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Design and implementation of the SMART learning support services model in digital EFL classrooms at a vocational university

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Abstract

With information technology deeply integrated into modern education, learning support services are increasingly recognised as crucial for facilitating digital transformation in English-as-a-foreign-language (EFL) classrooms. These digitally-enabled services play a vital role in engaging students across online and in-class settings, providing smart learning environments, enabling interactive instructional activities, and fostering lifelong learning capacities. Drawing on the theories of learning support services and smart education, this study presents a SMART learning support services model, designed to address the specific teaching and learning needs of higher vocational EFL education in the digital era. The SMART model comprises five key components: 'S' for Space, 'M' for Methodology, 'A' for Assessment, 'R' for Resources, and 'T' for Teacher development. Taking a vocational university in China as an example, this model was implemented to support EFL teaching and learning in vocational higher education institution through the integration of digital learning spaces, constructivist blended teaching methodologies, technology-assisted formative and summative assessment approaches, digital learning resources, and enhanced teacher digital literacy and pedagogical competencies.

Keywords SMART model, learning support services, smart education, EFL education, higher vocational education

1. Introduction

As digital technologies become fundamental to contemporary educational practices, English-as-a-foreign-language (EFL) education has entered the digital era, with classroom interactions and instructional methods undergoing dramatic transformation. While traditional educational contexts featured one-way knowledge transfer from teachers to students in physical classrooms, EFL education in the digital era has been redefined by flexible learning environments, interactive teaching strategies, and innovative assessment methods powered by information technology, particularly artificial intelligence (Wen, 2024). This shift is driven by the societal demands for job-qualified graduates and enabled through technology integration (Gu et al., 2021). These changes necessitate corresponding adjustments in how language teaching and learning are organised and supported, calling for learning support services aligned with emerging student needs. Currently, higher vocational EFL education in China has witnessed curricular reforms and pedagogical innovations powered by digital platforms and specialised software incorporating learning management and student response systems (Cui, 2023). However, the design of contextually appropriate EFL learning support mechanisms remains under-explored in the literature.

This study presents a SMART learning support services model designed to guide the digital transformation of higher vocational EFL education. Starting with an introduction to the theoretical context of learning support services, the paper outlines the construction of the SMART learning support services model, which is informed by the smart education theory. The model provides a structured framework to enhance EFL learning by addressing the digital learning spaces where education occurs, the pedagogical methodologies employed by teachers, the implementation of technology-assisted assessment, the digital learning resources available, and the development of teachers' digital literacy and pedagogical competencies. To validate its practical application, the model was implemented at a Chinese vocational university, demonstrating the significant role learning support services play in facilitating effective EFL education in the digital era.

2. The Theoretical Context of Learning Support Services

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The concept of learning support services originated and developed from distance teaching and learning practices (Ding, 2002). It referred to the comprehensive range of informational, resource-based, personnel, and infrastructural assistance provided to students throughout their learning process (Dai et al., 2021). In recent decades, learning support services have gained widespread recognition alongside the increasingly close integration of evolving technologies and education (Wu et al., 2017). Research on the construction of learning support services models has primarily focused on distance education practices and subject-specific teaching in blended learning contexts (Wang et al., 2019). For example, Shi and Cheng (2013) analysed challenges in open and distance education, proposing a five-dimensional framework, including teaching staff, instructional resources, pedagogical processes, educational facilities, and administrative support, to design learning support systems. Bai et al. (2018) constructed a four-dimensional model, including personnel, resources, interactive activities, and assessment support, for blended learning, applying it to various courses and deriving strategic insights for support services. Li and Wu (2024) developed an intelligent learning space model to facilitate learning, integrating virtual and physical environments with modern technologies, which ensured that students activated prior knowledge, actively processed learning content, and enhanced problem-solving skills.

In the EFL context, researchers have investigated the incorporation of learning support services into EFL teaching in the digital era, with focused attention on pedagogical innovations arising from instructional practices. These include the deployment of digital learning platforms, strategies for fostering student autonomy, and integration of virtual and physical resources. For instance, Gong (2024) conducted a comparative study of two intelligent education platforms implemented in higher vocational EFL classes, revealing that platform infrastructures significantly influenced the effectiveness of instructional interactions, particularly in learning resource development and sharing, the organisation of group work, and the delivery of formative and summative assessment. Song (2020) investigated how a public platform on WeChat, China's predominant social media application, was designed to facilitate self-directed learning among adult EFL learners, revealing that digitally delivered resources, combined with teacher guidance, feedback, and progress monitoring, effectively stimulated students' motivation for English acquisition and strengthened their self-regulated learning competencies.

Studies have also been conducted to explore how digital transformation in EFL classrooms can be achieved through systematic learning support frameworks. Yang (2022) established a four-dimensional learning support framework for higher vocational EFL instruction in a SPOC-based blended learning environment, incorporating support from teaching personnel, learning resources, online and in-class interactions, as well as classroom assessment. Gao and Shao (2024, p. 10) argued that digital transformation in EFL teaching should embody five characteristics: "self-directed, motivated, adaptive, resources-enriched, and technology-embedded", from which they derived the 'SMART' learning path. This framework adopted a more learner-centred approach, incorporating generative activity design, intelligent assessment systems, multi-modal teaching resources, and learning support technologies. Both frameworks made valuable contributions to understanding how learning support services enhanced pedagogical procedures in a digital context. However, their scope left critical gaps by insufficiently addressing how digital spaces could drive systemic digital transformation of teaching environments and overlooked the role of teacher development, both of which served as vital roles in building a sustainable, smart EFL educational context. These gaps necessitate a more comprehensive model, prompting the present study to introduce the SMART learning support services model.

3. The Design of the SMART Learning Support Services Model

The SMART learning support services model is informed by the smart education theory proposed by Gu et al. (2021), who argued that the integration of digital technology and education is more than simply adopting digital tools in classroom teaching – it requires the building of an educational ecosystem that enables teachers to teach efficiently using innovative pedagogy and assessment, and empowers students to learn effectively through diverse learning tools and materials (Zhu, 2018). Such a smart education environment requires modern learning spaces supported by technologies that cater to students' educational needs and offer abundant accessible digital resources and tools; teaching methodologies that provide students with access to learning opportunities anytime, anywhere, and on-demand; assessment approaches that intelligently assess and provide feedback on learning processes; and a culture that fosters students who possess competence in human-machine collaboration, uphold sound values, and exhibit qualities in action, thinking, and creativity (Zhu & Wei, 2017).

Drawing on this theoretical perspective, the SMART learning support services model comprises five components that address the essential keys to the digital transformation of smart EFL educational contexts: 'S' for Space, which denotes the online and in-class digital spaces where learning takes place; 'M' for Methodology, which represents the constructivist blended teaching methodologies that facilitate language acquisitions in digital environments; 'A' for Assessment, which signifies technology-assisted assessment approaches; 'R' for Resources, which highlights accessible digital learning resources; and 'T' for Teacher development, which stresses the enhancement of teacher digital literacy and pedagogical competencies (see Figure 1). These components are further elaborated in the following sections.

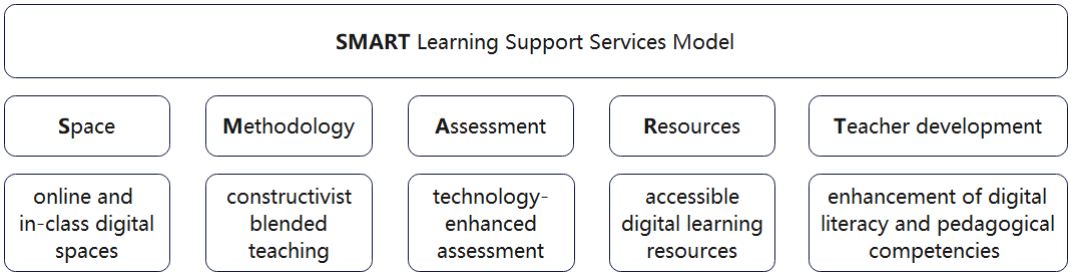

Figure 1. The SMART learning support services model

3.1. Space

As Jin et al. (2022) pointed out, digital spaces have emerged as vital pillars underpinning effective teaching and learning in the digital era. These spaces are anchored in smart education platforms, which teachers and students can use both in the classroom to support instructional dialogues and after class to facilitate online autonomous learning (Zhao et al., 2022). They could assist teachers in identifying students' learning needs and adapting to their diverse requirements, and offer digital environments where students can access a broader range of educational resources and engage in personalised learning experiences (Hu et al., 2016; Yan & Li, 2024). The effects of these functions have been confirmed in recent studies, where various online platforms and apps have been found to assist students in understanding and engaging with academic content, boost group collaborations, and provide practical feedback (Bersamin et al., 2024; Huang et al., 2021; Yeo et al., 2025). Jin et al. (2022) noted that digital spaces fulfil multiple roles, including the provision of digital courses, assessment support, high-quality digital learning resources, and training materials for teacher development. This indicates that digital spaces serve as the foundation for digital transformation in EFL classrooms, shaping teaching and assessment methods, providing classroom materials, and determining whether teachers have the conditions to develop their digital literacy and pedagogical competency in digital educational contexts.

3.2. Methodology

Digital learning environments mark a shift in teaching methodologies, moving from the traditional "sage on the stage" model toward a "guide from the side" approach (Enwereji & Van Rooyen, 2025, p. 76). This transformation reflects constructivist views of learning, which consider that learning happens in two dimensions: cognitive processes, where individuals develop mental frameworks to interpret the knowledge they receive, and contextual actions, where they engage in collaborative efforts within real-world tasks (James, 2008). Among diverse teaching methodologies, blended teaching, which integrates the strengths of real-time interactions with the flexibility of online settings, has emerged as a methodology that reflects the constructivist call and meets teachers' instructional needs in a digital environment (Heilporn et al., 2021).Such an approach contributes to cultivating students with skills in learning, analysing, creating, collaborating, communicating, and solving real-life complex problems through assigning optimally tailored learning tasks and activities (Gu et al., 2021). For vocational EFL contexts, workplace-related communication activities function as student-centred tasks, which help students recognise the practical relevance of their learning and strengthen intrinsic motivation. Recent studies have explored constructivist approaches to blended EFL teaching. For example, Zhang (2024) reviewed relevant literature in the recent decade about AI applications in mobile-assisted language learning, discovering that AI was utilised in EFL classrooms to adapt content to students' needs, facilitate self-directed study, and foster immersive social contexts for language practices, enabling learning through social interaction and situated contexts. Nusong and Watanapokakul (2025) examined blended learning in Thai EFL classrooms, where self-paced online activities were structured to encourage students to construct knowledge through active participation, while in-class discussions promoted peer collaboration, allowing students to seek feedback and co-construct meaning. These pedagogical methodologies enable students to develop their self-monitoring, self-regulated, and collaborative skills, which are not only beneficial in their EFL learning, but also instrumental in fostering their life-long learning capacities.

3.3. Assessment

With teaching methodologies aligned with constructivist principles, assessment approaches need to correspond to these pedagogical perspectives. In the digital age, assessment extends beyond testing students' recall of factual knowledge; it probes deeper conceptual understandings, progresses to more complex problem-solving tasks, and underscores its significant role in enhancing learning (James, 2008). Scholarly discourse on classroom assessment revolves around its formative and summative dimensions. Formative assessment involves ongoing, often informal, evaluations to gauge students' comprehension, enabling teachers to determine the most effective ways to foster further understanding; by contrast, summative assessment entails more formal evaluations that consolidate a student's progress, serving purposes from communicating with educational stakeholders to certification within formal examination programmes (Mansell et al., 2009). In recent years, technology-assisted assessment has been found to assist teaching and learning in EFL classrooms. For instance, technology-aided formative assessment platforms have been applied in EFL classrooms in a Chinese university to facilitate teaching, classroom management, and assessment through recording student performance and providing individual feedback (Huang et al., 2021). Additionally, digital summative assessment platforms, such as automated speech recognition systems and writing evaluation

programmes, have been implemented in EFL classrooms to auto-score speaking and writing tasks, providing feedback channels that allow students to track their progress independently and enable teachers to provide constructive comments in a timely manner (for example, Daniels, 2022; Zhang & Hyland, 2018). The integration of these technology-assisted assessment approaches ensures that students' language proficiency can be assessed effectively from multiple aspects and that the assessment results can be utilised efficiently to enhance their learning.

3.4. Resources

The successful implementation of teaching and assessment in digital EFL classrooms hinges on the foundation provided by appropriately designed digital learning resources. Churchill (2017) defined digital learning resources as technology-driven multimedia materials created specifically for educational needs in digital educational contexts. From his perspective, when effectively utilised, digital learning resources function as tools within learning activities that empower students during their learning process (Churchill, 2017). They are capable of addressing students' individual learning requirements, boosting their motivation through interactive activities, and encouraging students to put in greater effort and participate actively in learning tasks (Wu et al., 2025). In contemporary EFL classrooms, a diverse array of digital learning resources has been applied. For instance, digital textbooks and multimedia courseware have been used in EFL education contexts with guided learning strategies to increase students' engagement, motivation, and comprehension (Chen et al., 2023); massive open online courses (MOOCs) have been used in EFL contexts to foster learner autonomy, as students can exercise control over the learning content they engage in (Ding & Shen, 2022); digital learning tasks, such as games-based activities, have also been found to be incorporated in classes to effectively improve EFL students' learning (for example, García-Pinar, 2024; Song & Sparks, 2019). These digital resources have helped transform EFL classrooms by creating refreshing, engaging, and interactive learning experiences for students, laying a solid foundation for quality learning, teaching, and assessment that meet the demands of the digital education era.

3.5. Teacher Development

The final key to the digital transformation of EFL education lies in teachers' digital literacy and pedagogical competency, which serves as the foundation and driving force for empowering teachers to skilfully utilise digital teaching platforms, employ digital resources, and conduct teaching and assessment that align with students' learning needs. To achieve such transformation, teachers' continuing professional learning and development, which provides them with learning opportunities to drive their growth, institutional changes and sustainable development, is essential (Xie et al., 2022). These learning opportunities should target teachers' capacities in effectively integrating digital technologies into teaching, assessment, and digital materials management and development, aligning with current curriculum standards and supporting diverse learning requirements through inclusive practices, as highlighted in the UNICEF *Educators' Digital Competence Framework* (UNICEF Regional Office for Europe and Central Asia, 2022). The effective acquisition and application of such capacities can foster meaningful communication between teachers and students, and support collaboration and knowledge sharing among teachers via communities of practice (Foulger et al., 2017). This plays a significant role in enhancing continuous professional growth, fostering constructive dialogues, and cultivating a culture of collaborative professionalism (UNICEF Regional Office for Europe and Central Asia, 2022). With a well-structured mechanism for developing teachers' digital literacy and pedagogical competency, EFL teaching in digital environments will become more sustainable, as teachers are enabled to develop more creative and technology-adaptive approaches to teaching and assessment, rather than merely adhering rigidly to coursebooks to deliver instructions.

4. The Implementation of the SMART Learning Support Services Model

The SMART learning support services model was implemented at a Chinese vocational university to drive the digital transformation of the *General English* course, a mandatory EFL module for all first-year non-English majors. The target students of this course exhibit varied English proficiency levels: some had continuous EFL learning experiences during their basic education, while others from vocational secondary education backgrounds had limited prior exposure to EFL instructions. A majority of these students aim to enhance their spoken English proficiency and pass the College English Test Band-4 (CET-4) before graduation to boost their employability. Therefore, communicative skills and test-taking skills are their two primary learning needs. Additionally, digital competencies for EFL learning are also essential skills students need to master in the digital era. Students should be able to retrieve, comprehend, process, and apply the knowledge they gain via accessible digital technologies. More importantly, they should be empowered to take ownership of their learning and develop collaborative skills that support peer learning, which are the foundations that enable them to generate and innovate new knowledge.

In this vocational university, digital transformation was initiated through the integration of five digital platforms and tools, which collectively established the digital spaces where EFL teaching and learning unfolded. These platforms and tools included SuperStarLearn, China University MOOC, iWrite, FiF, and iTest, each tailored to specific scenarios within EFL learning, teaching, and assessment. The first two platforms, SuperStarLearn and China University MOOC, were utilised by EFL teachers at this vocational university as in-class teaching platforms for organising instructional activities and as after-class repositories for supplementary e-learning resources. SuperStarLearn, a mobile learning platform with

integrated learning management system (LMS) and student response system (SRS) functions, supported a range of operational features that facilitated interactions between teachers and students, as well as peer collaboration. For instance, teachers could utilise the platform to hold in-class instructional dialogues via live-streaming functions such as random selection and polls, which enhance students' motivation and engagement during lessons. Group discussions could be easily initiated within the platform by assigning random groups or allowing students to form their own, thereby promoting collaborative learning. Additionally, the platform offered digital reports for students to monitor their learning progress, review their performance, and identify areas requiring improvement.

In contrast to SuperStarLearn's focus on in-class engagement, China University MOOC functioned as a knowledge-sharing platform, disseminating e-learning materials to both students in the university and broader external audiences. Since 2018, the *General English* course has been adapted into a MOOC titled *English for Careers* and hosted on China University MOOC. Teachers in the *General English* teaching team developed video lectures based on their daily instruction, created online tasks and discussion prompts as supplementary resources, and opened access to external learners, thereby cultivating a larger, more diverse learning community. Together, these two platforms constructed interactive learning spaces where students engaged in technology-enhanced activities, such as online discussions, group projects, and reflective blogs, enabling them to actively co-construct knowledge. The e-learning resources hosted on these platforms also empowered students to preview or revisit course content according to their individual needs, strengthening interactions within the learning community and ultimately supporting improved learning outcomes.

Beyond instructional support, three additional digital tools, iWrite, FiF, and iTest, were incorporated into the assessment practices of the *General English* teaching team. iWrite, a web-based writing support platform equipped with an AI-driven marking system, was adopted to assess students' writing performance. The platform could conduct multi-dimensional analyses of grammar and vocabulary use, delivering instant-scored feedback that allowed students to promptly identify and revise errors while enabling teachers to provide targeted guidance for improvement. FiF, a mobile application incorporating speech synthesis, recognition, and assessment technologies, was employed to enhance students' oral proficiency by analysing their pronunciation, fluency, and task completion, and generating detailed diagnostic reports that highlighted areas for development. iTest, a digital platform for test creation and distribution with intelligent automated scoring, facilitated the administration of class-wide and institution-wide assessments, including unit tests, mid-term tests, final tests, and even language skills competitions. Collectively, these technology-assisted tools enhanced both summative and formative assessment in the *General English* course: for summative purposes, they automated scoring and feedback in a timely manner, boosting assessment efficiency and reducing teachers' workload; for formative assessment, they supported targeted, constructive feedback from teachers and enabled students to self-reflect through automated insights, thereby driving self-regulated and continuous learning.

To sustain the digital transformation initiatives, the management team of the *General English* course organised regular peer exchanges, where teachers shared their experiences of integrating these platforms and tools into daily instructions. Additionally, technical specialists from the companies that developed these digital platforms and tools were also invited regularly to deliver periodic training sessions to the *General English* teaching team, equipping teachers with technological knowledge and skills of how to make better use of platform functionalities, enhancing their digital literacy, and refining their instructional design capabilities. To further address real-time technical challenges, these specialists also set up dedicated Q&A groups, where they provided timely support to both teachers and students, offering quick solutions to issues such as platform access errors, functional operation confusion, or resource retrieval problems whenever they arise. These efforts not only strengthened teachers' digital competencies and pedagogical skills but also underpinned the sustainable digital transformation of the *General English* course. Furthermore, these exchanges fostered potential for technological innovations, as shared insights could spur collaborations between teachers and technical specialists to refine platform features, ensuring they remained aligned with the unique demands of digital EFL instruction.

5. Conclusion

This paper reports on the design and implementation of the SMART learning support services model in digital EFL classrooms at a Chinese vocational university. The model not only expands the research scope of learning support services theory within the EFL field but also offers practical insights into enhancing EFL education through integrated advancements in digital spaces, teaching methodologies, assessment approaches, digital learning resources, and teacher development. By operationalising these dimensions, the model demonstrates how systematic digital transformation can be facilitated in higher vocational EFL educational contexts, fostering more engaging and adaptive language learning environments. However, the model is not without limitations. Firstly, its implementation was confined to a single vocational university, limiting the generalisability of findings to larger or more diverse institutional contexts. Secondly, the model's effectiveness relies heavily on the availability and functionality of digital platforms, which may pose barriers to replication in settings where such tools are inaccessible or inadequately provided.

Future research could build on the foundation of this study by exploring several issues. Firstly, investigating teachers' practical experiences with the SMART learning support services model, including their perceptions of its usability, challenges encountered in implementation, and professional development needs, would shed light on factors influencing its sustained adoption. Additionally,

examining how the model reshapes specific teaching and assessment practices, such as the redesign of formative feedback or the adaptation of collaborative learning strategies, could reveal deeper insights into its pedagogical impact. Finally, further inquiry into how the model affects students' learning trajectories, including changes in motivation, self-regulated learning behaviours, and language proficiency gains, would clarify the model's effects on student learning outcomes, contributing to a more holistic understanding of its value in EFL education.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.