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Student-Centered Approach in Primary Mathematics: Teachers' Perceptions and Practices in Rural Cambodia

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ABSTRACT

The successful implementation of student-centered pedagogy in primary mathematics education is fundamentally contingent upon teachers' perceptions and instructional practices, particularly within developing country contexts undergoing curriculum reform. This study examined the perceptions and classroom practices of primary mathematics teachers regarding the adoption of the Student-Centered Approach (SCA) in rural and remote public primary schools in Siem Reap Province, Cambodia. Employing a qualitative case study design guided by phenomenological principles, data were collected through semi-structured individual interviews and non-participant classroom observations with four purposively selected female primary mathematics teachers representing both experienced and newly qualified practitioners across rural and remote school settings. Thematic content analysis was applied to identify patterns across interview transcripts and observational field notes. The findings indicate that all participants demonstrated a broadly consistent conceptual understanding of SCA principles; however, a notable gap was observed between their stated perceptions and enacted classroom practices. Experienced teachers implemented SCA more effectively and consistently than their newly qualified counterparts, a disparity attributed primarily to differences in professional development access, teaching experience, and individual motivation rather than geographic location or formal educational background. Systemic barriers including classroom overcrowding, insufficient instructional materials, and inequitable distribution of in-service training opportunities were identified as significant constraints on effective SCA adoption. The study concludes that sustainable pedagogical reform in resource-limited primary school contexts requires coordinated investment in teacher professional development equity alongside structural improvements in school-level resources and institutional support.

Keywords: Cambodia Primary Education, Curriculum Reform, Student-Centered Approach, Teacher Perception, Teacher Professional Development

INTRODUCTION

Education serves as the foundational pillar of national development, playing an indispensable role in human capital formation, poverty reduction, and sustainable economic growth (Hübel et al., 2023; Riadynska, 2022). Governments at all levels, development agencies, and civil society organizations have long committed substantial resources to advancing the quality and accessibility of general education, from primary schooling through to higher education (Musah et al., 2024). International bodies including UNESCO, UNICEF, and the World Bank have provided considerable financial and technical assistance to expand primary education access, particularly in low- and middle-income countries. Despite these sustained efforts, persistent disparities in educational quality and learning outcomes remain a critical concern across the developing world, with millions of school-age children still failing to acquire foundational literacy and numeracy skills (Beng, 2021; Trinh, 2023).

Within the Southeast Asian context, Cambodia presents a particularly compelling case for examining the intersection of curriculum reform and pedagogical practice (Run et al., 2025). The country's education system has undergone substantial transformation since the post-conflict reconstruction era, with the Cambodian government designating primary education as a national development priority and allocating a significant portion of the Ministry of Education, Youth and Sport (MoEYS) budget to this subsector (MoEYS, 2025). Progress in school enrollment has been documented, with the net enrollment rate in primary education reaching near-universal levels in recent years. However, improvements in access have not been uniformly accompanied by corresponding gains in educational quality, particularly in rural and remote provinces where resource constraints, infrastructure deficiencies, and geographic isolation continue to impede effective teaching and learning (Meas et al., 2024).

A growing body of scholarship has identified teacher pedagogy as among the most influential school-level determinants of student learning outcomes. In particular, the adoption of learner-centered pedagogical approaches has been associated with increased student engagement, improved academic achievement, and reduced dropout rates across diverse educational contexts (Sakata et al., 2022). The Student-Centered Approach (SCA) places the emphasis of classroom instruction on facilitating student learning rather than transmitting information through direct teacher exposition (Eksangkul et al., 2023). This approach actively involves learners in the construction of knowledge, drawing on their prior experiences, promoting critical thinking, and fostering the capacity to apply learning to authentic real-world situations (McCombs & Whisler, 1997; Weimer, 2008). Within the framework of constructivist learning theory, SCA has been broadly endorsed as a pedagogically sound response to the limitations of traditional, teacher-directed instruction (Vygotsky, 2018).

In response to international educational trends and domestic development imperatives, Cambodia has initiated a series of curriculum reforms at the primary level with the explicit aim of transitioning from a traditional teacher-centered approach toward a more student-centered paradigm. The new primary curriculum framework reflects the government's commitment to improving the quality of teaching and learning in public schools, encouraging active participation, inquiry-based learning, and the development of higher-order thinking skills among students (MoEYS, 2024). However, Adnan et al. (2020) argued that the successful implementation of curricular innovations is contingent upon teachers' willingness and capacity to transform their classroom practices accordingly. Research conducted in comparable developing country contexts suggests that curriculum reform efforts frequently encounter significant challenges at the implementation stage, particularly where teachers lack adequate professional preparation, pedagogical knowledge, and instructional materials (Sakata et al., 2022; Schweisfurth, 2015).

Previous studies conducted in Cambodia and the broader Southeast Asian region have documented several structural and contextual barriers that constrain the effective adoption of student-centered pedagogy. These include insufficient pre-service and in-service teacher training, limited access to appropriate teaching and learning materials, large class sizes, low teacher salaries, and the persistence of deeply ingrained teacher-centered instructional habits shaped by prior educational experience and cultural norms (Atkinson & King, 2025; Sok & Heng, 2024). The tension between policy-mandated pedagogical reform and the practical realities of classroom teaching has been particularly acute in rural and remote school settings, where systemic disadvantages are most pronounced. Hour (2025) similarly observed that in Cambodian educational institutions, the student-centered approach remains aspirational rather than consistently realized, owing in part to a gap between institutional expectations and the actual pedagogical competencies of teaching staff.

Despite the growing literature on curriculum reform and pedagogical change in Cambodia, a notable research gap persists concerning the specific perceptions and instructional practices of primary mathematics teachers in rural and remote contexts. Much of the extant scholarship has focused on higher education or urban settings, leaving the experiences of teachers in geographically disadvantaged provinces such as Siem Reap comparatively underexplored. Furthermore, few studies have examined whether significant differences exist between teachers in rural and remote areas in terms of their understanding of, and commitment to, student-centered pedagogical principles. This absence of context-specific empirical evidence limits the development of targeted policy interventions and professional development programs that are responsive to the lived realities of teachers working in underserved communities.

The present study seeks to address this gap by examining the perceptions and classroom practices of primary mathematics teachers in Siem Reap Province, Cambodia, with particular attention to the adoption of the Student-Centered Approach within the context of ongoing national curriculum reform. The study makes three specific contributions to the existing literature. First, it provides empirical evidence from rural and remote primary school settings in Cambodia, a context that has received comparatively limited scholarly attention relative to urban schools and higher education institutions. Second, it offers a comparative perspective on experienced and newly qualified teachers within the same geographic and institutional context, enabling a more nuanced understanding of how professional development history and teaching experience shape SCA adoption. Third, it contributes to the broader theoretical debate on learner-centered pedagogy implementation in low- and middle-income countries by demonstrating that individual teacher motivation can function as a meaningful compensatory factor in resource-constrained environments, extending rather than contradicting existing frameworks such as Raymond's (1997) model of teacher perceptions and practices. The study is guided by the following research questions: (1) What are primary mathematics teachers' perceptions regarding the adoption of the Student-Centered Approach in rural and remote areas of Siem Reap Province, Cambodia? (2) What instructional practices do these teachers employ in the teaching of mathematics in public primary schools? (3) How do primary mathematics teachers utilize their pedagogical methods to facilitate effective student learning?

LITERATURE REVIEW

Teachers' Perceptions and Practices in Mathematics Education

Teacher perception is widely understood as an internalized mental construct developed through accumulated personal experiences, including prior schooling, teacher training, and classroom practice, that functions as a cognitive filter shaping how individuals interpret and respond to new information (Datnow et al., 2023; Wolff et al., 2021). Unlike knowledge, which must be objectively verifiable, perception operates as a subjective evaluative judgment that may or may not align with empirical reality (Giri & Nagendra, 2024). In mathematics education specifically, teachers' perceptions constitute a critical determinant of instructional decision-making, as two teachers possessing equivalent subject knowledge may nevertheless adopt fundamentally different teaching approaches owing to differences in their underlying pedagogical beliefs (Ernest, 1989; Khalil et al., 2024). Research has consistently demonstrated that teachers' perceptions exert significant influence on their classroom practices, with those holding reform-oriented perceptions more likely to engage in reform-aligned instructional behaviors (Lindvall, 2025; Roehrig & Kruse, 2005).

The relationship between perception and practice is, however, neither linear nor straightforward. Thompson (2006) cautioned that the correlation between teachers' perceptions of mathematics teaching and their actual instructional practices does not operate through a simple causal mechanism. More recently, Koskinen and Pitkäniemi (2022) affirmed through a research synthesis that meaningful mathematics instruction requires teachers to possess not only content knowledge but also a coherent set of pedagogical beliefs conducive to student-centered learning. Furthermore, Sakata et al. (2022) argued that effective implementation of learner-centered pedagogy depends significantly on the interplay between teacher agency, cultural beliefs, and institutional support structures, suggesting that perception alone is insufficient to transform practice without enabling systemic conditions. Raymond's (1997) theoretical model, presented in Figure 1, captures these layered relationships by illustrating how past experiences, formal teacher education, and social teaching norms each contribute to shaping both teacher perception and classroom practice.

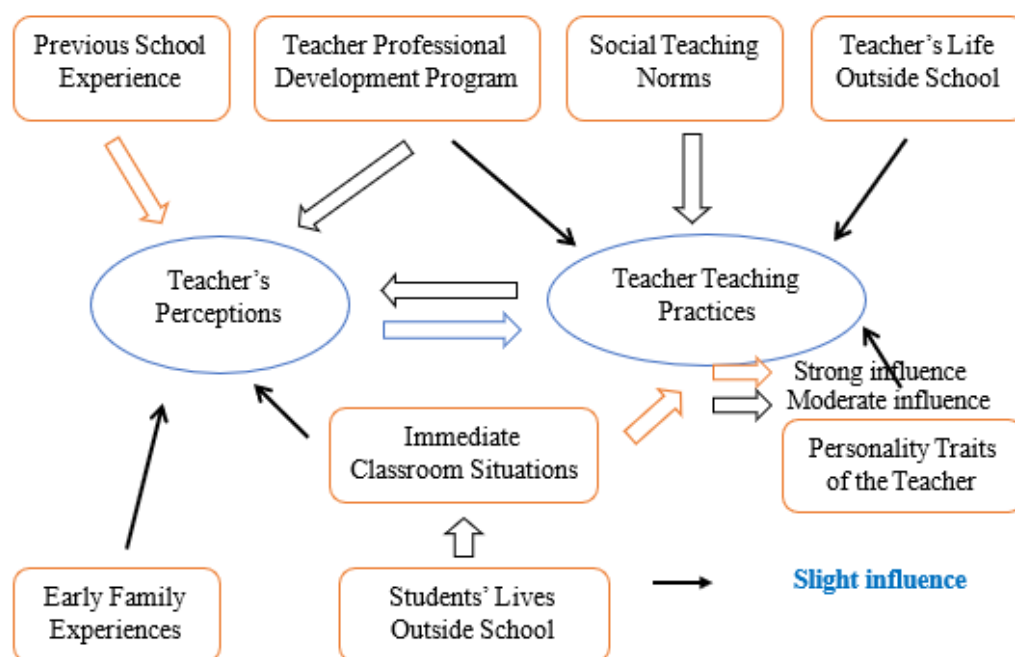


Figure 1 Raymond's Model of Teacher Perceptions and Teaching Practices (1997)

The Student-Centered Approach: Principles and Theoretical Underpinnings

The Student-Centered Approach (SCA) represents a broad pedagogical orientation in which the focus of classroom instruction shifts from teacher transmission of content to the facilitation of active student learning (Hasibuan et al., 2025; Weimer, 2008). Rooted in the constructivist tradition, particularly Vygotsky's (2018) sociocultural theory of learning and Dewey's (1997) experiential education philosophy, SCA holds that learners construct knowledge most effectively through direct experience, social interaction, and the application of

learning to meaningful real-world contexts. Within SCA classrooms, teachers are repositioned as facilitators who design learning experiences, encourage inquiry, and scaffold student understanding, rather than functioning as the primary source of knowledge transmission (Malik et al., 2025).

Bremner (2021) identified six core characteristics of learner-centered pedagogy: active participation, adaptive instruction, learner autonomy, development of relevant skills, power-sharing between teacher and student, and formative assessment. A systematic review by Sakata et al. (2022) found that active participation and responsiveness to learner needs were the most widely recognized SCA dimensions across diverse cultural and geographic contexts, while power-sharing and formative assessment received considerably less emphasis in Asian and African educational settings. This finding is particularly relevant to the Cambodian context, where hierarchical classroom norms and teacher authority remain influential cultural forces. Despite growing international endorsement of SCA by bodies such as UNESCO and the World Bank, evidence from low- and middle-income countries suggests that successful implementation remains elusive and context-dependent (Bremner et al., 2023; Sakata et al., 2022).

Primary Education and Curriculum Reform in Cambodia

Cambodia's primary education system covers Grades 1 through 6 and forms the foundational stage of a nine-year basic education cycle. Cambodia's formal education structure encompasses six years of primary schooling followed by three years of lower secondary education, with upper secondary and higher education thereafter (MoEYS, 2019, 2024). Following decades of post-conflict reconstruction, the government has substantially increased investment in primary education, prioritizing near-universal enrollment and the reform of curriculum frameworks. The most recent national primary curriculum, introduced in 2004 and progressively implemented from 2006, was designed to shift pedagogy from a predominantly teacher-directed model toward a student-centered one, with mathematics allocated an increased number of weekly instructional periods across all grade levels. Tables 1 and 2 illustrate the curricular changes before and after the 2004 reform.

Table 1 Weekly Lesson Schedule of Primary Education Before the 2004 Curriculum Reform

Subject	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Khmer Language	14	12	12	11	8	8
Foreign Language	—	—	—	—	3	3
Mathematics	5	5	5	5	5	5
Science	2	3	3	3	3	3
History and Geography	2	2	2	2	2	2
Moral-Civics	1	2	2	2	2	2

Subject	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Arts	2	2	2	2	2	2
Technology	1	1	1	2	2	2
Physical Education	2	2	2	2	2	2
Special Activities	1	1	1	1	1	1
Total	30	30	30	30	30	30

Source: MoeYS (2004, 2006); UNESCO (2011)

Note: Each teaching period lasts 45 minutes

Table 2 Weekly Lesson Schedule Following the New National Curriculum (2024)

Subject	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Khmer Language	13	13	13	8	10	10
Mathematics	7	7	7	6	6	6
Science and Social Studies	3	3	3	—	—	—
Science	—	—	—	4	3	3
Social Studies	—	—	—	5	4	4
Physical and Health Education	2	2	2	2	2	2
Sub-total	25	25	25	25	25	25
Local Life Skills Program	2 to 5	2 to 5	2 to 5	2 to 5	2 to 5	2 to 5
Total	27 to 30	27 to 30	27 to 30	27 to 30	27 to 30	27 to 30

Source: MoeYS (2004, 2006); UNESCO (2011)

Note: Arts education is integrated into Science and Social Studies in Grades 1 to 3, and into Social Studies in Grades 4 to 6. Each teaching period lasts 40 minutes

Despite this policy-level commitment to SCA, research has documented significant implementation gaps, particularly in rural and remote schools. Meas et al. (2024) noted that primary schools in underserved provinces continue to face shortages of qualified teachers, insufficient instructional materials, and limited access to professional development opportunities. Classroom observation studies have further revealed that mathematics instruction in Cambodian primary schools remains predominantly whole-class in format, with students spending the majority of lesson time copying content from the board and performing computational exercises with limited conceptual engagement (MoEYS, 2024; Sok & Heng, 2024).

Theoretical and Conceptual Framework

This study is grounded in Raymond's (1997) model of teacher perceptions and practices, which posits that teachers' instructional behaviors are shaped by a complex interaction of past experiences, formal teacher education, and prevailing social and institutional norms. The model proposes that past school experiences

exert the strongest influence on the development of teacher perceptions, followed by the type of teacher education program received, with the immediate classroom context and professional social norms exerting a more moderate shaping influence on actual teaching practices. This framework is complemented by Vygotsky's (2018) constructivist theory, which underscores the social and experiential dimensions of meaningful learning, and by the principles of the National Council of Teachers of Mathematics (NCTM), which advocate for mathematically rich, student-centered classroom environments.

The conceptual framework adopted in this study, presented in Figure 2, illustrates how these theoretical foundations converge to shape primary mathematics teachers' perceptions and classroom practices in the context of Cambodia's new curriculum reform. Specifically, the framework proposes that the national primary curriculum, informed by both NCTM standards and Realistic Mathematics Education (RME) principles, directly influences the instructional orientations of primary mathematics teachers. Teachers' perceptions, filtered through their prior experiences, professional training, and cultural contexts, in turn mediate the degree to which SCA principles are translated into actual classroom practice. As Hour (2025) observed in a related Cambodian educational context, a persistent gap between institutional expectations and teachers' enacted pedagogical competencies remains a central challenge for educational reform efforts at all levels.

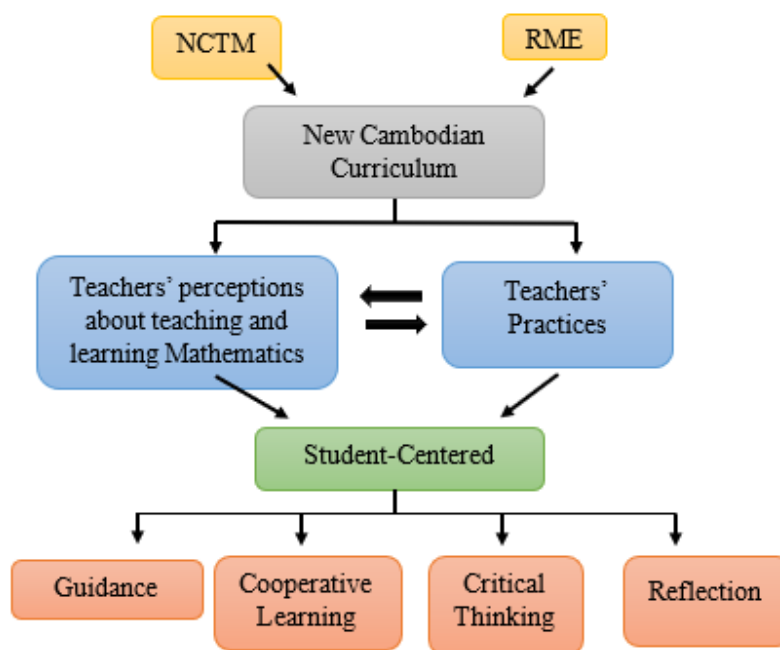


Figure 2 Conceptual Framework

RESEARCH METHODOLOGY

This study adopted a qualitative research design, which is appropriate for examining complex social phenomena that require in-depth understanding rather than numerical measurement (Creswell & Creswell, 2022). Specifically, a case study approach was employed to investigate primary mathematics teachers' perceptions and practices regarding the Student-Centered Approach within the context of ongoing curriculum reform in Siem Reap Province, Cambodia. A case study design is particularly well-suited to this inquiry as it allows the researcher to explore contextually bounded phenomena in their natural setting, yielding rich and detailed data that illuminates the lived experiences of participants (Merriam & Tisdell, 2016). Within this qualitative tradition, phenomenological principles guided the analytical orientation of the study, with the aim of understanding and describing how teachers experience and make sense of their everyday instructional realities (Daly, 2005).

Purposive sampling was employed to select participants, as this technique enables researchers to identify information-rich cases that are well-aligned with the specific focus of the inquiry (Creswell & Creswell, 2023). Two public primary schools from one district within Siem Reap Province were selected based on their geographic location, representing rural and remote school settings respectively. Four primary mathematics teachers participated in the study: two experienced teachers and two newly qualified teachers, teaching across Grades 1 to 6. Although four participants constitute a small sample, this number is consistent with the bounded, in-depth nature of qualitative case study research, which prioritizes analytical depth and contextual richness over statistical representativeness (Creswell & Creswell, 2023; Merriam & Tisdell, 2016). This deliberate contrast between experienced and newly qualified teachers enabled comparative exploration of how teaching experience and professional development history shape teachers' perceptions and instructional practices. Table 3 presents the basic profile of participants.

Table 3 Basic Information of Participants

Location	Schools Selected	Total Participants	Teacher Type	Geographic Setting
Siem Reap Province (12 Districts)	2 public primary schools from 1 district	4	2 Experienced, 2 Newly Qualified	Rural and Remote

Source: Researcher's Database (2025)

Data were collected through two primary instruments: semi-structured individual interviews and non-participant classroom observations. Semi-structured interviews were selected because they allow the interviewer to pursue predetermined themes while simultaneously affording participants the flexibility to

elaborate on their experiences, attitudes, and opinions in an open and unrestricted manner (Merriam & Tisdell, 2016). This format was considered especially appropriate given the study's aim of capturing teachers' nuanced perceptions of SCA, as it encouraged candid and detailed responses in a private, low-pressure setting. Classroom observations were conducted concurrently to examine the extent to which teachers' stated perceptions were reflected in their actual instructional practices, providing a triangulated perspective on the perception-practice relationship (Creswell & Creswell, 2023).

Prior to data collection, ethical clearance procedures were observed. Written permission was obtained from the principals of both participating schools, followed by the distribution of informed consent forms to all teacher participants. Participants were assured of the voluntary nature of their involvement and were fully briefed on the study's objectives, procedures, and intended use of findings before any data collection commenced. All interviews were audio-recorded with participants' consent and subsequently transcribed verbatim to preserve accuracy and completeness. The researcher also acknowledges that, as an outsider conducting observations in the participants' own classrooms, a degree of observer effect cannot be entirely excluded. Reflexive awareness of this limitation was maintained throughout the data collection and analysis process.

Data analysis followed a thematic content analysis approach, conducted manually through systematic reading, coding, and categorization of interview transcripts and observation notes (Braun & Clarke, 2022). The researcher identified recurring patterns, themes, and sub-themes by grouping related segments of data, with particular attention to convergences and divergences between participants' expressed perceptions and their observed classroom behaviors. To strengthen the trustworthiness of the findings, member checking was employed, whereby transcriptions were returned to participants for verification prior to analysis. Observational data were subsequently compared with interview transcripts to produce an integrated, triangulated account of primary mathematics teachers' perceptions and practices in relation to SCA implementation.

RESULTS AND DISCUSSION

Participant Profiles

Four female primary mathematics teachers from two public schools in Siem Reap Province participated in this study. All held a High School Diploma supplemented by two years of pedagogical training completed at the Siem Reap Pedagogical Training Institute. Participants 1 and 2 (P1 and P2) were stationed at a rural primary school, while Participants 3 and 4 (P3 and P4) taught at a remote primary school. Their teaching experience ranged from 2 to 29 years, and their ages spanned from 22 to 48 years. Table 4 presents a summary of participants' profiles.

Table 4 Personal Data of Participants

Participant	Sex	Age	Educational Background	School Location	Grade	Teaching Experience
P1	F	48	High School Diploma + 2-year pedagogical training	Rural	3	29 years
P2	F	23	High School Diploma + 2-year pedagogical training	Rural	3	3 years
P3	F	36	High School Diploma + 2-year pedagogical training	Remote	5	16 years
P4	F	22	High School Diploma + 2-year pedagogical training	Remote	6	2 years

Source: Researcher's Database (2025)

Teachers' Perceptions and Classroom Practices of the Student-Centered Approach

All four participants demonstrated a broadly consistent conceptual understanding of the Student-Centered Approach, describing it as a pedagogical orientation in which student activities, expression, and collaborative problem-solving take precedence over direct teacher instruction. They identified the teacher's role as that of a facilitator who organizes learning tasks, monitors student progress, and corrects errors rather than functioning as the primary transmitter of knowledge. P1 articulated this understanding through her description of group-based addition exercises using concrete manipulatives, explaining that students discuss solutions among themselves while the teacher assumes a corrective and facilitative role. This description reflects a clear grasp of the constructivist principle that knowledge is socially constructed through peer interaction rather than transmitted unidirectionally from teacher to student (Vygotsky, 2018). P3 similarly summarized the SCA dynamic through the pedagogical sequence she described as 'I do, You do, We do,' capturing the gradual release of instructional responsibility from teacher to student. This formulation aligns closely with scaffolded instruction theory, in which the teacher progressively withdraws direct support as learner competence develops (McCombs & Whisler, 1997). Together, these accounts suggest that experienced teachers have internalized SCA not merely as a procedural technique but as a coherent pedagogical philosophy grounded in student agency and collaborative learning.

Classroom observation data, however, revealed a notable divergence between stated perceptions and enacted practice. Experienced teachers, P1 and P3, demonstrated more consistent implementation of SCA, with students actively engaging in group activities, peer discussion, and self-directed problem-solving. By contrast, newly qualified teachers, P2 and P4, were observed to rely more heavily

on teacher-directed instruction, frequently reverting to a combined SCA and TCA approach. This perception-practice gap is consistent with the broader literature. Raymond (1997) established that teachers' prior schooling experiences and ingrained instructional habits exert a stronger influence on actual classroom behavior than formally acquired pedagogical knowledge. More recently, Bremner et al. (2023) confirmed through a systematic review that the gap between teachers' espoused learner-centered beliefs and their observable classroom practice remains one of the most persistent challenges to SCA implementation in low- and middle-income country contexts.

Implementation of SCA Principles: Guidance, Cooperative Learning, Critical Thinking, and Reflection

Across all four participants, the four core principles of SCA, namely guidance and direction, cooperative learning, critical thinking, and reflection, were consistently referenced as central to their instructional approach, though their application varied markedly between experienced and newly qualified teachers.

Regarding guidance and direction, P1 demonstrated sophisticated differentiation in her instructional approach, assigning individual and pair work for lower-order computational exercises while organizing small mixed-ability groups with designated roles, including group leader, note-taker, and calculator, for more complex problem-solving tasks. This structured differentiation reflects an advanced understanding of how task design and grouping strategies can simultaneously accommodate diverse learner abilities and promote cooperative engagement. By contrast, P2 and P4 acknowledged the importance of providing clear instructions but expressed considerably less confidence in designing and applying differentiated guidance strategies within their classrooms. This discrepancy suggests that pedagogical knowledge and classroom management competence, both of which are substantially shaped by accumulated teaching experience and professional development exposure, are significant determinants of instructional quality in SCA implementation (Sok & Heng, 2024).

On cooperative learning, all four participants reported using group work, peer teaching, and reward mechanisms to sustain student motivation and participation. P4 introduced a competitive scoring system in which differentiated marks were awarded based on the order and accuracy of exercise completion, a technique she reported as highly effective in maintaining student engagement in her remote school setting. While competitive reward structures carry certain pedagogical risks if not carefully managed, this finding illustrates how teachers in resource-constrained contexts creatively adapt SCA principles to their immediate classroom realities, a form of contextual pedagogical improvisation that has been observed in comparable developing country settings (Sakata et al., 2022). The use of tangible rewards such as verbal praise and small gifts was similarly reported across all participants as a motivational strategy for lower-achieving students, reinforcing the importance of

affective dimensions of learning in primary mathematics classrooms (Koskinen & Pitkäniemi, 2022).

On critical thinking, experienced teachers P1 and P3 reported providing strategic clues and follow-up questions to sustain student reasoning when initial attempts at problem-solving were unsuccessful, thereby maintaining cognitive engagement without simply supplying correct answers. This approach reflects a deliberate effort to develop higher-order thinking skills within the SCA framework. Newly qualified teachers P2 and P4, however, tended to accept students' self-assessments of correctness without probing further, a pattern consistent with the finding that newly qualified teachers in developing country contexts often lack the pedagogical repertoire needed to sustain deep inquiry-based learning under real classroom conditions (Bremner et al., 2023).

Regarding reflection, P3 provided the most detailed account, describing how she regularly required students to summarize completed lessons, explain calculation procedures to peers, and evaluate their own understanding before receiving teacher feedback. This structured use of reflection as a consolidation and self-assessment tool aligns with formative assessment principles identified as a core dimension of effective learner-centered pedagogy (Bremner, 2021). Newly qualified teachers acknowledged reflection as valuable but demonstrated less systematic integration of it during classroom observation, suggesting that the skill of embedding reflective practice into routine lesson sequences develops gradually through experience and targeted professional development rather than through pre-service training alone.

Teacher Professional Development, Challenges, and Motivation

A critical finding of this study concerns the uneven access to, and quality of, teacher professional development among participants. Three participants, P2, P3, and P4, had received SCA-related instruction during pre-service training at the Siem Reap Pedagogical Training Institute, while P1 had completed her teacher training prior to the formal introduction of SCA and therefore acquired her pedagogical knowledge exclusively through short-term in-service seminars organized by non-governmental organizations. This finding reveals a structural inequity in professional development provision, as newly qualified teachers reported insufficient in-service follow-up training after graduation, and experienced teachers noted that only two to three senior staff per school were typically invited to attend district-level professional development seminars. This distribution pattern effectively disadvantages newer teachers, who are among those most in need of sustained pedagogical support (Boateng & Wolfenden, 2022; Sok & Heng, 2024).

Teachers identified several recurring challenges to SCA implementation. Classroom overcrowding, with 40 to 55 students per class, severely constrained the feasibility of group-based and activity-centered learning. Insufficient instructional materials, limited time within lesson plans, and a high proportion of low-achieving or disengaged students further compounded implementation difficulties.

Additionally, student absenteeism associated with agricultural and domestic labor demands was identified as a significant contextual barrier, particularly in remote schools. These structural constraints are well-documented in the literature on learner-centered pedagogy reform in low- and middle-income countries and represent systemic rather than individual impediments to effective SCA adoption (Meas et al., 2024; Sakata et al., 2022).

Despite these challenges, teacher motivation and satisfaction emerged as decisive factors in determining the quality of SCA implementation, independent of age, teaching experience, or school location. P3, despite having received no pre-service SCA training, demonstrated among the strongest classroom implementation of the approach, attributed to her sustained engagement with in-service training programs and her intrinsic motivation to improve her instructional practice. This finding supports Hour's (2025) observation within the Cambodian educational context that institutional and professional culture, including access to quality training and a sense of personal commitment, significantly shapes the pedagogical quality that teachers bring to their classrooms.

The findings of this study largely support and extend the existing body of literature on SCA implementation in developing country primary school contexts. In alignment with Sakata, Bremner et al. (2022), who concluded through a systematic review that learner-centered pedagogy implementation in low- and middle-income countries is consistently constrained by teacher preparation deficits, resource scarcity, and cultural teaching norms, the present study confirms that Cambodian primary mathematics teachers in rural and remote Siem Reap schools face structurally similar barriers. The coexistence of SCA-aligned beliefs with predominantly teacher-directed practice observed in this study mirrors the implementation gap that Bremner et al. (2023) identify as characteristic of pedagogical reform efforts across the Global South, where surface-level adoption of learner-centered language does not necessarily translate into transformed classroom behavior.

The study also extends Raymond's (1997) theoretical model by providing empirical evidence from a post-conflict developing country context in which the model's predictions hold: prior teaching experience and the nature of pre-service training are strong predictors of teachers' capacity to implement SCA effectively. However, the case of P3, an experienced teacher who successfully internalized SCA principles without formal pre-service exposure, introduces a meaningful qualification to the model, suggesting that sustained in-service engagement and personal motivation can, under certain conditions, compensate for gaps in initial teacher preparation. This finding extends rather than contradicts Raymond's model and is consistent with Sok and Heng's (2024) argument that continuous, practically oriented professional development is indispensable for improving teaching quality in Cambodia.

Where this study diverges from some prior literature is in its emphasis on teacher motivation as an autonomous determinant of SCA quality. While Meas et al. (2024) and Sakata et al. (2022) highlight systemic and structural factors as the primary constraints on learner-centered pedagogy adoption, the present findings suggest that within the same structural context, comparable training backgrounds, identical resource constraints, and equivalent school locations, individual differences in motivation and professional commitment produce markedly different instructional outcomes. This finding contributes a nuanced perspective to the field, reinforcing the view that pedagogical reform in resource-limited contexts requires not only structural investment in materials and training but also targeted strategies for cultivating teacher agency, professional identity, and intrinsic motivation as foundational preconditions for sustainable SCA implementation.

Limitations

Several limitations of this study should be acknowledged when interpreting its findings. First, the purposive sample comprised only four participants drawn from two primary schools within a single district of Siem Reap Province. While this sample size is consistent with the bounded, in-depth nature of qualitative case study research, it nonetheless limits the transferability of findings to other districts, provinces, or school types within Cambodia (Creswell & Creswell, 2023; Merriam & Tisdell, 2016). Readers are therefore advised to exercise caution when generalizing the findings beyond the specific context studied. Second, all four participants were female, reflecting the demographic composition of primary teaching staff in the participating schools rather than a deliberate sampling decision. The absence of male participants may limit the extent to which gender-related variations in teacher perceptions and practices can be explored. Third, as the researcher conducted both interviews and classroom observations, the potential for observer effect cannot be entirely excluded, as participants may have modified their instructional behavior in response to being observed. Although member checking and transcript verification were employed to strengthen credibility, the study's reliance on self-reported data from a small number of participants represents an inherent constraint of the qualitative design. Future research employing larger and more geographically diverse samples, as well as longitudinal observation designs, would substantially strengthen the evidence base on primary mathematics teachers' SCA practices in Cambodian public schools.

CONCLUSION

This study examined the perceptions and classroom practices of four primary mathematics teachers in rural and remote schools in Siem Reap Province, Cambodia, with specific focus on the adoption of the Student-Centered Approach within the context of national curriculum reform. The findings revealed that all participants held a generally sound conceptual understanding of SCA principles,

recognizing the importance of student activity, cooperative learning, critical thinking, and guided reflection in the mathematics classroom. However, a consistent gap was observed between teachers' stated perceptions and their actual instructional practices, with experienced teachers demonstrating considerably more effective and sustained SCA implementation than their newly qualified counterparts. This disparity was closely linked to differences in professional development experience, teaching confidence, and personal motivation rather than to geographic location, age, or formal educational background alone.

The study further identified several systemic barriers that constrain effective SCA implementation across both school settings. These include classroom overcrowding, inadequate teaching and learning materials, unequal access to in-service professional development opportunities, and persistent student engagement challenges rooted in socioeconomic conditions. Notably, teacher motivation emerged as a significant independent factor in determining instructional quality, as evidenced by the case of P3, whose strong commitment to professional growth enabled her to implement SCA effectively despite the absence of formal pre-service training in this approach. These findings collectively affirm that the translation of curriculum reform policy into meaningful classroom practice is a deeply contextual process, shaped by the interplay of individual, institutional, and systemic factors.

This study contributes to the existing literature by providing context-specific empirical evidence from rural and remote primary schools in Cambodia, a setting that has received comparatively limited scholarly attention relative to urban and higher education contexts. While prior research has broadly documented the challenges of learner-centered pedagogy implementation in low- and middle-income countries, the present study extends this understanding by demonstrating that teacher motivation and sustained in-service professional engagement can serve as meaningful compensatory factors in resource-constrained environments. The novelty of this study lies in its comparative focus on experienced and newly qualified teachers across geographically distinct school settings, revealing that professional development equity, rather than curriculum design alone, is a critical determinant of SCA adoption at the classroom level.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are directed at key educational stakeholders. School principals and administrators should adopt a more proactive role in supporting teachers' professional growth by facilitating regular inter-school classroom visits, enabling newly qualified teachers to observe and learn directly from experienced colleagues' instructional practices. Such school-based peer learning initiatives have been identified as among the most contextually relevant and cost-effective forms of professional development available in under-resourced settings (Boateng & Wolfenden, 2022).

At the institutional level, school administrators should ensure the provision of adequate teaching and learning facilities, including sufficient textbooks, pedagogical guide books, and SCA-aligned instructional materials, as the absence of these resources was identified as a primary constraint on effective implementation. The Ministry of Education, Youth and Sport should expand and systematize its teacher professional development programs, ensuring that in-service training opportunities are distributed equitably across all teaching staff rather than being limited to a small number of senior teachers per school. Particular attention should be directed toward newly qualified teachers, who currently receive the least structured support at the most critical stage of their professional formation (Sok & Heng, 2024).

Finally, the government should allocate increased budgetary resources to the sustained development of teacher professional competencies in SCA, particularly in rural and remote provinces where structural disadvantages are most acute. Future research is recommended to extend this inquiry to larger and more diverse samples of primary mathematics teachers across multiple provinces, employing mixed-methods designs to quantify the relationships identified qualitatively in the present study. Longitudinal studies tracking the development of SCA practices over time would further enrich understanding of how teacher perceptions evolve in response to professional development and classroom experience within Cambodia's continuing curriculum reform process.

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