

EVALUATING THE IMPACT OF SMART TABLETS ON ENGLISH LANGUAGE ACQUISITION IN AIHUA HIGH SCHOOL

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Abstract. This study investigates the use of smart tablets in high school classrooms in Guangxi to determine whether they help or hinder the teaching and learning process. It employs a mixed-method research approach, including student questionnaire surveys and classroom observations. The study examines the advantages and difficulties associated with smart tablets. 254 students and relevant teachers from 6 English classes in Grades 7 to 9 at Aihua School in the Guangxi Zhuang Autonomous Region participated in the study: 125 in the smart classes (the experimental group) and 128 in the traditional classes (the control group). The experimental group consisted of 3 smart classes that used the AI smart tablet teaching model. The students were aged 15-16, with 45% of them were male students and 55% of them female students. Smart tablets were regularly available to every student in the experimental group. In contrast, three traditional classes, also with students aged 15-16 and 47% of them were male students and 53% of them female students, received traditional instruction without the use of smart tablets as part of the control group. The pre-test and post-test results show that although smart tablets have the potential to enhance the curriculum, promote interactive learning, and provide individualised learning experiences, there are challenges, including technological barriers, the need for teacher training, and the risk of distractions.

Keywords: *smart tablets, teaching and learning process, Chinese high schools, implementation challenges, educational technology management*

Introduction

Smart technology has fundamentally transformed the educational landscape with a range of innovative tools that enhance teaching and learning (Mayer, 2020; Ertmer and Ottenbreit-Leftwich, 2013; Mishra and Koehler, 2006). Examples of this transformation include the introduction of artificial intelligence, smartphone applications, and interactive whiteboards. Traditional methods often fall short of the dynamic, personalised learning opportunities offered by these technologies (Mayer, 2020; Ertmer and Ottenbreit-Leftwich, 2013). In the context of teaching English, such technologies facilitate interactive exercises and real-time feedback, allowing students to engage more deeply with the material (Dörnyei and Muir, 2019; Ertmer and Ottenbreit-Leftwich, 2013). To improve student academic performance and teaching effectiveness, many Chinese high schools are incorporating smart tablets into their curricula. However, opinions on the use of smart tablets in classrooms differ. Some people remain concerned about potential drawbacks, while others believe they have the potential to transform education (Carr, 2020; Twenge and Campbell, 2018; Kuznekoff and Titsworth, 2013). This study aims to investigate the use of smart tablets in high school classrooms in Guangxi.

Theoretical framework

Theory of constructivist learning

According to constructivism, students continually construct knowledge based on their previous experiences and interactions with the outside world. With smart tablets, students can explore, collaborate, and develop their understanding of English in an engaging environment (Johnson and Johnson, 2014; Ertmer and Ottenbreit-Leftwich, 2013). For example, students can use various educational apps and online resources to build their knowledge systems, participate in peer discussions, and learn independently (Sailer and Homner, 2020; Johnson and Johnson, 2014; Hwang and Wu, 2012).

Theory of multiple intelligences

According to Howard Gardner's multiple intelligences theory, individuals possess a range of intelligences, such as spatial, linguistic, logical-mathematical, and interpersonal intelligence. Smart tablets can support various learning styles associated with different types of intelligence (Mayer, 2020). Specifically, online platforms allow interpersonal learners to participate, and resources are beneficial for visual learners (Mayer, 2020; Johnson and Johnson, 2014).

Materials and Methods

This study used two complementary research methods to investigate the efficacy of smart classroom instruction. To assess whether smart classrooms enhance student achievement, academic performance is compared between experimental and control classes using a pre-test and post-test design. A student questionnaire survey was then used to evaluate students' learning experiences with smart tablets, determining whether the benefits of using smart tablets in real teaching and learning contexts outweigh any potential disadvantages.

Participants, setting and data collection

For the pre-test and post-test design, 254 students and relevant teachers from 6 English classes in Grades 7 to 9 at Aihua School in the Guangxi Zhuang Autonomous Region participated in the study: 125 in the smart classes (the experimental group) and 128 in the traditional classes (the control group). The experimental group consisted of 3 smart classes that used the AI smart tablet teaching model. The students were aged 15-16, with 45% of them were male students and 55% of them female students. Smart tablets were regularly available to every student in the experimental group. In contrast, three traditional classes, also with students aged 15-16 and 47% of them were male students and 53% of them female students, received traditional instruction without the use of smart tablets as part of the control group. For the student questionnaire survey: A total of 125 valid samples were collected, all from Grade 9 students in the smart classes (experimental group) at Aihua School (Guangxi). The questionnaire consists of 10 questions designed to investigate students' learning resources, engagement and motivation, usage experience, overall attitude, and willingness to continue using smart tablets. The aim is to collect authentic and valid usage data from students in the experimental group to provide reliable support for the research analysis.

The smart classrooms were equipped with smart tablets featuring a cloud-based learning management system that synchronises students' performance data and offers AI-generated personalised practice recommendations, personalised learning pathways, and real-time performance analytics. Traditional classroom teaching resources included textbooks, printed worksheets and whiteboards. The evaluation instruments included the school's standardised pre-test, which gauges English proficiency prior to study, and the post-test as the final exam, which monitors academic performance throughout the study. Questionnaire items were also used. The pre-test and post-test comparison was the primary data collection technique used in this study. To ensure the validity and reliability of the research findings, interference from irrelevant variables was eliminated through longitudinal analysis of the English proficiency test results of the same group of students at various time points. The test comprised two stages: the post-test was administered one week after the 16-week teaching cycle to assess the effects of various teaching models, and the pre-test was a diagnostic test completed one week prior to the start of the new semester to gather baseline data on students' initial English proficiency. To ensure the validity and comparability of the results, both tests used the same set of standardised English basic knowledge test papers, which covered language knowledge and language application modules and were based on the GAOKAO (college entrance exam) English syllabus.

Results and Discussion

Pre-test and post-test data analysis

The collected data were methodically examined to assess how students' English proficiency changed before and after the smart tablet intervention, based on the pre-test and post-test comparison design used in this study (*Table 1*). The results of the data analysis showed that there was no significant difference between the two groups' pre-test English scores ($p > 0.05$), suggesting that the two groups' initial English proficiency was comparable and that they were homogeneous. This provided a basis for comparing the effects of the teaching interventions. The experimental group (smart classes) outperformed the control group (traditional classes) in the post-test by 6.044 points in total English, including 1.489 points in the listening section. The differences in both indicators were statistically significant ($p < 0.05$), indicating that the experimental group's mean overall English performance improved after the smart tablet intervention. The benefits of the smart tablet teaching model in enhancing students' English learning outcomes are further supported by the smart classes' higher average post-test scores in the reading, cloze, and writing sections (*Figure 1* and *Figure 2*).

Table 1. Pre-test and post-test data.

Items	Smart Class Pre-test (N=125)	Smart Class Post-test (N=125)	Traditional Class Pre-test (N=128)	Traditional Class Post-test (N=129)
Total Score_Mean	52.056	56.048	49.152	50.004
Total Score_SD	23.272	24.025	23.589	23.648
Listening_Mean	11.48	12.008	10.461	10.519
Listening_SD	5.057	5.232	5.041	5.078
Reading_Mean	20.528	22.28	20.648	21.341
Reading_SD	5.999	6.3	6.957	6.987
Cloze_Mean	3.52	3.688	3.281	3.558
Cloze_SD	2.708	2.888	2.685	2.588
Writing_Mean	15.82	17.48	14.42	14.88
Writing_SD	13.44	13.84	12.768	12.931

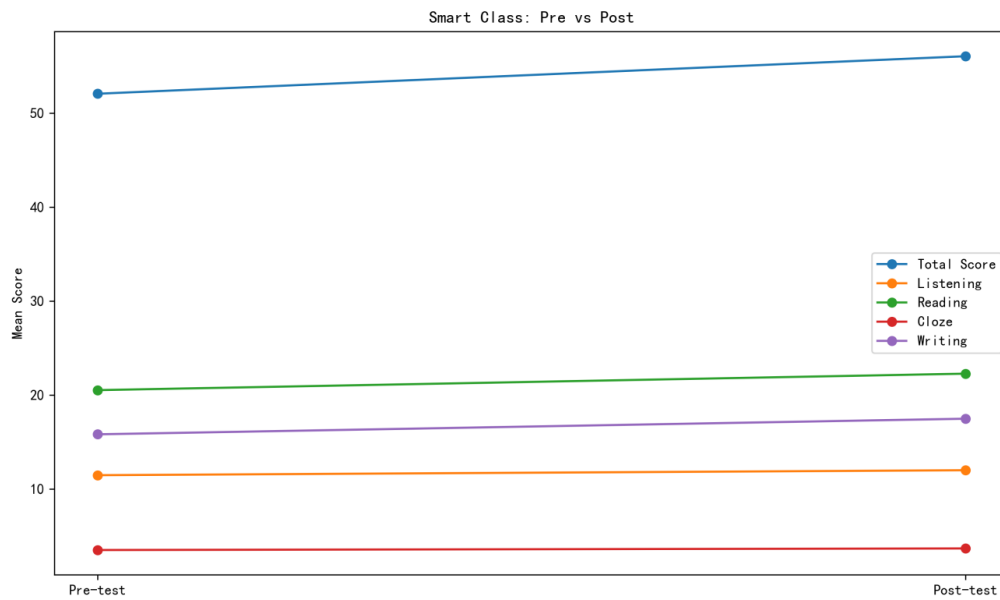


Figure 1. Pre-test and post-test mean scores for the smart class.

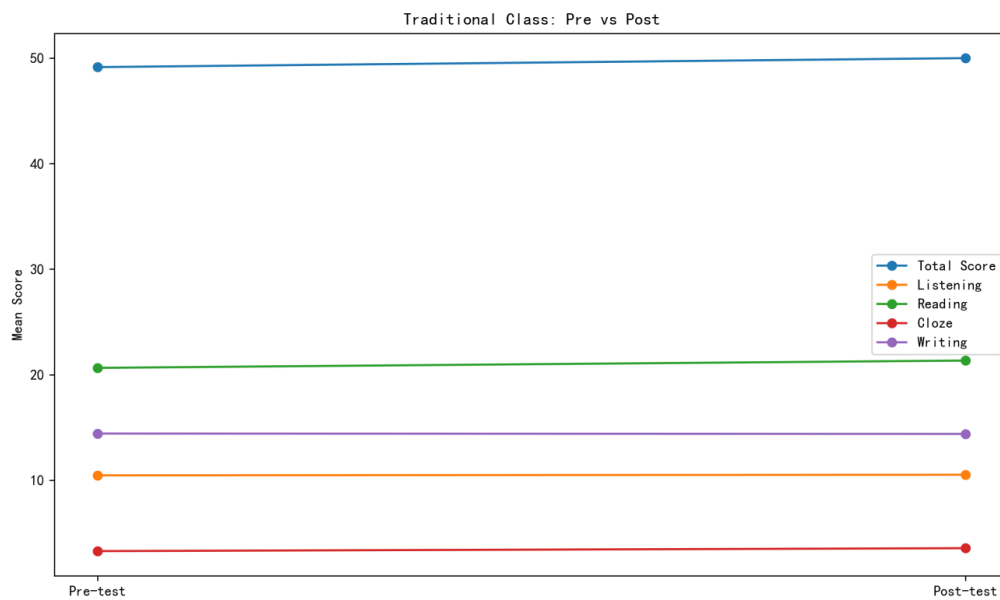


Figure 2. Pre-test and post-test mean scores for the traditional class.

Questionnaire data analysis

A total of 125 valid samples were collected for this survey, all from Grade 9 students in the smart classes at Aihua School (Guangxi). The sample's grade distribution was balanced overall, spanning two academic levels: Grade 9 senior high school students at Aihua. This aligns with the study's research goal, which focuses on students transitioning from junior to senior high school. The sample structure is logical and representative, accurately reflecting how students at different academic levels use smart tablets. The differences were subjected to descriptive statistical analysis. The findings indicate that positive effect dimensions received generally high scores. In particular, the average score for classroom interaction promotion was 3.82, learning materials support

was 3.91, and learning interest enhancement was 3.86. The median for all positive dimensions was 4, indicating an overall positive distribution. In contrast, negative experience dimensions had comparatively low mean scores: technical problems disturbance was 2.64, learning distraction behaviour was 2.54, and operation adaptation difficulty was 2.42. All indicators fell within the normal range for skewness and kurtosis. With no notable outliers or extreme clustering, the data distribution matches the actual response patterns of the middle school students, demonstrating the validity and reliability of the statistical findings (Table 2 and Figure 3).

Table 2. Descriptive statistics of all dimensions.

Category	Mean	Mid	Stg	Skew	Kur
Learning_Materials_Support	3.91	4	0.951	-1.082	1.363
Classroom_Interaction_Promotion	3.82	4	1.095	-0.712	-0.095
Personalised_Learning_Support	3.71	4	1.156	-0.976	0.403
Learning_Interest_Enhancement	3.86	4	1.065	-0.904	0.206
Learning_Efficiency_Improvement	3.82	4	1.04	-1.038	1.011
Technical_Problems_Disturbance	2.64	3	1.266	0.127	-1.231
Learning_Distraction_Behaviour	2.54	2	1.394	0.478	-1.184
Operation_Adaptation_Difficulty	2.42	2	1.199	0.629	-0.592
Overall_Learning_Improvement	3.65	4	1.057	-0.585	0.036
Continuous_Usage_Intention	4.04	4	0.928	-0.88	0.346

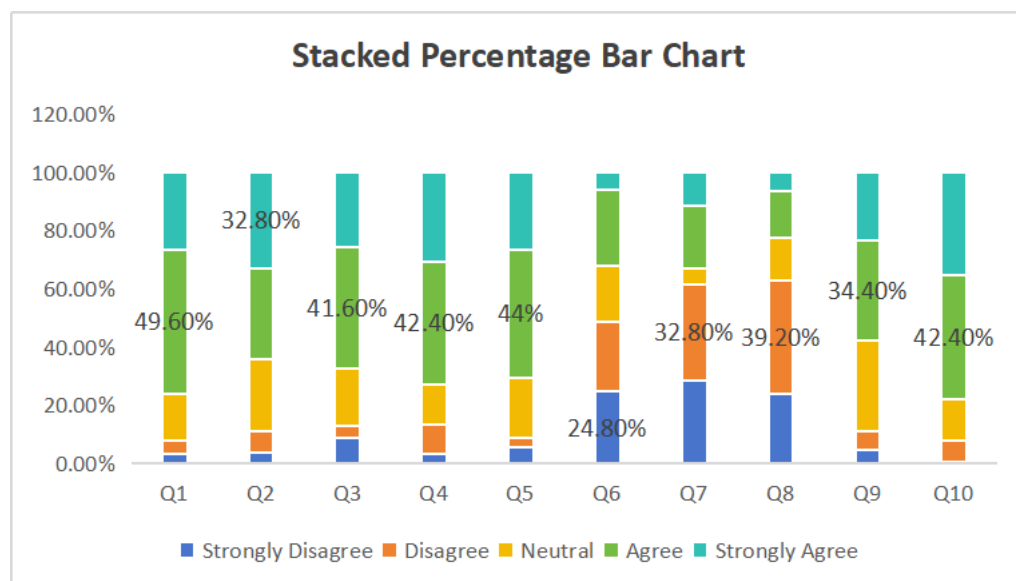


Figure 3. Students' views of smart tablet usage in percentage.

The results of this study indicate that students used smart tablets in a dual-effect manner. On one hand, students were generally aware of the benefits of smart tablets, such as robust support for learning materials, substantial promotion of classroom interaction, successful enhancement of learning interest, and evident improvement in learning efficiency. Negative experiences, on the other hand, cannot be disregarded; these primarily include technical malfunctions, learning distraction behaviours, and specific challenges with operational adaptation. Overall, the majority of students recognised the benefits of smart tablets for learning. However, there were still significant issues that needed to be resolved, such as technical difficulties and learning distractions. The descriptive statistics and distribution data, which show good data reliability and structural rationality, provide a useful foundation for enhancing device functions, teaching management, and learning guidance strategies.

The benefits of smart tablets in high school

Enhancing educational materials

High school teachers can use smart tablets to access a range of educational materials, including articles from both domestic and international periodicals, radio programmes, and video clips from original films. This extends beyond the limitations of textbooks and makes the curriculum more up-to-date. These tools can increase students' enthusiasm for learning, broaden their perspectives, and enhance their knowledge. According to the cognitive theory of multimedia learning (Mayer, 2020), students' visual and auditory channels can be activated simultaneously by smart tablets that offer multimodal resources such as text, images, audio, and video, thereby increasing information processing efficiency (effect size $d=0.75$) (Mayer, 2020). Students' need for autonomy is met, and their intrinsic motivation to study is increased by the wide range of resources that smart tablets provide, such as virtual laboratories and open classes from esteemed universities (Ryan and Deci, 2020).

Promoting interaction between teachers and students

Due to the interactive features of smart tablets, such as group discussion, voting, and quick-response activities, traditional classes no longer have the same monotonous atmosphere (Dörnyei and Muir, 2019). Teachers can immediately ask students questions using the tablets, and students can respond promptly. Instructors can assess students' learning progress in real time and adjust the pace of instruction accordingly (Hwang and Wu, 2012). Students use the tablets to exchange ideas and resources during group cooperative learning, which enhances their teamwork and English communication skills. This flipped learning approach, using smart tablets, increases classroom productivity (Johnson and Johnson, 2014).

Personalising learning method

Personalised learning and targeted feedback are enabled by real-time data analysis (e.g., homework accuracy, error trends). Adaptive learning systems in the classroom recommend personalised resources based on each student's performance. Smart tablets can identify each student's strengths and weaknesses and develop personalised learning plans using data such as response scenarios and learning paths. Students can select appropriate learning materials, such as vocabulary expansion courses or specialised grammar exercises, according to their development and needs to achieve customised instruction.

The game setting system and virtual reality interactive improve students' interaction

Self-determination theory states that by creating staged goals (e.g., unlocking achievements, ranking points), game level design effectively stimulates intrinsic motivations such as challenge and curiosity (Ryan and Deci, 2020). Furthermore, by significantly lowering cognitive load (e.g., by initiating challenge escalation at the correct rate), dynamic difficulty modification based on real-time data analysis can enhance learning efficiency (Hwang and Wu, 2012). Additionally, a meta-analysis of 75 studies found that gamification elements such as progress visualisation and instant feedback systems greatly enhanced emotional engagement ($d=0.64$) and information

retention(effect size $d=0.58$) (Sailer and Homner, 2020). Numerous elite Chinese cities have also adopted smart tablets and interactive virtual reality simulations. For example, teachers at a major middle school in Nanning in the Guangxi province used tablets and virtual reality technology in the “Silk Road” history Unit to let students bargain with an ancient local businessman in the virtual city of Changan. Additionally, the instructors set up a sandstorm emergency so that students could leave the VR environment with their belongings. Instructors have noted that students were more motivated because they were more committed to finishing lessons and achieving personal goals within the app, which raises engagement levels. Since these immersive activities closely resembled real-world interactions, students felt more confident and eager to participate. Moreover, virtual reality can simulate microscopic scenes or historical events, overcoming the constraints of traditional classroom time and space. For example, virtual laboratories improve the investigation process while reducing the hazards associated with actual experiments.

Negative aspects of smart tablets in high school

Some students reported negative experiences when using smart tablets. Technical issues, such as system freezes, application crashes, unreliable network connections, and related problems, caused problem to 51.2% of students in smart classes. The statistical analysis of the disturbance dimension shows that technical malfunctions were a major issue during use. Technical problems, including battery issues, slow network connections, and software malfunctions, were the subject of numerous complaints. These problems occasionally interfered with the teaching process during classroom observations. For example, a poor network connection made it difficult for students to participate in an online group discussion (*Figure 4*). Similarly, when the novelty of smart tools diminished over time, students may lose interest if the technology has not been updated regularly or used in creative and engaging ways. Additionally, frequent hardware updates for smart tablets require costly maintenance. The incompatibility of different tablet brands’ operating systems and software increased the technical training burden on teachers. Moreover, teachers were distracted by technical problems, reducing their actual teaching time by about 15%. Message alerts and other tablet notifications distracted students and hindered their ability to learn in class (Twenge and Campbell, 2018).

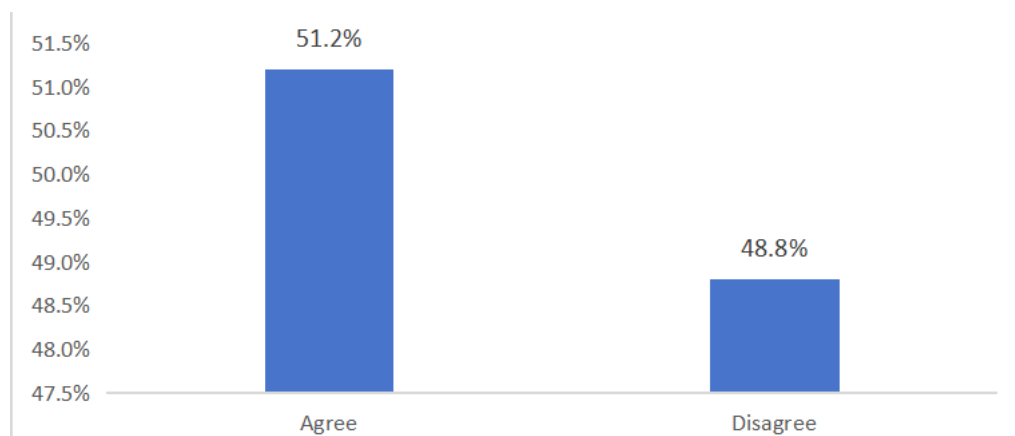


Figure 4. Students’ views of technical issues while using the smart tablet.

The distraction and cognitive laziness

Smart tablets are multifunctional devices with both educational and entertainment features. As long as a network connection is available, students can access blocked sites, even though many smart learning tablets claim to have no external network ports. Furthermore, some students may find it challenging to use technology-based learning environments, and their varying levels of digital literacy can make participation more difficult. As a result, students who lack self-control may circumvent security measures to engage in activities such as gaming, watching videos, and browsing social media during class. Without external supervision, students are 2.3 times more likely to use tablets for non-learning activities. Statistical analysis shows that 40% of students in smart classes reported being easily sidetracked when using smart tablets for educational purposes. Irrelevant content frequently distracted them, making it harder for them to concentrate on learning (*Figure 5*). This outcome aligns with the low score on the learning-distraction behaviour dimension, which indicated a typical usage management issue. This behaviour detracts from the learning objectives and negatively affects academic performance, particularly in subjects such as English. Students switched tasks (e.g., from a learning app to a game) every three minutes when using the smart tablet. Multitasking reduces information retention by 40%. In classes where smart tablets were allowed, students engaged in up to 35% of non-learning activities, including social media and gaming. A 20% increase in teachers' classroom management time impacted teaching progress (Kuznekoff and Titsworth, 2013).

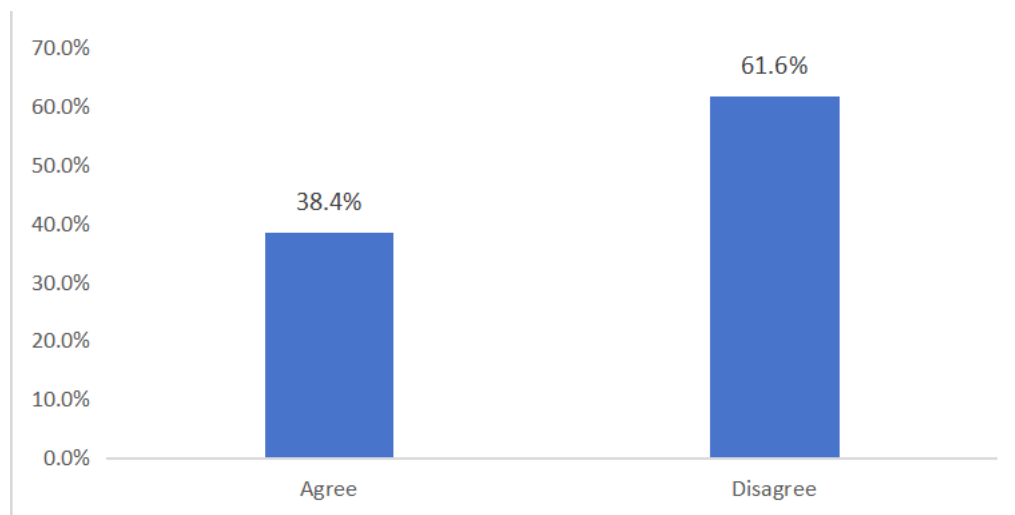


Figure 5. Students' views of distractions while using the smart tablet.

Students typically find answers quickly rather than carefully considering the question due to smart tablets' instant answer search features, such as photo search and one-click query. Long-term use of tablets can rewire the brain's neural pathways and impair critical thinking and deep reading skills (Carr, 2020). Overuse of smart tablets can cause students to lose motivation, resulting in poor pre-class preparation, and create a tendency to hastily look up answers online when faced with difficulties in thinking and problem-solving skills, which are essential for cognitive development. Experiments show that students who retrieve information using tablets retain 40% less information than students in traditional learning groups (Sparrow et al., 2011). Students are less likely to actively investigate difficult subjects because smart tablets are so convenient,

which impairs their ability to solve problems. On open-ended questions, students who used tablets performed much worse than those in the traditional learning group, according to teacher evaluations. Students with lower self-regulation skills were more likely to become distracted in smart tablet classes, and their grades significantly declined (effect size $d=0.61$).

Technical training for teachers

When attempting to use smart tablets in the classroom, many teachers encountered problems. Although schools provided some training, teachers felt unprepared to integrate tablet-based instruction into their regular courses. As the training materials were unrelated to the actual demands of the classroom, more than 60% of educators believed that previous training was “too theoretical” and found it difficult to apply what they had learned (Ertmer and Ottenbreit-Leftwich, 2013). Furthermore, because teachers must focus on both classroom management and the technical operation of smart tablets, the teaching load increases. Due to inexperience with integrating technology, some teachers found it difficult to develop engaging tablet-based teaching activities (Mishra and Koehler, 2006). Technical problems, such as tablet crashes and internet outages, disrupt classes, hinder students’ ability to learn effectively, and irritate teachers, who may then refrain from using smart tablets in the classroom.

Strategies for using smart tablets

Enhancing technical assistance

Schools should communicate with technical service providers, enhance network architecture, and promptly resolve network and equipment issues. Smart tablets should also undergo regular maintenance and updates to ensure stable operation. Additionally, smart tablets should have an AI diagnostic system. The built-in AI assistant (such as the voice guide “Xiaozhi teacher”) can respond to 80% of common technical problems in real time, reducing the duration of operational disruptions. Automated fault diagnostic systems have reduced the frequency of technical assistance required by teachers by 65%.

Increasing guidance and management

The rules for the classroom should be made clear. Teachers and schools should set strict guidelines for tablet use and assist students in using tablets appropriately. Engage students in self-discipline education activities to help them develop self-awareness and self-management skills. Moreover, students’ unusual behaviours (such as spending excessive time on unrelated content) can be detected by embedded AI-assisted tools, which can then automatically send reminders or lock the screen. AI intervention reduces classroom distraction by 52%, according to experiments. Furthermore, use a “flat use point system” (one hour of concentrated study equals ten points) to help students learn self-management. When positive stimuli are used in the classroom, students increase focus time by 1.5 times (Ryan and Deci, 2020). Establish a “peer supervision” system. In group collaborative work, peer monitoring, such as peer evaluation of tablet performance, can reduce infractions. Experiments show that peer supervision increases group work completion rates by 28% (Johnson and Johnson, 2014).

Improving the teachers' technical skill level

According to differences in teachers' technical proficiency, the school should have three tiers of training modules: primary-familiar with basic operations; intermediate - skilful in operation and can teach others; and advanced-expert in all features of the smart tablets. Phased training and continuous feedback mechanisms can significantly improve teachers' technical application skills (Guskey, 2002). Furthermore, each school should have one or two full-time "technical tutors" assigned to handle daily issues and check classrooms for emergency troubleshooting each day. In schools with technical support, response times were reduced to less than 15 minutes, and equipment usage increased by 40%.

Conclusion

There are several advantages and disadvantages to using smart tablets in English classes at senior high schools in Guangxi. Teachers must balance the use of smart technology with more conventional teaching techniques, even though it can enhance learning. By ensuring that digital tools support meaningful student participation rather than replace it, teachers can create a more comprehensive and effective learning environment. In addition to fostering academic growth, this balance helps students develop the social skills necessary to succeed in a society that values teamwork. However, smart tablets will undoubtedly become a powerful tool in the long term to support the improvement of English teaching quality in Guangxi senior high schools and create a superior, more productive English learning environment for students if teachers, students, and schools collaborate to overcome current challenges through strategies such as strengthening student management, improving technical support, and enhancing the quality of teachers.

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Conflict of interest

The authors confirm that there is no conflict of interest with any parties in this research study.

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