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Quality Control and Management in Digital Learning Platforms

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Quality Control and Management in Digital Learning Platforms

ETM 560: TOTAL QUALITY MANAGEMENT

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Submitted By: Saumya Saxena

Abstract

The COVID-19 pandemic has changed the face of education forever. Though the educational system has seamlessly transitioned from the traditional physical classroom teaching to the digital teaching setup, there are certain barriers faced by students and faculty that affect the quality of digital learning. The aim of this paper is to identify key quality issues in the digital learning platforms used in current online education system from the perspective of students. The research is based on literature review, and responses to a structured questionnaire along with semi-structured interviews. The research shows that majority of the students are satisfied with their digital learning experience on a high level, but they face some key challenges especially in the areas of platform interface and course assessment. The student responses received were analyzed and a list of viable solutions have been recommended to address these challenges. The recommendations are based on the Continuous Process Improvement methodology of Total Quality Management. In future, the study may be extended to a wider set of students from different demographic groups. There is also a scope to evaluate these digital learning platforms from the perspective of faculty and teaching staff.

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Introduction

The COVID-19 pandemic has changed the way we operate in our daily lives. Due to imposed lockdown and other measures taken to contain the virus, the traditional classroom learnings had to be suspended and the digital learning emerged as the new mechanism to continue teaching and other learning activities. Advancements in the digital technology have led to revamping and transforming of the educational system across the globe. However, this seamless transformation has certain barriers which affect the overall quality of digital learning for the students.

The objective of this paper is to identify and analyze the major quality issues in today's digital learning platforms. The post-pandemic surveys have shown that students are preferring digital/online learning over traditional learning methods. But further research indicates that there are some areas of digital learning platforms which need to be improved to offer quality learning experience to students. Four areas of digital learning platforms i.e., digital course content, digital course assessment, platform interface and collaboration methods, have been used for a detailed study of quality issues. The in-depth research is based on a structured questionnaire and semi-structured interviews. The research shows that platform interface and digital course assessments are the critical areas requiring quality improvement.

To overcome these quality issues, the techniques, and tools of Total Quality Management (TQM) have been explored. The paper describes how the Continuous Process Improvement methodology of TQM can be utilized to improve quality of digital learning platforms.

Literature Review

A study of multiple surveys and articles have shown that despite the shortcomings of digital learning platforms, majority of students prefer to continue online learning instead of the traditional method. Some of the major advantages as reported by students are given below:

- **Self-paced learning:** There is no fixed schedule in many courses and students have the flexibility to access the learnings as per their convenience of time and place.
- **Better-time management:** Digital learning format allows students to manage studies with their other commitments of work and career.
- **On the go access to documents:** Students can access the course content anytime anywhere from different devices such as the laptop, mobile, tablets etc.
- **Broader learning opportunities:** One of the highly regarded advantages of digital learning is the wide variety of options available to students and professionals without uprooting their lives. A student from India can enroll in a course offered by universities of the US.
- **Customized learning environment:** With online classes, students have the opportunity to learn and study in their comfort zone. They can access the course content even when they are travelling. Also, they can communicate with teachers and classmates through different channels such as email, digital learning platforms, videoconference etc.

A survey, the Digital Learning Plus, conducted in April 2021 and published by Bay View Analytics suggest that 73% students would like to take some fully online classes in the future [4].

However, the same survey also indicates that many students want an increase of technology usage in their courses.

Preferences for my post-pandemic academic experiences

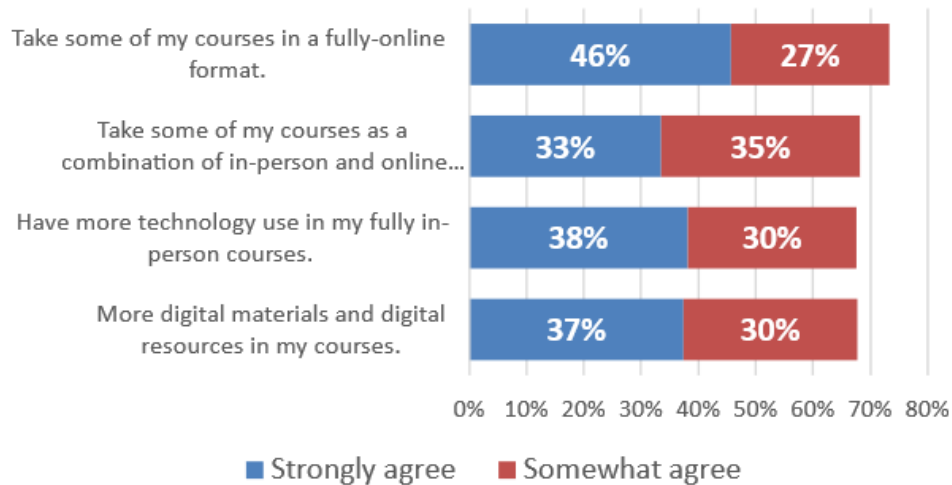


Figure 1: The Digital Learning Plus survey (April 2021) [4]

Studies in the field of digital learning show the following disadvantages:

- **Lack of human engagement:** The learnings are delivered through coursework and pre-recorded lectures. And as most of the times the students are studying in silos as per their convenience, there is less engagement with other students and faculty.
- **Absence of opportunities for hands-on learning:** The hands-on learning of complex subject such as lab work in science, are missed in digital learning setting.
- **Supervised teaching and assessment:** The assessments taken online are mostly not proctored leaving the students with a scope of using unethical methods of passing the assessment.
- **Ineffective collaborative learning:** Since the students are not physically gathered in a joined classroom, there are limited interpersonal relationships developed and effective collaboration is missed in projects.

Research Methodology

Based on the literature findings there were four areas identified to study quality issues in digital learning platforms:

1. **Digital Course Content:** This includes the quality of structure, design, and content of the course materials and if the materials were engaging and effective enough to meet the learning objectives of the course.
2. **Digital Course Assessment:** This area explores the effectiveness of online assessments in evaluating student's understanding of the course.
3. **Platform Interface:** This examines the digital learning platform from the technical standpoint. It checks aspects such as user-friendliness, instructional design, accessibility, and interoperability.
4. **Collaboration Methods:** This area analyzes how well the platform serves the students as a tool to collaborate and communicate with class members and faculty.

To further investigate quality of digital learning platforms from the perspective of students, a structured (Appendix A) was prepared based on the areas identified above. The questionnaire was floated to students at different schools and universities and a total of 24 responses was received. In addition to the questionnaire, four semi-structured interviews were conducted with students and professionals working in the digital learning domain to better understand the quality issues.

Research Findings

There were 24 responses received from the questionnaire. The demographics of respondents is summarized below:

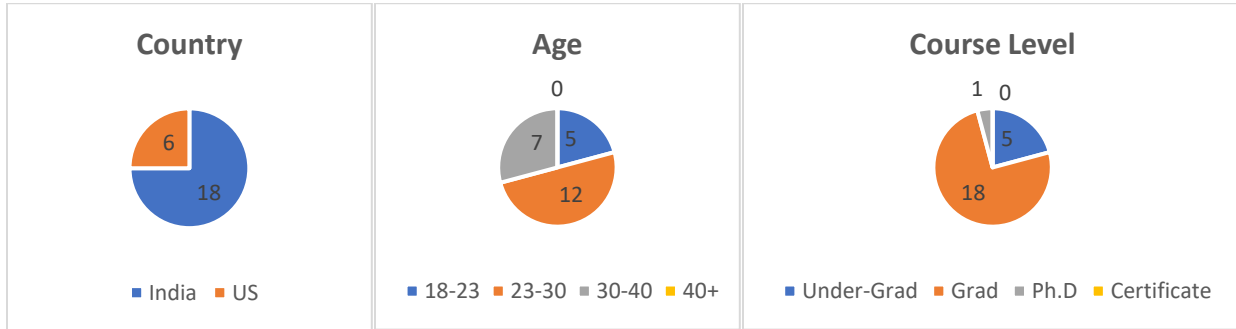


Figure 2: Demographics of respondents

Following charts depict the students' rating of various aspects of each quality area.

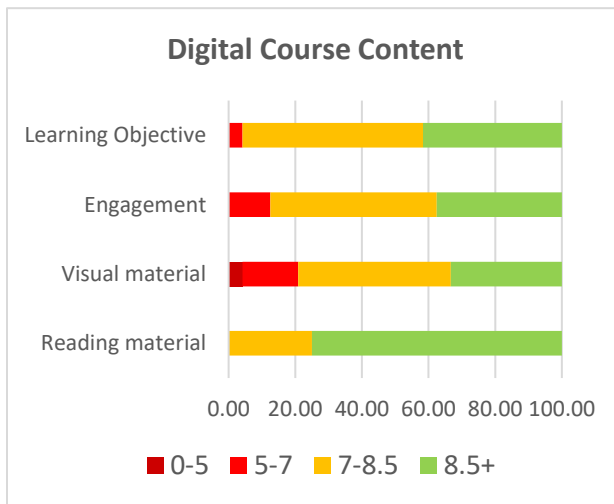


Figure 3: Analysis of Digital Course Content

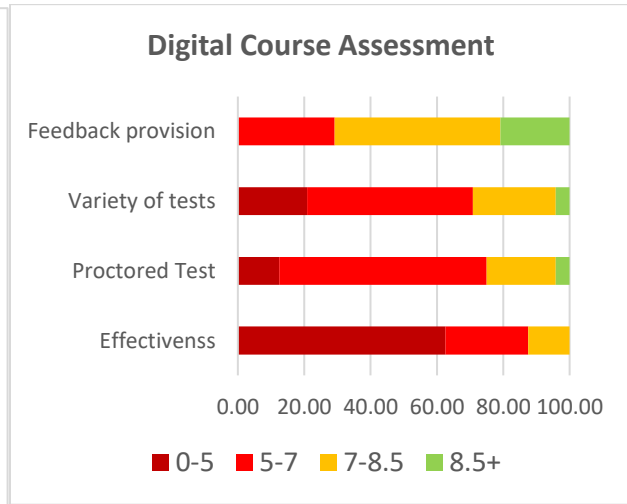


Figure 4: Analysis of Digital Course Assessment

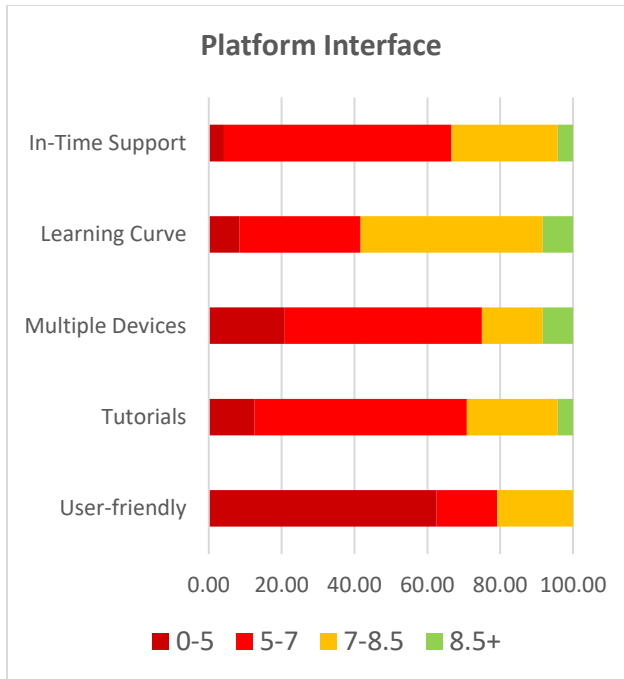


Figure 5: Analysis of Platform Interface

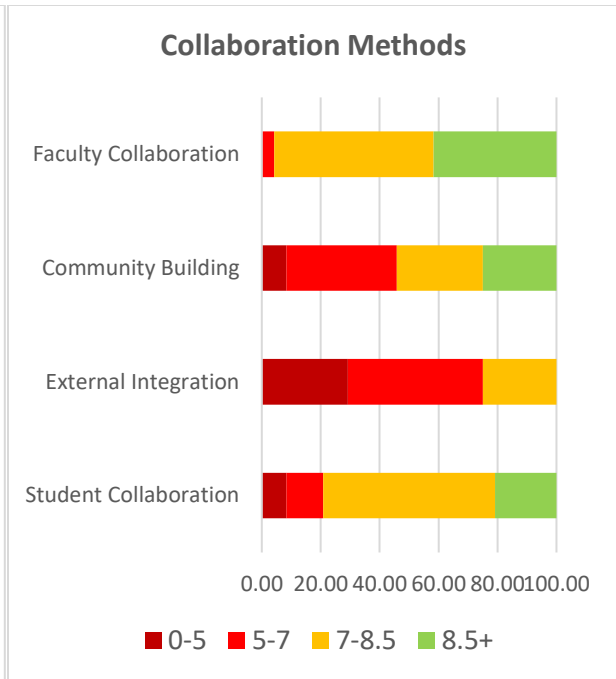


Figure 6: Analysis of Collaboration Methods

A comparison of all four areas shows that platform interface had least student satisfaction followed by digital course assessment, and then collaboration methods. The students were well satisfied with the digital course content hinting slight scope of improvement to enhance the engagement level of course.

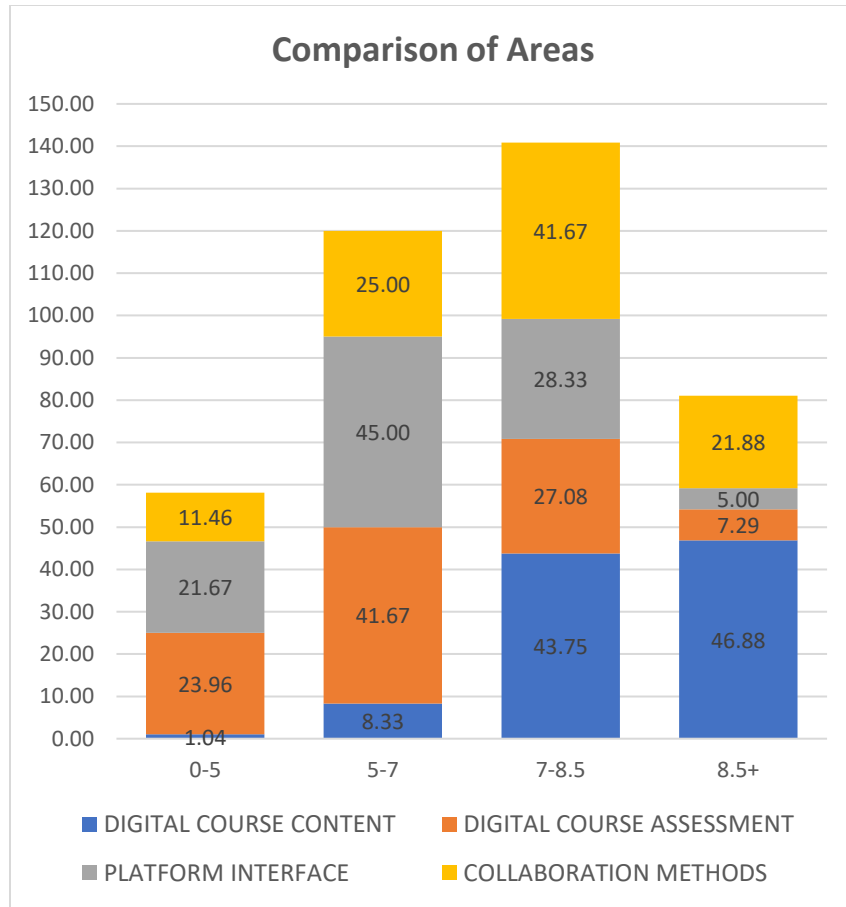


Figure 7: Comparison of the four areas of research

Table 1 summarizes the key quality issues identified from the research.

Table 1: Key Quality Issues

Digital Course Content	Digital Course Assessment	Platform Interface	Collaboration Methods
Course content is less interactive and engaging	Assessment is not proctored mostly	Insufficient dashboards with considerably basic information of upcoming classes	Limited integration with other learning systems such as LinkedIn, Coursera etc.
Lack of visually rich materials in course content	Lack of support to several types of assessments	Access required across devices such as phones, iPads etc.	Limited collaboration with other students for project work
	Proctored tests are sometimes on a different platform resulting in many technical glitches	Lack of in-time support provided for technical issues faced	

Since platform interface and digital course assessment were recorded as areas with lowest quality among four, they were analyzed further using Pareto Charts. Also, in order to develop a quality improvement plan, the aspects having scores between 0-5 were considered to be the critical area requiring improvement.

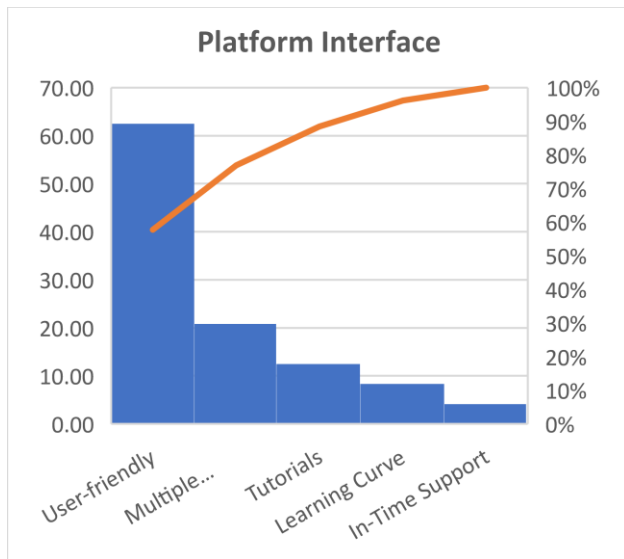


Figure 8: Pareto chart of Platform Interface area

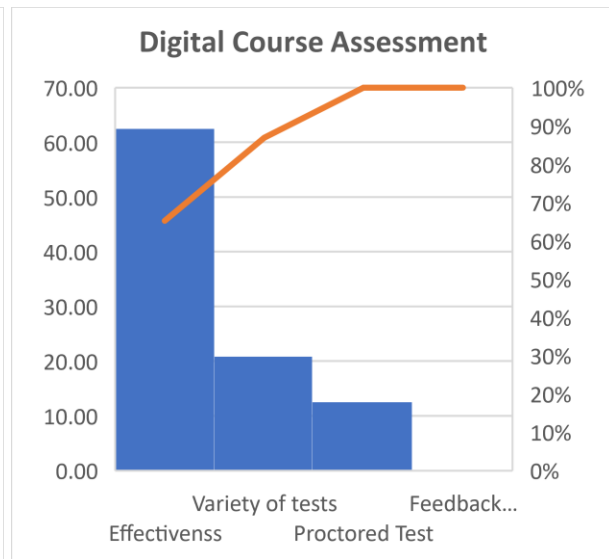


Figure 9: Pareto chart of Digital Course Assessment area

Recommendations

Total quality management is one of the emerging areas of management. According to the definitive text, Total Quality: A User's Guide for Implementation [12], Total Quality Management (TQM) is a management technique based on the idea that all "employees continuously improve their ability to provide on-demand products and services that customers will find of particular value." Techniques and methodologies of TQM are being widely used and appreciated in every industry including education sector. Applying TQM to education includes achieving high quality in all aspects of education such as course design, course delivery, teaching methods, technology etc.

This paper explores the TQM methodologies and practices to address the identified quality issues of digital learning platforms. The recommendation in the paper is based on the **Continuous Process Improvement** methodology of TQM.

The quality improvement plan is divided into two phases:

1. **Phase 1:** This phase would focus on resolving the critical issue areas i.e., platform interface, and digital course assessment, identified as part of this study. An enhanced version of the platform called beta version would be developed and implemented in a controlled environment. The results of the implementation would be analyzed and assessed against the decided performance measures to evaluate the quality of beta version.
2. **Phase 2:** If the findings of phase 1 show high quality results, then the Beta version would be implemented in real-time environment. Continuous feedback would be taken from students and further plans would be designed to address the quality issues, if recorded any.

The phase wise approach of quality improvement is based on the **Plan-Do-Check-Act** (PDCA) cycle of continuous process improvement. PDCA is an iterative process of continuous improvement of products and services in business.

Phase 1 – PDCA

Plan: The objectives and approach to implement improvement plan are designed in this phase. In the current, there are four major activities described as part of this phase.

- **Identify Key Issues:** The key issues are already identified in this study as follows:
 - Platform Interface
 - Poor user-friendliness
 - Inaccessibility across multiple devices
 - Digital Course Assessment
 - Lack of technical compatibility with proctored tests
 - Ineffective assessments
- **List Possible Solutions:** To improve quality of the digital learning platform, certain quality standards and frameworks are suggested.
 - Quality Standards
 - ISO 25010: This determines which quality characteristics will be taken into account when evaluating the properties of a software product [8]. ISO 25010 comprises the eight quality characteristics shown in the following figure. It would help to address issues related to interoperability, performance efficiency etc.



Figure 10: Quality characteristics of ISO 25010

- ECB Check: It is a quality improvement scheme which supports organizations to measure how successful their e-learning programs are and allows for continuous improvement through peer collaboration and

benchmarking [9]. It is a certification tool and can be used for internal quality check of the courses and programs.

- Quality Frameworks
 - Shareable Content Object Reference Model (SCORM): It is a set of technical standards for eLearning products and provides the communication method and data models that allow eLearning content and learning management systems to work together [10]. SCORM is composed of three sub-specifications. Content packaging specifies how content should be packaged and described. Run-Time specifies how content should be launched, how data communicates with the LMS and includes the spec for the data model of that communication. Lastly, Sequencing specifies how a learner can navigate between parts of a course.
 - IEEE 1484 – IEEE standard for learning object metadata: IEEE1484.12.1-2020 specifies a conceptual data schema that defines the structure of a metadata instance for a learning object [11]. A metadata instance for a learning object describes relevant characteristics of the learning object to which it applies. Such characteristics can be regrouped in general, life cycle, meta-metadata, educational, technical, educational, rights, relation, annotation, and classification categories.
- **Define Performance Measures:** To validate if the updated version has successfully overcome the quality issues, it is imperative that performance measures are determined. Some of these are listed below:
 - Quality standards compliance such as ECB check certification.
 - Also, the updated version can be assessed quantitatively on following parameters:
 - Ease of use
 - Accessibility
 - Interoperability

- Technical Support
- **Determine Measurement Methods:** Once the performance measures are decided, the methods to measure these must be described. This may include:
 - Peer reviews
 - Formal feedback through structured survey/questionnaire
 - Defining control limits would help to determine the future course of action. The qualitative parameters described above can be used to calculate an overall score called Performance Index (PI):
 - $PI > 9$: Implement the version to next level
 - $8 < PI < 9$: Take corrective actions and improve the score
 - $PI < 8$: Go back to plan phase and re-plan.

Do: Once the plan is final, it is time to implement the plan. This phase includes performing technical changes to comply with selected quality standards and realigning design to comply with selected quality frameworks. The Beta version would be implemented internally by offering a course to the employees of the organization developing the platform and testing the platform with their help. Formal feedback on platform performance from the employees would be taken to evaluate performance efficiency. Weekly peer reviews throughout the design and implementation phase should be conducted to collaboratively verify and test the updated features.

Check: This stage is about checking if the implemented plan or solution has met its objectives successfully or not. In this stage, check if the solution is compliant with quality standards such as ECB Check certification. The feedback results must be assessed against the defined quantitative parameters. If the performance results deviate beyond control limits, then go back to Plan phase and take corrective actions.

Act: This is the last stage of PDCA cycle in which if everything looks good then the plan is implemented in real environment. If the feedback results display high quality, then implement the beta version in universities and schools. Since PDCA is a process of continuous improvement, the cycle must be repeated to provide enhance quality results in future.

Phase 2 – PDCA

Once the beta version has passed all quality checks and requirements, it is ready for implementation in the schools and universities. At the time of implementing this new version, training sessions must be conducted with students to describe the enhance features of the learning platform. This will facilitate the smooth transition of students from old version of digital learning platform to new version. It is also suggested that advanced technology be utilized such as the artificial intelligence enabled chatbot to provide real-time technical support to students. This phase is also based on PDCA cycle, and the beta version would be considered as the baseline for this phase.

Plan: This phase would address the remaining quality issue areas i.e., collaboration methods and digital course content of the study. The quantitative parameters to evaluate performance would be flexibility and collaboration.

Do: Just like the previous phase, the Do stage would include making technical and design changes to the platform. The course content would be updated to increase engagement and learning for the students. It is suggested that the next version be first implemented in a smaller size of school to test the new features in a controlled method. A round of workshop would facilitate explaining the new features to school students.

Check: In this stage, reviews must be taken from end-users i.e., students through a structured questionnaire. These reviews must be analyzed and assessed based on the decided quantitative parameters of Phase 2. If there are quality deviations noted beyond the control limits, then re-planning or re-designing should be done to address those deviations.

Act: Once the next version shows high quality results, it is ready to be implemented in larger size or all universities and schools. The next round of PDCA cycle must also be planned and initiated at the end of this phase.

Conclusion

This study demonstrated that although digital learning has a positive effect on students and meets their educational needs to a significant degree, there are still certain areas where quality improvement is essential for an overall high-quality learning. It comprehensively enlisted the quality issues faced in current digital learning platforms.

The Total Quality Management tools and methods were explored to devise a strategy of improving quality based on Continuous Process Improvement methodology of TQM. The study describes a phased-approach of quality improvement based on Plan-Do-Check-Act cycle and how it can be used to enhance the quality of digital learning platforms.

This approach may be applied by people working in the digital learning domain to improve the quality of their platforms and offer a seamless and effective learning experience to students.

Future Research

This paper has some limitations which should be addressed in future research. The study was conducted for a limited number of students, and it may be extended to a wider audience from different demographics.

Also, there is scope to explore aspects of quality from the perspective of faculty and teaching staff.

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Appendix A

Questionnaire used in the research.

Questions	
1	Select the age group you belong to.
2	Select the level of your online course.
3	On a scale of 1-10, rate the quality of reading material provided as part of course.
4	On a scale of 1-10, how engaging and interactive is the course material?
5	On a scale of 1-10, rate the quality of visual material provided as part of course.
6	On a scale of 1-10, how aligned is the course with your learning objectives?
7	On a scale of 1-10, how effective are the assessments in testing your understanding of the course?
8	Are proctored tests conducted on the learning platform used by your university, or there is some external tool used for proctored tests?
9	On a scale of 1-10, rate your experience of proctored tests conducted online.
10	On a scale of 1-10, how satisfied are you with the variety of tests available during the assessment?
11	On a scale of 1-10, rate your experience of receiving feedback from the faculty/instructor during the course?
12	On a scale of 1-10, rate the user-friendliness of the digital learning platform used.
13	On a scale of 1-10, how helpful were the instructions provided on how-to use the platform?
14	On a scale of 1-10, rate your experience of using the learning platform across the devices such as iPads, tablets, mobile phones etc.
15	On a scale of 1-10, how effective is the learning platform in designing and displaying your learning curve.
16	On a scale of 1-10, how would you rate the in-time support provided in case of any issues faced in the platform.
17	On a scale of 1-10, rate the learning platform as a tool to collaborate with other students.
18	On a scale of 1-10, how well is the learning platform integrated with other technologies, websites such as university website, LinkedIn etc.
19	On a scale of 1-10, rate how the learning platform facilitates building a student community having similar learning objectives, interests etc.
20	On a scale of 1-10, how well can you collaborate with your faculty/instructor using the tool?
21	Please share any additional comments you have about digital learning platforms.