the educational industry. Numerous studies have been conducted in a variety of educational fields to improve the quality of education and reduce ineffectiveness

by using the Six Sigma methodology. When it comes to solving process-related issues in the growing sector, the DMAIC technique is quite helpful in analyzing and optimizing internal operations (Wang, 2008). The DMAIC method comprises a five-phase cycle that aids in enhancing quality (Wang, 2008). Because it is growing in popularity for addressing problems related to quality, Six Sigma is frequently used in its implementation. On the other hand, it is practical for consistently enhancing both the quality and analyzing the processes and helps in lowering operational expenses (Hilton & Sohal, 2012).

### Methodology

The research methodology will involve collecting data on the targeted individuals and using surveys to quickly and effectively gather a lot of information while allowing respondents to choose. The purpose of this research is to enhance the Six Sigma process, reduce knowledge and training gaps, and strengthen resistance to change in educational institutions (Gupta et al., 2018). Both primary and secondary data will be required for the study. Samples will be created through direct observation once the reasons for flaws have been identified. The process consists of four stages, which are as follows:

Firstly, will analyze the issues faced by educational institutions while establishing the research goals (He & Goh, 2015). Additional materials on Six Sigma approaches will be reviewed to advance the literature theory used as an effective problem-solving tool.

Secondly, observations from students and faculty will be recorded and gathered by using an electronic questionnaire. The DMAIC (define, measure, analyze, improvement control) method of Six Sigma is to be used following data collection (Suresh et al., 2012).

Then, using the formula

$$Y = f(x),$$

### Reliability statistics

Table 1

Reliability Statistics

Crobach's Alpha	N of Items
0.853	20

If,

Y is the result and x is the cause,

The sigma level can be calculated.

Additionally, Regression analysis, Correlation and Hypothesis testing will be performed to identify the primary sources of the issue and its effects (Gupta et al., 2018). The statistical software will then be used to create essential quality factors using the data acquired from this analysis.

Making a test with sample statistics that can be applied to either accept or reject the null theory is the goal of hypothesis testing (Noronha et al., 2021). If the number of samples is more than 30, the Z equation is applied to do this. As follows is the Z formula:

$$Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

The t-test is utilized in its place, though, if the number of samples size is under 30. The following is the t-test formula:

$$T = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

After measuring sigma levels and hypothesis testing, we may analyze deviations and evaluate statistics efficiently by utilizing charts of control (LeMahieu et al., 2017). This enables us to find possible problems and lastly, Six Sigma implementation in educational institutions before and after changes (Mitra, 2004).

### Result and Discussion

The DMAIC technique of Six Sigma can be effectively implemented in educational facilities with the participation and education of staff. However, the lack of adequate legal regulations, especially for educational institutions, has stuck its implementation. It would be beneficial to encourage the approach at the state level by creating rules and guidelines for its application in education to promote its wider adoption.

Table 1 shows that the Cronbach alpha value of 0.853 indicates that the research scales consistently produce reliable results within the intended standards.

### ANOVA Analysis

**Table 2**

*ANOVA ANALYSIS*

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	77.108	24	3.213	2.457	0
Residual	251.012	192	1.307		
Total	328.12	216			

Significant variations between the mean values of several variables are shown if the F statistic's value is higher than a critical threshold. With a p-value of 0.00, less than or equal to the alpha

### Regression analysis

Researchers use regression analysis to evaluate hypotheses and measure the relationship between variables. Independent analysis is required for each variable.

threshold of 0.05, the value of F is 2.457, indicating statistical significance. As a result, the mean of the various performance levels at educational institutions differs significantly.

**Table 3**

*F-TEST*

F	df1	df2	Sig.
1.374	4	192	0.024

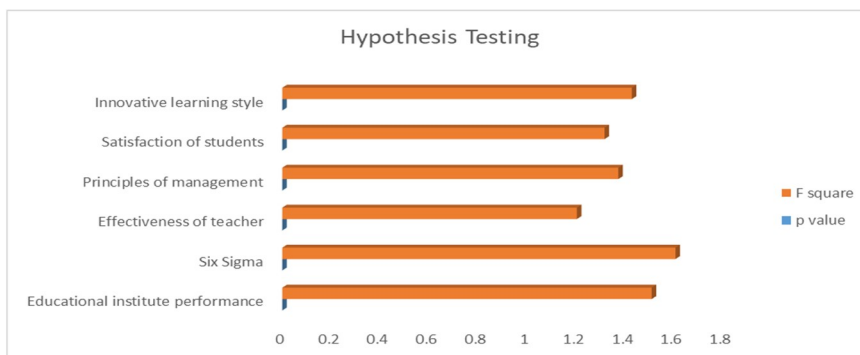
In this case, the p-value is 0.024, which is less than 0.05, indicating that the hypothesis has been accepted with an F-test of 1.374. If the P-

value is greater than 0.05, the hypothesis has been rejected; if it is less than 0.05, the hypothesis has been accepted.

### Hypothesis Testing

**Graph 1**

*Hypothesis testing*



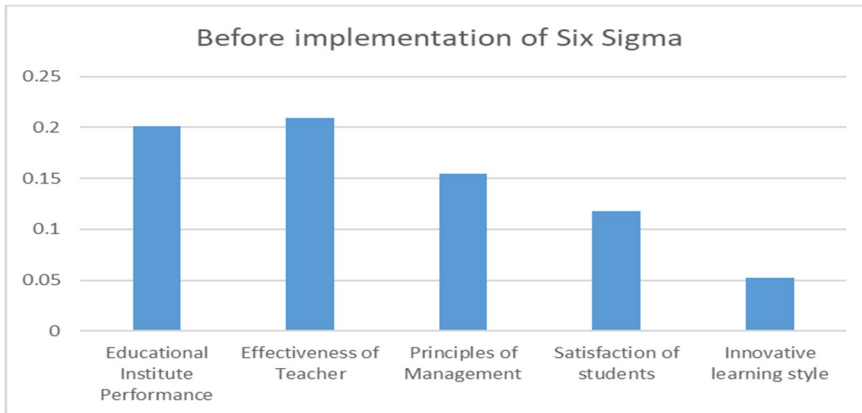
There's statistical significance when the p-value is less than 0.05. In this graph, all hypotheses have been accepted and the f-square indicates

that below 0.02 is weak, between 0.15 and 0.35 is reasonable, and over 0.35 is strong.

### Before the Implementation of Six Sigma

Graph 2

Before the implementation of Six Sigma



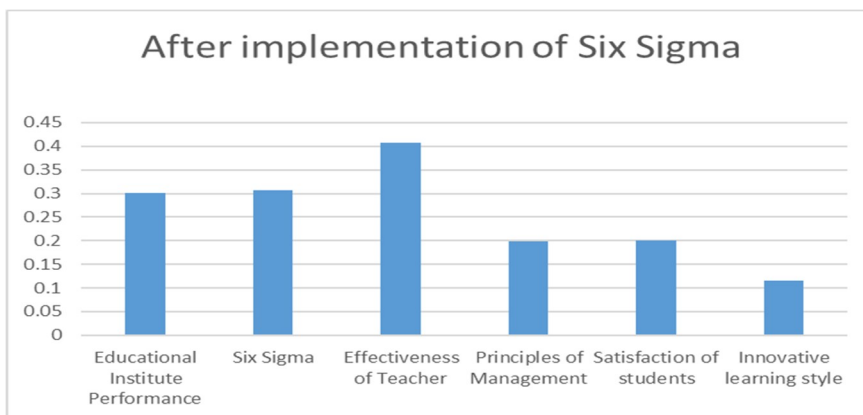
Before implementation of Six Sigma educational institute performed 20%, effectiveness of teacher 21%, principles of

management 15%, satisfaction of students 13% and innovative learning style 5%.

### After the implementation of Six Sigma

Graph 3

After the implementation of Six Sigma



After implementing Six Sigma, educational institutes performed 30%, effectiveness of teachers 41%, principles of management 20%,

satisfaction of students 20% and innovative learning style 12%.

## **Conclusion**

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In conclusion, several Six Sigma strategies have been developed to improve the quality of higher learning. The Define phase of the DMAIC process determines the primary input and output variables. The Measure phase involves measuring both input and output variables after data collection over time. During the analysis phase, statistical software is used to identify variables. Appropriate corrective actions can be implemented to improve the

process after identifying a variable that is not included in the test. In academic settings, this stage is essential to ensure student achievement and improvement. While the Control phase mainly focuses on setting up mechanisms and delegating accountability for maintaining and continuously improving the implemented solutions, the Improvement phase concentrates on fine-tuning and optimizing the established solutions through evaluating outcomes and input changes.

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