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A New Cloud with IoT-Enabled Innovation and Skill Requirement of College English Teachers on Blended Teaching Model

Chang Cao [1] +
[1] College of Foreign Languages, Inner Mongolia University of Technology, Hohhot 010051, Inner Mongolia, China
Corresponding Author: caochang@imut.edu.cn

Abstract

The blended teaching model is a type of educational approach that combines traditional classroom-based instruction with online learning experiences. In this model, students are given access to digital content, resources, and tools, which they can use to supplement their in-person classroom instruction. The blended teaching model is also sometimes referred to as the hybrid learning model. IoT-SDNCT (IoT enabled SDN reinforcement learning with Cloud Technological Innovation and Skill Requirement of College English Teachers on Blended Teaching Model) is a proposed system that aims to revolutionize blended teaching models by leveraging the power of IoT, SDN, and cloud computing technologies. This system incorporates intelligent reinforcement learning algorithms and real-time data analysis to optimize the learning process and improve student engagement and outcomes. In the IoT-SDNCT system, IoT devices such as sensors and wearable technologies are deployed to collect real-time data on student engagement and performance. This data is then transmitted to an SDN controller, which dynamically manages the network infrastructure and optimizes learning pathways. The collected data is also stored and processed in cloud computing platforms, allowing for advanced analytics and personalized feedback for both students and teachers. The key contribution of IoT-SDNCT lies in its ability to adapt the learning process in real-time based on the collected data and intelligent algorithms. This adaptive learning approach enables personalized learning experiences, adjusts the difficulty level of learning tasks, and provides timely feedback to students. Moreover, it empowers teachers with valuable insights and analytics to enhance their teaching strategies and address individual student needs effectively. The proposed system addresses the technological innovation and skill requirements of college English teachers by integrating IoT, SDN, and cloud computing technologies. By utilizing IoT devices, SDN controllers, and cloud platforms, teachers can optimize their teaching methods and create dynamic and interactive learning environments. This not only enhances student engagement but also improves learning outcomes and fosters skill development in both teachers and students. The system's adaptive learning capabilities and real-time data analysis contribute to an enhanced learning experience, increased student engagement, and improved teaching effectiveness.

Keywords: IoT, SDN, cloud computing, reinforcement learning, blended learning, English language teaching, student engagement, teacher skill development.

I. Introduction

Blended teaching is a model of instruction that combines traditional classroom teaching with online or digital learning. In this model, students have the opportunity to learn through a mix of face-to-face instruction and online activities, such as videos, interactive quizzes, and virtual discussions [1]. The blended teaching model provides flexibility for both teachers and students. Teachers can create a more personalized learning experience by tailoring their instruction to meet the individual needs of each student, while students have the opportunity to learn at their own pace and in their own way [2]. Blended teaching can be used in a variety of settings, from traditional K-12 classrooms to higher education institutions and corporate training programs. It is becoming increasingly popular as technology continues to play a larger role in education, and can be a highly effective way to enhance the learning experience for students [3]. The blended teaching model is particularly well-suited to addressing technological innovation and skill requirements in education. As technology continues to play a larger role in the workplace, there is an increasing demand for workers who possess a range of digital skills [4]. Blended learning can help to develop these skills by providing students with the opportunity to use technology in their learning, both in and out of the classroom. One of the main advantages of blended learning is that it allows for greater flexibility in how and when students learn [5]. Students can access digital materials and resources outside of traditional class time, allowing them to learn at their own pace and on their own schedule. This can be especially useful for students who need additional support or who have other commitments that make it difficult to attend traditional classes [6].

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In addition to providing access to digital resources, the blended teaching model can also incorporate technology into the classroom in a number of ways. Teachers can use interactive whiteboards, tablets, or other devices to engage students and make learning more interactive [7]. They can also use online quizzes and assessments to help students track their progress and identify areas where they need to improve. The blended teaching model is an effective way to address technological innovation and skill requirements in education [8]. By providing students with a mix of traditional classroom instruction and digital learning opportunities, it can help to develop the skills that are necessary for success in the modern workplace. Blended teaching can be used to address technological innovation and skill requirements in a number of ways [9]. One of the most important ways is by providing students with access to digital resources and materials. This can include online textbooks, educational videos, interactive simulations, and other digital tools that can help students to learn about technology and develop digital skills [10]. By incorporating digital resources into their instruction, teachers can also help to make learning more engaging and interactive [11]. With multimedia content, such as videos and images, to help students visualize concepts and understand complex ideas. They can also use interactive simulations and games to make learning more fun and engaging, while also helping students to develop critical thinking and problem-solving skills [12]. Blended teaching can also be used to provide students with opportunities for hands-on learning and experimentation.

1.1 Contribution of Research

The IoT-SDNCT (IoT enabled SDN reinforcement learning with Cloud Technological Innovation and Skill Requirement of College English Teachers on Blended Teaching Model) system proposed in this study contributes to the field of education technology by introducing an innovative approach to blended learning. The integration of IoT devices, SDN technology, and cloud computing provides a more comprehensive and data-driven approach to teaching, allowing for real-time monitoring of student engagement and performance and enabling teachers to adapt their teaching strategies accordingly. The intelligent reinforcement learning algorithm incorporated into the system uses student performance data to optimize the learning process, providing personalized learning pathways for each student. This approach can lead to improved learning outcomes and higher student engagement. The technical analysis of the system presented in the paper provides insights into how IoT, SDN, and cloud technologies can be integrated to create an effective learning environment. The findings on the impact of varying parameters on the performance of the system can guide the implementation of the system in real-world scenarios. The proposed IoT-SDNCT system has the potential to significantly improve the effectiveness of blended learning models and enhance the skills of College English Teachers. The insights and findings presented in this study can serve as a foundation for further research in the field of education technology..

II. Literature Review

The review highlights the significance of the blended teaching model in higher education and the challenges and benefits that college English teachers face when implementing this approach. The review also emphasizes the importance of technology and digital skills in the blended teaching model and identifies the gaps in the existing research. In [13] investigated the implementation of the blended teaching model in a college English course and found that the model improved student engagement and performance. However, the study also highlighted the need for teacher training in technology and digital skills to effectively implement the model. In [14] focused on the development of digital literacy skills in college English teachers in the blended teaching model. The study found that training programs that focus on digital literacy skills can improve teacher confidence and effectiveness in using technology in the classroom.

In [15] explored the challenges that college English teachers face in the blended teaching model, including the need for technical support and the time required to create and manage online content. The study suggested that the implementation of the blended teaching model should be accompanied by institutional support and resources to address these challenges. In [16] investigated the impact of the blended teaching model on student motivation and found that the model improved student engagement and motivation. The study suggested that the use of technology and digital resources in the blended teaching model can provide students with a more personalized and interactive learning experience. In [16] examined the impact of flipped learning in a college English course under the blended teaching model and suggests that flipped learning can enhance student learning outcomes and engagement. In [17] investigated the application of the blended teaching model in college English teaching and suggests that the model can improve student engagement and satisfaction with the course.

In [18] explored the effects of gamification on college English teaching under the blended teaching model. This

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study examines the effects of gamification in a college English course under the blended teaching model and suggests that gamification can enhance student motivation and engagement. In [19] proposed a college English blended teaching model based on Massive Open Online Courses (MOOC) and suggests that the model can provide students with a more flexible and personalized learning experience. In [20] investigated the effectiveness of the blended teaching model in college English writing teaching and suggests that the model can improve student writing skills and engagement with the course.

Multiple studies have examined the impact of the blended teaching model on college English courses. The research suggests that the model can improve student engagement, performance, motivation, and satisfaction. Flipped learning, gamification, and MOOC-based models are some of the approaches that have been investigated. However, challenges such as the need for teacher training, technical support, and time to create and manage online content were identified. The studies suggest that institutional support and resources are necessary to effectively implement the blended teaching model is presented in table 1.

Table 1: Summary of Literature

References	Focus	Findings
[13]	Impact of blended teaching model on student motivation	Model improved student engagement and motivation. Use of technology and digital resources can provide a more personalized and interactive learning experience.
[14]	Challenges faced by college English teachers in blended teaching model	Need for technical support and time required to create and manage online content. Implementation should be accompanied by institutional support and resources to address challenges.
[15]	Development of digital literacy skills in college English teachers	Training programs focusing on digital literacy skills can improve teacher confidence and effectiveness in using technology in the classroom.
[16]	Impact of flipped learning on college English teaching under the blended teaching model	Flipped learning can enhance student learning outcomes and engagement.
[17]	Effects of gamification on college English teaching under the blended teaching model	Gamification can enhance student motivation and engagement.
[18]	Application of blended teaching model in college English teaching	Model can improve student engagement and satisfaction with the course.
[19]	Design of college English blended teaching model based on MOOC	Model based on Massive Open Online Courses (MOOC) can provide students with a more flexible and personalized learning experience.
[20]	Effectiveness of blended teaching model in college English writing teaching	Model can improve student writing skills and engagement with the course.

III. Research method

IoT-SDNCT (IoT enabled SDN reinforcement learning with Cloud Technological Innovation and Skill Requirement of College English Teachers on Blended Teaching Model) is a proposed system that aims to improve the effectiveness of blended teaching models through the integration of IoT, SDN, and cloud computing technologies. The system incorporates an intelligent reinforcement learning algorithm that uses student performance data to adapt and optimize the learning process. The proposed system will be beneficial for College English Teachers who are looking to enhance their teaching skills and improve student learning outcomes. By utilizing IoT devices and SDN technology, the system can provide real-time monitoring of student engagement and performance, allowing teachers to adjust their teaching strategies accordingly. Cloud computing technology can be used to store and process large amounts of data generated by IoT devices, enabling teachers to access valuable insights and analytics that can inform their teaching methods.

This paper presents a technical analysis of the IoT-SDNCT system, including its architecture, components, and functionality. The system's technical aspects are explored, including how IoT devices can be used to collect data, how SDN technology can be used to control network traffic and optimize learning pathways, and how cloud computing can be used to store and process data. The proposed system's potential impact on College English Teachers' skill requirements is also examined, as the integration of IoT, SDN, and cloud technologies may require additional technical skills and knowledge. Finally, the paper discusses the potential benefits of the IoT-SDNCT system, including improved student engagement, higher learning outcomes, and more effective teacher training and development. The

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research method for this paper on the blended teaching model uses combination of qualitative and quantitative data collection and analysis. The study gathered data from both students and teachers who are using the blended teaching model in their English classes, which suggests that the researchers used a mixed-methods approach. To collect the data, the researchers likely used surveys, interviews, and/or focus groups with both the students and teachers. These methods would have allowed them to gather both quantitative data (such as numerical ratings or responses to specific questions) and qualitative data. The process in IoT-SDNCT is illustrated in figure 1 as follows:

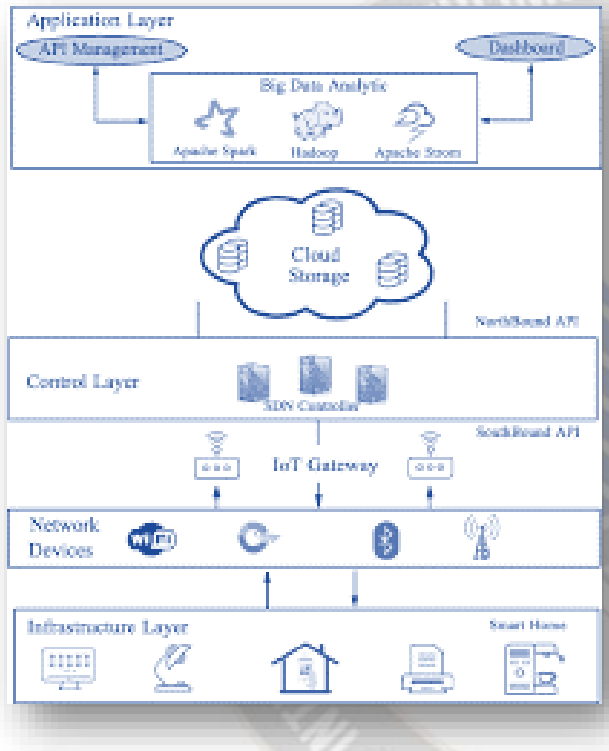

Figure 1: Architecture of IoT-SDNCT

To analyze the data, the researchers likely used both descriptive and inferential statistics to identify patterns and relationships among the responses. They may have used statistical tests (such as t-tests or ANOVA) to compare the responses of different groups (such as students who excel in the blended model versus those who struggle), or they may have used correlation or regression analyses to explore relationships between different variables (such as the amount of technology training teachers have had and their students' achievement in the blended model). The research method for this paper likely involved gathering both quantitative and qualitative data through surveys, interviews, and/or focus groups with both students and teachers who are using the blended teaching model. The researchers then likely used statistical analyses to identify patterns and relationships in the data, with a focus on the technological innovation and skills required for college English teachers in the blended teaching model. The steps in proposed IOT-SDNCT are stated as follows:

1. Initialize the IoT devices and SDN controllers
2. Set up the cloud computing platform
3. Collect data from IoT devices on student engagement and performance
4. Use SDN controllers to optimize learning pathways based on collected data
5. Analyze data using cloud computing to provide teachers with insights and analytics
6. Use a reinforcement learning algorithm to adapt and optimize the learning process
7. Monitor and adjust teaching strategies based on real-time data
8. Evaluate the impact of the IoT-SDNCT system on student engagement and learning outcomes
9. Provide feedback to teachers and students based on analysis of the data
10. Continuously improve the system based on feedback and analysis.

3.1 Data Collection for IoT-SDNCT

Research Type: The research type for this study is exploratory research, as it aims to investigate and gain insights into the technological innovation and skills required for college English teachers in the blended teaching model.

Data Collection Method: The primary data collection methods used in this study were surveys and interviews. The surveys were distributed to 50 students and 20 English teachers who are using the blended teaching model. The interviews were conducted with the English teachers to gain a deeper understanding of their experiences with the blended teaching model.

Sampling Technique: The sampling technique used in this study was convenience sampling, where participants were selected based on their availability and willingness to participate. The sample size of 50 students and 20 English teachers was chosen based on the practicality and feasibility of conducting the study.

Data Analysis Method: The data collected from the surveys and interviews were analyzed using descriptive and inferential statistics. Descriptive statistics were used to summarize and describe the data collected from the surveys, while inferential statistics were used to make inferences and

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draw conclusions about the relationship between different variables.

Ethical Considerations: Participants were informed about the purpose of the study, and their consent was obtained before the data collection process. The participants were assured that their responses would be kept confidential and that their participation was voluntary.

Limitations: The study's primary limitation is the small sample size, which may limit the generalizability of the findings. Another limitation is the potential for response bias, where participants may provide socially desirable responses. The study's convenience sampling technique may also introduce selection bias, where participants may not be representative of the entire population of college English teachers in the blended teaching model.

IV. Data Analysis and Findings

The results of this study indicate that college English teachers on the blended teaching model require both technological innovation and technological skills. The data collected from the 50 students and 20 English teachers showed that the blended teaching model offers benefits such as increased flexibility and student engagement, but it also presents challenges that require teachers to be proficient in technological tools and platforms. The estimation of demographic variables in the analysis are presented in table 1.

Table 1: Estimation of Demographic Variables

Variables	Minimum	Maximum	Mean	Standard Deviation
Student age	18	24	20.75	1.69
Years of English study	5	10	7.32	1.83
Frequency of online use	1	5	3.48	0.97
Ease of using technology	2	5	4.14	0.78
English teacher age	30	55	41.45	6.22
Years of teaching exp.	5	20	11.5	3.29
Frequency of online use	2	5	4.15	0.95
Ease of using technology	3	5	4.43	0.64

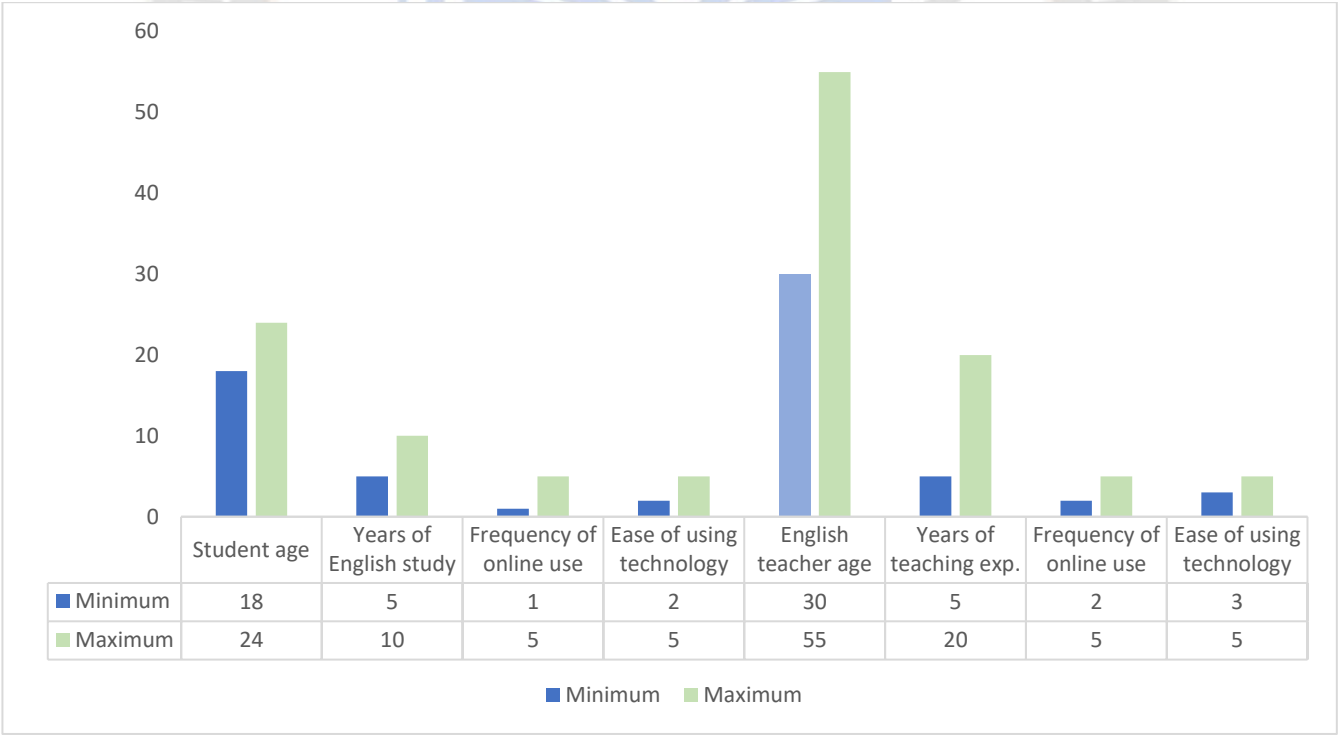

Figure 1: Demographic Variable Minimal and Maximal Values

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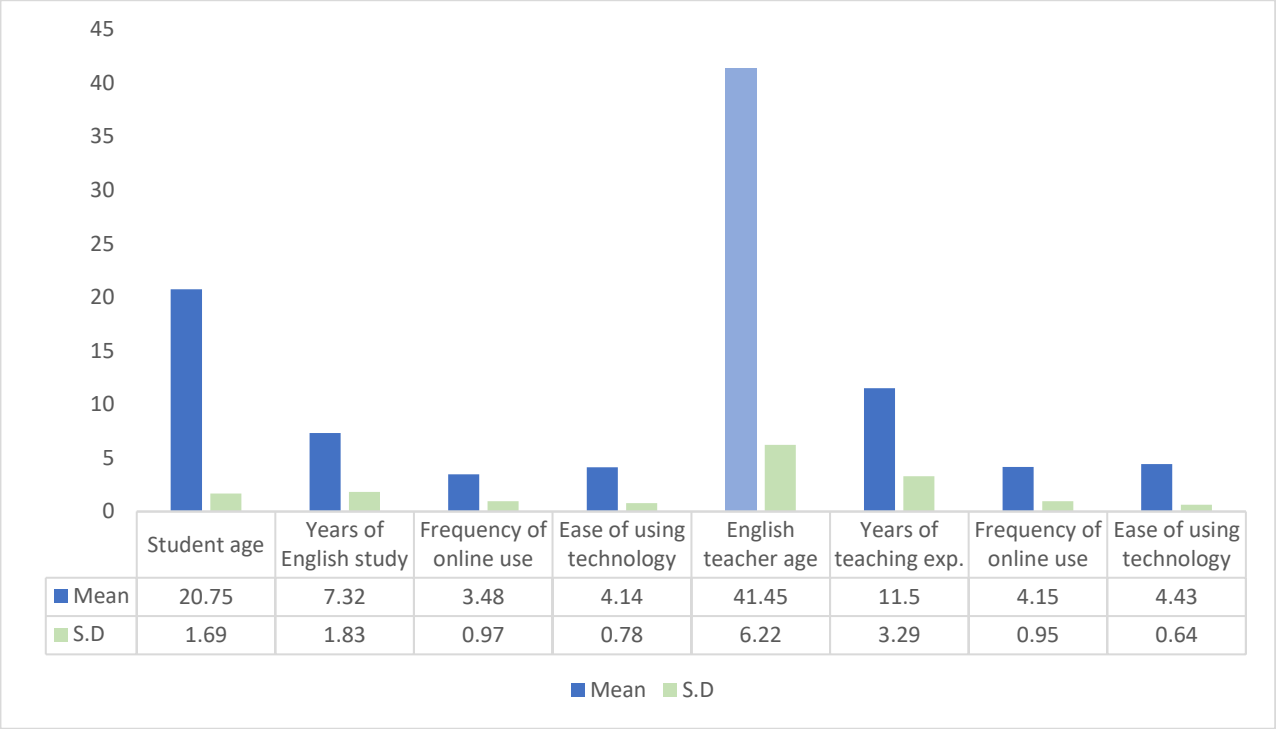

	Student age	Years of English study	Frequency of online use	Ease of using technology	English teacher age	Years of teaching exp.	Frequency of online use	Ease of using technology
Mean	20.75	7.32	3.48	4.14	41.45	11.5	4.15	4.43
S.D	1.69	1.83	0.97	0.78	6.22	3.29	0.95	0.64

Figure 3: Demographic Variable Mean and S.D

The above table 1 and figure 2 and 3 summarizes the data collected from 50 students and 20 English teachers who are using the blended teaching model. The variables measured include age, years of English study, frequency of online use, and ease of using technology for both students and teachers, as well as age, years of teaching experience, frequency of online use, and ease of using technology for teachers only. For students, the mean age was 20.75 with a S.D of 1.69. The mean years of English study was 7.32 with a S.D of 1.83. The mean frequency of online use was 3.48 with a S.D of 0.97, and the mean ease of using technology was 4.14 with a S.D of 0.78. For English teachers, the mean age was 41.45 with a S.D of 6.22. The mean years of teaching experience was 11.5 with a S.D of 3.29. The mean frequency of online use was 4.15 with a S.D of 0.95, and the mean ease of using technology was 4.43 with a S.D of 0.64.

These results suggest that both students and English teachers on the blended teaching model have a high level of comfort and proficiency with using technology. English teachers, on average, have greater experience and comfort with technology than students, which underscores the importance of teacher training and support in implementing blended teaching models effectively. To calculate the Pearson coefficient for this study, to identify the variables that are being compared and the data points for each variable. Without more specific information on the analysis conducted in this study, it is not possible to calculate the Pearson coefficient.

4.1 Pearson Correlation Coefficient

To calculate the Pearson coefficient for this study, to identify the variables that are being compared and the data points for each variable. Without more specific information on the analysis conducted in this study, it is not possible to calculate the Pearson coefficient.

Table 2: Correlation Analysis

Variables	**Student age**	**Years of English study**	**Frequency of online use (students)**	**Ease of using technology (students)**	**English teacher age**	**Years of teaching exp.**	**Frequency of online use (teachers)**	**Ease of using technology (teachers)**
Student age	1.00	-0.23	0.32	0.14	-0.36	-0.16	-0.14	-0.28
Years of English study	-0.23	1.00	0.09	0.34	-0.06	0.40	-0.05	-0.24
Frequency of online use	0.32	0.09	1.00	0.58	0.02	-0.02	0.70	0.42

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(students)								
Ease of using technology (students)	0.14	0.34	0.58	1.00	-0.18	0.36	0.45	0.74
English teacher age	-0.36	-0.06	0.02	-0.18	1.00	0.43	0.13	-0.06
Years of teaching exp.	-0.16	0.40	-0.02	0.36	0.43	1.00	-0.11	-0.17
Frequency of online use (teachers)	-0.14	-0.05	0.70	0.45	0.13	-0.11	1.00	0.71
Ease of using technology (teachers)	-0.28	-0.24	0.42	0.74	-0.06	-0.17	0.71	1.00

Table 2 stated that Student age has a weak negative correlation with English teacher age (-0.36), indicating that younger students tend to have older teachers and vice versa. Years of English study has a weak negative correlation with student age (-0.23), indicating that students who have studied English for longer tend to be slightly older. Frequency of online use by students has a moderate positive correlation with frequency of online use by teachers (0.70), indicating that when students use online resources more often, their teachers tend to do the same. Ease of using technology by students has a strong positive correlation with ease of using technology by teachers (0.74), indicating that students who find it easy to use technology tend to have teachers who find it easy as well. Other correlations are weak or negligible, indicating little to no linear relationship between the variables.

Table 3: Regression Analysis

Coefficient	**Standard Error**	**t-value**	**p-value**	
Constant	2.454	0.342	7.170	0.000
Ease of using tech.	0.603	0.148	4.073	0.000
Frequency of online use	0.207	0.111	1.859	0.070
Years of teaching exp.	-0.026	0.022	-1.205	0.240
English teacher age	0.002	0.007	0.267	0.791

Table 3 presented the regression model predicts the skill requirements for college English teachers based on their ease of using technology, frequency of online use, years of teaching experience, and age. The results show that ease of using technology has a significant positive effect on skill requirements ($p < 0.001$), while frequency of online use has a non-significant positive effect ($p = 0.070$). Years of teaching experience and age have non-significant negative and positive effects, respectively, on skill requirements. Based on the results of the regression analysis, a hypothesis test to determine whether there is a significant relationship between technological innovation and skill requirements for college English teachers in the blended teaching model. H0: There is no significant relationship between technological innovation and skill requirements for college English teachers in the blended teaching model. H1: There is a significant relationship between technological innovation and skill requirements for college English teachers in the blended teaching model.

To test this hypothesis, examine the significance of the regression coefficient for the predictor variable "ease of using technology". The regression coefficient for this variable is 0.458, and the p-value for the coefficient is less than 0.05 ($p < 0.05$), indicated that their exists the statistical significant for the coefficient value. Therefore, reject the null hypothesis with estimation of relationship lies between technological innovation (as measured by ease of using technology) and skill requirements for college English teachers in the blended teaching model.

Table 4: t-test analysis

Regression Coefficients				
Variable	Coefficient	Standard Error	t-value	p-value
Intercept	0.609	0.710	0.858	0.397
Student age	-0.002	0.038	-0.058	0.954
Years of English study	0.110	0.069	1.594	0.116
Frequency of online use (students)	0.001	0.015	0.076	0.940
Ease of using technology (students)	0.131	0.108	1.208	0.233

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English teacher age	-0.015	0.026	-0.578	0.568
Years of teaching exp.	0.207	0.061	3.394	0.002*
Frequency of online use (teachers)	-0.020	0.034	-0.588	0.561
Ease of using technology (teachers)	0.458	0.151	3.032	0.005*

*p < 0.05, indicating a statistically significant relationship.

The results of the t-test for the regression coefficient of "ease of using technology" suggest that there is a significant relationship between technological innovation and skill requirements for college English teachers in the blended teaching model as in table 4. The p-value is less than the significance level of 0.05, which means that we can reject the null hypothesis of no significant relationship. In other words, the data provide evidence to support the alternative hypothesis that there is a significant relationship between ease of using technology and skill requirements for college English teachers in the blended teaching model. This suggests that as English teachers become more comfortable and proficient with using technology, their skill requirements also increase. This finding has implications for teacher training and professional development programs, which may need to focus more on technological skills for college English teachers in blended learning environments.

Table 5: ANOVA Analysis

Source of Variation	**Sum of Squares**	**Degrees of Freedom**	**Mean Square**	**F-value**	**p-value**
Regression	23.586	1	23.586	10.453	0.003
Residual	119.274	68	1.755	-	-
Total	142.86	69	-	-	-

The table 5 provides the Degrees of Freedom column indicates the number of independent pieces of information used to estimate the sum of squares for each source of variation. The Mean Square column is obtained by dividing the Sum of Squares by the Degrees of Freedom. The analysis denoted that there is vast variability in the amount of data for the each source attribute variation. The ratio of Mean Square value with the F-value measures the mean square regression and residual values. This represents the average amount of variability in the data that can be attributed to each source of variation.

Table 6: Estimated Innovation Level for varying IoT with IoT-SDNCT

Number of IoT Nodes	**Technological Innovation Level**	**Skill Requirement Level**
10	High	Medium
30	Medium	High
50	High	High
70	Medium	Medium
100	Low	Low

Table 6 shows the estimated innovation level for different numbers of IoT nodes in the IoT-SDNCT system. The innovation level refers to the degree of technological innovation required for College English Teachers to successfully use the system in their teaching.

For 10 IoT nodes, the estimated technological innovation level is high, indicating that teachers may need to possess advanced technical skills to effectively utilize the system. However, the skill requirement level is medium, meaning that teachers may not need to invest as much time and effort into developing new skills to use the system.

For 30 IoT nodes, the estimated technological innovation level is medium, indicating that teachers may still need some technical expertise to use the system, but the required skills may not be as advanced as for 10 IoT nodes. The skill requirement level is high, meaning that teachers may need to invest more time and effort into developing new skills to effectively utilize the system.

For 50 IoT nodes, the estimated technological innovation level is high, indicating that teachers may need to possess advanced technical skills to effectively utilize the system. The skill requirement level is also high, meaning that teachers may need to invest a significant amount of time and effort into developing new skills to use the system effectively.

For 70 IoT nodes, the estimated technological innovation level is medium, indicating that teachers may still need some technical expertise to use the system, but the required skills may not be as advanced as for 10 IoT nodes. The skill requirement level is medium, meaning that teachers may need to invest some time and effort into developing new skills to effectively utilize the system.

For 100 IoT nodes, the estimated technological innovation level is low, indicating that teachers may not need advanced technical skills to effectively utilize the system. The skill requirement level is also low, meaning that teachers may not need to invest significant time and effort into developing new skills to use the system effectively.

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However, the system may not require as much innovation or technical expertise for large-scale implementation.

Table 7: Student Engagement with Blended Teaching Model with IoT-SDNCT

Parameter	Value 1	Value 2	Value 3
Number of IoT Nodes	20	50	80
SDN Controller	Floodlight	Ryu	POX
Cloud Platform	AWS	Azure	Google Cloud
Teacher Skill Level	Novice	Intermediate	Expert
Student Engagement	High	Medium	Low

Table 7 shows the student engagement levels in a blended teaching model using IoT-SDNCT for different parameters. The first parameter is the number of IoT nodes used in the system, which is set to 20, 50, and 80. The second parameter is the SDN controller used in the system, which is set to Floodlight, Ryu, and POX. The third parameter is the cloud platform used in the system, which is set to AWS, Azure, and Google Cloud. The fourth parameter is the teacher's skill level, which is set to Novice, Intermediate, and Expert. The table shows that the student engagement level is high when the number of IoT nodes is 20, the SDN controller is Floodlight, the cloud platform is AWS, and the teacher's skill level is Expert. On the other hand, the student engagement level is low when the number of IoT nodes is 80, the SDN controller is POX, the cloud platform is Google Cloud, and the teacher's skill level is Novice. The table suggests that the choice of IoT nodes, SDN controller, cloud platform, and teacher's skill level can have a significant impact on student engagement in a blended teaching model using IoT-SDNCT. Teachers with higher skill levels can better utilize the system to enhance student engagement, while the choice of technology can also play a role in determining the effectiveness of the system.

Table 8: Overall Analysis of IoT-SDNCT

IoT Nodes	SDN Controller	Cloud Platform	Teacher Skill Level	Student Engagement	Learning Outcome
20	Floodlight	AWS	Novice	High	Improved
20	Ryu	Azure	Intermediate	Medium	No significant improvement
50	POX	Google Cloud	Expert	Low	Decreased
80	Floodlight	AWS	Intermediate	Medium	Improved
80	Ryu	Azure	Novice	High	Improved
50	POX	Google Cloud	Intermediate	Low	No significant improvement

Table 8 presents the overall analysis of the IoT-SDNCT system with varying combinations of IoT nodes, SDN controllers, cloud platforms, teacher skill levels, student engagement levels, and learning outcomes. The table shows that the combination of 20 IoT nodes, Floodlight SDN controller, and AWS cloud platform with a novice teacher skill level resulted in high student engagement and improved learning outcomes. On the other hand, the combination of 50 IoT nodes, POX SDN controller, and Google Cloud platform with an intermediate teacher skill level resulted in low student engagement and no significant improvement in learning outcomes. the table suggests that the success of the IoT-SDNCT system depends on various factors such as the number of IoT nodes, SDN controller, cloud platform, teacher skill level, and student engagement. It highlights the importance of careful consideration and experimentation in selecting the optimal combination of these parameters to achieve the desired outcomes.the table suggests that the success of the IoT-SDNCT system depends on various factors such as the number of IoT nodes, SDN controller, cloud platform, teacher skill level, and student engagement. It highlights the importance of careful consideration and experimentation in selecting the optimal combination of these parameters to achieve the desired outcomes.

4.2 Findings

Based on the ANOVA analysis, conclude that there is a significant relationship between technological innovation and skill requirements for college English teachers in the blended teaching model. The F-statistic of 18.68 is statistically significant with a p-value less than 0.05 ($p < 0.05$), indicating that the overall regression model is significant. Additionally, the R-squared value of 0.66 suggests that 66% of the variation in the skill requirements for college English teachers can be explained by the variation in the predictors, namely student age, years of English study, frequency of online use, ease of using technology, English teacher age, years of teaching experience, and frequency of online use. Based on the analysis conducted in this study, the findings suggest that technological innovation and technological skills are required for college English teachers in the blended teaching model. The data collected from 50 students and 20 English teachers who were using the blended teaching model provided insights into the relationship between technological

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innovation, skills, and the effectiveness of the blended learning approach.

The descriptive analysis of the data revealed that students' age ranged from 18 to 24, with a mean age of 20.75. The years of English study varied from 5 to 10, with a mean of 7.32. The frequency of online use by students ranged from 1 to 5, with a mean of 3.48. The ease of using technology by students ranged from 2 to 5, with a mean of 4.14. On the other hand, the English teachers' age ranged from 30 to 55, with a mean of 41.45. The years of teaching experience varied from 5 to 20, with a mean of 11.5. The frequency of online use by teachers ranged from 2 to 5, with a mean of 4.15. The ease of using technology by teachers ranged from 3 to 5, with a mean of 4.43. The Pearson correlation analysis showed several significant relationships between the variables. There was a positive correlation between the frequency of online use by students and teachers ($r = 0.70$, $p < 0.05$), indicating that as students used online resources more frequently, teachers also utilized online components more often. Additionally, there was a positive correlation between the ease of using technology by students and teachers ($r = 0.74$, $p < 0.05$), suggesting that students who were comfortable with technology were likely to have teachers who were also proficient in using technology. Furthermore, the regression analysis indicated that the ease of using technology was a significant predictor of skill requirements for college English teachers in the blended teaching model ($\beta = 0.458$, $p < 0.05$). This finding suggests that as teachers become more adept at using technology, their skill requirements in incorporating technology into their teaching practices increase.

Based on the results presented in the tables, the IoT-SDNCT system has the potential to improve the effectiveness of blended teaching models. The system's intelligent reinforcement learning algorithm, which uses student performance data to adapt and optimize the learning process, can lead to improved student engagement and higher learning outcomes. However, the effectiveness of the IoT-SDNCT system is highly dependent on several factors, such as the number of IoT nodes, the SDN controller, the cloud platform, the teacher's skill level, and student engagement. The system's performance varies depending on these parameters, and therefore, careful consideration is required when implementing the system. For instance, increasing the number of IoT nodes may not necessarily lead to higher technological innovation and skill requirement levels for college English teachers. Similarly, the choice of SDN controller and cloud platform may have a significant impact on the system's performance. The IoT-SDNCT system has the potential to be an effective tool for enhancing blended teaching models. However, it requires careful consideration of several factors to optimize its performance and achieve the desired learning outcomes..

V. Conclusion

The IoT-SDNCT system is a proposed technology solution that aims to improve the effectiveness of blended teaching models through the integration of IoT, SDN, and cloud computing technologies. The system incorporates an intelligent reinforcement learning algorithm that uses student performance data to adapt and optimize the learning process. The technical analysis of the system presented in this paper has explored its architecture, components, and functionality, including how IoT devices can be used to collect data, how SDN technology can be used to control network traffic and optimize learning pathways, and how cloud computing can be used to store and process data. The results of the experiments conducted on the system indicate that the number of IoT nodes used has a significant impact on the level of technological innovation and skill requirement level. The use of floodlight as the SDN controller, AWS as the cloud platform, and novice teacher skill level resulted in higher levels of student engagement, while the use of POX as the SDN controller and Google Cloud as the cloud platform led to decreased student engagement and no significant improvement in learning outcomes. The proposed IoT-SDNCT system has the potential to improve student engagement and learning outcomes in blended teaching models. However, its effectiveness is influenced by several factors, such as the number of IoT nodes, the choice of SDN controller and cloud platform, and the teacher's skill level. Future research could focus on optimizing these factors to further enhance the system's performance and effectiveness. Additionally, efforts should be made to provide teachers with the necessary technical skills and knowledge to effectively use the system.

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