

IoT IN CLASSROOM: ENHANCING THE STUDY OF ENGLISH LITERATURE THROUGH INTERACTIVE TECHNOLOGIES

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ABSTRACT

The integration of the Internet of Things in education revolutionized the way things are taught and learned in the classroom. Smart devices, digital platforms, and connected tools can create an immersive learning environment that promotes active learning and critical thinking. In a smart classroom, a teacher uses various IoT devices such as, smart boards, IoT-connected tablets, and laptops, which amplifies attendance and participation monitoring, personalised learning, classroom management and safety, and collaborative learning. This paper examines how IoT enhances and revolutionizes the way literature is taught and experienced in the classroom by incorporating interactive learning tools. It will employ survey method and practical applications of IoT in literary works. Highlighting the impact of these technologies on teaching methodologies and learning outcomes. IoT allows real-time access to literary resources, that enables them to analyze the texts in innovative ways. For instance, interactive reading applications can provide annotations, summaries, and multimedia content related to literary works, facilitating a better understanding of themes and historical contexts. collaborative tools, such as Mentimeter, padlet, etc. connected through IoT encourage students to engage in discussions, share insights, and co-create projects, enhancing their analytical and interpretative skills. Assignments can be given electronically and results and progress can be tracked instantly. Data analytics helps the educator to assess the students individually and adapt instructional strategies and methodologies according to the situation. It helps to track student progress, engagement, and performance in real-time. By integrating IoT into the teaching process, educators can create a more responsive, interactive, student-centered classroom that helps to enhance the understanding and abilities of each learner.

1. INTRODUCTION

The IoT(Internet of Things) has enlarged the scope of education by incorporating digital devices to enhance teaching-learning experiences. It is a network of interconnected devices, where devices such as sensors, smartboards, and tablets collect, analyze and exchange data to improve educational outcomes. The learning environment, that has been created by it is more dynamic and personalized. It helps in teaching and administrative work such as attendance, monitoring students' progress, and facilitating virtual learning. During the pandemic, we relied more upon this IoT in the education field as it was impossible to conduct classes as usual in the colleges, and schools. It enhanced the scope of a better learning environment. Smart class rooms equipped with

IoT devices can create an interactive learning atmosphere where teachers can engage the students in different activities through multi-media content and data driven instructional strategies. IoT-enabled platform helps the students to have a better understanding of the lessons with ease and pleasure. They acquire knowledge and develop their abilities at a quicker pace.

Samuel Greengard in his book *The Internet of Things in the Modern Classroom: Educational Technology That Transforms Teaching and Learning*, explains that since IoT creates a personalized learning environment for the student with the assistance of devices like laptops, smartboards, and other smart devices, teachers can also elevate the teaching-learning experience to meet the individual need of the student. It helps them to understand the drawbacks of the students and guide them to improve in their respective areas. The same methodology will result in a more fruitful learning outcome. According to him smart classrooms and virtual learning platforms make classrooms more engaging.

The study investigates the effectiveness of IoT-based Teaching and learning technologies in enhancing student engagement and participation in English Literature classes and how they help in developing critical thinking and analytical skills in students by understanding and retaining literary concepts.

2. LITERARY REVIEW

Various impactful studies have already been made in the field of the Internet of Things in education, which has gained significant attention highlighting its potential to transform traditional learning methodologies. The previous studies explore how IoT can enhance the study of English Literature through interactive technologies, collaboration, fostering engagement, and personalized learning.

In this era of technology, IoT has brought rapid changes in the field of education. The conventional teaching methods are not able to meet the requirements of the modern era given the rapid increase in technological and knowledge growth. The teachers have been trying hard to give individual attention and concentrate on the development of each student from the beginning. IoT in education gave way to personalized teaching, which could help educators reach their goals easily. Flipped classrooms enable students to learn more and grow rapidly in their creative and critical thinking processes.

The Internet of Things refers to a network of interconnected devices that communicate and share data. In the context of education, IoT encompasses smart devices, sensors, and applications that facilitate enhanced learning experiences (Sung & Chen, 2016). Real-time data collection, remote access, and adaptive learning environments are some of the other features of IoT-incorporated classrooms

Wang et al. (2019) discuss the use of smart boards and augmented reality (AR) applications in classrooms, which provide enticing experiences that can bring literary texts to life. These technologies enable students to visualize settings, characters, and historical contexts. Such deep understanding gives them a clear picture of the concept that they will never forget. Thus, IoT increases student engagement in the literature classes.

Research by Chen et al. (2018) shows that collaborative learning environments allow students to share thoughts, annotations, and interpretations in real time. This technique encourages peer-to-peer learning which is essential to explore the diverse perspectives in literary analysis. IoT technologies sooth the way for students to collaborate, and have an entirely different experience in literature learning.

The adaptive nature of IoT-enabled classrooms fosters personalised learning which helps the teacher to identify the potential of students and give individual attention without having much trouble. According to Liu et al. (2020), IoT application helps to track student progress and preferences, enabling teachers to give assignments and homework depending on the capability of the student. It is a kind of customization that motivates and allows for differentiated instruction. This differentiated instruction, which meets the needs of all students, is important in literature studies as the comprehension capacity and interests of the students vary from one another.

IoT tools can stimulate critical thinking and creativity among students. Research by Lee et al. (2021) highlights how IoT applications that incorporate gamification elements encourage students to engage with literary texts in innovative ways. By transforming traditional assessments into interactive challenges, students can explore themes, characters, and narrative structures more dynamically, fostering deeper analytical skills.

While the potential benefits like enhancement of the capability and knowledge base of the student are significant, numerous challenges and hindrances like data privacy, the digital divide, and the need for teacher training in using these technologies effectively must be addressed (Khan et al., 2022). According to this research, educators need to balance technology integration with traditional pedagogical approaches to ensure a comprehensive literary education.

The integration of IoT in the classroom presents a promising avenue for enhancing the study of English literature. By fostering engagement, collaboration, and personalized learning experiences, interactive technologies can transform the way students interact with literary texts. As research continues to evolve in this field, it is crucial to consider both the opportunities and challenges associated with implementing IoT in education.

3. IMPLEMENTATION METHODS

While using an IoT enabled classroom, the class can begin with a poll or a quiz to assess prior knowledge on the author or the particular lesson. Lesson can be studied through multimedia resources such as video clips, digital annotations, and interactive learning environments. The educator can display the video related to the topic on smart screens, and gather responses using connected devices. An interactive character map would be helpful in a better understanding of the lesson. Students will use their connected devices to contribute to building connections between characters. The educators can encourage the students to leave multimedia comments (audio recordings, short videos, or typed annotations) that explore the language, themes, and emotional tone. Platforms like Google Docs, with comments enabled, or a digital whiteboard where annotations appear in real-time on a shared display can be used. Group activity can be given to the students to gather more information on different aspects of the lesson. Each group will research and create a short presentation using IoT tools (connected tablets or laptops), relating the theme to modern-day examples or current events. Groups will share their findings by casting their presentations to the classroom's smartboard or projector. Other students will provide feedback via a live polling app, rating how well the group connected themes to today's world.

To assess the students, educator can conduct an IoT-enabled exit poll or quick quiz on the themes, characters, and important scenes using an app like Socrative or Google Forms. This can provide real-time feedback on students' comprehension. For extra support for students who struggle, can be offered with personalized, one-on-one sessions using IoT tools like digital tutoring apps (e.g., Grammarly or NoRedInk) that provide scaffolded feedback on essay writing or comprehension exercises. The session can be finished with a quick group discussion, asking students to reflect on what they've learned. Encourage them to share their thoughts via a connected app, such as Padlet or Miro.

1. **Smartboards & Interactive Annotations:**

Introducing smartboards into the classroom, allows students to annotate excerpts or lines from literature during lectures in real time. They can collaboratively make annotations, which helps them to build on each other's ideas, encouraging a dialogic approach to text interpretation. IoT-powered smart pens, are used to highlight passages for the students, and are then synced to their devices for further review.

2. **Wearable Devices for Real-time Feedback:**

Each student is given a wearable device that tracks engagement levels throughout the class. These devices are connected to a central system that provides with insights into when students are most attentive or distracted. Based on the real-time feedback, educators can change the teaching style, shifting topics or pacing to suit the situation.

3. **Cloud-based Collaboration Tools:**

A cloud-based IoT system where students can collaboratively write essays, analyze passages, and engage in peer feedback outside of the classroom. Using voice-activated smart assistants, students can query devices for thematic analysis, receive instant information on the historical contexts of the specific lesson, and even participate in voice-based discussions facilitated by AI-powered systems.

4. **Automated Assessment Tools:**

IoT-integrated systems also track student progress and automate assessments. Students' annotations, participation in discussions, and collaborative efforts are all analyzed through these tools, generating reports that help both the teacher and the students identify areas of improvement.

A survey was conducted to assess the impact of IoT-enabled English classrooms on students. The findings provide insights into how these technologically enhanced learning environments influence student engagement, participation, and academic performance.

2. Which IoT-based interactive technologies have you used/seen in English classes? (select all that apply)

56 responses

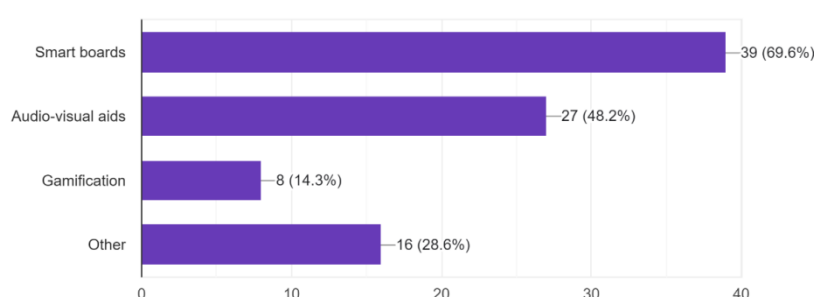


Figure 1

The most commonly utilized technology is smart boards, with 69.6% of respondents (39 out of 56) reporting their use. Audio-visual aids are also prominent, with 48.2% (27 respondents) having

experienced these tools. Gamification, a method that integrates game-like elements into the learning process, was used by 14.3% of respondents (8 students). Lastly, 28.6% of participants (16 respondents) mentioned other types of IoT-based technologies, indicating a variety of additional tools or methods being employed in the classroom.

These findings suggest that smart boards and audio-visual aids are the dominant IoT technologies in English classrooms, contributing to a more interactive and engaging learning environment. However, the use of gamification and other technologies is less widespread, pointing to areas for potential growth in integrating diverse IoT tools in educational settings.

3. How effective do you think IoT- based interactive technologies are in enhancing student engagement and participation in English classes?
56 responses

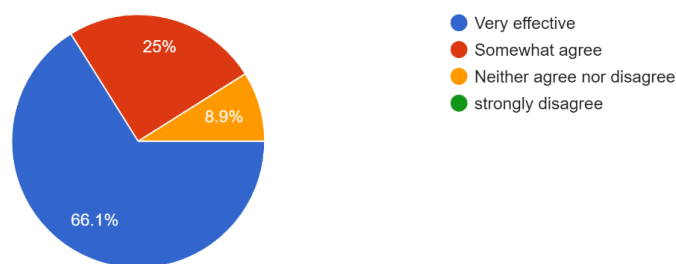


Figure 2

The survey data regarding the effectiveness of IoT-based interactive technologies in enhancing student engagement and participation in English classes shows a predominantly positive response. A significant majority, 66.1% of respondents, believe that these technologies are *very effective*. This suggests that most students feel that the integration of IoT tools in the classroom significantly boosts their involvement and interest in learning.

4. How often do you use IoT-based interactive technologies in English classes?
56 responses

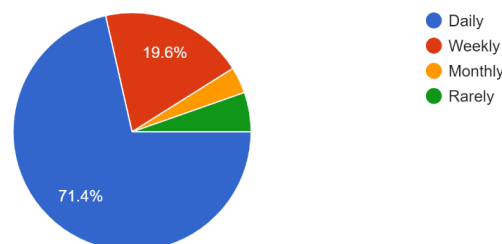


Figure 3

The survey results indicate that a significant majority of respondents, 71.4%, use IoT-based interactive technologies in their English classes on a daily basis, suggesting that IoT technologies are deeply integrated into the everyday learning process for most students, potentially creating a dynamic and technology-driven classroom environment.

5. What benefits do you associate with using IoT-based interactive technologies?(select all that apply)

56 responses

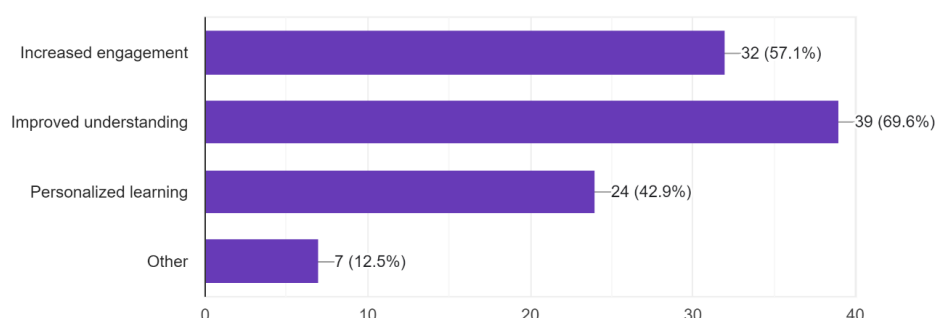


Figure 4

It is obvious from the survey outcome that most of the students like smart classrooms since it improves understanding.

6. What challenges have you faced while using IoT-based interactive technologies?

56 responses

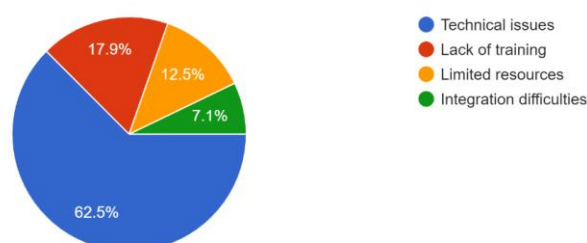


Figure 5

Most of the students (62.5%) raise technical issues as the major challenge that they face in an IoT-based classroom. Lack of training for both, the teachers and the student should also be taken care of.

Overall, the data reflects a strong consensus that IoT-enabled classrooms contribute positively to student engagement and active participation in English learning environments.

Behavioural Observations

A behavioural observational study was carried out to examine the impact of IoT in English classrooms. The study focused on how IoT tools influence student engagement, participation, and learning outcomes. Various behaviours and interactions were observed during IoT-enabled lessons to assess the technology's effectiveness. The findings aimed to provide insights into the role of IoT in enhancing the educational experience in English classes. Below are the findings of the study,

1. Increased Engagement:

Initially, students show heightened interest due to the novelty of the technology. The smartboards enable them to visualize the text in new ways, and wearable devices create a sense of immediate feedback, making them more conscious of their attentiveness.

2. Improved Collaboration:

Students who are typically quieter in class begin to participate more during IoT-driven activities. The cloud-based tools allow them to collaborate from the comfort of their homes, which encourages more thoughtful, in-depth discussions. Shy students find voice-activated discussions less intimidating than speaking in front of their peers.

3. Critical Thinking and Analysis:

The real-time ability to annotate and analyse texts on the smartboard helps students engage with the material more critically. The dynamic nature of the classroom discussions facilitates a more interactive analysis.

4. Over-reliance on Technology:

However, as the semester progresses, some students begin relying too heavily on the technology. Instead of reading the text thoroughly, some resort to querying smart assistants for instant summaries or analyses. This leads to a superficial understanding of the text, rather than deep engagement.

5. Data Privacy Concerns:

A few students express discomfort about being monitored through their wearables, fearing that their personal data might be misused. Dr. Ananya addresses these concerns by emphasizing that the data is anonymized and used solely to improve their learning experience, but this unease still affects some students' willingness to fully participate.

Pros of IoT Integration in English Literature Classes:

Like any technology, IoT in classrooms has both advantages and disadvantages. While it offers significant benefits such as enhanced interactivity and personalized learning, there are also potential drawbacks to consider. These may include challenges related to privacy, security, and the need for technical infrastructure. Understanding both sides is essential for effectively implementing IoT in educational settings.

1. Enhanced Interactivity:

IoT tools like smartboards and cloud-based platforms make the study of literature more interactive, engaging students through multiple modes of learning—visual, auditory, and collaborative.

2. Real-time Feedback:

Wearable devices and smart systems provide immediate insights into student engagement levels, enabling the educator to adapt their teaching on the spot to meet students' needs.

3. **Collaborative Learning:**

Cloud-based tools foster collaboration beyond the classroom, encouraging students to work together on projects, essays, and discussions in a virtual space.

4. **Personalized Learning:**

IoT allows for customized learning experiences. Students can interact with the material at their own pace and in their preferred learning styles—whether that's annotating the text, listening to AI-generated analysis, or participating in virtual group discussions.

Cons of IoT Integration in English Literature Classes:

1. **Over-dependence on Technology:**

Students risk becoming overly reliant on IoT tools for analysis, bypassing deep reading in favor of technological shortcuts. This can detract from their critical thinking skills.

2. **Technical Challenges:**

The smooth functioning of an IoT-powered classroom depends on reliable technology. Occasional technical issues—like system crashes, data sync failures, or connectivity problems—can disrupt the flow of lessons.

3. **Cost and Accessibility:**

Implementing IoT solutions in a classroom requires significant financial investment. Schools with limited resources might struggle to afford smartboards, wearable devices, or cloud-based tools, leading to an inequality in access.

4. **Data Privacy:**

Students' personal data, collected through IoT devices, poses a privacy concern. Though anonymized, there are always risks of breaches or misuse, which can cause discomfort among students.

4. CONCLUSION

This study has examined new ways of technology-enhanced learning in English literature classes based on IoT technologies, thus providing valuable insights into how modern technology is likely to change the way students learn in the future. In the background, it has been already stressed how relation to IoT makes it possible to create more competent and interactive relations in literature study than the usual classroom interaction where students are passive and simply analyze the content or listen to monotone lectures.

The literature review helped to support the argument that use of devices IoT such as smart boards, widespread audio-visual aids, and even gamification methods are able to change the perception of students towards learning and their outcomes. It has also covered the increased worldwide tendency to use technology in the classroom in order to support a variety of learners' needs.

The deployment of IoT in classroom contexts as explained in the methodology section helped to busy the extent to which active learning, collaborative learning, and individual learning were always emphasized by the incorporation of these technologies. The outcome of the survey indicated that most of the learners were of the view that these tools of IoT have a positive effect in terms of how engaged the learners are, with a majority of them being able to use such technology on a regular basis. The behavioral observational study corroborated that the students paid more attention to the course materials and their peers in the course content integrated with IoT, and thus fulfilling the notion that these tools enhance the environment for learning.

Nonetheless, the research was able to appreciate the problems college instructors were enduring as factors related to IoT classrooms. Concern for privacy and security issues, the need for constant support and infrastructure were some of the problems that were raised. This brings out the necessity of careful planning and expenditure in IoT practices in education.

On the one hand, IoT based English Literature classrooms have positively contributed to the teaching of the discipline in terms of increased interest among students, higher levels of interaction, and an ability to provide individualized instruction, on the other hand, it will be unearthed that such technologies have their corresponding challenges that need to be tackled. For full realization of the benefits presented by IoT in education, it is necessary to strike such a balance in order to avoid courting difficulties that relate to implementation so that both teachers and learners can be ready to fit in this digital age. This study adds to the existing scholarship about the use of IoT in education and suggests possible avenues for further investigation and application in this field.

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