

Roles and Practical Boundaries of the National Smart Education Platform for Primary and Secondary Schools in Teachers' Digital Resource Ecosystems: A Qualitative Study in Yunnan, China

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Abstract: China's National Smart Education Platform for Primary and Secondary Schools gives teachers nationwide access to publicly funded basic-education resources. In practice, however, it is only one part of a wider resource environment that also includes textbooks, commercial repositories, professional literature, social media, school systems, colleagues' materials, and generative AI. Drawing on semi-structured interviews with nine teachers and one teaching-research officer in Yunnan, this exploratory qualitative study asks what the National Platform is actually used for within that wider ecology and where its practical limits emerge. Thematic analysis and cross-case comparison identified five recurring functions: authoritative curriculum and instructional reference; lesson observation and professional learning; foundational support for lesson preparation; support for demanding or unfamiliar tasks; and organized professional-development and public-service provision. The weight of these functions changed with the task, teachers' experience, subject area, and organizational setting. Resources were more likely to enter practice when they fitted students and local conditions, could be edited and moved through familiar workflows, and did not impose excessive time costs. Teachers dealt with mismatches by using resources directly, extracting selected elements, adapting them, combining several sources, or substituting another tool. These findings indicate that the National Platform is better judged by the professional functions it performs and by the conditions under which those functions become usable than by frequency of use alone. They also point to a mediating role for regional teaching-research systems between national provision and local classrooms.

1. Introduction

The Ministry of Education launched the upgraded National Smart Education Platform for Primary and Secondary Schools in March 2022 as part of China's public infrastructure for basic education ^[1]. Subsequent surveys have documented use in lesson preparation, classroom teaching, and professional learning, with marked variation across teacher groups ^[2]. Research has also

identified performance expectancy, social influence, platform services, and facilitating conditions as predictors of use^[3]; mapped differentiated professional-development needs^[4]; described classroom application patterns^[5]; evaluated the platform's resource configuration^[6]; and examined teaching-research communities supported by the platform^[7]. These studies establish the platform's reach. They say less, however, about a routine feature of teachers' work: teachers rarely rely on one resource source at a time. The practical question is thus not simply whether the National Platform is used, but what role it plays when teachers move among several sources while solving an instructional problem.

Looking only at one platform can distort both sides of the picture. A teacher who rarely logs in may still depend on the National Platform when a textbook changes, an open lesson has to be justified, or a professional-development task requires an authoritative reference. Conversely, a teacher who uses the platform often may still build everyday lessons from commercial slide decks, local materials, video sites, or colleagues' resources. In routine planning, sources are assembled around the problem at hand. Frequency is informative, but it cannot by itself tell us what a platform contributes or whether a resource actually reaches classroom use.

Curriculum-resource scholarship helps make this distinction visible. Remillard describes teachers' relationships with curriculum materials as participatory and interpretive rather than as straightforward implementation^[8]. In the Documentational Approach to Didactics, searching, selecting, redesigning, sequencing, and managing resources form part of the ongoing work through which teachers develop resource systems^[9]. Sherin and Drake identify reading, evaluating, and adapting as recurrent strategies in teachers' use of curriculum materials^[10]. Digital curriculum resources enlarge the space for design-in-use^[11], while research on teacher agency and technology integration shows that what teachers can do with a resource depends on professional capacity as well as contextual conditions^[12, 13]. Taken together, these perspectives make a basic point that is easy to lose in platform metrics: availability is only the beginning of practical use.

For a national public platform, the benchmark should therefore not be exclusive replacement of other sources. Teachers keep different resources because the resources do different jobs. A commercial repository may be faster for an editable worksheet; a video site may provide a vivid classroom example; a professional journal may be more useful for a current disciplinary debate. The National Platform may nevertheless retain distinctive value through curricular authority, systematic organization, equitable access, and professional learning. Such functions can matter greatly even when they are called upon intermittently. Treating substitution rate or login frequency as the main indicator would miss this form of strategically concentrated use.

We use the term teachers' digital resource ecosystem to refer to the sources, tools, professional networks, and routines that teachers assemble around planning, instruction, assessment, teaching research, and professional learning. Within that ecosystem, the study addresses three questions: What functions does the National Platform perform? How do those functions change across tasks, career stages, subjects, and organizational settings? What practical boundaries determine whether a platform resource is carried into teaching, and how do teachers work around those boundaries?

2. Methods

The study adopted an exploratory qualitative design and drew on semi-structured interviews with 10 participants in Yunnan. The group covered primary, lower-secondary, and upper-secondary education and included teachers of Chinese, mathematics, English, music, and information technology, together with one primary-mathematics teaching-research officer. Participants were based in Kunming, Qujing, Lincang, and Dehong and worked in urban, county, and border-area settings. Sampling was purposive. We sought contrasts in subject, professional role, teaching

experience, and intensity of platform use rather than a sample intended to represent the provincial teacher population.

That contrastive logic was particularly important in Yunnan, where the same national resource may meet very different school, regional, and subject conditions. The cases included high- and low-frequency users, beginning and experienced teachers, classroom teachers and a teaching-research officer, and subjects with different requirements for text, audiovisual material, assessment, or hands-on digital tools. The purpose was not to ask which view was most common. It was to see when the same platform function became valuable, marginal, or difficult to convert into practice. Table 1 summarizes the participants' contexts and use profiles, which provided the contrasts used in the cross-case analysis.

Table 1. Participant characteristics

Code	Context	Use profile
T01	Kunming; primary Chinese	Experienced; routine reference, intensive use for open lessons
T02	Lincang; former upper-secondary Chinese	Use mainly triggered by school training requirements
T03	Dehong; upper-secondary English	8 years; low-frequency, professional-development-driven use
T04	Kunming; primary mathematics	6 years; relatively active user
T05	Lincang; lower-secondary mathematics	13 years; task-driven use; equipment/student-readiness constraints
T06	Qijing; lower-secondary music	5 years; multi-source user; platform for verification/reference
T07	Kunming; primary information technology	10 years; formerly high-frequency, later reduced use
T08	Kunming; lower-secondary Chinese	10 years; multi-platform use, supplemented by mandated use
T09	Kunming; mathematics/teaching research	17 years; studio lead; frequent self-directed use
T10	Kunming; lower-secondary Chinese	17 years; teaching-research leader; special-task/PD use

The interviews followed resource-use episodes rather than relying only on general evaluations. Participants described their routine sources, occasions when they chose the National Platform voluntarily, how they judged the value of a resource, what they changed before enactment, and why apparently useful materials were sometimes abandoned. We also asked about school routines, teaching-research groups, master-teacher studios, and local platform channels. Two event prompts were especially useful: participants reconstructed one resource that did enter teaching and one that they considered but ultimately did not use. Interviews were consolidated in August 2026. The full transcripts, with non-substantive conversational material removed, formed the analytic corpus.

These event accounts often complicated participants' first descriptions of their own use. Several teachers who called themselves infrequent users could describe periods of intensive platform use around an open lesson, a revised textbook, a new curriculum requirement, or work undertaken for colleagues. High trust did not guarantee adoption either. Teachers sometimes rejected a trusted resource because editing was cumbersome, the level was wrong for their students, or the material duplicated a resource already embedded in local routines. Following concrete episodes therefore allowed us to separate a favorable or unfavorable attitude toward the platform from the sequence of decisions that produced actual use or non-use.

The analysis combined thematic analysis ^[14] with cross-case comparison. We coded resource channels, platform functions, task contexts, selection criteria, adaptation, abandonment, and forms of support, then compared candidate themes across use intensity, career stage, subject, and school context. Cases that did not fit an emerging pattern were examined rather than absorbed into the dominant account. Credibility was supported through concrete event reporting, negative-case attention, cross-case comparison, and explicit limits on inference, consistent with established qualitative criteria ^[15]. Qujing Normal University granted ethical approval for the study in a stamped institutional approval letter; the institution did not issue an approval number. All participants consented to participation and audio recording.

Coding began with participants' own descriptions of work: "checking textbook intention," "looking for a complete model," "extracting one activity," "switching to a downloadable source," "using another tool for practice," and "returning for a high-demand task." We then grouped such codes into broader categories of function, contextual condition, boundary, and response. Cross-case matrices were used to test how those categories behaved across subjects and use profiles. The most useful exceptions were not treated as noise. Experienced teachers who still relied on complete model lessons, for example, and low-frequency users who considered the platform indispensable for a particular task forced us to refine the initial categories. Recurrence across ten cases was used to sharpen interpretation, not to estimate prevalence.

Nor did we assume that the most frequently mentioned mechanism was necessarily the most important. The information-technology case, for instance, was unusual but analytically revealing: the teacher continued to trust the National Platform even after specialized hands-on tools became more central to local AI teaching. The teaching-research officer offered a different kind of boundary case, showing how a resource could have influence through a professional group without appearing as direct individual classroom use. We retained such cases because they exposed the conditions under which the platform's role changed.

3. Findings

3.1 A Multi-Source Ecosystem and the Platform's Differentiated Functions

Across the ten cases, teachers organized resources around tasks, not around loyalty to a single platform. Textbooks and teachers' guides anchored most planning. Commercial repositories were valued for downloadable slides, test banks, and familiar editing routines. Social-media and video sites supplied visual ideas or authentic classroom footage; journals were drawn on for research-oriented work; generative AI helped with drafting and media production. The National Platform sat inside this mix rather than above it. Participants repeatedly associated it with public-service legitimacy, systematic organization, and close alignment with curriculum and textbooks, but they switched sources when a task demanded speed, novelty, specialized software, or easier editing.

The sources were complementary in quite concrete ways. A commercial mathematics site might win the routine preparation decision because an exercise set could be downloaded and edited immediately. A music teacher might go to a video site for a performance example. Journals and CNKI mattered when teachers needed a recent disciplinary argument or evidence for teaching-research work. AI tools shortened drafting and production, but participants did not treat them as authoritative guides to curriculum interpretation. Against these alternatives, the National Platform's clearest advantages were trust, curricular legitimacy, orderly presentation, and free public access.

This helps explain a pattern that would look contradictory in a usage survey: teachers could speak highly of the National Platform without making it their first stop every day. One source was preferred for speed, another for authority, another for a specialized tool. A teacher might verify the intention of a textbook unit on the National Platform and then build the actual worksheet elsewhere.

Platform value and platform frequency therefore separated because the comparison being made was functional, not global.

Five functions appeared repeatedly. The first was authoritative curriculum and instructional reference. T09, for example, watched a lecture by textbook developers to understand changes to a Grade 6 mathematics unit and then carried that rationale into a lesson-planning group. T07 turned to National Platform guidance when a locally updated information-technology textbook was not yet available. In both cases, authority established a dependable starting point. It did not remove the need to judge whether the material fitted a particular class.

A second function was lesson observation and professional learning. Early-career teachers described stopping and replaying model lessons to study questioning, transitions, pacing, and the treatment of difficult content. Expert lectures, textbook interpretations, reform cases, and thematic training widened the learning function beyond lesson videos. Organized participation, however, was not automatically substantive. When required modules were generic or weakly connected with a subject problem, some teachers completed them procedurally rather than using them to rethink practice.

The same lesson video could serve very different professional purposes. Beginning teachers often watched complete lessons to see how a coherent sequence was built. Experienced teachers were more selective: they extracted an explanation, a transition, a questioning pattern, or an approach to a difficult point and compared it with their own established routines. Complete exemplars thus reduced uncertainty for some participants and provided material for professional calibration for others. Treating “watching a lesson” as one uniform behavior would hide that difference.

The third and fourth functions concerned lesson preparation and demanding tasks. Complete exemplars and standardized packages gave teachers a baseline for checking lesson structure and key content, particularly when their own repertoire was still developing. For experienced teachers with mature personal materials, routine searching yielded less additional value. The platform became more important again when the task changed: an open lesson, a competition, a revised textbook, or unfamiliar content justified a wider search and a stronger need for authoritative comparison. Low routine frequency, in these cases, coexisted with high-value episodic use.

A fifth function was public professional infrastructure. Summer and winter training, school-organized activities, exemplary-lesson programs, and earlier periods of online schooling all created institutional routes into the platform. Participants also drew attention to something easily overlooked in teacher-preference measures: resources were free and advertising-free for teachers, students, and families who might not purchase commercial services. This public-service function belongs to the platform’s system role, not simply to an individual teacher’s favorite-resource list.

3.2 Functions Vary with Task, Career Stage, Subject, and Organization

Use changed sharply with the situation. Routine lessons rewarded speed and compatibility with materials already on hand. Open lessons, competitions, policy changes, and new textbooks justified more time spent on authoritative or exemplary resources. Experience altered the type of value being sought. Beginning teachers were more likely to need a complete model; experienced teachers more often used the platform to check curriculum direction, compare alternatives, or support colleagues. Subject requirements produced another layer of variation: Chinese teachers emphasized textual interpretation and classroom examples, mathematics teachers focused on task design and textbook rationale, music teachers needed strong audiovisual material, and information-technology teaching increasingly required operational environments for programming and AI practice.

Task and experience were intertwined. When existing materials already solved a routine problem, another search had little expected return: the teacher would have to inspect, download, and rebuild

something that might add very little. Higher-stakes work changed that calculation. An open lesson or competition created pressure to compare alternatives and justify design choices; a revised textbook introduced uncertainty about intention; unfamiliar content made a complete exemplar more valuable. An aggregate label such as “low use” can therefore conceal concentrated use at precisely the moments when uncertainty and accountability are greatest.

Experience did not simply reduce platform dependence. It changed what teachers needed from the platform. Beginning teachers often wanted a visible planning structure. Experienced teachers had accumulated slides, assessment items, routines, and professional contacts, so a ready-made package offered less marginal value. Yet the same experience supported more selective interrogation: comparing explanations, taking one component, or using an authoritative resource to defend a design choice. Over time, the platform could move from being a source of models to a source of calibration.

T07’s information-technology case makes that shift concrete. When updated local materials were missing, National Platform guidance was central to interpreting new curriculum standards. Later, as Yunnan strengthened hands-on AI requirements, the teacher moved model training and agent-based practice to specialized tools but continued to use the National Platform for conceptual content. Perceived quality had not collapsed; the task had changed. School-purchased systems, teaching-research routines, mandatory training, and master-teacher studio activities produced similar shifts by creating entry points for some functions and making others redundant.

Organizational exposure was not enough on its own. Required training put teachers in contact with platform resources, but contact became durable use mainly when a resource could be discussed, adapted, and tied to a real teaching problem. Teaching-research groups and master-teacher studios mattered because they distributed interpretation work. One person could locate a promising resource, another could test an adaptation, and the group could retain what worked. In practical terms, such arrangements reduce the amount of conversion work that any single teacher has to do. This collective route also changes what counts as individual platform use. A resource located by one member may be interpreted in a group, modified by another, and later taught by several colleagues. In such cases, platform influence is distributed across a professional workflow and will be underestimated if measurement stops at the account activity of the teacher who eventually enters the classroom.

3.3 Practical Boundaries between Availability and Use

Contextual fit was the boundary teachers returned to most often. They judged resources against student readiness, instructional goals, curriculum progress, local policy, subject requirements, and cultural familiarity. T05 found that material pitched to stronger prior attainment demanded extra teaching time in a county-school setting. T06 wanted music examples with more local relevance. T07 faced a different mismatch: available AI resources did not fully support new hands-on local requirements. None of these resources was necessarily poor. The problem was the amount of localization required before the resource could be taught.

“Fit” was not a single judgment of whether content was good. Teachers asked whether the conceptual level matched what students already knew, whether the pacing would fit the lesson, whether examples resonated with local experience, whether activities were possible with existing equipment, and whether the material reflected current provincial or subject expectations. A resource could pass a professional-quality test and still fail the immediate classroom test. That distinction matters because informed non-use should not be mistaken for low awareness, low trust, or resistance.

Editability and workflow formed a second boundary. Participants already had working

toolchains: obtain a resource, edit it locally in PowerPoint or other software, move it to school equipment, and teach with it. A resource that could not be extracted, shortened, reorganized, or transferred easily added work at every step. Several teachers said that a less authoritative source could be preferable in routine preparation simply because its files were easy to download and modify. Practical usability thus depended not only on whether the platform itself was stable, but on how well a resource travelled through the rest of the teacher's workflow.

This is why editability should not be reduced to interface convenience. Teachers seldom taught a digital resource exactly as they found it. A strong lesson might still need to be shortened, resequenced, combined with local exercises, or rebuilt inside an existing presentation. Closed or awkward formats shifted time away from pedagogical adaptation and toward technical reconstruction. The relevant cost was the whole distance between finding a promising resource and having something ready for a particular classroom.

Time magnified these differences. Experienced teachers with established slide decks, item banks, and routines needed a clear gain before rebuilding materials around a new source. Rapidly changing subjects created another pressure. Participants trusted the National Platform for normative accuracy and systematic organization, but sometimes went to journals, video sites, or specialized software for recent cases, authentic footage, or creative media. Existing school accounts and management systems added path dependence: if routine needs were already covered elsewhere, an overlapping platform function had to offer a distinct benefit to justify switching.

A third boundary appeared between national provision and local use. Most participants did not describe Yunnan-specific platform channels as a regular part of their workflow. What they wanted was not simply more local content, but help with local interpretation: provincial requirements, subject-specific examples, resources calibrated to local students, and demonstrations of adaptation. It would be unrealistic for a national platform to encode every such variation. Regional teaching-research officers, master-teacher studios, and subject communities are better placed to curate and contextualize national materials, a role that is also consistent with emerging work on platform-supported teaching-research communities ^[7]. The interviews suggest that this mediation would be most useful when it reduces repeated local reconstruction rather than merely adding another layer of resource supply. A curated adaptation that explains why a national example was changed for a county school, for instance, can carry more practical information than an additional unannotated resource. The regional contribution is therefore interpretive as much as distributive.

Seen this way, the missing middle layer is an organized translation function. National resources can supply a common professional baseline; provincial and regional systems can add knowledge of local curricula, equipment, learner characteristics, and implementation priorities. Annotated exemplars, subject-specific adaptation cases, curated collections, and records from collaborative lesson study could make national materials easier to interpret and reuse without fragmenting the national resource base into numerous local versions.

3.4 Teachers Reconfigure Rather Than Simply Accept or Reject Resources

Teachers rarely responded to imperfect fit with a simple yes-or-no decision. They took pieces, changed presentation, combined sources, or moved to another tool. T01 carried questioning strategies and transitions from model lessons into her own materials. T06 kept the instructional logic of a music lesson but replaced the visuals. T07 paired platform micro-lessons with specialized AI tools. T09 combined official interpretation with recent journal cases and collaborative lesson study. Across these episodes we identified five responses: direct reference, selective extraction, contextual adaptation, multi-source combination, and substitution. They should not be read as a quality ladder. Direct use is efficient when fit is already high; substitution can be the more

professional choice when another source better serves the instructional goal.

Agency was visible in these small decisions as much as in the creation of entirely new materials. Teachers exercised judgment over what to preserve, what to alter, what to combine, and what to leave aside. Selective extraction could keep the curricular intention while improving local fit. Substitution could preserve an instructional goal when the platform did not provide the required tool. Combining sources could join an authoritative explanation with a locally effective example. Resource use, in other words, unfolded as a chain of professional judgments and transformations rather than as a one-time adoption decision.

4. Discussion and Implications

The ten cases suggest a different way of positioning the National Platform: as a differentiated public resource inside a plural resource ecosystem, not as a system whose success depends on teachers using it continuously or exclusively. This reading fits resource-system and participatory accounts of curriculum use ^[8, 9] and research on digital design-in-use ^[11]. It also adds an important qualification to survey and adoption evidence ^[2, 3]. Frequency, satisfaction, and continuance describe aspects of engagement, but they are not direct measures of instructional contribution. In our interviews, some of the most consequential uses were episodic—checking a curriculum interpretation, working with a new textbook, or preparing a demanding public lesson.

That distinction changes what should be counted. A public platform can stabilize interpretations of standards, provide a trusted reference when local materials conflict, make exemplary teaching visible across regions, and keep professional resources outside a commercial paywall. None of these functions requires every teacher to remain on the platform every day. Evaluation would be more informative if it separated routine dependence, episodic high-value use, organized professional use, and public-service reach rather than compressing them into one intensity score.

The multi-source perspective also makes competition with commercial, open, or AI resources a less useful success criterion. Teachers will continue to use other sources when those sources solve a task better. The more consequential question is whether the National Platform supplies functions that alternatives do not provide reliably and whether those functions can be combined with other resources without excessive friction. Its comparative strength may lie in anchoring trustworthy curriculum interpretation, equitable access, and professional learning while remaining compatible with the wider workflows in which teachers actually plan and teach.

A second contribution concerns task-resource fit. Classroom use in these cases depended on a configuration of resource features, student readiness, subject demands, available time, and school routines, consistent with broader evidence that technology integration reflects interacting resource, knowledge, institutional, and belief-related conditions ^[13]. Professional judgment is the mechanism linking public provision to enactment. Adaptation should not automatically be read as dilution of an official resource; often it is how a general resource becomes teachable for a particular class, echoing research on reading, evaluating, adapting, and teacher agency ^[10, 12].

The interviews also show why fit is better treated as a conversion problem than as a fixed property of a resource. Some mismatches can be handled by an individual teacher—shortening a lesson, replacing an example, or adding local practice. Others arise from non-editable formats, missing subject tools, or the absence of regional curation and are costly for one teacher to solve repeatedly. Responsibility is therefore distributed. Teachers need design capacity and judgment; platform developers can remove avoidable processing costs; regional professional systems can carry part of the contextualization work. Explaining every case of non-use as weak willingness would blur these very different sources of friction.

Practical boundaries are relational for the same reason. A barrier can disappear when the task

changes, when a teacher acquires a stronger repertoire, or when colleagues share adaptation work. A resource that fitted well last year can become costly after equipment, learner readiness, or policy expectations change. Platform quality and teacher competence should therefore not be treated as competing, independent explanations. What matters is the configuration in which resource characteristics, professional knowledge, tools, time, and organizational support meet around a specific task.

Three implications follow from that analysis. Evaluation should add functional evidence to login and viewing metrics: Can teachers obtain dependable curriculum guidance, solve a concrete instructional problem, rework materials, and use them within collaborative teaching research? Platform design should retain complete exemplars while also offering modular, editable components and interoperable formats; novices and experienced teachers often need different levels of granularity. Regional systems, finally, can curate strong resources, interpret local requirements, demonstrate adaptation, and organize collaborative refinement. These directions are compatible with Chinese research on differentiated professional-development needs, classroom application, resource configuration, and teaching-research communities ^[4-7].

The National Platform may thus be most valuable not when it replaces every competing source, but when it provides a stable professional baseline inside an open ecosystem. Clearer functional differentiation and lower cross-tool conversion costs would let teachers draw on authoritative public resources where those resources add distinctive value while preserving the contextual judgment that classroom use requires.

5. Conclusion and Limitations

In this purposive sample, the National Platform performed five recurring functions, but the weight of each function changed with task, career stage, subject, and organizational setting. A resource entered practice only when its professional value could be converted into contextual and workflow fit; when that conversion was difficult, teachers adapted, combined, or substituted resources. The study remains exploratory. Ten self-reported cases, with greater representation from urban settings, cannot estimate patterns across Yunnan or China, and classroom observation or platform logs may reveal discrepancies between recalled and enacted use. The contribution is therefore a set of analytically grounded propositions about function, fit, and boundary conditions that can be tested in larger and observational studies.

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