# Radical Improvement in Quality of Internal Examination Evaluation and Feedback System by Implementing Principles of Six Sigma During Covid19

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*Abstract* - The crisis caused by the COVID-19 virus has far-reaching effects in nearly all social areas, including education. Schools, Institutes and Universities were closed from March 2020 in nearly all countries across the world. Around 32 crore learners stopped moving to their schools and colleges and all educational activities were halted. This worked as a catalyst for the educational institutions to embed available technologies in the existing system which had never been used before. Hence the education industry adapted remote learning methodologies to survive the crises to provide seamless education. In the ever changing VUCA (Volatile-Uncertain-Complex-Ambiguous) world there are set of uncertainties that all higher educational institutes must consider in terms of continuous improvement to meet the demands of competitive and growing industry standards. These needs are concerned with the quality of services been offered that enhances experience of a learner even during the times of crisis such as the recent pandemic. It was further essential to modify the traditional evaluation mechanism for quality enhancement by evaluating available technologies as the learning cannot stop. This paper demonstrates the application of six sigma in evaluating the academic performance measures of a group of students in a deemed university based on DMAIC (Define – Measure – Analysis – Improve – Control) methodology.

In the examination management system, an evaluation process lies under the strongest tool for strategic development which is a primary necessity to increase and improve quality of any course. This paper describes scope of adapting an automated grading system based on AI for formative and summative assessments by application of six sigma principles which can dramatically cut down the cycle time of Students Results from 6 weeks to 6 days during and after the COVID 19 pandemic.

Keywords: *AI based grading; Six-Sigma; Quality enhancement; higher education, digitization*

## INTRODUCTION

The COVID-19 impact had a major impact on all sectors including Education, but learning cannot stop and hence the classroom teaching programs had to be shifted to e-learning platforms. In addition to this the assessment and grading system had to be conducted on virtual platforms to affirm social distancing. The closure of schools and colleges across 188 countries had to be then conducted in an alternative mode using Virtual mode on Internet. (UNICEF, September 2020).

In a grading system, operations and evaluations are 2 major tasks in administration. A dynamic evaluation system helps a student understand his weakness and failures which gradually helps him work on improvement mechanisms and regulate timely decision making for achieving individual goals.

Also, a grading process is a basic mechanism for academic quality assurance in higher education. Hence it is the major constraint to measure qualitative development of a student and a responsible competent workforce required in building vibrant evaluation system to map students learning outcomes that act as means of quality control for raising substantial standards for improvement of examination process in Colleges of Education. (Shazia Rashid, August 2020) (WHO, 2020)

The COVID-19 disruption continues through the second year of pandemic with its second and third wave of infections while students suffer the losses of delayed results. All the major countries have postponed their examinations time to time but this has created a bottleneck in student grading and evaluation to promote them in the next grade. Within these times most of the higher education institutes had shifted the examinations from traditional examination pattern to E-Platforms which provided AI proctoring technology. Such technological shifts certainly acted as boon to Education Sector and the teaching-learning cycle experienced a dynamic shift.

With the introduction of TechSavy platforms in teaching and grading universities across the world faced difficulty in providing timely evaluation and feedback to the students. Some major organizations including International Baccalaureate organization and Cambridge International cancelled their examinations in 2020, while some institutes decided to declare results based on past

performances. Few institutes including ours adapted an assignment-based examination and the submissions were accepted via a similarity check plagiarism software to affirm originality.

There was a major need to enable fair evaluation and robust feedback system for the GenNext. Hence it was important to identify challenges and strategies for improving quality standards in evaluation processes to match the speed of the VUCA world and to create a comprehensive professional development for student development even during the times of pandemic. With the use of AI grading system these hiccups can be tackled in a much faster and efficient manner. (Sharma, 2021)

## PROBLEM DEFINITION

To meet the pace of changing platforms from traditional to an automated one in COVID-19, The overall assessment methodology for course had to be reworked. The examination module for a course were based on a Trimester pattern. Each of which comprises of both summative and formative assessments that stretched across the academic delivery span of 12 weeks. In the existing assessment system, a period of 6 weeks is provided across all assessments (Summative + Formative) to faculty for completion of assessments manually post academic delivery. This creates a delay in feedback system and there's hardly a scope left for improvement. The outbreak of pandemic created a bottleneck in overall grading system. Amidst COVID-19 The traditional learning platform had shifted to the online platforms and world experienced a major technological shift to the 'digital world' opening doors for possibilities of adapting a digital and robust transition using AI grading system for evaluations. (Bowen, 2012) (Shazia Rashid, August 2020).

## SCOPE

The table explains scope of improvement in the current system of grading to an automated grading system by using an AI grading tool:

TABLE 1: DEPARTMENT: EXAMINATION

| Problem Statement: | Current Process Impact: |
|---|---|
| • A delay in series of assessment procedures thus causes a bottleneck affecting the Next Set of examination schedule and further causes delay in Result announcement.<br><br>• Additionally, Degree follows A Trimester Pattern hence the issue is recurring throughout the year. | The current system does have a 6 weeks assessment system but does not have a specification or defined goal.<br><br>There are undefined meaning term "Assessments" or "Assessment Methodology" and hence different Module Leaders follow different practices, Resulting variation in outcome. |
| **Six Sigma Objective Benefit:**<br><br>**Objective:**<br>Reducing the 6 weeks Assessment system to A Robust 6 Days assessment methodology by using AI grading system<br><br>**Benefits:**<br>The current system can thus be put together into a better and robust system to promote Module Leaders for timely submission. | **Milestones and Deliverables:**<br>**D** - Define<br>**M** - Measure<br>**A** - Analyze<br>**I** - Improve<br>**C** - Control<br>A research project which can radically improvise the existing grading and feedback system.<br>**AI Grading system**<br>**Digitization** |

## DISCUSSION/METHOD

To understand the bottleneck areas the authors had divided the Term in Weeks across Academic delivery and Formative+ Summative assessments. Based on each parameter the scope of improvement for improvising the grading and feedback system:

TABLE 2: ANALYSIS ON TIMELINES OF EVALUATION AND GRADING IN CURRENT SYSTEM

| Term I | Focused Areas | Current System of Submission | Days | Reasons of Getting results delayed | Proposed System of Grading (AI Based) | Days |
|---|---|---|---|---|---|---|
| Term | Commencement of Term 1 | Week 1 | 105 | NO | - | 105 Days |
| | Term 1 Ends | Week 15 | | NO | - | |
| | Mid-Term Exam | Week 10 | | NO | - | |
| | Mid-Term Result | Week 13 | 21 | Yes | 3 Days | 3 Days |
| | End-Term Exam | Week 15 | | NO | - | |
| | End-Term Result | Week 21(6 weeks from End Term) | 42 | YES | 6 Days | 6 Days |
| Total Days for declaring Results | | | 63 | ⟶ | | 9 |
| After implementation of Proposed System The result declaration process can be Radically reduced by | | | | | 54 Days | |

**Observations:**

A. The excel analysis helps us understand that each term comprise of academic delivery which cannot be a reason of delay in feedback.

B. It was also observed that for an academic excellence it is important that the feedback of Mid-Term is received much before the commencement of End-Term examination as it fosters gap analysis both for the Module Leader and student.

C. With the help of AI grading tools the delay caused in result declaration can be dramatically cut down to few days.

## DATA ANALYSIS

It has been observed that the AI Grading system has already been adapted in countries like US in large scale which has resulted in saving a large amount of money and time. AI system designed tests like GRE (Graduate Record Score) are been graded on their essays. Majority of the educators have endorsed the AI system as the system incorporates random analytical grading mechanism to evaluate candidate. (Chawla, 2019)

The AI system can automate the process of grading to expedite the manual evaluation procedure including large volumes of traditional tests. Additionally, A lot of time can be otherwise used in a robust Educator-Learner interaction and enhance the learning experience. The traditional methodology can thus be replaced by some auto-graded tools and techniques to further improvise quality of grading and feedback system. (Spilka, 2020).

Figure 1 shows The increasing market revenue across years in AI system.

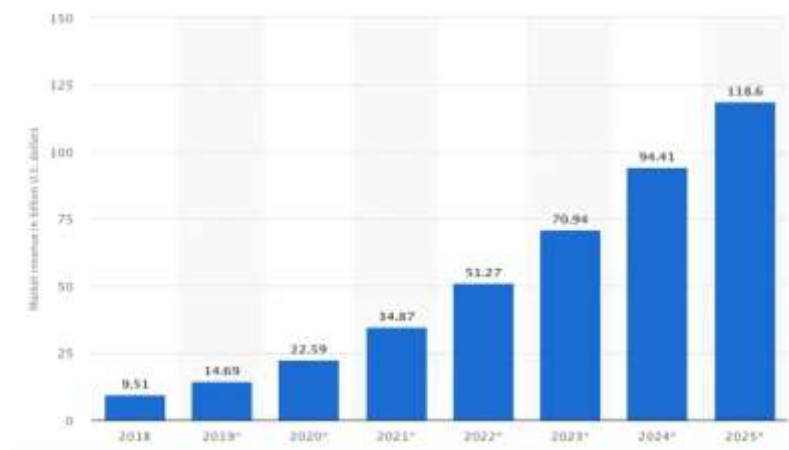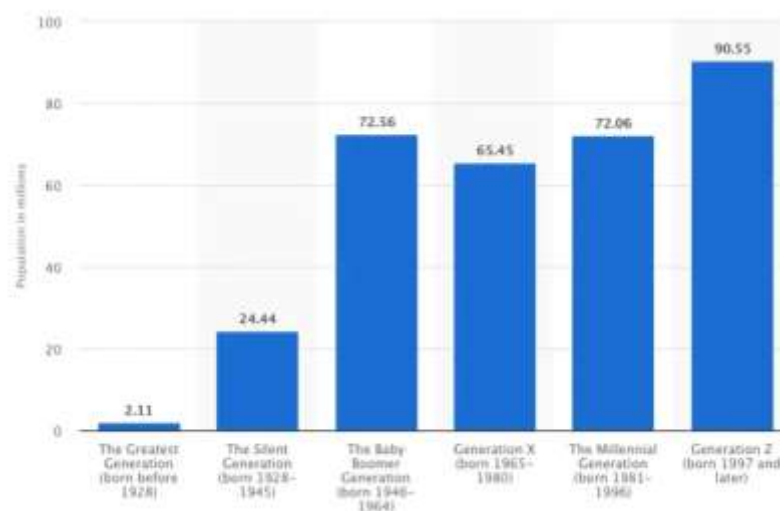FIGURE 1 : AI SOFTWARE MARKET REVENUE ACROSS YEAR



Figure 2 demonstrates data drawn from a subset population. AI systems have been adapted by various institutes across the globe across communities to enhance learning experience.

FIGURE 2: POPULATION BY GENERATION



AI grading system can additionally support educators in providing scope of improvement by a strong and automated feedback system supported by data and analysis as per candidate's performance. With the inclusion of such tools and techniques a learner concentrates on the weak areas specifically and the learning style can be customized as per individual requirement.

## CONCLUSION AND FUTURE SCOPE

The pandemic acted as a catalyst and exposed the current higher education system to a robust digital technology which offers innovative solutions for existing problems in terms of quality and strategies. It was gradually experienced that the education industry is capable to sustain even in the tough times of pandemic and can continue imparting education by embracing the advanced technology. To inculcate continuous improvement and to develop a robust feedback system it is certainly possible to reduce the time and stress associated with evaluation for faculty by using the AI Grading system. This will foster a consistent feedback system without delays and the evaluation time can be radically reduce from few weeks to few days to help enable scope for development. Hence, the authors are assessing various tools and techniques to improvise the current grading system by evaluating and analyzing areas of improvement.

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