IOT AND AI ENABLED ONLINE AND TRADITIONAL APPROACHES FOR ENHANCED CURRICULUM DESIGN AND STUDENT SATISFACTION IN HIGHER EDUCATION

Abstract

The growth in digital technology influences numerous segments, including academic achievement. Many education systems have incorporated e-learning into their teaching and learning processes. E-learning is rapidly evolving into the new standard in teaching and learning, particularly during the pandemic. However, the abrupt transition to complete online learning has a major impact on students. As a result, retaining student satisfaction with their learning experience is a key concern for all institutions. The objective of this paper is to examine the factors that most influence student satisfaction in traditional and online teaching and learning. The findings show that several factors influence student satisfaction, such as teacher interaction, curriculum design, course evaluation, and so on, and reach the conclusion with recommendations for enhancing student satisfaction by incorporating various artificial intelligence and IoT technique in both teaching and learning environments.

Keywords: Student satisfaction, curriculum design, online learning, feedback, assessment.

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I. INTRODUCTION

The new pedagogical approach has transmogrified the traditional education system into an entirely different perceived notion. The traditional classroom is a physical space where a teacher conducts a class of students in a face-to-face setting. It typically involves a structured learning environment where the teacher presents information to the students and the students engage in various learning activities, such as taking notes, asking questions, and participating in discussions. But nowadays traditional pedagogical approaches had comparatively changed to non-traditional approaches where the majority of the teaching and learning process is reliant on online resources and e-learning, both learners and teachers have begun to use online resources in their educational forums. As a result, various education service formats of learning and teaching are done in offline or face-to-face courses, recorded courses, or real-time online courses, resulting in a complex mixture of situations, such as diverse teaching technologies, learning methods, learners, tutors, and academic facilities [1]. Several learners were compelled to adapt to the abrupt transition from traditional pedagogical approaches to non-traditional approaches [2]. Because of this unexpected shift in response to COVID-19, numerous learners were uncertain about what to perceive [3], and enhancing their satisfaction would necessitate understanding their validation of experiences in the e-learning platform. Both in traditional and online approaches there can be various artificial intelligence and IoT techniques that can be incorporated for enhancing a better course design and improve student satisfaction. Though incorporating new technology into education have several benefits, still, various study states that it is equally critical to assess how it contributes to sustaining student satisfaction in their learning process.

II. LITERATURE REVIEW

Student satisfaction is a critical component of education because it influences student motivation, retention, knowledge development, academic achievement, and overall success. Student satisfaction is also a major concern in educational institutions, as new technology has transformed the educational forum. The literature review summarizes recent research on student satisfaction in both online and traditional classroom settings.

The quality of the curriculum design is the most important factor influencing student satisfaction in learning. With data collected from 563 students using an e-learning system, the researcher stated that student satisfaction is dependent on course design, course material, and curriculum planning [1][4]. Some researchers also stated that interaction with fellow students [8] and interpersonal interaction with teachers played a vital role in student satisfaction levels [5]. The uses of technology, the processes of assessments, and the learning materials provided to the students are found to be the factor that affects student satisfaction [6].

Student satisfaction was also felt to be impacted by parameters such as the time spent by teachers with students' doubts and concerns, as well as the teachers' ease of access and approach during class [7]. Teaching quality, course content, assessment, and feedback are another important factor that influences student satisfaction [9]. Students reported feeling anxious when the course was based on online learning. The research acquired information from 542 individuals who utilized educational sites during the pandemic. Learners who had prepared for online learning reported higher levels of anxiety than students who conveyed

less satisfaction and readiness. Learner satisfaction correlated poorly with the platforms' stability and assistance with technical issues. [10].

Various factors influence student satisfaction in both traditional and online learning. Student interaction [11], student-teacher interaction, teaching quality, technical support, frequent assessment and feedback, course quality, and course design are among these factors. Online education can be made more satisfying by even providing more learning materials and quizzes. Thus, educational institutions can focus on these factors in order to provide students with a positive and engaging online environment, thereby satisfying their learning experience.

Another researcher states that incorporating IoT into education also stays as an impact on student satisfaction as it can increase student-centric learning, the researcher also mentioned that learners had a good attitude towards IoT-driven instructional activities and viewed them to be interesting and encouraging. According to the report, IoT-driven lessons can be used to increase students' STEM (Science, Technology, Engineering, and Mathematics) career knowledge and skills. The results of this research may be valuable to teachers and academics interested in creating and carrying out IoT-driven educational activities in secondary schools [28].

III. TRADITIONAL APPROACH

Traditional learning entails instructors delivering literature in a structured, educational setting. Students are expected to pay close attention and absorb the information provided by the instructor [12]. Classroom instruction is frequently delivered through lectures, with books and other written materials used to supplement learning.Though traditional learning has been used for centuries it can be improvised by more interactive teaching techniques like group discussion, group projects, and implementing technology-based traditional classrooms like online resources, online video, etc. Academicians also feel that when compared to online teaching, traditional teaching are easier to organize group-based learning and interactions [13].

To enhance student satisfaction with traditional learning more technology should be incorporated as traditional learning will not suffice for this generation. The use of online learning or incorporating any type of flipped project-based game-based learning is critical for the future education system. Also, Smart Classrooms, Adaptive Learning, Personalized Learning Paths, Intelligent Tutoring Systems, Remote Learning Support, and Educational Robotics are forms of adapting to the futuristic form of learning traditional form.

IV. ONLINE APPROACH

Online learning, frequently referred to as e-learning, is now an effective means of imparting knowledge [14]. It is a term used for learning that is conducted entirely online, it is a type of learning in which learners acquire knowledge in an environment built by using internet-enabled devices, akin to the way they study in traditional classrooms. Learners may engage in as many discussions in this environment as they would in face-to-face classrooms [15].

71% of US higher education institutions provide online courses, and over six million learners enrolled in a minimum of one online course in 2016[16]. Teachers and learners are now able to engage in real-time online education and interaction via different electronic gadgets and platforms (e.g., virtual presence, YouTube, and other social media assistance) in online courses [17]. Because instructors and students do not directly interact with each other in online learning, it may be difficult for them to form close relationships [18]. Yet there are a few drawbacks to online learning, such as loneliness, a lack of motivation, and technical issues. Online education can be improvised by encouraging to learners motivate students to stay engaged. Online teaching can be made way more effective using the IoT and Artificial Intelligence technique as it is remote in access, the usage of personalized content recommendation, Gamification and Interactive Content, virtual classroom, and also online Proctoring can be used to find potential cheating behaviors, maintaining the credibility and fairness of online evaluations.

V. FACTORS CONTRIBUTING TO STUDENT SATISFACTION

Student satisfaction refers to how satisfied students are with their educational experiences. It includes a variety of factors such as instruction quality, the content of the course, course framework, instructor-student communication, involvement of students, feedback, assessment, and resources. Students are more likely to feel inspired, involved, and effective in their studies when they are satisfied with their academic experience.

1. **Instruction Quality:** The quality of instruction is one of the most significant factors related to student satisfaction. The level of expertise of the instructor, the instructor's knowledge, and the instructor's delivery of knowledge are all important factors in the achievement of any course. The instructor plays a significant role in course design and course motivation. Traditional learning is teacher-centered instruction, so the only medium for learners to gain knowledge is the instructor's knowledge. Only through communication between staff and teachers do students feel at ease in their educational environment. In traditional learning, student’s satisfaction with the course is heavily influenced by the instructor's quality. In online learning the quality of the instructor has a role in designing the course design and providing the learners with the course topics and course outcomes [19]. The instructor should be aware of how the course content has to be organized and sequenced [20].

2. **Course Quality:** The design of a course has an enormous effect on the learning experiences of students. Poor course design can result in student disengagement, frustration, as well as low academic performance, whereas the successful design of courses can encourage participation by students, motivation, and achievement. Both in traditional and online learning the course design are framed prior by the instructor. The course design is built with specific and measurable learning objectives and outcomes in mind. The content is chosen in accordance with the learning objectives and may include literature, notes, videos, or other resources. The lesson is planned around the objective with frequent assessments, assignments, and projects to ensure that the students are engaged in the course and hence feel satisfied with the course. In the online learning

syllabus and courses, materials are posted online for students [21]. Certain research says that students also felt that they were more satisfied when they have courses which are both traditional learning and online learning [22]. Therefore, understanding the essential course design elements that are beneficial to student satisfaction must be taken into account before educators and educational institutions design any course.

3. **Instructor - Student Interaction & Student – Student Interaction:** In any course, whether traditional or online learning, communication serves a vital part in maintaining the course motivated and in clearing doubts, having discussions, and developing good interpersonal communication with teacher-student and student-student interaction. Traditional learning is face-to-face, so there are more opportunities for teacher and student interaction. Additionally, there are also more opportunities for better communication in the learning environment by conducting group discussions and team projects.

   While online learning can be made more efficient and satisfying for students when the instructor uses software such as Microsoft Teams, Google Meets, NPTEL, SWAYAM, Moodle, or Zoom [21]. A lot of students acknowledged that they had more time to go through learning materials before participating in group discussions in online courses, as well as additional time to proceed over learning materials. Videos and online lectures can be used to provide students with hands-on practice and skill training [21].

4. **Assessment & Feedback:** Student satisfaction in every aspect of their education may exert a substantial influence on their involvement, motivation, and academic achievement. Assessment and feedback are also essential elements in student satisfaction because only through continuous assessment the student's understanding and results are determined; similarly, only through proper feedback from the instructor the students identify their flaws and chapters that need to be improved, assisting the student keep them motivated throughout the course. Survey results in 2021 conducted by National Student Survey stated that 72% of students felt that feedback on their work helped them to clarify their doubts. Another survey by the Higher Education Policy Institute stated that 73% of students felt satisfied with the feedback provided to them and mentioned as it was helpful for their future work. In online learning to enhance online learning engagement continuous and consistent feedback to students are more important. When the instructor designs a course, he/she should design the course with a good count on assessment and should provide timely feedback to students both in online and offline learning. According to research, students who are happy with their academic performance are found to be more satisfied in their courses [23].

5. **Technology & Resources:** Student satisfaction is greatly influenced by technology and resources, particularly when learning is conducted online. The student's learning style, preferences, personality, exposure to technology, digital knowledge, and necessary digital resources (system, mobile phones) in the classroom and at home play a significant role in accessing online material it also reflects in academic performance, understanding, and general course satisfaction when the course is properly designed. [24]. Digital learning is online learning. Learners must be comfortable with the fundamentals of ICT

(Information and Computer Technology) in order to fully engage in this process. ICT encompasses mobile phones, WI-FI, and communication technology. With digital education, instructors as well as pupils have access to resources that have been posted on online learning platforms, resources that have been given to learners by instructors, and documents that students have uploaded for grading [25]. To the future generation and current change toward higher exposure to online-based learning, researchers state that the use of technology has a great impact on student satisfaction [1][26][27].

VI. ARTIFICIAL INTELLIGENCE (AI) AND THE INTERNET OF THINGS (IOT) IN ENHANCING STUDENT SATISFACTION

Artificial intelligence (AI) and the Internet of Things (IoT) can potentially be applied towards enhancing the satisfaction of students in an assortment of ways. In the analysis of the factors to improve student satisfaction with the course, major concerns can be resolved by using technology in education. As the world becomes more technologically advanced, hence the proper use of it in education can provide far greater satisfaction to students, resulting in better outcomes and skills among this generation's learners. Thus, the IoT and Artificial Intelligence tools to enhance course design are as follows

1. **Personalized Learning:** Artificial Intelligence (AI) algorithms, such as adaptive educational platforms and smart tutoring systems, may be employed to personalize and streamline learning experiences by suggesting specific courses, sections, or materials according to each student's strengths and weaknesses, thus enhancing student engagement and performance [29]. IoT devices can be utilized to offer students access to instructional resources as well as to track their involvement and development. For online learners, IoT and AI might create personalized learning paths by advising classes and materials according to interests and learning goals. This personalization improves the effectiveness of learning via the Internet and raises satisfaction among learners [29][32].

2. **Smart Classrooms:** The Internet of Things (IoT) can be utilized to build linked classrooms that include smartboards, iPads, and sensors. These tools can be utilized to boost student engagement and the educational process.

3. **Intelligent Tutoring Systems:** In conventional learning environments, these innovations can serve as virtual tutors for students, offering them individualized advice and input. Such programs may enhance students' understanding of difficult subjects as they swiftly respond to their questions, boosting their enthusiasm for studying [30].

4. **Real-time Assessment:** IoT and AI can be utilized in traditional classes to streamline the evaluation of assignments and exams, giving students right away insight on how they performed. Greater satisfaction and a better knowledge of the instructional material can result from this short feedback loop [31].

5. **Adaptive Learning:** AI-powered online learning systems can modify the rigor and tempo of the instructional material in accordance with each pupil's efficiency, making sure that students are suitably pushed while being encouraged through their educational experience [30].

6. **Gamification and Interactive Content:** Online learning sessions can be gamified to make them exciting and interactive using IoT devices and AI. Gamification features like badges, points, and leaderboards can encourage students and improve course satisfaction.

7. **Collaboration in Virtual Classrooms:** IoT and AI can support virtual classes in online learning environments, enabling students to communicate with teachers and their classmates in real-time. This encourages collaborative learning and builds an impression of the group, which raises student satisfaction [33].

8. **Data-Driven Feedback and Improvement:** Artificial intelligence (AI) may analyze information from online educational interactions to offer useful insights to teachers and course creators. This data-driven methodology enables ongoing curriculum refinement, increasing the effectiveness and student satisfaction of online learning [34].

VII. CONCLUSION

Nowadays, there has been a significant shift in higher education institutions, courses have shifted from traditional learning to both offline and online learning-based courses. As a result, educational institutions are interested in understanding how they can handle and enhance student achievement and satisfaction. Nowadays, there is a growing body of study into the variables that influence students' satisfaction with both offline and online learning. This article discusses the factors that have the greatest impact on student satisfaction. Thus, in this technological world, we can incorporate various artificial intelligence tools in the educational medium to improve learner experience and learning satisfaction. According to various researchers, the basic structure of the course with intervals of feedback and assessment is the most important factor that influences student satisfaction. As a result, the classroom design can include a smart classroom, an intelligent teaching system, and regular assessment and feedback. The classroom can also include interaction between instructors and students, which improves the learning environment, and students can work in groups, which allows them to learn more and experience more of the learning process; thus, incorporating these into a course could increase the students' satisfaction with the course.

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