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Influencing factors for sustainable high-quality implementation of comprehensive practical activity courses in rural areas

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The Rural Comprehensive Practical Activity Course (RCPAC) plays a vital role in advancing quality education, fulfilling the fundamental goal of moral development, and promoting the modernization of rural education. Despite its significance, RCPAC currently faces the pressing challenge of maintaining high-quality implementation over time. Addressing the root causes of this unsustainability is essential for refining course design, improving implementation strategies, and ultimately enhancing the overall quality of the course. This study employs a qualitative research methodology, involving in-depth interviews with 42 RCPAC teachers. Guided by the core principles of grounded theory and supported by the qualitative analysis software NVivo11, the study conducts a three-stage coding to systematically identify and summarize the factors contributing to the lack of sustainable high-quality implementation. The analysis reveals that the sustainability challenges stem from the combined impact of six interrelated factors: teacher cognition, course resources, evaluation systems, school interventions, top-level design, and the teaching staff. These factors do not operate in isolation or correspond mechanically to the issue of sustainability. Instead, they interact dynamically, forming a complex network of mutual influence. These findings offer valuable insights for optimizing the design and implementation of RCPAC. Furthermore, they provide a practical reference for rural educational institutions seeking to develop more effective educational policies and teacher training programs.

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Introduction

Since the release of the Outline of Basic Education Course Reform (Trial) in 2001, the Comprehensive Practical Activity Course (CPAC) has become an integral part of basic education in China. Its role was further reinforced with the publication of the Guidelines for CPAC in Primary and Secondary Schools in 2017, signifying the course's transition into a phase of deepened innovation (Lü et al 2022). As a compulsory component of basic education, CPAC consists of four main modules: inquiry-based research, community service, design and production, and career experience. The course emphasizes the application of interdisciplinary knowledge to address real-life problems, aiming to develop students' core competencies such as problem-solving skills, innovative thinking, and social responsibility. Ultimately, it seeks to nurture well-rounded individuals equipped to meet the challenges of future society. Ensuring the sustainable high-quality implementation of CPAC is vital for cultivating students' core competencies and promoting ongoing reform in basic education (Huang 2023). In recent years, official documents issued by the Chinese government—such as the Decision of the State Council on Further Strengthening Rural Education and the National Plan for Building a Strong Education System (2024–2035)—have highlighted the importance of vigorously developing rural education and ensuring the sustainable high-quality implementation of rural course to enhance students' overall development (Zhou and Li 2024; Zhou 2025). In this context, the Rural Comprehensive Practical Activity Course (RCPAC) plays a pivotal role. Its sustainable high-quality implementation is crucial not only for the education of over ten million left-behind children in rural areas but also for the modernization of rural education itself (Yuan 2023; Qin 2023). As a key component of rural revitalization efforts, RCPAC is deeply connected to the quality of rural education and, by extension, impacts the overall quality of the rural population and the broader trajectory of socioeconomic development (Zhou et al. 2023). Therefore, ensuring the sustainable high-quality implementation of RCPAC is essential for advancing rural education and realizing the goals of rural revitalization.

The sustainable high-quality implementation of RCPAC has long been a topic of public concern. Assessing the quality of course implementation is inherently complex, but it can be evaluated by comparing educational inputs and outputs (Alam and Forhad 2022). In China, educational administrative agencies have provided robust support to ensure effective implementation of RCPAC, including the provision of modern teaching materials, designated activity venues, and advanced teaching and assessment technologies—measures widely regarded as instrumental in maintaining quality standards (Alam et al. 2014). Despite these efforts, many basic education schools primarily rely on examinations as the main criterion for evaluating educational quality, even while introducing diverse practical activities aimed at enriching campus life and strengthening students' core competencies (Alam 2020). This overreliance on testing has, to some extent, hindered the sustainability of high-quality implementation. It limits the flexibility and responsiveness of the education system, constrains institutional and course innovation, and ultimately impedes the advancement and humanization of education (Alam 2025). For course implementation to be truly sustainable, it must balance national education standards with the holistic developmental needs of learners—an essential foundation for long-term economic and social progress (Alam 2023). However, the current implementation of RCPAC faces significant sustainability challenges, as reflected in declining student engagement and interest (Chen 2024). Understanding the root causes of this unsustainability is therefore critical for optimizing course design, boosting student motivation, and safeguarding the quality of rural education. Addressing this gap in existing research, the present study adopts a bottom-up approach to investigate the factors and underlying mechanisms contributing to the unsustainability of high-quality RCPAC implementation. Based on the findings, this study also proposes targeted countermeasures. Accordingly, the study seeks to answer two key research questions: (1) What are the factors contributing to the unsustainability of high-quality RCPAC implementation? (2) Through what mechanisms do these factors affect the sustainability of high-quality RCPAC implementation?

Literature review

Comprehensive practical activity courses. The Guidelines clearly state that CPAC comprises interdisciplinary, practice-oriented courses grounded in students' real-life experiences and developmental needs. These courses are designed to help students identify problems in everyday contexts and actively engage in inquiry, service, production, and experiential learning to develop their core competencies. CPAC closely resembles integrated courses in international education systems, highlighting its relevance and adaptability to global educational standards.

Overseas research on integrated courses primarily centers on their conceptual foundations, implementation status, and strategies for improvement. Scholars define integrated courses as interdisciplinary approaches that emphasize connections and innovation across various knowledge domains to address real-world problems. The concepts of horizontal and vertical integration have been introduced: horizontal integration refers to the parallel teaching of different disciplines at the same educational level, while vertical integration involves progressive teaching across different levels (Mawdsley and Willis 2019). Integrated courses have garnered increasing attention, particularly in higher education and vocational training (Bhutto et al. 2020; Bourke et al. 2022). However, several challenges hinder effective implementation, including difficulties in course assessment and deviations from established guidelines (Ferguson-Patrick et al. 2018). To tackle these challenges, scholars recommend improving understanding of course philosophy, adopting innovative teaching methods, and implementing continuous assessment strategies (Junevicius et al. 2021). Additionally, the literature reveals a research gap: current studies predominantly focus on urban settings and higher education, with limited exploration of rural education contexts and basic education. This imbalance is notable, given that basic education plays a foundational role in students' development and warrants more scholarly attention.

Domestic research on CPAC mainly focuses on its implementation status, course implementation models, and instructional strategies. Studies on implementation have primarily concentrated on urban regions such as Beijing and Hangzhou (Liu and Dai 2020). Regarding course models, a notable contribution is the five-phase dynamic implementation model, which provides valuable insights into the stages of course development (Hei 2020). Another influential framework incorporates four types of instructional scaffolding—resource-based, procedural, organizational, and developmental—emphasizing the supportive role of educational research and challenging the notion of a linear implementation process (Fang 2020). In terms of instructional strategies, researchers have proposed recommendations related to teacher training, evaluation systems, and policy frameworks (Han 2020). However, debate continues over which areas should be prioritized: some scholars highlight the importance of policy and institutional mechanisms, while others stress the need to enhance teachers' professional competencies. Although these

recommendations offer meaningful guidance, they are largely based on theoretical analysis and lack sufficient empirical evidence.

RCPAC possesses distinctive features, such as access to abundant natural resources and its close ties to the "Three Rural Issues" (agriculture, rural areas, and farmers) (Deng and Wang 2019). Students can closely observe plant life, participate in farming activities, explore rural environmental conditions, and experience agricultural livelihoods. These immersive experiences foster a strong sense of identity and belonging to rural communities, contributing to local economic and social development (An et al. 2017). Through meaningful interactions with the rural environment, students engage in deep learning and real-world problem-solving, reflecting the course's practical orientation (Chen 2019). Furthermore, RCPAC plays a supportive role in the healthy development of rural left-behind children, who often lack access to natural spaces and social engagement opportunities (Yi 2019). Despite these strengths, rural schools face notable challenges in implementing RCPAC, such as limited educational vision, insufficient infrastructure, and a shortage of qualified teachers (Li and Deng 2019). In addition, many school leaders lack a comprehensive understanding of the course. However, the extent to which these factors affect implementation has yet to be empirically verified. Overall, research on RCPAC remains limited, with a particular scarcity of empirical studies in rural contexts.

Sustainable high-quality course implementation. Theories of course implementation have evolved significantly over time. Early models conceptualized implementation as a top-down policy or program driven by administrative mandates. In contrast, more recent perspectives frame course practice as embedded within complex social networks, highlighting the agency of implementers at multiple levels—particularly the pivotal role of teachers in shaping implementation outcomes (Shao and Hu 2025). Despite these theoretical advancements, the degree to which new course programs are effectively enacted in practice remains a critical determinant of reform success (Wang 2013). Enhancing the capabilities of the teaching workforce is therefore essential for ensuring implementation quality; without such capacity building, the goals of course reform are unlikely to be realized (Tang 2023).

Sustainability education calls for the integration of global challenges—such as climate change, environmental degradation, and economic inequality—into educational practices. As a transformative form of education, it requires changes in both content and pedagogy, with the broader goal of fostering social transformation (Wang and Guo 2025). In terms of instructional design, sustainability education promotes place-based approaches that are contextually grounded, ensuring that learning is locally relevant rather than abstract or disconnected. Contemporary definitions further broaden the scope of sustainability education by emphasizing inclusive access and the development of knowledge, skills, values, and agency needed to address global issues (Yue and Zheng 2025). In the K–12 context, it aims to anchor learning in local histories and resources, support individualized student development, encourage community co-governance, and serve as a driver of educational reform (Zhang and Xu 2023). Despite these ambitions, current practices often fall short of realizing the full transformative and action-oriented potential of sustainability education. For instance, some initiatives merely integrate environmental topics into science lessons without facilitating the deeper cognitive shifts and behavioral engagement that sustainability education demands (Zhu et al. 2023). Scholars contend that assessments should move beyond testing students' knowledge of sustainable development to also include cognitive development, application skills, and emotional intelligence.

Teachers play a pivotal role in this process by fostering critical thinking, equipping students with socially relevant competencies, and nurturing values and attitudes aligned with sustainable development.

Sustainable high-quality course implementation refers to the integration of sustainability education into the course, with an emphasis on cultivating students' core competencies through teaching and assessment practices informed by course theory. In contrast, unsustainable high-quality implementation describes a condition in which significant challenges hinder effectiveness—such as weakened connections between the course and local contexts, and an overemphasis on exam performance at the expense of core competencies. In recent years, the issue of unsustainability in the implementation of CPAC has attracted growing scholarly attention (Li 2018). Gao et al. (2020) identified three major contributing factors: the dominance of subject-based courses, the de-intellectualization of course content, and the perceived lack of meaning in learning outcomes. Zhao (2019), through logical analysis, argued that failing to center "moral education" within the course is a fundamental barrier to sustainability. He further pointed to the enduring influence of exam-oriented education, the misalignment between activity content and moral goals, and the marginalization of values education in teacher training as explicit contributors to the course's moral disorientation. Similarly, Wang (2019) highlighted issues related to course content, teaching personnel, course formats, and assessment practices as key obstacles to sustainable high-quality implementation. While these studies help identify critical influencing factors—such as course goals, content, teachers, and assessment—they primarily adopt descriptive or quantitative methods. Although informative, such approaches often lack the depth required to uncover the underlying causes of observed problems. Moreover, research specifically addressing the unsustainable implementation of CPAC in rural contexts remains scarce. In-depth, context-sensitive studies exploring the nature and root causes of this issue in rural settings are particularly limited. This research gap constrains a comprehensive understanding of RCPAC and limits frontline teachers' capacity to design and develop contextually relevant course resources. It also restricts education practitioners from engaging in richer, place-based educational practices, thereby reducing the effectiveness and precision of proposed solutions. In response, the present study focuses on CPAC teachers in rural primary and secondary schools. Using a qualitative research approach and in-depth interviews, it seeks to explore teachers' internal experiences and authentic perspectives, with the goal of identifying and synthesizing the underlying reasons for the unsustainable implementation of RCPAC. The findings aim to inform future research and guide practical improvements.

Research methodology
Research methods and tools. This study employs a qualitative research approach, conducting in-depth interviews with RCPAC teachers in natural settings to capture their real experiences and perceptions (Chen 2021). Given the study's specific focus, this method is well-suited to uncovering nuanced insights. The use of a relatively small sample enables a deeper exploration of individual perspectives and contextual factors (Bell 2010). A qualitative approach was chosen because it encourages open expression of participants' views and allows the research to remain closely aligned with key areas of inquiry. Following the basic principles of grounded theory, the original interview data were systematically analyzed through open coding, axial coding, and selective coding using the qualitative analysis software NVivo11.

Table 1 Basic information of participants.		
Basic information	**Option**	**Number of participants**
Gender	Male	21
	Female	21
Educational stage	Primary school	14
	Middle school	14
	High school	14

Research subjects and samples. This study selected RCPAC teachers as the research participants, based on two strict inclusion criteria: participants must have at least 8 years of teaching experience in RCPAC and have encountered challenges related to unsustainable high-quality implementation. Prior to the interviews, informed consent was obtained from all participants to ensure voluntary participation and agreement to audio recording. Participants were assured that their personal information would remain confidential and that all data would be used solely for academic purposes. After the study, data handling was carried out in accordance with the preferences expressed by the participants. To recruit interviewees, the study employed a combination of convenience sampling and snowball sampling. A total of 58 eligible teachers initially agreed to participate. However, starting from the 43rd interview, it became apparent that no new themes or insights were emerging—indicating the point of theoretical saturation. Consequently, the final sample size was set at 42 participants. To enhance the representativeness of the sample, participants were selected from diverse geographic regions, including eastern, central, and western China. Specifically, teachers were drawn from seven provinces: Inner Mongolia, Sichuan, Shaanxi, Henan, Heilongjiang, Anhui, and Guangdong. This geographic spread reflects the combined use of the two sampling strategies. Basic demographic information for the participants is presented in Table 1. The sample is proportionally balanced and demonstrates a reasonable degree of representativeness for the research context.

Research process. This study initially collected objective and authentic data through interviews with 42 RCPAC teachers. Following the core principles and procedures of grounded theory, the original interview transcripts underwent three stages of coding: open coding, axial coding, and selective coding. Based on this analytical process, an attribution analysis was conducted to explore the underlying causes of the unsustainability in the high-quality implementation of RCPAC. To ensure the objectivity and credibility of the findings, the study employed a triangulation strategy. Preliminary interviews were conducted with a subset of participants, which revealed the importance of adapting follow-up questions in subsequent interviews based on earlier responses. In addition, a second round of interviews was carried out with a few participants to enable cross-verification and validation of emerging themes and interpretations.

Interview process. This study employed a semi-structured interview method. First, an interview outline was developed, and research participants were selected according to predefined criteria. While most interviews were conducted face-to-face, remote video interviews were also utilized to accommodate geographical constraints. Before each interview, the purpose of the research was clearly explained to participants to enhance their understanding of the issue—namely, the unsustainable high-quality implementation of RCPAC. This preparation helped respondents reflect more deeply on their experiences and ensured the validity of the interview data. The interview protocol was guided by eight

core questions: "Have you ever encountered situations where the high-quality implementation of the CPAC was unsustainable?" "How do you perceive this phenomenon?" "Have other teachers experienced similar situations?" "What do you think are the reasons for the unsustainability of high-quality CPAC implementation in your practice?" "What other factors might influence your ability to implement RCPAC with high quality?" "What actions do you think schools should do to address this issue?" "Have you personally considered how to change this situation?" "What measures have you taken so far?". Guided by these questions, in-depth conversations were conducted with RCPAC teachers. Participants were encouraged to recall and describe their personal experiences with unsustainable implementation. Follow-up questions were asked based on their responses to elicit deeper insights and clarify ambiguities. The entire interview process was audio-recorded to ensure the accuracy and completeness of the collected data.

Coding process. Following the completion of the interviews, all audio recordings were promptly transcribed verbatim. The transcribed data were then imported into the "Internal Sources" section of NVivo11 software for analysis. A three-stage coding process, based on grounded theory and conducted in a bottom-up manner, was carried out as follows: (1) Open coding (level one). The first step involved segmenting the raw data and identifying recurring phenomena. Similar expressions or incidents in the transcripts were assigned localized codes that reflected their contextual meaning. This semantic classification allowed the researcher to derive initial concepts through constant comparison. The researcher, functioning as a third-party observer, reviewed the interview data line by line in NVivo11. Relevant semantic units were extracted and coded as free nodes. Each node was labeled using contextually grounded terms, and similar nodes were compared, merged, and refined. Redundant or overlapping nodes were deleted. This iterative process of breaking down, comparing, naming, and categorizing continued until all interview texts were fully coded. (2) Axial coding (level two). Building on the results of open coding, axial coding was used to identify and establish relationships among the previously isolated categories. The goal was to construct a coherent structure that explained the connections between concepts. A hierarchical tree structure was developed, in which free nodes were grouped under broader parent (tree) nodes. This step involved analyzing the causes, conditions, and interactions among categories to deepen the understanding of underlying patterns and mechanisms. (3) Selective coding (level three). In the final stage, selective coding aimed to identify a central or core category that integrates all other categories and appears consistently across the data. This core category represented a relatively stable and recurring phenomenon. Through iterative coding and analysis, a generalized node was constructed that could be logically linked to other key categories. The storylines developed in the open and axial coding stages were integrated to confirm the core category and clarify its role in the overall conceptual framework.

Coding reliability test. The reliability of coding in this study was assessed using two primary methods. (1) Coding Consistency Percentage. To evaluate the consistency of coding across researchers, the "coding comparison" function in NVivo 11 was employed to compare the independently coded textual data from two researchers. The resulting consistency percentages ranged from 84.21% to 94.41%, indicating a high level of agreement. In cases where discrepancies occurred, the researchers held discussions to collaboratively revise and unify the coding results. (2) Verification of Authenticity and Reliability. To ensure authenticity and reliability throughout the research process, continuous

comparisons were made during the interviews among events, concepts, and the relationships between them. After the coding phase, the researchers reconnected with the interviewees. A total of 26 participants agreed to review the coding coverage in relation to their own experiences. All confirmed that the coding results accurately represented their real-life situations and emotional responses.

Results and discussion

Attribution analysis of the unsustainability of high-quality RCPAC implementation. The localized concepts were then integrated into 20 free nodes (see column 1 of Table 2). During the second-level axial coding, relationships among these nodes were examined, and connections were established to form six thematic categories (see Column 4 of Table 2). In the third-level selective coding, a systematic analysis of the axial coding results was conducted to identify overarching, explanatory core categories that best represented the data (see Column 5 of Table 2).

In this study, the influencing factors are categorized into three types based on the nature of their impact: direct factors, primary factors, and fundamental factors. Direct factors exert a decisive influence on outcomes in the short term, producing the most immediate and visible effects. Primary factors serve a leading role in shaping outcomes; although they may not directly trigger changes, they act as key contributors to the overall process. Fundamental factors are deeper, underlying elements that shape outcomes over the long term. They are characterized by their stability and sustained influence (Berliner 2006).

Direct causes. From the original interview transcripts and coding results (see Table 3), we found that if teachers have cognitive biases regarding the positioning and objectives of RCPAC, it will directly affect the way they implement the course, the process of implementation, and the outcomes. This cognitive bias, as a form of uncertainty, becomes amplified through continuous amalgamation and may trigger a sudden shift in the implementation quality of the RCPAC at a certain tipping point (He and Zhou 2009). It is important to note that these cognitive biases do not emerge immediately but develop gradually over time. Approximately 40.5% of the interviewed teachers reported that they initially adhered strictly to the course standards and maintained high expectations for themselves. However, over time, their understanding of RCPAC subtly shifted, with many beginning to perceive it as a "school-based course" or even an "extracurricular course". This shift led to a gradual decline in their expectations for the course and a change in their attitudes toward students. In particular, with regard to student development goals, teachers increasingly emphasized basic knowledge and skills, while higher-order abilities—such as complex problem-solving—were often overlooked. Moreover, because this cognitive bias develops subtly, it is often difficult for teachers to recognize it. The process fosters a kind of cognitive inertia, causing teachers to internalize this altered understanding of RCPAC as the standard approach to implementation. A teacher remarked, "Practical difficulties do exist, but compared to the original level of rigor, things are now somewhat overly simplified." From the interview, it is evident that the teacher's cognitive bias stems from a significant simplification of the complexity inherent in RCPAC, leading to a divergence from the established course standards and a gradual departure from the core objective of cultivating students' comprehensive competencies.

Main causes. Based on the interview coding node information (see Table 4) and the results, 29 teachers reported that the decline in the quality of course implementation over time was largely due to limitations in course resources—particularly the weak alignment between those resources and the local rural context. Fullan believes that to make a significant impact on students, it is essential to innovate course resources contextually, deepen their connection with the local context, and support students in achieving deep learning (Jin and Zhang 2023). Although teachers often described local resources as "available" or "acceptable," few actually incorporated them into their teaching practices. While they verbally acknowledged the value of local resources, many did not genuinely appreciate or prioritize them. Subconsciously, a significant number of teachers perceived urban course resources as superior and expressed a desire to "learn from their experience" by observing city schools. Some even exhibited a form of "urban worship," dismissing rural resources and hoping to directly transplant urban educational materials into their own courses. This lack of originality and contextual adaptation contributed to a gradual loss of momentum in course implementation. A teacher remarked, "I occasionally make simple use of local resources, but most of the time I still prefer those from the city." In addition to the weak connection between course resources and the local rural context, the distortion of course evaluation activities also hindered the sustainable high-quality implementation of RCPAC. Course evaluation activities should establish a dual commitment to both short-term and long-term outcomes, and reward high-performing teachers in order to build sustainability (Fullan 2006). Among the respondents, 35 teachers reported experiencing a triple misalignment in the purpose, process, and outcomes of course evaluation, resulting in a shift from in-depth evaluation to superficial assessment. This transition gradually weakened the intended feedback and motivational functions of the evaluation system. The sentiment that "whether you do well or not, the result is the same" was widespread, significantly eroding teachers' enthusiasm for maintaining high-quality RCPAC implementation and ultimately diminishing the overall quality of course execution. A teacher remarked, "The time spent on formative assessments is hardly appreciated—students and parents rarely read them, and the school doesn't value them either. Under such circumstances, who would still be willing to take them seriously?" Key teacher-related factors affecting the sustainable high-quality implementation of RCPAC include the mismatch between course resources and the rural context, as well as the misalignment or distortion of evaluation activities. In addition, school-level issues—such as an excessive focus on producing grand or externally impressive outcomes—also undermine the long-term sustainability of high-quality implementation. Improving teachers' working environment, reducing non-instructional workload, and enhancing their autonomy can lead to a higher quality of course implementation (Fullan 2002). Among the respondents, 33 teachers expressed frustration over school interference during the implementation of RCPAC. In an effort to emphasize "specialized development," schools organized numerous activities and launched extensive promotional efforts. However, these actions disrupted the natural rhythm of RCPAC, resulting in the emergence of superficial elements within the course and ultimately diminishing the overall quality of its implementation. A teacher remarked, "With the increasing number of activities, my energy is too scattered, making it difficult to settle down and focus on anything."

Fundamental causes. Comparative coding of the original data (see Table 5) reveals that the root cause of the unsustainability in high-quality RCPAC implementation lies in the fact that the top-level design remains in an exploratory trial phase. This lack of clarity and stability in the overarching framework fundamentally impedes the sustainable and effective implementation of the course. Top-level design is essentially a form of top-down

Table 2 Three-stage coding.

Open coding — Node name	Sources	References	Axial coding	Selective coding
Teachers view it as a school-based course	18	20	Teachers have cognitive biases regarding course positioning and goals	Teacher cognitive biases, insufficient localization of course resources, distorted evaluation systems, irrelevant school interventions, vague top-level design, weak teaching staff
Teachers view it as an extracurricular course	14	14		
Teachers focus on the development of students' basic knowledge and skills	21	24		
Teachers tend to overlook higher-level course goals	16	18		
Course resources are not well integrated with the local context	17	18	Course resources are insufficiently connected to the local context	
Teachers blindly admire urban course resources	14	15		
Teachers do not pay enough attention to local resources	20	22		
Misalignment in evaluation roles	12	12	The purpose, process, and outcomes of course evaluation are distorted	
Evaluation still focuses primarily on knowledge	13	13		
Evaluation emphasizes form and results	16	16		
Lack of evaluation of the effectiveness of teacher guidance	15	15		
Schools are keen on publicity	14	14	Schools are more focused on grand, impressive external outcomes	
Schools are keen on organizing events	20	22		
Schools are keen on creating "unique features"	14	15		
Course status is inconsistent with its nature	15	16	Top-level design is in the exploratory phase	
There is much overlap in the course forms	19	21		
Too many course activities	18	19		
Serious lack of full-time teaching staff	14	15	Teaching staff is fragmented, weakened, and their development is limited	
Teachers lack the necessary competencies	23	29		
Teacher development paths are not smooth	25	34		

Table 3 Information of direct cause coding sub-nodes.

Direct cause	Free node name	Reference point content examples
Teachers have cognitive biases regarding course positioning and goals	Teachers view it as a school-based course	I ended up taking school-based lessons
	Teachers view it as an extracurricular course	Students are there to relax, as if they were in an extension class
	Teachers focus on the development of students' basic knowledge and skills	Develop basic knowledge and skills that students can use later
	Teachers tend to overlook higher-level course goals	I don't teach complicated skills

Table 4 Information of main cause coding sub-nodes.

Main cause	Free node name	Reference point content examples
Course resources are insufficiently connected to the local context	Course resources are not well integrated with the local context	Seldom do I gather material from the areas surrounding the school
	Teachers blindly admire urban course resources	The resources provided by the city are more authoritative
	Teachers do not pay enough attention to local resources	There doesn't seem to be anything special around here either
The purpose, process, and outcomes of course evaluation are distorted	Misalignment in evaluation roles	Whether it's good or not is up to the teacher
	Evaluation still focuses primarily on knowledge	A student must learn knowledge
	Evaluation emphasizes form and results	As long as the results are good, the process will also give high marks
	Lack of evaluation of the effectiveness of teacher guidance	No reward for good work
Schools are more focused on grand, impressive external outcomes	Schools are keen on publicity	I have to write a press release after the event
	Schools are keen on organizing events	A large number of activities have to be planned every semester
	Schools are keen on creating "unique features"	If you have a distinctive form, you can pass

leadership, where a single move can have far-reaching consequences. Any ambiguity in this process may lead to confusion in course implementation (Fullan 2006). Among the respondents, 21 teachers pointed out that although national policies designate CPAC as compulsory and on par with other academic subjects from primary through high school, in actual implementation, the course frequently overlaps with social practice and STEAM courses—both of which are often treated as supplementary rather than core components of the course. Furthermore, it also coincides with activities organized by the Young Pioneers, the Communist Youth League, and broader school-based moral education programs. This extensive overlap significantly compromises the course's independence and weakens its status as a distinct national course. Teachers described two major consequences of this situation. First, class hours originally allocated to CPAC are often encroached upon by core academic subjects such as Chinese, mathematics, and foreign languages, creating a gap between the planned schedule and real classroom practice. Second, the course is overloaded with numerous fragmented activities, lacking a clear instructional focus. This not only overwhelms teachers—who must manage and organize an excessive number of unrelated tasks—but also results in a noticeable decline in the quality of course implementation. A teacher commented, "The course lacks clear positioning and ultimately turned out to be a mishmash without a distinct identity." Aside from the impact of top-level design, the weakness of the teaching staff is another fundamental cause of the unsustainability of high-quality RCPAC implementation. A strong teaching staff serves as a platform where educators can share new educational concepts, perspectives, and knowledge with their colleagues. This exchange enables teachers to gain objective and valuable information, thereby reducing resistance to course implementation (Fullan 1996). Among the respondents, 15 teachers reported feeling increasingly inadequate

in their competencies as the course progressed. One major issue is the shortage of full-time teachers dedicated to comprehensive practical activity courses, which leaves many educators without peer support and fosters a sense of emotional isolation. Additionally, as teachers encountered more complex challenges in course implementation, their limited capabilities led to feelings of difficulty and a decline in self-efficacy. Finally, many teachers experienced stagnation in their professional development, which further eroded their intrinsic motivation to sustain high-quality instruction. A teacher remarked, "My colleagues are all part-time and can't offer much help. No one takes this seriously, and over time, I've just wanted to give up and disengage."

Model of causes for the unsustainability of high-quality RCPAC implementation. Based on the analysis above, six primary factors contribute to the unsustainability of high-quality RCPAC implementation: teacher cognition, course resources, evaluation activities, school interventions, top-level design, and the teaching staff. The key question that follows is: what are the underlying mechanisms through which these factors influence the sustainable high-quality implementation of RCPAC, and how are they interconnected? Understanding these mechanisms is essential for optimizing course design, preventing a decline in instructional quality, and ultimately achieving sustainable, high-quality implementation. Drawing on both interview data and relevant literature, the following sections provide an in-depth analysis of how these six factors function and interact, offering insight into the systemic barriers that must be addressed to ensure the long-term success of RCPAC.

We believe that the unsustainability of high-quality RCPAC implementation is the result of the combined influence of multiple factors, including teacher cognition, course resources,

Table 5 Information of fundamental cause coding sub-nodes.

Fundamental cause	Free node name	Reference point content examples
Top-level design is in the exploratory phase	Course status is inconsistent with its nature	We are given too few lessons
	There is much overlap in the course forms	Like STEAM courses, a hodgepodge
	Too many course activities	It's too scattered and my energy can't keep up a bit
Teaching staff is fragmented, weakened, and their development is limited	Serious lack of full-time teaching staff	I originally taught history
	Teachers lack the necessary competencies	It is not as easy to teach as other subjects
	Teacher development paths are not smooth	When I have doubts and difficulties, I don't know who to turn to for solutions

evaluation systems, school interventions, top-level design, and the teaching staff. First, teachers' understanding of the course is the driving force behind the sustainable high-quality implementation of the course. Course cognition is a key component of teachers' course competence, and the depth of teachers' understanding will determine how far the course can be successfully implemented (Li and Zhou 2021). Therefore, teachers must possess comprehensive knowledge of the RCPAC and develop course awareness in their minds. With the guidance of advanced course concepts, teachers can accurately perceive and understand the RCPAC, enabling them to design effective courses that can be sustainably implemented at a high quality. Second, course resources are the fundamental condition for the sustainable high-quality implementation of RCPAC. Rural areas boast abundant natural resources and social-cultural elements, offering unique educational potential that urban schools often lack (Ding et al. 2023). British educator Thomas Percy Nunn once said, "We do not seek to change the unchangeable conditions of human existence, but to fully utilize these conditions" (Nunn 1990). Utilizing the educational value of local rural resources contributes to the construction of a sustainable high-quality development model for RCPAC. Third, the evaluation system guides the course implementation's development. If distorted, it can lead to teachers losing direction in their evaluation efforts, resulting in arbitrary course implementation. Course evaluation is a process of studying and judging RCPAC design, implementation, and outcomes based on certain methods and principles (Zhang 2009). If the direction is incorrect, everything the teacher does afterward will be futile, making sustainable high-quality course implementation impossible. Fourth, school intervention is an external factor in the sustainable high-quality implementation of RCPAC. The more irrelevant interference from the school, the more disrupted the rhythm of course implementation becomes. The saying "the arm cannot twist the thigh" reflects the situation where, under the pressure of the larger school environment, teachers can only go along with the flow for the sake of survival. Fifth, top-level design is the fundamental guarantee for the sustainable high-quality implementation of RCPAC and plays a crucial role in course implementation. Poor top-level design leads to a mismatch between course design and implementation, undermining the seriousness and quality of course execution. Sixth, the teaching staff is essential for the sustainable high-quality implementation of RCPAC. A well-organized teaching staff can provide professional and emotional support to individual teachers, smooth development pathways, and contribute to the professional growth and career planning of RCPAC teachers. This, in turn, strengthens teachers' self-efficacy and internal motivation for implementing the course at a sustainable high-quality.

It is important to note that the relationship between the six factors (teacher cognition, course resources, evaluation system, school intervention, top-level design, teaching staff) and the unsustainability
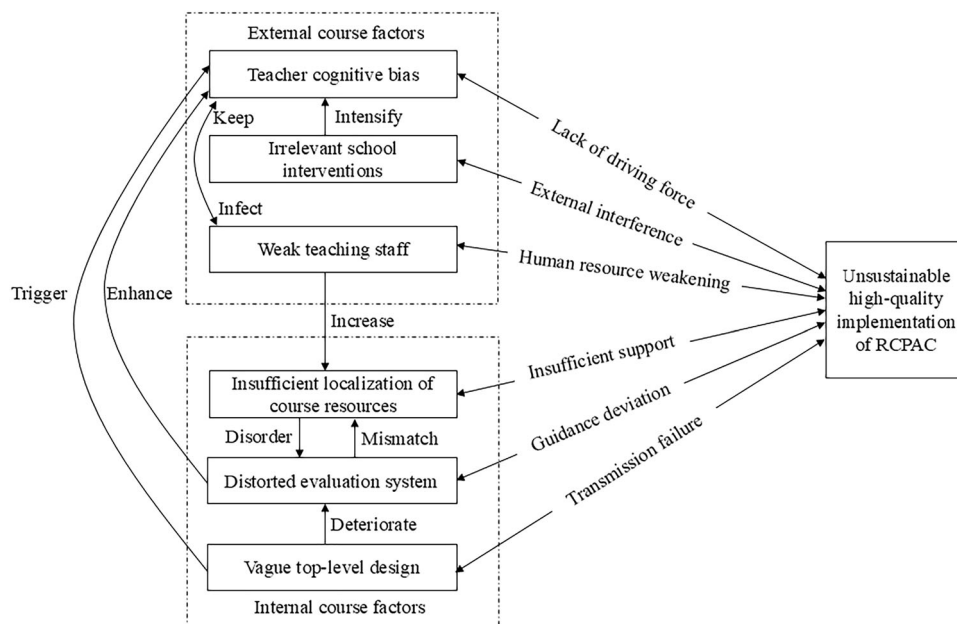
of high-quality RCPAC implementation is not a simple one-to-one correspondence. Instead, these factors are interconnected and mutually influential. They complement and interact with one another in complex and dynamic ways, shaping the overall effectiveness and sustainability of RCPAC implementation.

Teacher cognition, school intervention, and the teaching staff are critical external factors that influence the sustainable high-quality implementation of RCPAC. As the direct implementers of the course, teachers play a central role, and any cognitive bias they hold toward the course can undermine its effectiveness, ultimately affecting the overall quality of the teaching staff. The school, serving as the institutional environment where teachers operate, provides essential support for course implementation. When school interventions are misaligned or irrelevant to the goals of RCPAC, teachers may feel disoriented or unsupported, which not only hampers effective implementation but also subtly distorts their understanding of the course. Moreover, the teaching staff, as a professional community, significantly shapes individual teachers' course cognition. A weak or underdeveloped teaching team can result in diminished course resource quality, further impeding successful RCPAC delivery.

Course resources, evaluation System, and top-level design are internal conditions that influence the sustainable high-quality implementation of RCPAC. Course resources form the foundation of RCPAC implementation. Insufficient localization of course resources results in a homogenization of rural and urban courses, disrupting the rural course evaluation system and rendering evaluations ineffective (Chen and Liu 2021). The evaluation system provides direction for RCPAC implementation. The distorted evaluation system, through the asymmetry of its feedback mechanism (i.e., teachers can only rely on subjective interpretations to explain the results), amplifies the confusion in teachers' cognition of the course (Wei et al. 2023). It also leads to misalignment in the development of teachers' competencies, thereby undermining the construction of the teaching staff. Top-level design is the fundamental guarantee for the sustainable high-quality implementation of RCPAC. Without sound top-level design, teachers may struggle to distinguish between different courses, leading to cognitive biases and contributing to the distortion of the course evaluation system.

The sustainable high-quality implementation of RCPAC is influenced by the six factors mentioned above. Over time, the issue of unsustainable RCPAC implementation feeds back into these factors, manifesting as either adaptations and adjustments to the factors or failed adaptations, which deepens the issues. This leads to direct or indirect mutual influence between the factors, creating a cyclical and iterative relationship between each factor and the unsustainability of high-quality RCPAC implementation. This recursive effect further undermines teachers' motivation due to weakened implementation, thereby accelerating the decline in the quality of course implementation (Praetorius et al. 2017).

Fig. 1 Causal model. This figure illustrates the relationship between six causes and the implementation results of RCPAC.

Based on the above analysis, this study has developed a model illustrating the causes of the unsustainability of high-quality RCPAC implementation, as shown in Fig. 1 (in the figure, single arrows represent unidirectional influence, and double arrows represent bidirectional influence).

Conclusion and implications

Based on authentic interview materials, this study reveals the essence and deep-rooted causes behind the unsustainability of high-quality RCPAC implementation. The findings show that the combined influence of six factors, both internal and external to the course, affects the sustainable high-quality implementation of RCPAC. Teacher cognitive biases is the direct cause. Insufficient localization of course resources, the distortion of evaluation systems, and irrelevant school interventions are the primary causes, while vague top-level design and a weak teaching staff are the fundamental causes.

These research conclusions provide important insights for improving the quality of RCPAC implementation and for the intervention and optimization of course outcomes.

First, enhancing teachers' cognition of RCPAC. This hinges on the deep integration of course philosophy, instructional practice, and institutional support (Li 2021). (1) Systematic policy guidance and targeted conceptual training should be implemented to enhance teachers' understanding of RCPAC's course positioning, educational value, and its alignment with the national course framework. Such efforts are essential for challenging the implicit perception of RCPAC as a "marginal course" and for reinforcing its legitimacy within the broader educational system. (2) Professional learning communities and school-based training mechanisms should be leveraged to enhance teachers' capabilities in course development and project organization. These platforms can guide teachers in constructing knowledge and engaging in reflective practice within authentic educational settings. At the same time, it is crucial to establish a course support system rooted in local resources. Such a system fosters teachers' recognition of the educational value embedded in indigenous materials and helps counteract the prevailing tendency toward "urban centrism" (Semken and García 2021). (3) Course evaluation and incentive

mechanisms should be refined by integrating RCPAC into teacher professional development frameworks and school performance assessment systems. Institutionalizing RCPAC in this way can enhance teachers' motivation to engage with the course and strengthen their sense of professional responsibility. This, in turn, promotes the internalization and stabilization of their understanding of RCPAC. Importantly, this process goes beyond improving teachers' course literacy—it also lays a critical foundation for the high-quality development of rural education.

Second, reduce irrelevant school-level interference in RCPAC (Li et al. 2020). (1) The independent status of RCPAC within the national course system should be clearly defined. At the same time, clear boundaries must be established between RCPAC and school-level activities such as moral education campaigns, club exhibitions, and special initiatives. This distinction is essential to prevent the course from being instrumentalized for administrative or extracurricular purposes, thereby preserving its educational integrity and original intent. (2) A sound course management mechanism should be established to empower teachers as the primary agents in the design, organization, and implementation of RCPAC. By positioning teachers at the center of the process, this mechanism helps prevent the substitution of authentic coursework with superficial activities or the conflation of education with mere publicity, thus safeguarding the pedagogical integrity of the course. (3) Institutional reforms should be implemented to enhance the course leadership capacity of principals and middle-level administrators. These reforms should cultivate both the awareness and the ability to respect the internal logic of the course and to protect the time and resources allocated for RCPAC. Strengthening leadership in this way is essential to ensuring the course's effective implementation and long-term sustainability. (4) Course monitoring and accountability mechanisms should be developed to support schools in evaluating the implementation of RCPAC in alignment with national course standards and overarching educational goals. These mechanisms play a critical role in curbing tendencies toward formalism and utilitarianism, ensuring that the course remains focused on meaningful student learning rather than superficial compliance or outcome-driven practices (Gao et al. 2020). Ultimately, the effective implementation of RCPAC and the full realization of its

educational value can only be achieved by building a course ecosystem that is centered on student development and grounded in teachers' professional judgment. Such an ecosystem fosters meaningful learning experiences, empowers teacher agency, and aligns course practices with long-term educational goals.

Third, enhancing the capacity of the RCPAC teaching staff is a critical component in promoting the sustainable high-quality implementation of the course (Wang and Xie 2018). (1) At the institutional level, a dual system of full-time and part-time teacher deployment should be established, along with a clear definition of the professional status of RCPAC teachers. This will help enhance their sense of professional identity and legitimize their role within the school system. (2) A tiered and categorized pathway for professional development should be developed, integrating systematic training, project-based learning, and school-based research. This approach will strengthen core competencies in areas such as project design, interdisciplinary integration, and resource development (Li 2021). (3) RCPAC teaching achievements should be incorporated into teacher evaluation and promotion systems to stimulate enthusiasm and creativity, while also helping to reduce attrition rates (Liu and Fang 2020). By combining policy support, targeted professional development, and performance-based incentives, a competent, practice-oriented, and innovation-driven RCPAC teaching team can be cultivated—laying a strong foundation for the course's long-term sustainability.

Fourth, enhance the localization of RCPAC course resources. Course resources, the evaluation system, and top-level design are internal factors that affect the emergence and maintenance of sustainable high-quality RCPAC implementation. (1) Build a strong localization design and development team. Effective localized resource design and development require coordinated collaboration among multiple stakeholders, including schools, farmers, farms, and village committees. Institutional mechanisms should be established to ensure close cooperation among these parties, preventing conflicting policies from offsetting one another and undermining the intended outcomes (Huang et al. 2023). (2) The integration of local resources should be conducted with a critical and balanced perspective. It is essential to consider the interests of resource providers and to be mindful of potential harm to material resources. Responsible integration practices help sustain the long-term availability and educational value of local materials (Sobel 2004). (3) Multidimensional contextual experiences are vital for engaging learners' sensory perceptions and creating meaningful entry points into new knowledge. Such experiences provide an intuitive grasp of real-world phenomena, allowing learners to move from immersive participation to self-directed construction of understanding (Zhong and Liu 2022).

Fifth, establish a sound evaluation system for RCPAC. A robust evaluation system for RCPAC should be grounded in the course's core characteristics—practicality, locality, and generativity—while emphasizing diversity, process orientation, and developmental focus (Liu and Li 2021). (1) Evaluation should go beyond measuring outcomes or the mere completion of activities. Instead, it should focus on students' inquiry abilities, collaboration skills, problem-solving competencies, and value formation within authentic contexts. The emphasis must shift from a product-oriented model to one that prioritizes learning processes and developmental trajectories. (2) A participatory evaluation model should be adopted, involving teachers, students, parents, and community members to create a multidimensional and multi-layered feedback system. Special emphasis should be placed on student self-assessment and peer evaluation to cultivate learner agency and promote reflective thinking. (3) Evaluation tools such as learning portfolios, project reports, process observations, and reflective journals should be used to trace students' learning pathways and cognitive development. These approaches help reduce dependence on rigid scoring systems and standardized assessments. (4) Evaluation outcomes should inform course refinement and teaching adjustments, rather than serving merely administrative or archival purposes. Embedding evaluation within the broader course ecology and aligning it with students' actual developmental needs is essential for creating a supportive and generative RCPAC evaluation system that genuinely facilitates the achievement of course goals.

Sixth, enhancing the top-level design of RCPAC is essential for establishing a scientific, systematic, and adaptive policy framework that enables the transition from policy vision to effective classroom implementation. (1) The educational positioning and structural function of RCPAC within the national course system should be clearly defined. Its boundaries and synergies with adjacent courses—such as STEAM education—must be delineated to prevent functional overlap and avoid confusion in implementation. (2) Strategic alignment of course standards, resource systems, and implementation frameworks at both national and local levels is necessary to develop a guiding system that balances coherence with contextual flexibility. Such coordination will improve the course's operability and adaptability across diverse educational environments. (3) A comprehensive support system should be built, including platforms for resource integration, mechanisms for formative evaluation, and quality monitoring structures. These institutional supports are critical for ensuring the long-term, sustainable implementation of RCPAC (Pan et al. 2022). By constructing a top-level design framework that is coherent, directive, and collaborative, RCPAC can be effectively transformed from a policy directive into meaningful, impactful educational practice.

Limitations and future research

This study explored the reasons for the unsustainability of high-quality RCPAC implementation through in-depth interviews, achieving some valuable research results. However, several limitations remain in this study.

First, although the study reached "theoretical saturation" in qualitative research, this saturation is only an ideal state. The number of respondents (only 58), the type (only teachers), and the geographic distribution (data from only seven provinces) were limited, meaning that node saturation cannot be fully guaranteed. This has also resulted in the potential impact of regional policy differences or economic disparities among provinces being insufficiently explored. Future research could improve the quality of qualitative studies by increasing the number of interviewees, expanding types (e.g., adding principals or education bureau officials), and diversifying geographic distribution (including more provinces).

Second, this study only used in-depth interviews as a data source, lacking support from other types of data. Future research could broaden the sources of data by including teachers' instructional designs, classroom videos, etc., to establish data triangulation.

Third, the reason model for the unsustainability of high-quality RCPAC implementation reflects only qualitative relationships between influencing factors without showing specific correlation degrees. Future research could design surveys to explore the quantitative relationships between influencing factors and between factors and dependent variables, thus offering more accurate optimization strategies.

Data availability

The pseudonymized data that support the findings of this study are available on request from the corresponding author. The raw

data are not publicly available due to concerns that they might disclose the privacy of the participants.

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Author contributions
Conceptualization: JC and CW; methodology: LH; validation: JC; formal analysis: LZ and CW; investigation: LH; resources: LH; writing—original draft: LH and LZ; writing—review & editing: JC and ZL; visualization: LH; supervision: LZ; project administration: CW; funding acquisition: ZL. All authors reviewed the manuscript.

Competing interests
The authors declare no competing interests.

Ethical approval
This study was approved by the Institutional Ethics Board (IEB) of Shaanxi Normal University under ethics approval number 2023009-05, on September 5, 2023. The approval covered all stages of the research process, including participant recruitment, data collection, and data analysis. Ethical approval was obtained prior to data collection. All procedures involving human participants were conducted in accordance with the ethical standards of the committee and the Declaration of Helsinki.

Informed consent
Written informed consent was obtained from all participants between September 10, 2023 and November 15, 2023. The consent process was conducted by the first author prior to the commencement of data collection activities. All participants were adults and were recruited through classroom visits, and no vulnerable individuals or minors were involved. The consent covered data use and consent to publish. Before any data collection commenced, participants were first briefed about the aim of the research. They were then allowed to decide whether their interviews could be recorded. Therefore, participation in this study was completely voluntary and the responses given will be anonymous and used for academic purposes only. There is no risk to them of participating.

Additional information
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