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Exploration of Human-Computer Collaborative Intelligent-Teaching Paths for Interdisciplinary Primary-School English Teaching: Taking the First-Period Teaching of "I can draw" in Volume 1, Grade 3, Guangzhou Educational-Science Edition as an Example

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Abstract: Against the backdrop of digital development in education and teaching, rationally applying artificial intelligence for intelligent teaching, and fostering students' core English literacy relying on human-computer collaboration to realize the learning paradigm of "learning by doing, applying while learning, and innovating through application", has become a research hotspot in primary-school English teaching. Taking the lesson "Draw an animal", the first period of Unit 6 "I can draw" in Volume 1, Grade 3 of the Guangzhou Educational-Science Edition textbook as a case, this paper constructs a four-dimensional empowerment path of "digital-intelligent scenario creation — targeted teaching intervention — interdisciplinary integrated practice — multi-dimensional evaluation and feedback" on the basis of generative learning theory, task-based language-teaching theory and the TPACK framework. Supported by AI platforms and Seewo Whiteboard and combined with group cooperation, this lesson realizes the integration of English and fine-arts subjects. While improving students' language-application competence, it also develops their aesthetic awareness and artistic-creation capabilities. Digital tools help students establish sound-meaning associations for facial-feature vocabulary and exercise their hands-on, expressive and collaborative abilities. It provides an operable practical paradigm for implementing "digital-intelligence-driven, targeted-empowered" English teaching for middle-grade primary-school students.

Keywords: Digital-intelligence-driven; Primary-school English; Intelligent teaching; Interdisciplinary teaching; Human-computer collaboration

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1. Introduction

With the rapid development of artificial intelligence and big data, education is transforming from traditional

experience-oriented teaching to digital-intelligent targeted teaching. *Compulsory Education English Curriculum Standards (2022 Edition)* proposes to promote the in-depth integration of information technology and English teaching, and give play to the supporting role of modern information technology in English curriculum teaching and learning. This puts forward two requirements for teaching: promoting the reform of intelligent-teaching modes relying on digital-intelligent technologies; realizing targeted support for student learning via technologies and fulfilling the cultivation objectives of core literacy.

Generative artificial intelligence is reshaping classroom forms. Plenty of teaching practices have proven that digital-intelligent technologies are no longer mere teaching aids; instead, they have become vital driving forces for optimizing teaching paths and reconstructing classroom relationships. Nevertheless, practical problems still exist in the digital-intelligent application of middle-grade primary-school English classrooms. First, technologies are mostly used only for resource integration without in-depth incorporation into teaching design. Second, interdisciplinary teaching remains formalistic, with obvious subject "patchwork" phenomena. Third, there is no implementable path for targeted teaching, and no closed loop has been formed for the process-oriented collection and analysis of learning-situation data and teaching adjustment.

Taking the first period of Unit 6 "I can draw" for Grade 3 Volume 1 as an example, centering on the core task of "drawing animals", this paper designs gradient task chains for students with potential-development needs, sets up learning scaffolds, and integrates facial-feature vocabulary, English expressions for drawing and artistic creation. By comprehensively adopting tools such as AI videos, Seewo Whiteboard, intelligent platforms and speech assessment tools, it builds a teaching closed loop of "scenario creation — targeted teaching — interdisciplinary integration — multi-dimensional evaluation", and offers practical references for digital-intelligent English teaching in middle-grade primary schools.

2. Theoretical basis and analytical framework

2.1. Definition of core concepts

Digital-intelligence-driven means taking big data and artificial intelligence as driving forces to promote systematic reform in teaching-resource supply, classroom organization and evaluation methods [1]. Implemented in primary-school English classrooms, it refers to creating simulated linguistic scenarios with technical support, adjusting teaching rhythms in accordance with students' psychological characteristics, strengthening teacher-student and student-student collaborative interaction, helping students construct knowledge frameworks, and developing their information-processing and inductive-thinking abilities.

Targeted empowerment adheres to the value orientation that technologies serve student development. It provides adaptive learning support for different students by means of learning-situation portraits, personalized learning paths and timely learning assistance [2]. Its essence is student-oriented education that pursues students' long-term development rather than merely demonstrating technical tools.

2.2. Theoretical basis

Generative learning theory points out that learning is a process in which learners actively construct meanings, and it cannot be separated from situational interaction and meaning construction [3]. In this lesson, an AI-generated 3-D scenario in which Kung Fu Panda Po visits an art museum is adopted. The task is raised via the character's line "I want to put the drawings of animals here, can you teach me to draw?", which connects audio-visual experience and language learning and endows language learning with real-world situational

significance.

Task-based language-teaching theory emphasizes “learning by doing”, holding that learning occurs in the process of completing authentic tasks [4]. In this lesson, learning of facial-feature vocabulary and drawing instructions is integrated into the authentic task of drawing animals. Teachers adopt AI-generated drawing-demonstration videos to intuitively show English drawing instructions and provide visual support for classroom activities. Seewo interactive games are used to consolidate vocabulary, enabling students to achieve language internalization through games and hands-on practice.

The TPACK framework provides theoretical guidance for the integration of technology, subject content and pedagogy [5]. It reminds teachers that the focus of teaching lies not in technology itself, but in dynamically balancing teaching objectives and digital tools in combination with teaching content and learning situations. Applying AI technologies to the interdisciplinary classroom of English and fine arts in this lesson is exactly the practical implementation of this framework.

2.3. Manifestations of digital-intelligence-empowered interdisciplinary teaching

Based on the above-mentioned theories, digital-intelligence empowerment in this lesson is mainly reflected in three aspects.

(1) Content enhancement: Digital-intelligence technologies convert static textbooks into dynamic teaching resources. AI-animated demonstrations of drawing instructions such as “draw a face” and “draw two ears” transform abstract language into intuitive pictures and lower the psychological threshold for Grade-3 students to learn new knowledge.

(2) Scenario expansion: Breaking the limits of physical classrooms to build simulated linguistic scenarios. The storyline of Kung Fu Panda runs through the whole class and derives serial tasks, which effectively stimulate students’ learning motivation.

(3) Evidence generation: Technologies record learning behaviors such as classroom interaction, group cooperation and work presentation, generate process-oriented learning-situation data, and provide objective grounds for teachers to adjust teaching strategies [6].

3. Creation of digital-intelligent scenarios

3.1. Creation and digital-intelligent realization of authentic scenarios

Situated-cognition theory proposes that knowledge is attached to activities, scenarios and culture. Only when placed in real or simulated scenarios can students accomplish knowledge transfer. In this lesson, Kung Fu Panda serves as the situational thread running through the whole class. At the opening of class, an AI-produced self-introduction video of the character is played and the driving question “Can you teach me to draw?” is raised. Students are positioned as “little teachers who teach the panda to draw”, shifting them from passive listeners to active participants. AI is no longer merely a teaching tool but becomes a learning partner in class, motivating students to actively complete knowledge construction.

3.2. Activation of multimodal resources and embodied cognition

This lesson integrates multimodal teaching resources to activate students’ embodied cognition. In the “Let’s guess” session, pictures of the panda’s facial features are displayed separately, and the concept of noun plurals is initially introduced in the process of guessing animals. Combined with TPR (Total Physical Response)

teaching, body movements are adopted to strengthen memorization of the words *face, ear, eye, nose, mouth* and build sound-form-meaning associations for vocabulary.

AI-generated drawing-demonstration videos simultaneously present English instructions and drawing operations, mobilizing students' auditory and visual senses for multi-sensory collaborative learning. This fits the cognitive characteristics of primary-school students who are dominated by concrete thinking, and delivers better teaching effects than pure textual explanation [7].

4. Digital-intelligence-driven targeted teaching

4.1. From "empirical judgment" to "data-driven approach"

In traditional classrooms, teachers judge learning situations mainly through classroom observation, hand-raising feedback and assignment performance, which suffer from lag and subjectivity. Digital-intelligence technologies make learning-situation judgment data-driven. Dynamic assessment of learning status can be realized by relying on classroom data to meet students' demands for stratified and personalized learning [8].

4.2. Process-oriented data collection driven by task chains

This lesson organizes teaching with progressive task chains: starting from the general task of a class drawing contest, it proceeds sequentially with vocabulary perception, video comprehension, imitative reading, cooperative games, drawing practice and work presentation. Students naturally generate learning behaviors while finishing tasks, which facilitates teachers' collection of learning-situation information. Targeted teaching is realized mainly through three approaches in class. First, question-oriented instant classroom feedback. Thought-provoking questions are set while watching AI drawing videos. Teachers judge students' information-extraction and language-output competence according to their responses and flexibly adjust teaching rhythms. Second, classroom observation in games and cooperation. In vocabulary-consolidation games and the peer activity "You say, I draw", teachers observe students' participation status, capture common errors and individual learning difficulties, and implement teaching adapted to learning conditions. Third, multi-dimensional feedback via work screen projection. Students' drawings are projected through Seewo, and both drawing quality and oral English introduction are evaluated to test learning outcomes and feed back into teaching effectiveness.

4.3. Precise construction and dynamic adjustment of learning scaffolds

Grade-3 students have mastered partial color and shape words as well as simple basic sentence patterns, yet their vocabulary bank is limited and they can hardly fully express creative ideas. Visual scaffolds are needed to assist expression. In this lesson, scaffolds are built at three levels: vocabulary, sentence pattern and discourse.

At the vocabulary level, core facial-feature words are mastered with the help of pictures, TPR and classroom games, and changes between singular and plural forms are perceived through examples. At the sentence-pattern level, sentence patterns such as "Draw a…", "Draw two…", "Colour it!" are practiced repeatedly, and replaceable sentence-pattern frames are provided to support students' transfer and output. At the discourse level, complete drawing-step templates are offered as samples for students to give oral introductions to their works. Meanwhile, plenty of pair-work and group dialogue practices are arranged to expand students' opportunities for oral practice, consolidate new knowledge and raise their participation level.

5. Interdisciplinary integration and two-way empowerment

5.1. Internal logic and existing problems of interdisciplinary integration

Compulsory Education Curriculum Scheme (2022 Edition) advocates carrying out interdisciplinary theme-based learning [9] and guides students to solve authentic problems by comprehensively applying multidisciplinary knowledge. However, many current interdisciplinary classrooms simply splice subject content without internal logic, resulting in superficial integration [10].

5.2. In-depth integration of English and fine arts: Design based on core tasks

Taking "drawing animals" as the unified core task, this lesson organically combines English learning of facial-feature vocabulary with fine-arts creation to achieve two-way empowerment. From the perspective of the English subject, drawing creation provides authentic communicative scenarios. Students learn facial-feature vocabulary and practice drawing instructions for the authentic tasks of "teaching the panda to draw" and "guiding peers to draw", returning language to its essence as a communication tool. From the perspective of the fine-arts subject, English linguistic descriptions sort out drawing workflows. Students draw while speaking, externalizing creative ideas through language and reflecting on and adjusting drawing procedures. Their linguistic competence and fine-arts practical ability are developed simultaneously. Students need to mobilize both linguistic and visuospatial intelligence and switch between two symbol systems, which promotes deep learning.

5.3. Co-development of thinking quality and aesthetic competence

Interdisciplinary design takes both thinking training and aesthetic cultivation into consideration. The activity "You say I draw" allows students to choose drawing sequences independently and initially develops their critical awareness. Classroom discussions on "What is a good drawing?" break the single standard that "a good drawing must look realistic". Works are appreciated from multiple perspectives including creativity, emotion and color to foster students' multi-dimensional viewpoints.

Appreciation of Chinese and foreign artworks is introduced into class. Students carry out appreciation exchanges in English or Chinese to implement aesthetic education. Special attention is paid to students with potential-development needs in teaching. Uniform criteria are not adopted to judge drawings. Encouraging evaluations are prioritized in presentation sessions so that every student can gain a sense of learning achievement, practicing the concept of targeted empowerment for all students.

6. Integration of multi-dimensional evaluation

6.1. From "single evaluation" to "multi-dimensional evaluation"

Traditional English classrooms mostly adopt paper-and-pencil tests for evaluation, which can hardly measure comprehensive abilities such as oral output and creative practice. Clear and implementable evaluation indicators are often lacking for performance-oriented tasks [11]. Based on the integration of teaching-learning-assessment, this lesson combines performance-oriented evaluation and process-oriented feedback to build a multi-dimensional evaluation system featuring diversified evaluation subjects, dimensions and approaches.

6.2. Performance-oriented evaluation: Integrated evaluation of drawings and linguistic expression

This lesson takes "drawing animals" as the core performance-oriented task, and evaluation is conducted

simultaneously with task completion. In presentation sessions, students show their drawings and introduce drawing steps using English learned in class. Both teachers and peers evaluate drawing quality and linguistic expression. Students are clearly informed of classroom-learning objectives and evaluation criteria. The intelligent-education platform can digitally archive students' works and provide instant evaluation feedback.

6.3. Process-oriented feedback: Post-class reflection and self-regulation

Post-class self-assessment is arranged in this lesson to guide students to carry out metacognitive reflection. The self-assessment form covers three parts: first, mastery of facial-feature vocabulary and noun plurals; second, proficiency in core sentence patterns such as "Draw a…"; third, review of classroom performance from listening, speaking, reading and writing perspectives to sort out strengths and deficiencies. Evaluation is no longer merely teachers' judgment of students' final results. Instead, it promotes students' independent reflection and adjustment of learning behaviors and develops their autonomous-learning capabilities [12].

7. Reflections and prospects

7.1. Innovative value of this lesson case

First, intelligent scenario creation: taking the virtual-AI character Kung Fu Panda as a learning partner and relying on a drawing-competition scenario, it realizes the transformation from virtual scenarios to students' embodied participation, which conforms to primary-school students' psychological characteristics. Second, systematic task design: progressive task chains covering listening, speaking, reading, playing, drawing and presenting are set. Each task matches corresponding learning objectives and evaluations, forming a complete learning closed loop. Third, organic interdisciplinary integration: the core task connects English and fine arts, where language serves creation and creation carries language output, achieving two-way empowerment and avoiding subject patchwork. Fourth, diversified-evaluation design: combining teacher, peer and self-evaluation, it gives consideration to outcome evaluation and process reflection and attaches importance to metacognitive-ability cultivation.

7.2. Practical reflections and optimization directions

This lesson still has room for improvement. In terms of technology, AI and Seewo Whiteboard are only used as classroom aids. Full-process learning-situation collection, personalized-learning-path push, and intelligent instant feedback have not yet been realized, and further technical value mining is needed, relying on intelligent platforms. In terms of evaluation, there is no way to integrate evaluation data from different subjects and dimensions, making it difficult to generate complete, comprehensive learning-situation portraits of students, which calls for further exploration.

7.3. Toward a new human-computer-collaborative teaching ecosystem

Teaching in the digital-intelligence era is undergoing a shift from treating AI as a tool to regarding AI as a learning partner [13], so as to build a human-computer-collaborative teaching ecosystem. "Digital-intelligence-driven and targeted empowerment" does not pursue technical ostentation. Its core lies in supporting teaching decisions with learning-situation data and providing adaptive learning support for every student with a student-oriented philosophy. This lesson is only one classroom-practice exploration. More front-line teachers are expected to carry out research to promote the normalized implementation of

digital-intelligent interdisciplinary teaching.

Disclosure statement

The author declares no conflict of interest.

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