

Chapter 7

Smart Education in Action: Case Studies

Mapping China's Innovative Classroom Transformation



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7.1 Introduction

China's intelligent-education push marks a shift from hardware rollout to systemic transformation of time, space, and pedagogy (Zeng et al., 2023). Drawing on 43 cases nationwide, this chapter examines how policy, cloud platforms, and instructional models converge to reshape learning. Five archetypes emerge: platform ecosystems streamline planning and feedback; blended-flexible spirals personalize learning with videos, dashboards, and adaptive tasks; interactive models leverage XR and AI for real-time co-construction; integrated teaching–assessment aligns instruction with diagnostics; and interdisciplinary studios foster inquiry through sensor data and portfolios. Three design features cut across cases: digital tools enhance rather than replace in-person teaching (Schiff, 2021); analytics drive real-time adjustment (Koukaras et al., 2025); and connected ecosystems outperform standalone tools (Sengupta et al., 2025). This chapter offers not a tech checklist, but a research-informed blueprint for designing future-ready, competency-based, and equitable teaching models—guiding policymakers, educators, and researchers in advancing smart education.

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7.2 Case Studies

7.2.1 *Intelligent Platforms and Policy-Driven Ecosystem*

Cloud platforms have become central to China's education reform, reflecting a global shift toward ecosystem-based design. Eleven cases from Gansu to Shanghai illustrate how smart-education policies activate integrated platforms combining content, analytics, and teacher support. Schools use shared platforms to embed cross-disciplinary goals, implement flipped classrooms, and apply smart-pen diagnostics. Key design principles emerge: digital tools enhance face-to-face learning; analytics enable real-time scaffolding; and connected ecosystems outperform isolated tools. These cases highlight a move toward policy-driven, platform-enabled systems supporting equitable, competency-based education. The core lesson is that building sustainable capacity in interoperable systems and data literacy, not hardware alone, drives reform forward.

7.2.1.1 **Smart Education Initiative Schools: A Case Study of Integrating Physical-Education Components into Third-Grade Chinese Language Instruction**

At Tianjin's Yixingbu No. 3 Primary School, the Smart-Education Platform enables a cross-disciplinary unit merging third-grade Chinese with physical education under the "Five-Education Integration" policy. The platform serves not just as a resource bank but as a hub linking teachers, parents, and communities. Three sequences illustrate this fusion: students read and act out "Ants Moving Cheese" through gymnastic drills; "Run Like a Deer" pairs a fable with sprint exercises tracked by analytics; and a family dance event ends the unit, followed by reflective writing.

Results show gains in engagement, movement accuracy, writing, and teamwork. Teachers use real-time data and curated media, while parents access learning insights. Though metadata and analytics skills remain uneven, the case shows how digital platforms can support holistic, integrated learning aligned with national reform goals.

7.2.1.2 **Investigating an Integrated Online–Offline Model for Primary Mathematics Under China's "Double Reduction" Policy**

In response to the "Double Reduction" policy, Wanzhi Second Primary School in Wuhu redesigned a Grade-five math lesson using a dual-line model that blended national expert videos with in-person facilitation. Teachers co-planned using the Smart-Education Platform and local diagnostics, aligning content with student needs. During class, expert segments were paused for predictions, peer discussion, and tablet-based weighing simulations.

Real-time analytics surfaced diverse solution paths, helping reinforce the “divide-into-three” strategy. After class, the platform pushed differentiated tasks and videos, while dashboards supported teacher reflection. Results showed gains in engagement, reasoning, and expression, along with reduced prep time and lower student workload. The case shows how intelligent platforms can translate policy into effective local practice, though metadata alignment and teacher training in data use remain areas for improvement.

7.2.1.3 Practice-Based Inquiry into Fourth-Grade Geometry Pedagogy Supported by the “Three-Assistants” Digital Platform

At Minhang Experimental Primary School, Shanghai’s “Three-Assistants” platform was integrated into a fourth-grade geometry unit to tackle low tech fluency, misalignment with competency-based goals, and weak spatial reasoning. With only 5% of staff experienced with the tool, the team adopted a “resource-thinking-data” model: teachers designed lessons using drag-and-drop tools, and students engaged in hands-on tasks like rotating lines and measuring angles.

The platform captured progress in real time and provided post-class differentiated homework with automated feedback. Teachers used analytics to guide follow-ups, resulting in better spatial reasoning, increased student autonomy, and wider platform adoption. Teachers reported stronger data use and lesson design skills. While challenges remain—especially around long-term tracking and content depth—the case shows how aligned digital tools can personalize learning and scale competency-based instruction.

7.2.1.4 Constructing a Digital-Education Ecosystem via a Dual-Teacher Flipped Classroom Model: A Bar-Graph Instruction Case Study

At Chongqing’s Xinghu School, a dual-teacher flipped classroom restructured a fourth-grade bar-graph lesson using China’s Smart-Education Platform. Students previewed content through micro-videos and online quizzes, while teachers used analytics to pinpoint misconceptions and customize objectives. In class, expert video clips alternated with local teacher facilitation, prompting predictions, discussion, and hands-on graphing using tablets.

Students practiced the full statistical cycle and submitted work for peer and teacher feedback. After class, personalized follow-ups supported both struggling and advanced learners, culminating in a data-based decision-making project. Teachers leveraged dashboards for adjustments and shared insights on the platform’s forum. The model improved bar-graph skills, student autonomy, and teacher efficiency, showing how national resources and local practice can merge into a flexible, data-informed digital ecosystem.

7.2.1.5 Platform-Powered Intelligent Resource Sharing in Dual-Teacher Classrooms

At Yangchun Primary School in rural Gansu, a dual-teacher model powered by China's Smart-Education Platform helped address staff shortages by integrating expert-led instruction with local facilitation. In a Grade-three science lesson on silk-worm life cycles, classroom teachers paired expert videos with hands-on modeling and digital quizzes, using analytics to identify misconceptions and adjust in real time.

Students completed differentiated homework, shared insect photos, and reflected on life-cycle patterns, while the after-school module extended learning into the home. Outcomes included higher engagement, improved diagram accuracy, and stronger environmental awareness. Teachers reported reduced prep time and improved digital fluency. Though content contextualization and data-literacy gaps remain, the case shows how intelligent platforms can support equitable, co-taught instruction across rural classrooms.

7.2.1.6 Smart-Enabled Mathematics Instruction: A Practice-Based Exploration from a Core-Competency Perspective

Qingdao Wangbu Primary School uses smart-education platforms to integrate “mathematical core literacy” into instruction, aligning with the 2022 curriculum and Double Reduction goals. Teachers curate videos and tools from national and local platforms like Hexadecimal Classroom and Love-Homework, embedding expert clips into lesson plans. Diagnostic data from preview sheets guide real-time orchestration, while error patterns and group tasks are auto-generated mid-lesson to support differentiated teaching.

Post-class, the system assigns personalized homework and auto-grades submissions, while data dashboards support teacher reflection and parent updates. A “Growth-Tree” system converts progress into virtual rewards to sustain motivation. Results show stronger understanding, active participation, and lighter teacher workload. Though gaps remain in resource tagging and platform dependence, the case illustrates how smart ecosystems can bridge national standards and classroom realities, driving equitable, high-quality math education.

7.2.1.7 Technology-Enabled Enhancement of Primary Pupils' Conceptual Consistency in Computation: The “Within-Table Multiplication-and-Division Review” Lesson as Case

Minhang Experimental Primary School in Shanghai used the “Smart Pen & Paper” platform to boost second graders' computational consistency, aligning with the 2022 Math Curriculum. A pre-test revealed strengths in forming multiplication/division equations but gaps in linking operations and grasping inverses, guiding targeted goals and mixed-ability grouping.

In class, teachers used “Assignment Correction” to compare answers, aiding conceptual visualization. Students explored number pairs, linked operations collaboratively, with peer reviews and “Thinking Replay” deepening strategy understanding. Follow-up tests showed 40-point subtraction gains and 80% mastery of inverse logic. Teachers noted lighter marking, though analytics training and metadata challenges persist, highlighting smart platforms’ role in education reform.

7.2.1.8 “Teaching for Thinking”: Data-Driven Instructional Design for Mathematics Review Lessons

To reinforce “computational consistency” in line with the 2022 Mathematics Curriculum, Minhang Experimental Primary School used Shanghai’s “Smart Pen & Paper” system in a second-grade review lesson on within-table multiplication and division. Pre-tests revealed confusion linking multiplication/division with addition/subtraction and inverse operations. Teachers used this data to set precise goals and form mixed-ability groups.

In class, students compared original and revised answers, mapped number relationships, and critiqued remainder strategies. The platform captured stylus paths for peer comparison and reasoning review. Post-tests showed subtraction accuracy rose by 40 points, and the share articulating inverse logic increased from 14 to 80%. Teachers gained planning insights and reduced marking burdens. Despite ongoing challenges in analytics training and metadata tagging, the case shows how intelligent platforms make abstract math ideas concrete, supporting China’s smart-education goals.

7.2.1.9 Transforming Instructional Data into a Dynamic Pedagogical Portrait: A Case Study of the Grade-Three Checkpoint Task “Division by a One-Digit Number”

In Shanghai’s Minhang District, Smart-Pen and “MinZhi Homework” platforms transformed a third-grade division checkpoint into a data-driven learning opportunity. Automated scoring of real-time responses revealed challenges in reading, place value, and connecting algorithms to context. Teachers used these insights to define focused objectives and regroup students by error type.

Class activities included self-review, discussion of anonymized work samples, and targeted peer explanations. A follow-up diagnostic showed accuracy on a key item rose from 63 to 95%. Teachers reported reduced prep time and more meaningful lesson study. More than raising scores, the approach fostered “evidence before explanation” mindsets, enabling dynamic grouping and tailored support. While gaps remain in analytics literacy and metadata precision, the case shows how routine assessments can become engines of conceptual growth in smart-education ecosystems.

7.2.1.10 Teacher-Role Transformation and Student Self-Directed Learning in Smart Education

At Sichuan's Xingwen Town Central Primary School, digital tools—cloud resources, dashboards, and smart-pen analytics—revamped daily instruction. A “learning-teaching integration” model connected pre-class diagnostics, in-class peer critique, and post-class tasks. Teachers used analytics to group students by needs, facilitate lessons, and assign differentiated work, fostering student agency.

To sustain change, a “334” system included competitions, structured reflection, and incentives like performance points. Results: livelier dialogue, faster error correction, greater student autonomy, lighter teacher marking, and sharper learning insights. While metadata quality and hardware access remain challenges, the case showcases smart platforms driving China's education reform.

7.2.1.11 Intelligent Enlightenment: Innovations and Practices in Digitalized Teaching Models for Kindergarten Education

Qingxiao Kindergarten in Sichuan reimaged early-childhood education using a smart-education platform that integrates teaching, administration, and family engagement. Interactive apps—covering stories, rhythm, and cognitive games—run on classroom whiteboards, while real-time analytics track learning and adapt content to each child's needs. A parent portal streams classroom activities, offers micro-lessons, and allows real-time communication, making families active participants.

The system also supports governance: anonymized usage and wellbeing data feed into county-level planning. Teachers receive usage alerts that trigger mentoring, and vendor-led webinars help align practice with policy and platform features. Despite ongoing challenges like content renewal, digital access for all families, and screen-time balance, the model has improved engagement, learning outcomes, and assessment precision. This case highlights how a connected digital ecosystem can personalize learning and strengthen early-childhood education through collaborative, data-driven design.

7.2.2 Blended and Flexible Teaching Models

Twelve cases across rural and urban China demonstrate how blended learning effectively supports smart-education goals by merging online and offline learning. Pre-class videos activate prior knowledge, in-class dashboards enable real-time regrouping, and post-class tasks extend learning beyond the classroom. Common approaches include dual-teacher models, micro-courses, and recursive learning cycles, tailored to local needs. Results indicate improved engagement, sharper diagnostics, and stronger teacher collaboration. Despite challenges in analytics use and

device equity, aligning vision, professional growth, and infrastructure makes blended learning a durable foundation for personalized, competency-based education.

7.2.2.1 Preliminary Investigation of a Dual-Line Blended Teaching Model Grounded in the “Three Zones–Ten Rings” Framework

At Dongyue Road Primary School in Qingdao, the “Three Zones–Ten Loops” model offers a systematic blended-learning framework rooted in constructivist and connectivist theory. It integrates diagnosis, design, immersion, inquiry, feedback, and evaluation into a fluid online–offline cycle. A sixth-grade math lesson on the “chicken–rabbit in one cage” problem exemplified the model’s use of pre-class quizzes, visual triggers, group strategy debates, and tablet-based real-time analytics.

Post-class, auto-scored homework and micro-lessons support reflection and deeper transfer. Outcomes included stronger modelling skills, improved pacing, and better diagnostic teaching without added instructional time. Teachers balanced guidance and facilitation more effectively. Persistent challenges—tech gaps, teacher readiness, and student self-regulation—remain. Still, this case shows how a recursive, platform-enabled pedagogy can move beyond basic hybrid instruction toward a fully integrated, data-informed smart-education environment.

7.2.2.2 Applied Study of Dual-Line Integrated Teaching Practices Using the Guangzhou Shared-Classroom Platform

At Zhuangbian Primary School in rural Guangzhou, the Shared-Classroom Platform supports a “dual-line integration” model that blends online expert teaching with in-person facilitation. Students preview video lessons and quizzes, helping teachers identify learning gaps and customize plans. In class, video segments alternate with small-group tasks and tablet-based checks, while analytics flag misconceptions for immediate intervention.

Post-class, differentiated assignments and reflections drive a continuous improvement cycle. Embedded within a broader “12345” strategy, the model supports the Double Reduction agenda and reduces rural–urban learning disparities. Teachers report stronger student inquiry, improved collaboration, and reduced prep workloads. The school now leads district-wide training and innovation. Remaining challenges include connectivity, content depth, and analytics capacity. Still, the case highlights how blended, policy-aligned platforms can promote equity and innovation in rural classrooms aligned with national smart-education goals.

7.2.2.3 Constructing a New Dual-Teacher Classroom to Energize Smart Teaching: Design and Implementation at Baishuihu School Under the “Internet Plus” Initiative

Baishuihu School in Nanchang implemented a dual-teacher model under the “Internet Plus” initiative, combining live expert broadcasts with in-room facilitation. The system integrates Shangshu Master-Teacher videos, Smart-Homework micro-lessons, and National Smart-Education Platform resources. Teachers assign preview tasks using pre-selected video clips and analytics to identify focus areas. In class, students toggle between streamed content and local support, while tablets and whiteboards support active engagement.

Post-class, differentiated tasks and analytics dashboards guide reflection and teacher collaboration. After two years, students show improved self-regulation, concept transfer, and active learning. Teachers report reduced prep time, stronger digital fluency, and peer recognition. While challenges persist—like bandwidth issues and slow model replication—the case shows how a blended digital model can enhance rural instruction, foster teacher growth, and align classroom practice with China’s smart-education goals.

7.2.2.4 Human–Machine Collaborative AI Dual-Teacher English Instruction in Small Rural Schools of Inner Mongolia’s Ethnic Regions

In Inner Mongolia’s Zhungeer Qi, a dual-teacher model combining AI robots and local instruction addresses rural English teaching gaps. As part of the “Internet Plus Education” initiative, schools adopted education robots, enhanced connectivity, and teacher training. AI robots simulate authentic input, diagnose errors, and give instant feedback, while teachers focus on cultural context and interaction. Lessons like “Lost and Found” and “Guess the Season” integrate multimodal activities, with real-time analytics guiding instruction and student grouping.

After two years, students show improved oral fluency, quicker error correction, and greater confidence. Teachers report reduced prep time and enhanced reflection, while a rotating lesson network fosters rural–urban collaboration. Challenges—such as network issues and analytics literacy—remain, but the case highlights how human–AI collaboration can personalize language learning and improve equity in China’s smart-education system.

7.2.2.5 Technology-Enabled “Three-Level, Four-Loop” Smart-Teaching Model: Research and Practice

Shenzhen Education Science Research Institute Experimental Primary School designed a “Three-Stage, Four-Loop” smart-teaching model aligning with China’s digital education policies. The stages—design, implementation, and evaluation—are

bridged by loops of immersion, task guidance, adaptive support, and peer sharing. Lessons are co-planned through a platform, taught using multimedia and real-time feedback, and evaluated via analytics and portfolios.

A key innovation is co-developed subject-specific tools—grammar apps, writing boards, project dashboards—supporting interaction, evidence capture, and personalization. Growth is scaffolded by a tiered training system and cross-grade innovation studios. After four years, classrooms show deeper inquiry, more responsive teaching, and richer student work. Teachers report reduced grading time and better understanding of misconceptions. Despite interface and data challenges, the case demonstrates how structured routines and smart tools can drive classroom transformation under China's smart-education reforms.

7.2.2.6 Pragmatic Inquiry: Implementing a Micro-Course–Driven Blended Precision-Teaching Model

Weiting Experimental Primary School in Suzhou implements a micro-course–driven precision-teaching model using the Yijia Academy platform. Lessons unfold in three stages: pre-class videos and quizzes, in-class tablet-supported interaction, and post-class differentiated tasks. Continuous analytics on student performance enable teachers to adjust objectives, regroup students, and provide targeted interventions—enhancing rigor while meeting Double Reduction goals.

The school has developed hundreds of competency-tagged micro-courses and subject-specific widgets that support immersive, adaptive, and peer-based learning. Professional development is embedded through mentoring and action research, helping teachers continuously refine their practice. After four years, results show stronger student inquiry, more agile teaching, reduced grading time, and notable academic success. Despite ongoing challenges with device access, metadata precision, and analytics literacy, the model demonstrates how micro-courses and real-time data can integrate online and offline learning in a scalable smart-education system.

7.2.2.7 Interdisciplinary Learning in an OMO Environment: Applying the “4Co” Framework via a Campus-Wide Universal Platform

Maluan Primary School in Shenzhen adopted an Online-Merge-Offline (OMO) model based on the “4Co” framework—Collaborative teaching research, Co-teaching, Multi-class communication, and Cross-class collaboration—using the ClassIn platform. Interdisciplinary units like urban ecology combined online data analysis with outdoor activities, while teachers from various subjects co-taught through live streams and micro-tasks. Platform data guided student regrouping and scaffolding, supported by continuous feedback from teachers, students, and parents.

Over four years, the school delivered 2,771 recorded lessons, boosted advanced tool use from 14 to 45%, and created 280 micro-courses. Despite challenges in metadata, analytics literacy, and bandwidth, plans for a data hub and AI lab aim to

strengthen this flexible, interdisciplinary learning ecosystem aligned with China's smart-education goals.

7.2.2.8 Exploring a Smart-Teaching Model Oriented Toward Holistic Development in Primary Education

Baomin Primary School and partner campuses created a “Three-Stage, Six-Step” (3S–6S) smart-teaching model combining online autonomy with collaborative, real-world learning. Students begin with self-paced resources like videos and AR/VR demos, then move into team-based projects, and finally apply learning through interdisciplinary school-wide events. The six looping actions—task setting, exploration, sharing, and reflection—integrate instruction, assessment, and student agency.

Teachers use cloud platforms to push personalized content, track real-time progress, and build “learning portraits.” Smart studios and analytics unify homework, classwork, and extracurriculars. By 2024, the network had developed apps and tools to monitor both cognitive and socio-emotional growth. Outcomes include stronger inquiry, early error correction, and reduced grading loads. Despite gaps in metadata, bandwidth, and analytics skills, the model exemplifies how structured digital ecosystems can support holistic, student-centered learning.

7.2.2.9 Smart-Education Platforms as Catalysts for a New Digital Model of Primary Chinese Language Instruction: An Applied Study

Fengshushan Dongnanhai Primary School in Changsha leveraged the National Smart-Education Platform to build a blended Chinese-language pedagogy with the core goal of “one lesson, one take-away.” Teachers co-designed lessons using multimedia resources and drills, integrating pre-class previews, live annotations, and real-time scaffolding based on analytics like reading speed and quiz scores.

Post-class, differentiated homework and parent-submitted artefacts enriched the learning loop, contributing to each student's digital “learning portrait.” Teachers reported faster prep, greater ICT fluency, and better cross-school collaboration, while students gained autonomy and improved language output. Despite challenges in metadata and access, the case illustrates how policy-aligned platforms can merge diagnostics, teaching, and feedback into a flexible, student-centered language-learning model.

7.2.2.10 Empowering Aesthetic Literacy Through a Dual-Teacher Classroom: Practice-Based Exploration

Dongzhimen Middle School Yonghegong Primary (Beijing) and Ziyun No. 3 Primary (Guizhou) co-taught a sixth-grade poetry lesson using the ClassIn platform, blending

expert instruction with local facilitation to foster aesthetic literacy. The lesson on Cai Wei from *The Book of Songs* explored imagery and emotion through split-screen recitation, polls, and student uploads.

Teachers collaboratively planned around key curriculum goals, while the dual-teacher format enabled real-time discussion and cultural connection. Post-lesson data showed 90% + participation and improved poetic understanding. Teachers reported reduced prep time and stronger regional collaboration. Despite bandwidth and meta-data issues, this case highlights how dual-teacher smart classrooms can integrate technology and tradition for richer cultural education.

7.2.2.11 Exploration and Practice of a Novel Instructional Paradigm in Classroom Teaching

Beijing Chaoyang Fangcaodi International School piloted a blended, multimodal lesson around a Grade 4 “plant hammer-dye” project, integrating flipped learning, gamification, and mixed reality. Pre-class surveys identified gaps, while in-class activities included magnet-card races, hands-on dyeing, peer review, and iterative technique refinement.

Mobile tools supported after-class adjustments, and all work fed into individualized “learning portraits” for family feedback. The model aligned with life-based and labor-education goals while reducing lecture time and grading burden. Students progressed from mimicry to creative problem-solving. Despite tech and data-literacy hurdles, the case shows how blended, data-informed models can support student-centered innovation in China's smart-education reform.

7.2.2.12 Employing Networked Environments in Early Childhood Language Instruction: A Brief Exploration

A county-level kindergarten reimagined early language learning by embedding networked tools—smart boards, video tables, and cloud resources—into every phase of instruction. Classrooms became multimodal studios where children explored digital storybooks, AR scenes, and interactive games, boosting engagement and expressive confidence while reducing participation barriers.

Three pedagogical modes emerged. In interactive mode, student drawings were projected for real-time peer commentary. In exploratory mode, prompts like “What animals change like frogs?” led to micro-video searches and collective meaning-making. In layered mode, mixed-age groups accessed differentiated content—animations for beginners, documentaries for advanced learners—fostering inclusive inquiry.

Teachers shifted from direct instruction to guided facilitation, and families extended learning through online follow-ups. Despite challenges with screen time, bandwidth, and teacher training, the case shows how intelligent environments can support dynamic, student-led literacy development in early childhood education.

7.2.3 Technology-Augmented Interactive Teaching

Seven cases demonstrate how intelligent technologies—from AI-enhanced tangrams to data-visible English corners—enhance real-time classroom interaction. Teachers break curricula into digital “learning bricks,” distributed via cloud platforms, tracking click paths, speech turns, and gestures to provide just-in-time feedback. Mobile devices, XR clips, and adaptive algorithms engage students actively, while dashboards offer insights for regrouping and home–school collaboration. Despite challenges like bandwidth and data literacy, evidence shows that when digital tools function as co-teachers rather than passive content providers, classrooms experience greater engagement, richer dialogue, and reduced teacher preparation time.

7.2.3.1 “Internet Plus” and the Modularization of Textbook Components: Implementing Multi-Dimensional Interactive Teaching in Synchronous Classrooms

Under Zhejiang’s “Internet Plus Compulsory Education” initiative, Changhong Township Primary (rural) and Maoshancheng Campus (urban) co-developed an interactive synchronous teaching model. Lessons were modularized into “learning bricks”—2–3 slides with draggable elements and annotation zones—enabling real-time collaboration across 370 km via Zhijianghui cloud and RayLink.

Joint syllabus mapping, standard design templates, and video-based refinement supported quality control. Five interaction modes were assessed through rubrics, while AI analytics tracked turn-taking and tool use. Over three years, the model expanded from music and art to core subjects, achieving a 99% lesson-recording rate.

Data show improved student participation, rural teacher confidence, and urban teacher pedagogical reflection. Despite metadata and bandwidth limitations, this case illustrates how modular content, shared design, and live analytics can turn remote instruction into dynamic, co-constructed learning aligned with China’s smart-education vision.

7.2.3.2 Constructing and Scaling a “Smart English Corner” Within the “Internet Plus” Framework: A Case Study

Qiaoshe Central Primary School in Nanchang reimaged its English club as a “smart English corner” spanning classrooms, homes, and the library. Textbook dialogues were modularized into micro-videos and conversation cards via ClassIn and Seewo. A pairing algorithm matched students with peers, teachers, or international volunteers for real-time conversations, with interactive tools logging vocabulary use and pronunciation for instant feedback.

On campus, gamified speaking tasks earned points on learning dashboards. At home, families co-watched videos or dubbed cartoons; in the library, English staff hosted debates and storytelling. Metadata enabled differentiated tasks and tracked process-based progress.

Within two years, 90% of students regularly contributed spoken artefacts. Oral fluency improved, and teachers saw reduced prep time due to reusable content and automated diagnostics. Despite challenges with bandwidth and analytics skills, the model exemplifies student-centered, tech-supported language immersion.

7.2.3.3 Enhancing Learning Experience Through Mobile Devices: Authentic Interaction for Context-Rich Instruction

Zhabei Tianjiabing Primary School in Shanghai piloted one-to-one tablet use to enrich situational English learning. Teachers broke textbook units into “micro-scenes” enabling prediction, annotation, and meaning-making on student screens. In *The Toothless Tiger*, students played a magnifying-glass game to infer characters and completed story-building tasks. Analytics tracked interactions, guiding in-the-moment support.

Other lessons used playful, authentic contexts. In *What Is “Home” in Your Eyes?*, students conducted tablet-facilitated interviews. In *A Visit to Ocean World*, VR and interactive maps replaced field trips, with gamified puzzles introducing vocabulary. Students recorded, critiqued, and reflected through multimodal expression.

Results included stronger engagement, faster correction, and deeper comprehension. Teachers reused materials and gained diagnostic clarity. While bandwidth and data-literacy remain challenges, the case highlights how mobile technology and context-rich scenes support interactive, student-centered smart education.

7.2.3.4 Information-Technology-Empowered Primary English Instruction: Toward Pathways for Personalized Learning

Etuoque Qianqi Third Primary School adopted a blended English instruction model to close achievement gaps. Teachers curated a cloud library of micro-videos, graded readers, and games, tagged by skill level. Students explored materials on tablets pre-class, with analytics shaping groupings and goals.

In class, whiteboards, clickers, peer tasks, and speech-recognition tools enabled instant feedback and performance tracking. Adaptive systems suggested personalized follow-ups. Post-class, students completed targeted assignments—phonics, dubbing, or storybooks—while teachers annotated submissions and refined plans using weekly dashboards.

Outcomes included gains in listening (+8 points), reading fluency (+18 wpm), and proficiency (62% to 81%). Teachers saw reduced grading time and improved collaboration via shared data. Despite device and bandwidth gaps, the case illustrates how

integrated platforms can personalize learning and support China's smart-education vision.

7.2.3.5 Artificial-Intelligence-Supported Practice in Primary Mathematics Teaching: An Exploratory Study

At Beijing Eleven School's Zhongguancun campus, a first-grade tangram unit used AI to enrich spatial learning. Diagnostics via UMU showed low cultural knowledge but strong storytelling, informing ability-based grouping and goals.

In class, "Tatian AI Tangram" offered real-time feedback on shape construction, while "Wenxin Yiyan" generated context-rich narratives. Students moved from shape assembly to collaborative storytelling, guided by analytics and peer comparison. After class, "Panda AR Tangram" supported 3D uploads and personalized tasks, while teachers used data to refine instruction.

The project boosted engagement, conceptual talk, and intentional design, with reduced grading workload. Though challenges in metadata, bandwidth, and ethics remain, the case highlights how AI and AR can personalize math learning and support China's smart-education agenda.

7.2.3.6 "One Lesson, One Inquiry, One Cognitive Step": An Initial Exploration of a Review-Lesson Model in Smart English Classrooms

Fuzhou Gulou Experimental Primary School piloted a smart English review lesson on "Housework," aligning inquiry-based teaching with real-time diagnostics. Before class, HiTeach data revealed challenges with Whose...? grammar, shaping objectives and student grouping.

In class, clickers, touchscreens, and games like "Garbage Sorting" supported grammar correction, divergent thinking, and logic. Live analytics enabled just-in-time scaffolding and error-triggered reteaching. Post-class, dashboards personalized homework and informed teacher reflection.

Results included improved listening and reading scores, higher proficiency, and reduced marking time. Despite issues with metadata and bandwidth, the case illustrates how data-informed review lessons can foster cognitive growth and engagement in China's smart-education ecosystem.

7.2.3.7 Integrating and Innovating Information Technology in Early Childhood Teaching: Evidence from Tomorrow Kindergarten

Tomorrow Kindergarten reimaged early-childhood teaching by integrating technology as both tool and mindset. A self-assessment revealed digital fluency gaps, prompting leadership to adopt a vision grounded in humanistic and cognitive theories,

supported by tiered teacher development. Novices mastered basic tools; experienced staff explored AR storytelling and real-time analytics.

In practice, large screens and mobile devices supported play-based learning, with digital portfolios and home tasks extending engagement. Teachers designed tiered content, using cloud tools to adapt to emerging interests. Formative assessment relied on photo records and analytics to guide next steps.

Initial results included stronger engagement, richer multimodal expression, and greater educator confidence. Despite challenges like screen-time concerns and content upkeep, the case shows how aligned vision, teacher growth, and adaptive ecosystems can transform early education within China's smart-education agenda.

7.2.4 Teaching–Assessment Integration and Personalized Learning

Six cases highlight Chinese schools integrating instruction, assessment, and feedback into continuous, data-driven cycles. Tools like Green Indicator dashboards and cloud textbooks enable teachers to identify misconceptions and personalize learning using real-time analytics and evolving digital portraits. Beyond grading, platforms reveal cognitive breakpoints, support peer explanations, and analyze classroom dialogue, easing teacher workload and enhancing professional dialogue. These examples demonstrate how tight teaching–assessment integration fosters competency-based, equitable education, providing a scalable, data-informed personalization model within China's smart-education ecosystem.

7.2.4.1 Unit-Level Instructional Improvement Aimed at Higher-Order Thinking: Practice and Research from a Big-Data Evidence Perspective

At Tianyuan Foreign-Language Experimental Primary School in Shanghai, big-data dashboards revealed strong performance but weaker higher-order thinking. In response, the school used analytics to drive unit-level instructional redesign targeting advanced cognition. Teachers co-analyzed Green Indicator data to co-develop problem chains emphasizing analysis and synthesis. Digital pre-tests revealed misconceptions and shaped grouping and objectives.

During instruction, the Three-Assistants platform visualized thinking via drag paths and diagrams, allowing real-time scaffolding. Post-unit projects contributed to student “learning portraits” and informed lesson study. After two years, higher-order thinking scores matched top domains, and classrooms saw more student-led inquiry. Teachers noted reduced marking time and richer professional discussion.

Despite ongoing issues—metadata precision, analytics training, and bandwidth—the case shows how tightly integrated planning, diagnostics, and feedback can

promote personalized, cognitively rich learning aligned with China's smart-education reform goals.

7.2.4.2 Preliminary Exploration of an Integrated Smart-Classroom Model for Teaching and Assessment in Primary Mathematics Under the “Double Reduction” Policy

Xianshan Primary School in Qingdao redesigned math instruction into a smart-classroom model integrating teaching, assessment, and feedback to support the Double Reduction policy. Teachers use dashboards to co-design micro-lessons and tiered homework, while students preview videos and quizzes at home. Analytics reveal misconceptions and guide in-class focus.

During lessons, clicker responses generate real-time dashboards to identify learning breakpoints. Teachers pause instruction to prompt peer explanations and assign differentiated tasks. The Classroom Optimization Master app tracks engagement and shares progress with families.

Post-class, AI assigns homework based on individual errors, updating digital learning portraits and informing weekly teacher–parent meetings. Over two years, quiz scores and problem-solving improved, while homework time and grading decreased. Despite challenges in bandwidth and analytics fluency, the case shows how integrated data loops support personalized, effective instruction.

7.2.4.3 Applying a UbD-Based Primary Chinese Model Aligned with Teaching–Learning–Assessment Consistency via the YueJiao-Xiangyun Platform: An Implementation Study

Guangzhou Zengcheng Affiliated Primary School applied a Chinese-language model based on Understanding by Design (UbD) using the YueJiao-Xiangyun platform to achieve teaching–learning–assessment alignment. Teachers set comprehension goals aligned with national standards and built four-stage workflows supported by multimedia tools and analytics.

Pre-class tasks—videos, vocabulary checks, and oral uploads—generated diagnostic scores, shaping in-class grouping and objectives. Interactive features like annotation and drag-and-drop enabled real-time checks, while dashboards flagged learning gaps and triggered targeted peer or teacher interventions. The platform's metadata-tagged artefacts offered instant access to remedial or enrichment tasks without interrupting flow.

In a lesson on “Ancient Scholars on Reading,” the system tracked progress across pre-task pronunciation, in-class understanding, and post-task reflections. After a year, participation rose, prep time fell, and instructional discussions became more data-driven. Despite metadata and access challenges, the case shows how integrated platforms can support personalized literacy instruction.

7.2.4.4 Designing Reading Tasks Through the C-D-C-I Framework in Primary English Within a Smart-Education Environment

Qingdao Yuying Primary School implemented the C-D-C-I model—Curriculum goals, Diagnosis, Creation of tasks, and Instruction—within its smart-education English reading assessment. Goals were aligned with national standards, and dashboards identified weaknesses in inference and vocabulary.

A text on the 19th Asian Games was selected and transformed into multimodal items with ascending cognitive difficulty. Pre-tests guided grouping; during the test, platforms tracked answer paths and timing for diagnostic depth. Post-test analytics informed peer reviews and personalized follow-ups like phonics videos or debate clips.

Accuracy rose from the 70s to mid-80s, and teachers gained insights into reading behavior. The model shifted assessment from summative to growth-oriented. Teachers also built a localized test bank. Despite metadata and access issues, the case shows how integrated diagnostics and instruction can foster higher-order reading in China's smart-education context.

7.2.4.5 A “5 + 4” Learning-Guided Classroom Model for Primary English Informed by Big-Data Analytics

Qingdao Bilingual Primary School applied a “5 + 4” big-data-driven model to redesign its English instruction. The five learning stages—preparation, activity, guidance, mastery check, and resource push—were supported by four core actions: instruction, task design, application, and testing. Pre-class tasks via the Changyan app revealed readiness gaps, while in-class dashboards flagged misconceptions, prompting real-time peer explanation or drills.

The 9331 platform analyzed teaching behaviors using interaction charts and a nine-point rubric, informing continuous lesson improvement. After class, personalized homework and family-uploaded videos fed student learning profiles. Tagged artefacts allowed adaptive content delivery—phonics or debates—without disrupting flow.

In one year, listening scores rose by 8 points and reading speed increased by 18 wpm, with benchmark attainment climbing from 62 to 81%. Though challenges remain—device gaps, metadata, analytics literacy—the model shows how integrated data cycles enhance personalized English learning.

7.2.4.6 Integrating Learning and Assessment to Foster Students' Core Competencies: A Case Study of the "Pyramid" Lesson

To foster core competencies in line with the 2022 curriculum, Yangshita Hope Primary, with support from Inner Mongolia Normal University, embedded "learning–assessment fusion" into a Grade-5 Chinese lesson on The Pyramid. A cloud platform facilitated a four-phase lesson cycle—knowledge linking, self-learning, cooperative inquiry, and feedback–synthesis—while tracking student engagement and performance.

Pre-class analytics informed inquiry groupings: 20 of 21 students completed quizzes, and 17 posed questions about pyramids. During class, students wrote guidebooks and exchanged 65 peer comments, shifting from teacher-led correction to peer critique. Post-lesson analytics showed near-universal vocabulary mastery and improved comparative writing. Learning portraits captured growth across content, expression, and cultural understanding.

Teachers reported greater engagement, lighter grading, and more focused professional dialogue. Though challenges remain in metadata precision and device access, the case shows how embedded assessment drives personalized, competency-based learning within China's smart-education framework.

7.2.5 Student-Centered and Interdisciplinary Innovation

Seven classroom cases illustrate how Chinese schools are breaking disciplinary boundaries to foster whole-child creativity through intelligent, student-centered ecologies. Learners act as designers, engaging in inquiry, collaboration, and reflection while cloud systems log their progress into evolving "learning portraits." Common features—problem-based learning, AI-supported scaffolding, industry links, and multimodal portfolios—streamline feedback and promote higher-order thinking. Though challenges like limited bandwidth and coarse metadata persist, these practices signal a key shift in China's smart-education strategy toward integrated, competence-driven learning.

7.2.5.1 An Integrated Learning Practice Model Informed by Digital-Intelligence Transformation

Yinchuan's No. 16 Primary School piloted a student-centered, interdisciplinary model grounded in the "Sun-ward Growth" Whole-Child Curriculum and the data-driven "3L-3T" classroom, integrating self-study, collaborative inquiry, and post-lesson extension with cognitive processes like questioning and reflective innovation. Digital artefacts and learning portraits are updated via Ningxia Cloud and the National Smart-Education platform.

The model spans three levels: (1) intra-disciplinary integration restructures textbook content using digital notebooks and mind maps; (2) cross-disciplinary themes like “At the Farm” merge English, coding, music, and math around real-world issues; and (3) school-wide courses dissolve schedules, involve families and experts, and use multimodal portfolios for assessment.

Early outcomes include livelier classrooms and award-winning projects, with teachers noting reduced workloads and improved collaboration. Despite challenges in metadata, analytics literacy, and device access, the model exemplifies integrated, intelligent instruction for holistic student development.

7.2.5.2 Leveraging the Internet to Ensure High-Quality Adoption of the “Five-Dominant Learning” Instructional Model: A School-Based Case Study

Guangzhou's Tian'en Bilingual School adopted the “Five-Dominant Learning” model to tackle rapid enrollment and novice teachers. This internet-enhanced framework emphasizes teacher guidance, student agency, skill training, problem orientation, and thinking development through six steps: contextual induction, individual/pair exploration, group inquiry, real-time monitoring, public presentation, and reflective thinking. The school integrated platforms like the National Smart-Education system, Guangzhou Shared-Classroom, and Seewo into a unified digital ecosystem. Students preview content pre-class; in-class dashboards enable dynamic regrouping and feedback; and AI-driven homework personalizes learning. Parent-teacher communication and ongoing professional development are embedded online. After three years, improvements include higher academic performance, richer student discourse, and enhanced teacher innovation. Despite ongoing challenges with metadata quality, bandwidth, and analytics literacy, this case exemplifies how digital integration can effectively realize student-centered pedagogy within China's smart-education framework.

7.2.5.3 Design and Implementation of a “Three-Guiding, Three-Learning” Precision-Teaching Model in Rural Primary Schools Empowered by Digital Intelligence

Guangzhou's Shaxu No. 1 Primary, a village-in-the-city school serving mainly migrant students with an aging faculty, transformed challenges into strengths through its “Three-Guiding, Three-Learning” (3G–3L) precision-teaching model. Aligned with China's Double Reduction and “Rongle Class 2.0” reforms, this approach integrates teacher actions—problem guidance, facilitation, and deep practice—with student modes—autonomous inquiry, collaborative exhibition, and reflective expansion—leveraging multimodal data for personalized learning. Digital tools like UMU, YueJiao-Xiangyun, Wisdom Cards, and Seewo boards support pre-class diagnostics, real-time adjustments, and AI-driven homework. Institutional change is guided