

Efficient Teaching Pattern (ETP) Recommendation And Priority-Based Categorization To Enhance The Quality Of Online Learning (QOL)

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Abstract: Nowadays the main mode of Learning is only through online. Though online Learning is gaining much popularity it also brings a chaos among parents about the students learning pattern. It is more important that the online learning should provide a Quality of Learning (QoL) as much as the regular classroom learning. The proposed system introduced a new mechanism named as Efficient Teaching Pattern (ETP) Recommendation. Here, to engage the students in online learning and to produce the Quality of Online Learning (QOL) the Efficient Teaching Pattern (ETP) is accumulated via Pattern Matching method. The tutors teaching style and easy conveying techniques are observed and the pattern is recommended for other teachers to follow. Through this implementation the Students concentration improved and high-performance is maintained. Further, the system adapted a Priority Based Categorization in E-learning, where the most important preferences in online classes are discussed and priority is produced accordingly. Also, the system produces authority for students to customize their classes and choose their own teachers of their convenience through the Teacher Switch-Over Options. Finally the system incorporates a 'check-list' implementation after every class. The check-list collects feedbacks of the online session from both the students and teachers for further improvisation. The performance of the proposed system is produced through the experimental results.

Keywords: Quality of Online Learning (QOL), Efficient Teaching Pattern (ETP), Recommendation system, Pattern Matching, Priority-based categorization.

1. Introduction

Due to The COVID-19 pandemic situation the education system has changed worldwide. Online learning is no longer an option it has been mandatory in the pandemic [1]. Also, an increasing number of online classes have incorporated several components as an effort to improve the quality of learning and instruction. A survey of tutors regarding online teaching indicated that most academicians had opt their own style of teaching, and now most of them systematize and conduct their online lectures, either live or pre-recorded version. The most challenging part in online is to understand the teaching and analyzing the pattern of online courses. In online classes teachers' audio/video is the highlight that keeps the session lively and engaging for students. To accomplish the mentioned fact an effective practices are empirically tested. The interaction among the teacher/student and student/student started to fade when number of students is increased in one session. Some of the researchers produced a set of Pre-lecture quizzes to validate the student's current knowledge- level about the subject/portion and to enhance the student engagement in learning [4]. Conversely, various studies contain varied results concerning student performance improvisation [5].

This article aims to investigate the flaws of online learning. It also aims to accumulate some drastic changes in the online learning Process to produce a Quality of Online Learning (QOL).

The following research solutions are defined in order to achieve the goal of the proposed methodology:

- Initially the students' difficulties over the online classes are analyzed using Deep learning. Generally in classes the way of Teaching is more important to engage the students. Here, the proposed system using a Pattern Matching technique locates the Efficient Teaching Pattern (ETP) analyzing the style of lectures among the tutors. The best one pattern is chosen and recommended to the other teachers

to follow the same pattern for the classes. This helps in engaging the students in producing a remarkable Quality of Online Learning (QOL).

- Further the system adapted a Priority-Based categorization to arrange the priority and fulfil the requirements of the online classes accordingly.
- The system also provides a Teacher Switch-over Option, where the students can switch over the teachers according to their convenience and priority.
- Finally, a checklist about the classes reported regularly (Daily class basis) to visualize the increasing performance perceived via Proposed Implementation.

2. Literature Survey

Several Researchers defined several challenges and barriers faced in ongoing online classes. Recently online classes the main missing factor is lack of active learning and interaction among the teacher and the students. Moreover, several students face technical difficulties in attending online lectures or determination exercises due to varied software system versions or differing kinds of operating systems [8].

D. Cohen et al in [6] declared a Online Quiz and game-based learning approach that can aid the online Learning method by enhancing emotional states similar to engagement producing an formative assessment. R. K. shah and L. A. Barkas in [7] expressed 'One of the important problems in education is understanding student engagement and also the impact on learning performance. Therefore, it's essential to research the utilization of eLearning technology by students to contribute to eLearning style and support student engagement.

C. M. Plump and J. LaRosa in [8] explore the learners' perspective of utilizing Kahoot! in an online synchronous English class. In this study, Kahoot! Used run within a university learning management system, permitting the teacher to share his screen with online students together with an online video streaming of the teacher and a list of the students participating are permuted [9]. Ma Lin's in [10] performed a research analyzing the description of the courses and thoroughly focus on locating the students' Online Learning (OL) requirements and convenience. Consequently, Ma Lin designed a new analysis on combining "Tencent Classroom" and "Rain Classroom" using the 'split screen' technology in computer to realize online teaching and learning

3. Efficient Teaching Pattern (ETP) Recommendation

3.1 Pattern Matching

The Efficient Teaching Pattern (ETP) analysis is achieved using pattern matching. The student behaviours during classes are recorded for analysis. The students' difficulties during the online classes are studied. The students are queried about the teacher skills, the most attentive and interactive session. The feedbacks of student about their respective teachers are collected via a set of questionnaire session. Through this session the Efficient Teaching Pattern (ETP) opted and selected for recommendation.

3.2 ETP Recommendation

All the teaching patterns of the teachers are analyzed by the feedback of students and the best pattern of teaching is chosen. Then, the selected pattern is recommended to other teachers to make the students more convenient and to adapt easy way of learning. The teacher-teachers conversation is arranged and the ETP tutor is made to discuss about the pattern the person follows for teaching students. Through this session the other teachers gain knowledge of the Efficient Teaching Pattern, this way the teaching is made easy. By utilizing the proposed way of learning the students high performance is maintained and the Quality of Online Learning (QoL) is enhanced.

3.3 Priority-Based Categorization In E-Learning

To enhance the quality of E-Learning and to change the way of teaching and online learning pattern initially the whole mechanism of Online Learning must be studied. Here, the system provides a priority based categorization considering the importance of the teacher and students convenience in online classes.

3.3.1 First Priority

In the first categorization the most important requirements that directs to a successful online session are accumulated in the first priority.

Consistency in Audio: In online classes Audio connectivity plays a vital role. If there is no proper audio it will affect the students' portions and reflects in remarks. The system concentrates on providing a constant flow of Audio Network.

Understandable Presentation: The teachers are instructed in a way to provide a very easy and interactive presentation for every student to understand it easily. The presentation are produced in a form of pictorial representation (visual representation as by photo or Drawing) to make the way of learning simpler.

Teacher-Student Interaction: To make the online session more interesting and lively a student teacher interaction must be produced in middle of every class. Through the interaction the students' attention and focus is improved.

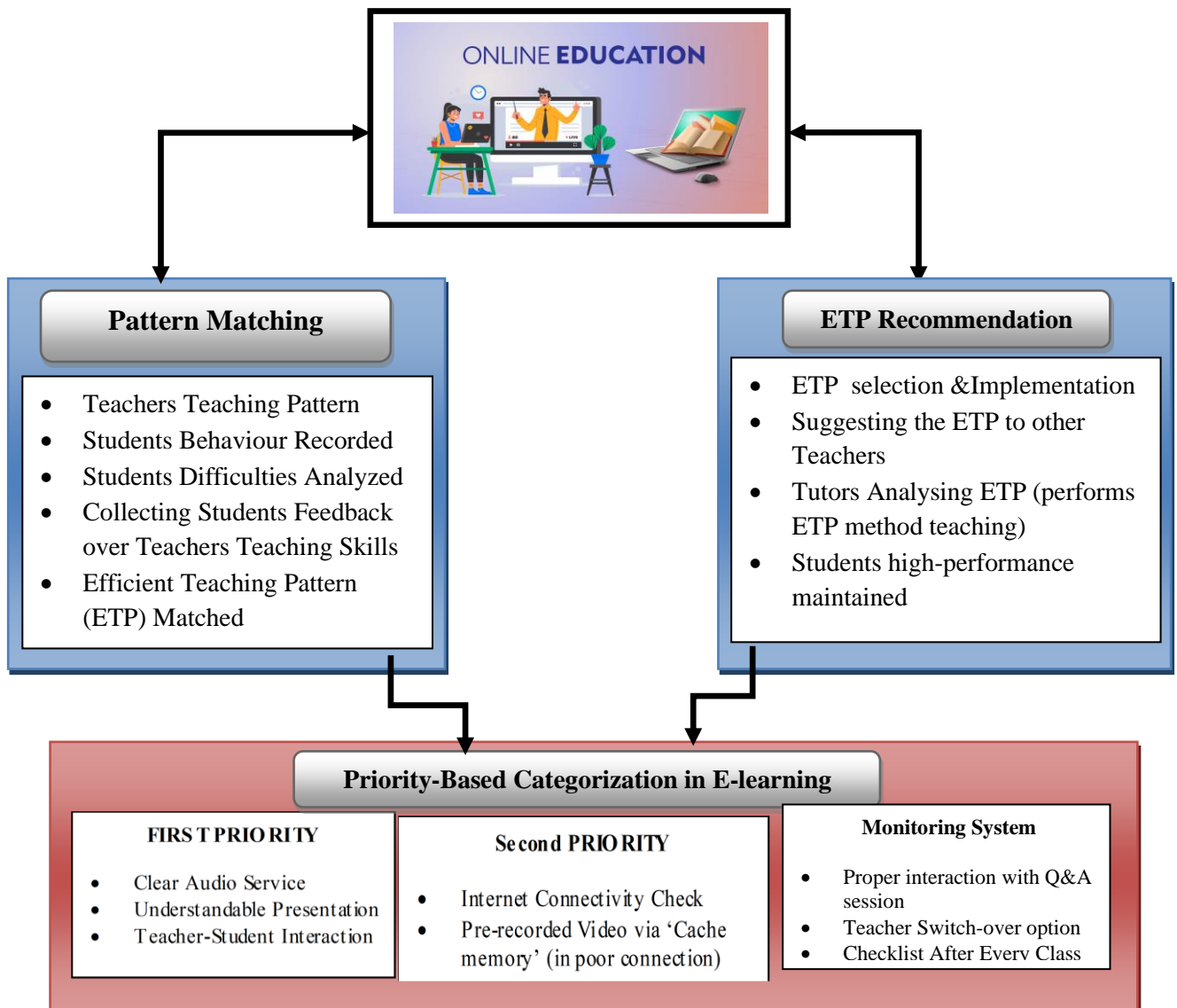


Fig 1: System architecture for enhanced e-learning

3.3.2 Second Priority

The second priority goes to proper internet connectivity check for video.

As audio, video is also a main component to handle a proper E-learning session. Generally, video presence stimulates in-person (One-to-one) instruction creating a social relationship/bond between the teacher and the students.

Auto Enabling System: There are chances of some students faking while online classes by turning off the videos. To avoid this situation an Auto-enabling Video System is opted where the Video on/Off authority is not provided to the students only the system has authority on it.

Pre-Recorded Video/Audio in Cache Memory: Pre-recorded sessions are stored in Cache Memory. In case if suddenly the audio/Video is disconnected the Pre-recorded video is played automatically to continue the session. The recorded video matching the real audio is continued producing an ongoing online session without any interruption.

3.3.3 Monitoring System

The proposed system implementation is well-monitored and recorded for further usage. A **proper interaction via Question and Answer** session opted to keep the students engaging.

Teacher Switch-Over Option: Further, to provide a comfortable learning among students a Teacher switch-over option deliberated. Students are given authority to choose the teacher according to their convenience. By using switch-over option the students can switch the classes of their choice.

Checklist after Every Class: After every class a check list of the session are regulated and submitted in daily basis. The feedback from both the student and the teacher about the online class collected and uploaded regularly in the system. This regular update helps to improve the quality of online learning.

4. EFFICIENT TEACHING PATTERN (ETP) ALGORITHM

Algorithm: Efficient Teaching Pattern (ETP) Recommendation and Priority-Based Categorization in E-learning

Inputs: Student behaviour during online classes, teacher skills, student feedback, audio connectivity, presentation quality, teacher-student interaction, video connectivity, pre-recorded sessions, monitoring system, student preferences

Outputs: Efficient Teaching Pattern (ETP) recommendation, priority-based categorization, audio and video connectivity check, pre-recorded sessions, monitoring and recording system, teacher switch-over option, checklist feedback

// Efficient Teaching Pattern (ETP) Recommendation:

function ETP Recommendation(studentBehaviour, teacherSkills, studentFeedback):

// Record student behaviour during classes for analysis.

// Study student difficulties during online classes.

// Query students about teacher skills, the most attentive and interactive session.

// Collect student feedback about respective teachers via a set of questionnaire session.

// Analyze all teaching patterns and choose the best one.

// Recommend the selected pattern to other teachers to make the students more convenient and to adapt an easy way of learning.

// Arrange a conversation between teachers to discuss the Efficient Teaching Pattern.

// Enhance the quality of online learning using the proposed way of learning.

// Priority-Based Categorization in E-learning:

function PriorityBasedCategorization(audioConnectivity, presentationQuality, teacherStudentInteraction, videoConnectivity, preRecordedSessions, monitoringSystem):

// First priority:

```
if (audioConnectivity == true):
// Provide a constant flow of Audio Network.
if (presentationQuality == true):
// Provide an easy and interactive presentation for every student to understand easily.
// Produce presentations in a form of pictorial representation.
if (teacherStudentInteraction == true):
// Produce a student-teacher interaction in the middle of every class.
// Improve students' attention and focus.

// Second priority:
if (videoConnectivity == true):
// Provide proper internet connectivity check for video.
// Stimulate in-person (One-to-one) instruction.
// Use an auto-enabling Video System to avoid students faking by turning off videos.
// Store pre-recorded sessions in Cache Memory to play automatically in case of disconnection.

// Monitoring system:
// Interact with students via question and answer sessions.
// Provide a teacher switch-over option to choose teachers according to student preferences.
// Regulate a check list after every class.
// Collect feedback from both the student and the teacher about the online class and upload regularly.

// Main code:
studentBehavior = getStudentBehavior()
teacherSkills = getTeacherSkills()
studentFeedback = getStudentFeedback()

ETPRecommendation(studentBehavior, teacherSkills, studentFeedback)

audioConnectivity = true
presentationQuality = true
teacherStudentInteraction = true
videoConnectivity = true
preRecordedSessions = true
monitoringSystem = true

PriorityBasedCategorization(audioConnectivity, presentationQuality, teacherStudentInteraction,
videoConnectivity, preRecordedSessions, monitoringSystem)
```

The pseudo code steps for the above algorithm defined as:

- The process of Efficient Teaching Pattern (ETP) analysis involves pattern matching.
- Student behaviors during classes are recorded and analyzed.
- Difficulties faced by students during online classes are studied.
- Students are queried about teacher skills and the most attentive and interactive sessions.
- Feedback from students about their respective teachers is collected through questionnaires.
- The ETP is selected based on this feedback and recommended for use.
- The teaching patterns of all teachers are analyzed, and the best pattern is chosen.
- The selected pattern is recommended to other teachers to improve student convenience and learning.
- Teacher-teacher conversations are arranged to discuss the teaching patterns.
- The ETP tutor discusses the pattern they follow for teaching students.

- Priority-Based Categorization in E-Learning is implemented to consider the importance of teacher and student convenience.
- The first priority includes consistency in audio, understandable presentation, and teacher-student interaction.
- The second priority is given to proper internet connectivity for video and an auto-enabling video system.
- Pre-recorded video/audio in cache memory is used to avoid interruptions during connectivity issues.
- The system is well-monitored and recorded for further usage.
- A teacher switch-over option is provided for students to choose the teacher they prefer.
- A checklist after every class is maintained for regular feedback collection and improvement of online learning.
- The ETP algorithm takes inputs such as student behavior, teacher skills, student feedback, audio and video connectivity, pre-recorded sessions, monitoring system, and student preferences.
- The algorithm outputs the ETP recommendation, priority-based categorization, connectivity checks, pre-recorded sessions, monitoring and recording system, teacher switch-over option, and checklist feedback.

5. Result Analysis

The graph (Figure 2) shows the test performance after implementation of the proposed system. The graph performance increases gradually and results are good after the proposed system implementation. For this experiment the system accumulated a Kaggle dataset that performs classical approach where a model is trained offline and deployed statically.

Here, in below graph a performance learning of the students is made. The pre-test was performed at the very beginning before starting the ETP session. While, the second post-test is done at the end of the lecture (After ETP Session) The pre-test aims to determine the understanding level for the specific subject that will be presented. The post-test tries to capture the students' understanding and interaction level after participating in the ETP lecture.

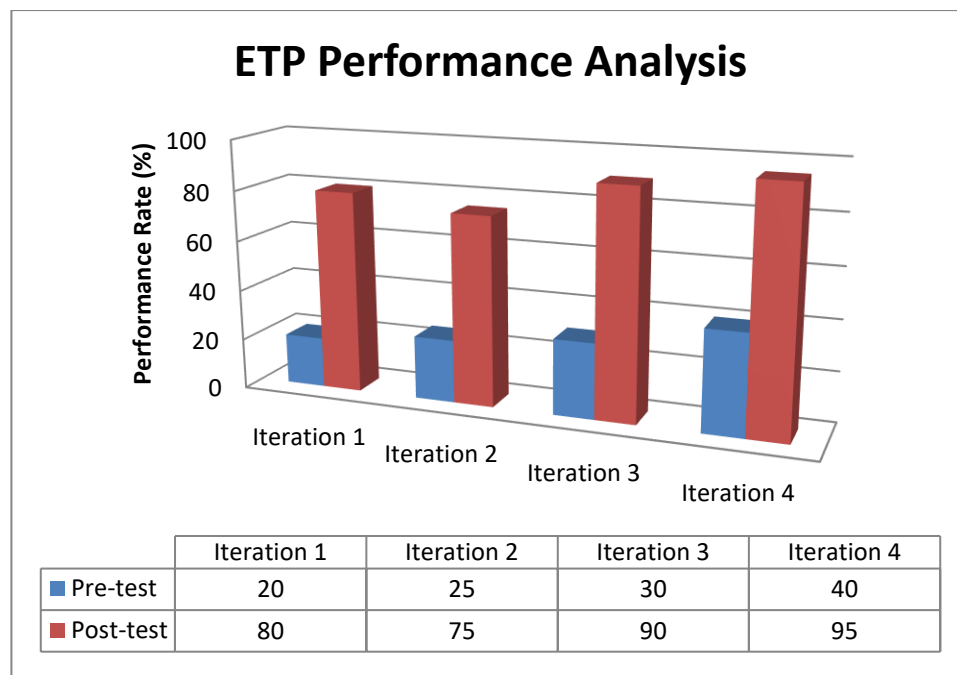


Fig 2: Performance Learning Graph Before ETP vs After ETP

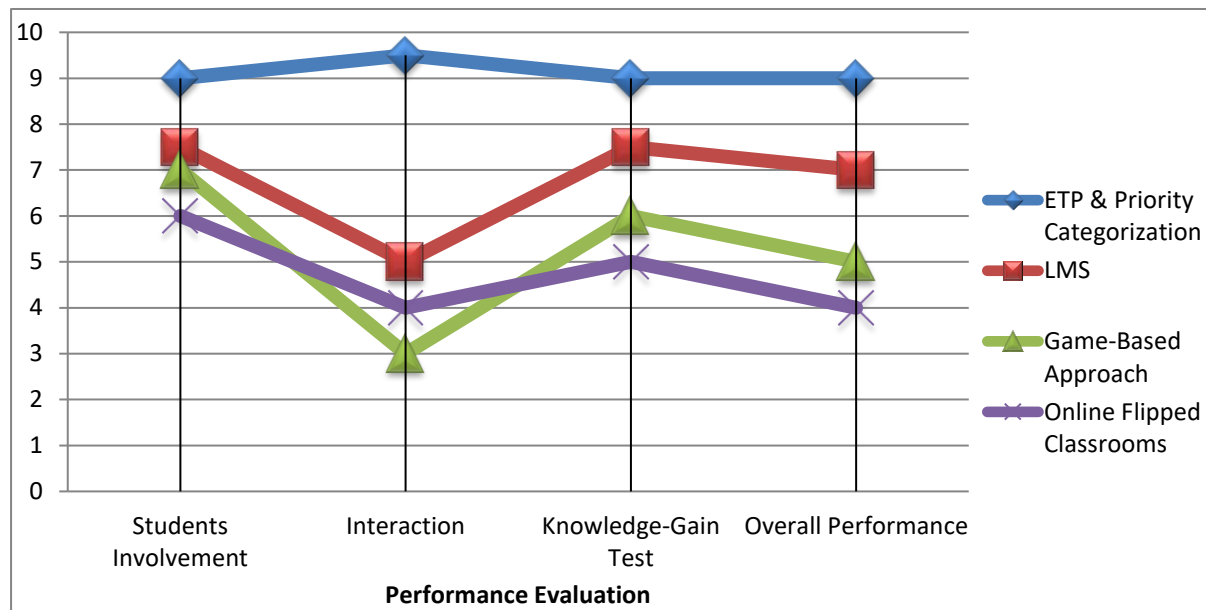


Fig 3: Performance existing Vs Proposed System

From the graph (Figure 3) a set of performance such as involvement, student-teacher interaction, Knowledge gain test are evaluated. A comparison between existing and proposed is made and proposed system (ETP) deliberates increased performance than the other system.

6. CONCLUSION

The online teaching method has become a potential trend for future teaching and learning. Several methods implemented to enhance the Quality of Online Learning (QOL) which is not up-to-the-mark. The paper introduces 'Efficient Teaching Pattern (ETP)' Concept evaluating the style and efficiency of the teachers. The efficient pattern is selected and the way of teaching is recommended to other teachers for implementing. Further the system implements a Priority-Based Categorization, where the priority-based requirements (Audio/video, Network, etc...) are noted and given importance in teaching and learning. Finally the system provided Teacher Switch-over option for the student to customize their own teachers according to their convenience. These set of implementations will 100% enhance the student performance with a standard Quality of Online Learning (QOL).

In future enhancement, a deep analysis on the student performance graph is initiated and regularized switch-class option will be provided to engage the students.

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