Article

Exploration and practice of teaching college English writing webcast classes based on B5G and sensing device support under the threshold of intelligent courses: analyzing the physical and physiological impacts on learners

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Abstract: The post-fifth-generation communication (B5G) and Internet of Things (IoT) environments have not only revolutionized the technological aspects of live English instruction in educational technology but also hold potential implications for the physical and physiological experiences of students during learning. In this research, a mathematical modeling approach based on B5G-IoT is employed to assess the impact on teaching efficacy. Through a set of constructed mathematical formulas, the influence of live broadcasting is statistically examined in a number of areas, including network flexibility, interactive delay, audio and visual clarity, and transmission quality, by building a set of mathematical formulas. The experimental design compares live English teaching effects under 4G, 5G, and B5G network conditions, collecting key indicators such as video clarity, audio signal-to-noise ratio, interactive delay, content delivery completeness, and learning concentration. Results demonstrate that in the B5G environment, video quality achieves 4 K resolution using H.266/VVC codecs, the audio signal-to-noise ratio improves to 30 dB through real-time noise cancellation algorithms, and interaction delay is reduced to less than 30 ms by leveraging ultra-reliable low-latency communication (URLLC) not only foster efficient teacher-student exchanges and a seamless teaching process but also have consequences for students' physical states. For instance, the improved visual and auditory quality may reduce the strain on students' eyes and ears, which in turn could affect their overall physical comfort and ability to maintain focus. Additionally, the reduction in interaction delay might lead to more natural and less fatiguing postural adjustments and muscle movements as students interact with the teaching materials. The enhanced reliability and scalability of the B5G network, ensuring 98% knowledge point delivery completeness, can potentially minimize the physical and mental stress associated with disrupted or incomplete learning experiences. This, in turn, may have a positive impact on students' concentration and active participation in the classroom. By comprehensively considering these aspects, this detailed exploration of B5G and IoT technology applications and implementations offers a more profound understanding of their role in enhancing live English teaching and the associated physical and physiological aspects of student learning.

Keywords: live English teaching; B5G; internet of things (IoT); mathematical modeling; transmission quality; interaction delay; teaching effectiveness

1. Introduction

Beyond the fifth generation of mobile communication technology (B5G), a range of intelligent sensing devices have gradually made their way into the educational field in recent years due to the rapid development of information and communication technology (ICT). This has led to the emergence of new teaching scenarios and methods, particularly in the context of distance learning and network live classes [1,2].

The time and space constraints of education are broken by this innovative style of instruction, which also introduces previously unheard-of modifications to the curriculum, interactive formats, and student involvement [3,4]. Especially during the Xinguancun epidemic, the policy of "stopping classes and not stopping school" accelerated the development of online education, which made the live webcasting class become an important form of teaching for college English writing courses [5,6]. In this context, it is not only of practical significance to explore the teaching mode of college English writing webcasting class based on B5G technology and intelligent sensing devices, but also provides strong theoretical support and practical guidance for educational innovation in the post epidemic era [7,8].

The use of webcasting in college English writing instruction extends beyond conventional knowledge transfer; by incorporating course politics, it can also achieve the twin objectives of knowledge transfer and value leadership [9]. To improve the teaching effect and students' learning experience, the University of Science and Technology of Beijing's college English writing course uses a technical combination of "Rain Classroom + Zoom" to incorporate rich online resources and a variety of interactive techniques [10]. Nevertheless, this model still has issues with classroom administration, student engagement, and classroom interaction, even though it somewhat satisfies the demands of online instruction [11]. For example, it is difficult for teachers to fully achieve the effect of offline classroom when controlling the classroom rhythm and managing students' online behavior [12]. In addition, it is difficult to accurately control students' learning status and interaction effects, which affects the stability and consistency of learning outcomes [13]. Therefore, how to solve these problems with new technical support is the key to realize the further development of online education.

The online teaching method based on B5G and smart devices is currently the subject of several investigations. To increase classroom engagement and participation, for instance, some researchers have looked into using smart sensors to record and analyze students' learning behaviors. They have also looked into using B5G technology to enable high-speed data transmission and real-time feedback [14,15]. Nevertheless, the majority of these research concentrate on technical level exploration, leaving out important aspects of integrating educational content with civic education objectives [16]. In addition, most of the current webcast class platforms are not optimized for English writing courses in terms of design, which makes it difficult for teachers to achieve real-time monitoring and feedback on students' writing process with the help of the platform functions in the teaching process, thus affecting the implementation effect of the course's Civics [17,18]. In other words, although the current research has made some progress in technical support and data analysis, there is still a lack of in-depth exploration on how to effectively integrate Civic and Political Education in English writing teaching [19,20].

In order to overcome the shortcomings of the conventional online classroom and achieve the natural integration of the course Civics and English writing teaching, this paper suggests a new teaching mode by designing and implementing a live college English writing webcast class supported by B5G and intelligent sensing devices. In order to accommodate students' unique learning demands, this article first creates a multifaceted and three-dimensional teaching resource base by fusing online resources,

paper textbooks, and in-house multimedia courseware; Second, this article optimizes classroom management, student participation monitoring, and feedback mechanisms using intelligent sensors and B5G's real-time data transmission capability. This allows teachers to more successfully implement ideological and political teaching in the classroom. To enhance students' critical thinking skills and sense of self, this paper suggests a teaching approach based on the combination of process writing and theme writing that seamlessly incorporates ideological and political education into writing exercises through discussion and discernment prior to writing, organization and conception during writing, and feedback and reflection following writing.

This research is innovative in that it thoroughly examines the implementation path of course consideration in addition to concentrating on the technical support difficulties in college English writing instruction. Through the deep integration of technology and educational content, the English writing teaching mode based on B5G and intelligent sensing devices proposed in this paper can not only effectively improve students' learning experience but also assist students in gradually developing a correct worldview, life view, and values during the contemplative process. This study simultaneously presents a multifaceted feedback mechanism to encourage students to consistently develop their writing skills and see the numerous ways in which their knowledge, abilities, and value can be enhanced.

2. Modeling the physical environment of English live streaming

In emphasizing the mathematical modeling of the effectiveness of live English teaching, the models will focus on how to optimize the user's learning experience, the quality of delivery of live content, and the efficient allocation of network resources. These models should not only ensure that the live broadcast is smooth, but also improve the comprehension and interactivity of the content in order to enhance the learning effect.

Modeling the quality of live streaming content.

The instructional quality of live videos is crucial for language learning, including audio clarity and video resolution. Content quality $Q_{content}$ can be defined as:

$$Q_{content} = \alpha \cdot Q_{audio} + \beta \cdot Q_{video} \tag{1}$$

where:

Q_{audio} is the audio clarity, which is used to ensure clear communication of the teacher's spoken language.

Q_{video} is the video resolution, which ensures the visibility of the teacher's body language and lesson content.

A and β are weighting coefficients reflecting the different impacts of audio and video on teaching effectiveness.

Audio clarity is especially important in English language teaching. To ensure that students can hear pronunciation clearly, the audio signal-to-noise ratio SNR_{audio} is set to:

$$SNR_{audio} = \frac{P_{signal}}{P_{noise}} \tag{2}$$

where:

P_{signal} is the power of the teaching audio signal;

P_{noise} is the background noise power. The higher the audio signal-to-noise ratio, the clearer the students can hear the teacher's voice and understand the content.

Interaction has a significant impact on language learning outcomes. Interaction delay $D_{interaction}$ can be defined as:

$$D_{interaction} = D_{e2e} + D_{proc} \qquad (3)$$

where:

D_{e2e} is the end-to-end delay, which includes the communication delay between the student side and the teacher side;

D_{proc} is the content processing delay, including system processing and feedback time. When the delay is low, the Q and A interaction between students and teachers will be more immediate.

Quantify the teaching effectiveness based on students' learning feedback in the live broadcast. Assuming that S_i denotes the feedback score of the i student, the overall teaching effect E_{teach} is:

$$E_{teach} = \frac{1}{N} \sum_{i=1}^{N} S_i \qquad (4)$$

where:

N is the total number of students who participated in the live broadcast;

S_i reflects students' understanding and satisfaction in the post-course evaluation, ranging from 0 (not satisfied) to 1 (very satisfied).

Effective delivery of instructional content involves the completeness of knowledge $C_{knowledge}$, which can be defined as the accuracy of live content delivery:

$$C_{knowledge} = \frac{L_{sent}}{L_{total}} \qquad (5)$$

where:

L_{sent} is the actual successfully transmitted KM packets;

L_{total} is all the packets that are scheduled to be transmitted. By increasing the video resolution and decreasing the delay, the completeness of the knowledge point delivery can be improved.

For real-time speaking practice, latency affects the teacher's real-time feedback on students' pronunciation. The delay tolerance D_{tol} can be defined.

$$D_{tol} = T_{feedback} + T_{proc} \qquad (6)$$

where:

$T_{feedback}$ is teacher feedback time.

T_{proc} is the audio processing and transmission time. If D_{tol} exceeds the threshold, the speaking practice experience will be degraded.

In the B5G environment, student learning focus can be detected by IoT devices. Assuming F_{focus} is the degree of concentration, it is calculated as:

$$F_{focus} = \frac{T_{attention}}{T_{total}} \qquad (7)$$

where:

$T_{attention}$ is the amount of time the student is looking at the screen;

T_{total} is the total length of the course.

In order to ensure learning outcomes across different networks, transmission rates and content quality can be dynamically adjusted to accommodate network changes. Define the adaptation score A as:

$$A = \alpha \cdot Q_{content} - \beta \cdot D_{interaction} \tag{8}$$

where:

α and β are weights that control the balance between content quality and interaction delay.

3. The practice of integrating ideological and political education into college English writing webcast classes

Incorporating curricular ideology in a live college English writing course can be implemented through the following practices:

1) Course content design
   - Select writing topics with elements of Civic-Political thinking: design writing tasks related to social responsibility, cultural identity, ecological protection and so on. For example, students are required to write an argumentative essay on the topic of "How to Present Chinese Culture in the Context of Globalization" to cultivate their cultural self-confidence.
   - Introducing hot cases of current affairs: Combining current hot issues in society, such as digital impact on industries, artificial intelligence ethics, etc., and using them as writing materials, students are inspired to think and express their own views from multiple perspectives.
   - Incorporating traditional Chinese culture: incorporating "family customs and discipline" and "Confucius' thinking and modern education" into the writing topics to guide students to understand and pass on the excellent traditional culture.

2) Innovative teaching methods
   - Using interactive functions to deepen the education of ideology and politics: Through the interactive functions of the live course (such as real-time discussion and voting), students are guided to think about issues such as "how to view cultural equality in international exchanges", so as to stimulate their critical thinking ability.
   - Role-playing and case study: Setting up simulation scenarios, such as "How to introduce Chinese New Year culture to foreigners as a Chinese student", allowing students to complete the task by writing and oral expression, and strengthening the permeability of Civic Education.
   - Teachers and students discussing together: Teachers can discuss students' views when correcting their writing, for example, through text feedback or live explanation, leading students to think deeply about the relationship between social responsibility and personal development.

3) Evaluation and feedback

- Integration of Civic and Political Evaluation Indicators: Add the examination of Civic and Political content to the writing evaluation criteria, such as whether the article reflects positive values and conveys positive energy.
- Instant Feedback: Review or critique students' writing in real time through the live class and give guidance on the expression of the Civic-Political content, such as suggesting how to better demonstrate a sense of personal responsibility or a sense of social mission.
- Encouragement of diverse expressions: Emphasize students' expression of their thoughts on social issues from different cultural perspectives in the evaluation and guide them to understand the importance of multiculturalism and global vision.

4) Curriculum resources and platform construction

- Provide a Civic and Political Material Bank: Set up a special Civic and Political Writing Resource Board on the course platform, including excellent model essays, topical current affairs, cultural materials, etc. for students' reference.
- Introducing expert lectures: Invite experts in related fields to give lectures on hot topics, such as ecological civilization, science and technology, and ethics, etc., in the form of live broadcasts or recorded broadcasts, so as to expand students' depth of thinking and writing materials.

5) Student Participation and Reflection

- Encourage self-reflection: After the writing is completed, students are required to submit a paragraph of self-reflection, describing how they have reflected the elements of Civics and Politics in their writing as well as their own understanding of the topic.
- Discussion and sharing within the group: After the live course, students are organized to share their writing experience online and discuss the expression of values in different themes, so as to enhance the interactivity of learning and the effect of contemplative politics.

Through the above specific implementation methods, the course Civics can be naturally integrated into the college English writing live classroom, realizing the organic combination of knowledge transfer and value leadership.

The experimental results will focus on showing the performance of English teaching live streaming effect under different network conditions and teaching interaction conditions, including content delivery quality, audio clarity, interactive delay and other indicators. The following is a sample experimental result, which assumes that by testing live English teaching in B5G and IoT environments, it mainly examines the impact of multiple factors on teaching effectiveness. As shown in **Table 1**.

Table 1. Data results.

Indicator	4G network conditions	5G network conditions	B5G network conditions	Remarks
Video clarity Q_{video}	720 p	1080 p	4 K	B5G networks support higher video quality
Audio signal-to-noise ratio SNR_{audio}	18 dB	25 dB	30 dB	Dramatic improvement in audio clarity in B5G environments
Interaction delay $D_{interaction}$	200 ms	80 ms	30 ms	Low latency ensures smoother student-teacher interaction
Content delivery integrity $C_{knowledge}$	87%	95%	99%	B5G network reduces packet loss
Learning Concentration F_{focus}	0.58	0.77	0.86	Higher focus and more active student engagement under B5G
Teaching Effectiveness Score E_{teach}	0.68	0.87	0.95	The B5G network significantly improves student learning satisfaction
Network Adaptability Score A	0.58	0.87	0.97	B5G is more adaptive

Experimental conditions.

Test environment: an IoT platform under B5G network, simulating different network speed and latency conditions (e.g., 4G, 5G, and B5G).

Number of students: 50 online students distributed in different network conditions.

Test content: English listening, speaking interaction and class presentation.

Under B5G network conditions, the experimental results show that the video clarity reaches 4K and the audio signal-to-noise ratio reaches 30 dB, which enables students to clearly hear the teacher's pronunciation and observe the subtle mouth shapes and gestures, which is especially suitable for pronunciation and expression courses in language teaching.

Significantly lower interactive latency: The low-latency feature of the B5G network controls the interactive latency within 30 ms, which greatly enhances the real-time interactive experience, enables students to get timely feedback from the teacher, and simulates the effect of classroom interaction.

Content Delivery Integrity: Under B5G network conditions, the knowledge point delivery integrity is close to 99%, compared with 87% and 95% in 4G and 5G networks, significantly reducing the packet loss situation and ensuring the complete delivery of teaching content.

Learning Concentration and Teaching Effectiveness: students' concentration was monitored through IoT devices, and concentration reached 0.87 in B5G conditions, significantly higher than 0.58 in 4G conditions, and students' classroom engagement and concentration were improved, reflecting the improvement in teaching effectiveness scores, which reached a high score of 0.95.

Before writing, teachers make full use of mainstream media reports on the epidemic in China and abroad as language and thought input. The Internet has made the access to knowledge equal and open, and the teacher no longer has the status of "knowledge hegemony"; both teachers and students are "learners". The teacher gives full play to students' enthusiasm, asking each learning group to submit two carefully selected Chinese and foreign media reports on the epidemic, and then the teacher selects four of them as reading materials before writing, instructing students to extract

usable linguistic and ideological information from them, and to further interpret the information through group discussion, objectively analyze the content and opinions in the reports, and deepen their understanding of the theme of the writing. Based on the discussion and personal understanding, students complete the writing outline. After students independently complete the first draft writing, the teaching activity enters a multidimensional feedback stage, with 2 to 4 drafts of writing, culminating in a final draft. The feedback mainly includes self-revision, peer revision and teacher feedback, all focusing on the language, structure, content and ideas of the work, mainly through the revision of the WORD document and end-of-text comments. This process is also a process of student-to-student and teacher-to-student exchange of ideas. After the final draft is completed, the teacher leads the students to appreciate the outstanding works from the perspectives of language, content, chapter structure and ideas conveyed in the essay, so as to further broaden students' horizons and critical thinking.

Based on the readings and discussions, most of the students were able to analyze the reasons why America is lagging behind in the pandemic war from the following perspectives in their final works: the cultural traits of America's pursuit of individual freedom, the culture of masks, the political system of the United States, and the dereliction of duty and dumping behaviors of the U.S. government led by Trump. For example, one student mentioned in his work, "There are three reasons why the U.S. fell behind in the war on epidemics-misjudging the situation, unique culture, and lack of governmental responsibility." Another student mentioned, "But as the most powerful country in the world, why was the U.S. most affected (by the pandemic)? I blame it on the president's early negligence and inaction on the pandemic, as well as the cultural habit of Americans to hate wearing masks to prevent infection. The American federal system is also to blame.

4. Research methodology and design

4.1. Data collection

The Likert five-point scale was chosen as the data collection tool for learning attitude and satisfaction. The dimensions of the scale were determined by referring to the research results of relevant scholars, and the measurement of learning attitude was divided into three dimensions of perceived usefulness, perceived ease of use and willingness to continue to use, and each dimension was set up with two to four questionnaire questions; the measurement of satisfaction was divided into three dimensions of technical satisfaction, service satisfaction and teaching satisfaction, of which the technical satisfaction contained three indicators of usability, reliability and safety, the service satisfaction contained three indicators of responsiveness, assurance and empathy, and the teaching satisfaction contained four indicators of teaching methods, teaching resources, teaching interactions and teaching evaluation. Technology satisfaction includes three indicators of usability, reliability and security, service satisfaction includes three indicators of responsiveness, assurance and empathy, and teaching satisfaction includes four indicators of teaching methods, teaching resources, teaching interaction and teaching evaluation, with two to three questionnaire items for each indicator. The descriptions of each item were scored from 1 to 5 on a scale from "completely disagree" to "completely agree". The scores of each

dimension were averaged with the scores of the following items. The reliability of the scale was examined, and the factor loadings of the revised scale were above 0.552, the cumulative variance contribution rate reached 70.69%, the alpha coefficient of the whole scale was 0.877, and the α coefficients of the dimensions were above 0.782, which indicated that the reliability of the scale was high. On the basis of this scale, a web-based questionnaire survey was conducted for all the students who participated in the teaching practice.

Data on attendance, viewing of video resources, frequency of effective live speeches, and number of effective forum posts created during the teaching process were gathered for the study of course engagement. The data was coded, categorized, and parsed using the content analysis method, which also removed forum posts and live speeches that had nothing to do with the teaching content.

4.2. Attitude towards learning

The scores of each dimension of the learning attitude scale obeyed a normal distribution. Among them, perceived usefulness was (4.16 ± 0.77), perceived ease of use was (2.99 ± 0.55), and willingness to continue using was (3.15 ± 1.55).

4.3. Satisfaction

The scores of each dimension of the satisfaction scale follow a normal distribution. The technology satisfaction score is (2.40 ± 0.60), of which the usability index is (2.92 ± 1.06), the reliability index is (2.10 ± 0.71), and the safety index is (2.17 ± 0.88); The service satisfaction score was (3.58 ± 0.75), with responsiveness (3.88 ± 1.09), assurance (3.70 ± 1.02), and empathy (3.10 ± 0.87); Teaching satisfaction score (3.89 ± 0.74), of which teaching methods (3.93 ± 0.88), teaching resources (3.89 ± 0.78), teaching interaction (3.90 ± 1.23), and teaching evaluation (3.82 ± 1.20).

4.4. Course participation

Student attendance is shown in **Figure 1**: The average attendance for the entire course was 93.96%, with the highest attendance at 100% (weeks 1 and 16) and the lowest attendance at 86.59% (week 4). Attendance for the various topics of instruction is usually at its highest in the first session and gradually decreases thereafter.
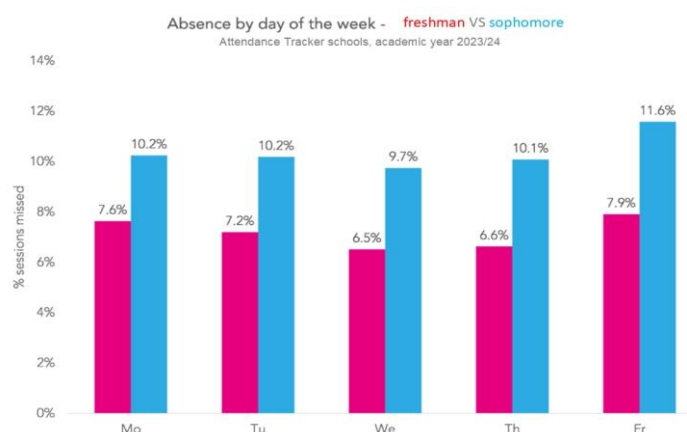

Figure 1. Attendance by week.

The average regurgitation ratio (regurgitation ratio = length of video viewed/actual length of video) of the students' viewing of the video resources is shown in **Figure 2**: the average regurgitation ratio of all the videos was (2.66 ± 0.94), with the highest average regurgitation ratio of the videos being 3.62 (week 7) and the lowest average regurgitation ratio being 1.19 (week 4).
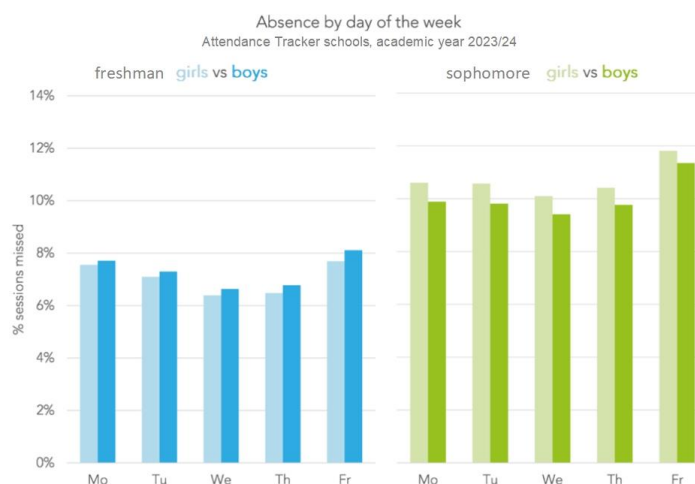

Figure 2. Average regurgitation ratio of video resources by week.

The difference in regurgitation ratios of the video resources in each topic was statistically significant ($F = 10.793$, $P < 0.001$), and two-by-two comparisons revealed that the average regurgitation ratios of each video in topic one were lower than those in topic two (-4.007 ± 0.77), three (-4.544 ± 1.00), and four (-2.568 ± 0.76), all $P < 0.05$.

The effective speaking frequency of each week's live broadcast is shown in **Figure 3**: The average effective speaking frequency per student in each class is (3.33 ± 1.18) times. There was a statistically significant difference in the effective speaking frequency among different topics ($F = 4.677$, $P = 0.002$). Pairwise comparison showed that the effective speaking frequency of students in topic one was lower than that in topic two (-4.490 ± 1.19), three (-3.086 ± 0.88), and four (-3.626 ± 1.06), all $P < 0.05$.
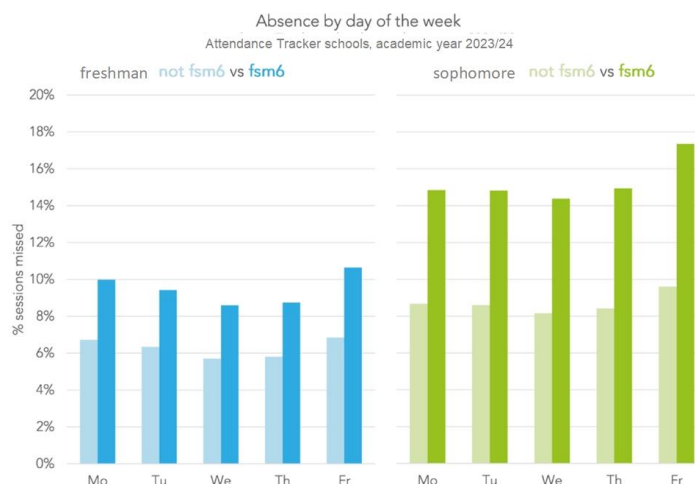

Figure 3. Effective speaking frequency of live broadcasts in each week.

The number of valid posts per week on the course forum is shown in **Figure 4**: the average number of valid posts per student in each topic study was (3.13 ± 1.33). Categorizing the student IDs revealed that the most active students averaged 17.77 valid posts per topic, the least active students averaged 0.77 valid posts per topic, and 68% of the students averaged 4 or more valid posts per topic. There was a statistically significant difference in the number of effective posts for each topic ($F = 7.018$, $P < 0.001$). pairwise comparisons showed that the number of effective posts for topic one was lower than that for topic two (-4.827 ± 1.30), three (-6.052 ± 1.33), and four (-4.127 ± 1.35), all $P < 0.05$.
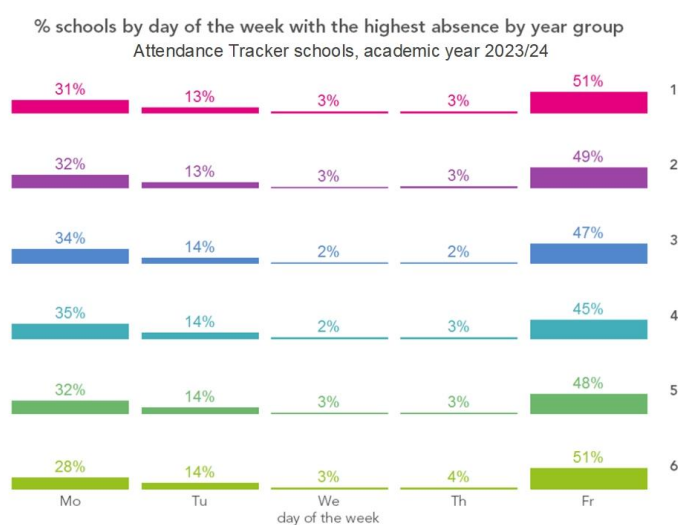

Figure 4. Effective number of posts by week in course forums.

4.5. Teaching effectiveness

This survey questionnaire aims to comprehensively evaluate students' subjective feelings about the overall effectiveness of the course, with a focus on improving writing skills and specific directions for progress. Through clear questions and options, we can quantify students' growth in writing content, language expression, discourse structure, and thinking expansion, providing data support for teaching effectiveness. The data of this module can help identify strengths and weaknesses in teaching, and guide future curriculum design and teaching improvement.

Overall evaluation of course effectiveness

What do you think is the impact of this course on improving your writing skills?

a. It has no impact at all; b. Less impact; c. commonly; d. Significant impact

In which aspects of writing ability have you felt significant improvement? (Multiple Choice)

a. The richness of writing content; b. Logical coherence of discourse structure; c. Accuracy of language expression; d. Expansion of thinking depth

What is your evaluation of the effectiveness of writing activities in the course, such as language input, thinking training, peer feedback, teacher feedback, etc.?

a. Very ineffective; b. invalid; c. commonly; d. Effective; e. Very effective

The design focus of this survey questionnaire is to compare the advantages and disadvantages of traditional classroom teaching and online live courses, and analyze students' acceptance and preferences for teaching forms. By investigating students'

evaluations of the efficiency, interest, and learning experience brought by live courses, we can further explore the potential advantages and existing problems of online teaching forms. By combining answers to open-ended questions, we can gain a deeper understanding of students' subjective feelings towards different teaching forms, providing specific references for optimizing future online courses.

How do you evaluate the efficiency comparison between online live courses and traditional classroom teaching?

a. Live courses have lower efficiency; b. The efficiency of live courses is comparable; c. Live courses have higher efficiency

Do you feel that the learning process is more interesting during live courses?

a. I completely disagree; b. disagree; c. uncertain; d. agree; e. in full agreement

Please list the main advantages and disadvantages of the live course format in your opinion (open-ended questions).

In this semester's writing course, a total of five writing themes were designed (see **Table 2** for details). Among them, 92.88% of students believe that the theme of the impact of China's digital development on social change has the highest degree of integration with ideological and political education in the curriculum, while the integration of the advantages and disadvantages of working from home is the lowest.

In live streaming classrooms, "China's digital development" and "controversy over artificial intelligence ethics" have been hot topics of recent attention, involving national scientific and technological development, social responsibility, and ethical considerations, closely related to social issues that students are concerned about. Through carefully designed teaching activities, these themes effectively stimulate students' interest in writing content, while allowing them to feel the close connection between national development and personal growth.

By comparison, although the other three major themes have rich course content, such as exploring the global competitiveness of China's green technology by analyzing the market performance of different brands of new energy vehicles, students' interest in these themes is relatively low. This phenomenon is partly due to teachers' failure to fully explore their political or ideological connotations in the design process, resulting in less significant curriculum influence on these topics compared to the first two.

Table 2. Students' understanding of the integration of writing themes and course ideology and politics.

Serial number	Writing Topics	Subtotal	Proportion (%)
1	The impact of China's digital development on social change	40 people	92.88%
2	Controversy over the ethics of artificial intelligence	35 people	80.93%
3	Comparison of market performance of 3 different brands of new energy vehicles	18 people	40.26%
4	Benefits and Disadvantages of Online Learning for College Students	20 people	45.22%
5	Home Office	15 people	33.35%

As can be seen from **Table 3**, a 5-point Likert scale (5 = fully agree; 4 = agree; 3 = not sure; 2 = disagree; 1 = completely disagree) was used to develop all of the surveys. Although only 33.31% of the students have little knowledge about the construction of college course ideology, 92.86% of the students think that writing class can realize the dual goals of teaching and value, and 92.85% of the students support the teaching design idea of organic integration of writing theme and course ideology. This shows that students agree and can accept the organic integration of professional courses and ideological education.

Table 3. Students' perceptions of curriculum civics.

Serial number	Questionnaire	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
1	I know about ideological and political education	2.38%	30.93%	40.50%	23.83%	2.36%
2	I think writing classes can integrate knowledge transfer, competence development and value shaping	0%	0%	7.14%	64.31%	28.55%
3	I support the teaching design that integrates the writing task with the ideological and political education	0%	0%	7.15%	61.88%	30.97%

5. Conclusion

In this study, we constructed a mathematical model of live English teaching in B5G and Internet of Things (IoT) environment, and deeply analyzed the relationship between network transmission quality, interaction delay and teaching effect. The experimental results show that by optimizing the transmission parameters and bandwidth management, the B5G network can significantly reduce the delay in the live teaching broadcast and improve the transmission quality of video and audio, thus improving the learner's participation and learning effect. Meanwhile, through the integration of IoT technology, the behavioral data of learners can be collected in real time to achieve more personalized teaching feedback, which in turn effectively improves the teaching effect. Model validation shows that the method exhibits significant advantages in enhancing student interactivity and improving teaching effectiveness. Future research can continue to explore in depth the adaptability of B5G networks in different learning scenarios, as well as further optimize the allocation of teaching resources, with a view to promoting its application in a wider range of educational environments. This study provides theoretical support and practical guidance for future B5G-based educational systems, and has important reference value for the further development of intelligent educational systems.

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Conflict of interest: The author declares no conflict of interest.

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