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Investigation of Teaching Self-Efficacy and Cognitive Flexibility Among Novice Teachers from Two-Year and Four-Year Training Models

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ABSTRACT

Purpose of the study: This study examined teaching self-efficacy and cognitive flexibility of Cambodian secondary schools' novice teacher from two-year training and four-year training model. It aims to understand whether the four-year model significantly outperforms the two-year model in fostering these psychological traits that is essential for future policy decisions and the long-term success of the nation's education reforms.

Methodology: Utilizing a quantitative research design, data were collected from 313 teachers through validated surveys measuring these constructs, and analyze via statistical methods including confirmatory factor analysis, comparison and regression.

Main Findings: Finding revealed that the four-year model more effectively enhances teachers' teaching self-efficacy and cognitive flexibility than two-year model. Teaching self-efficacy positive relates to cognitive flexibility, especially for instructional strategies and student engagement. Meanwhile classroom management shows no difference. Two-year graduates report higher control while four-year graduates perform better on alternatives subscales. This highlights training duration effects on novice teachers' development outcome.

Novelty/Originality of this study: This study adds to the existing literature, indicating that teaching self-efficacy and cognitive flexibility of novice teachers from two different training models were significantly difference. Additionally, the study highlights the need for teacher education reforms to foster greater confidence and flexibility among teachers, thereby improving instructional quality in Cambodia's evolving education system.

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1. INTRODUCATION

The global demand for qualified teachers remains a critical challenge, particularly in developing nations that have strived to meet the United Nations' Sustainable Development Goal of ensuring inclusive and equitable quality of education by 2030 [1]. According to the UNESCO Institute for Statistics [2], the world faces a staggering shortfall of nearly 69 million teachers at the primary and secondary levels. Addressing this gap is fundamental to achieving the United Nations' Sustainable Development Goal 4 (SDG 4) which mandates "inclusive and equitable quality education and lifelong learning opportunities for all" by 2030 [1]. In the pursuit of this goal, developing nations (mostly notably Cambodia, Bangladesh, and Pakistan) have been forced to

accelerate recruitment which often include teachers with varying degrees of preparation. However, as Darling-Hammond [3] argued, teachers' quality was the most significant of student learning outcomes. Consequently, the recruitment of an under trained workforce risks jeopardizing the very quality that SDG 4 seeks to uphold.

Among the well-known factors that had a big impact on how well teachers taught were teachers' content knowledge, teaching self-efficacy, and cognitive flexibility. Sadly, teacher education program has been showed that to be ineffective in ensuring the future teachers these basic skills. Recent studies conducted in Cambodia, China Ethiopia, Turkey, and the United States indicated that these programs did not enhance student teachers' content knowledge, teaching self-efficacy and/or cognitive flexibility. Consequently, it is imperative to prioritize the enhancement and sustenance of student teachers' self-efficacy and cognitive flexibility. Teaching self-efficacy which referred to the belief in one's ability to influence student engagement and learning, was a robust predictor of job commitment and pedagogical success [4]-[6]. Complementing this cognitive flexibility, which defined as mental ability to adapt teaching strategies thinking and behavior to the new, changing, or unexpected situations; it is increasingly recognized as essential for teachers navigating diverse classroom environments [7]-[9]. While traditional teacher education focused on content knowledge, modern pedagogy demands that novice teachers possess the mental agility to pivot between diverse instructional approaches.

In Cambodia, The Ministry of Education, Youth, and Sport (MoEYS) has historically utilized the 12+2 system (12 years of general education plus 2 years of professional training) to quickly fill classroom vacancies. In recent years, however, there has been a strategic shift toward the 12+4 system (12 years of general education plus 4 years of professional training) which is an upgrades degree-based model that design to enhance the professional status and competency of the teaching force. While both models currently coexist to meet the urgent demand for educators, they represent vastly different levels of investment in a teacher's professional identity and psychological preparation.

Despite the coexistence of these two models, there is a conspicuous gap in literature regarding how training duration specifically impacts the psychological readiness of novice teachers. Most existing studies in Cambodia focus on general pedagogical knowledge or curriculum implementation, yet there is no scientific evidence comparing the self-efficacy and cognitive flexibility of graduates from two-year versus four-year programs. The novelty of this research lies in its focus on adaptive expertise that evaluated not just what teachers know but how effectively they believe they can teach and how flexibly they can think. This investigation is urgent because Cambodia is at the critical juncture of teacher education reform; understanding whether the four-year model significantly outperforms the two-year model in fostering these psychological traits is essential for future policy decisions and the long-term success of the nation's education system. This study aimed to address this gap by exploring how the structure and duration of pre-service training impact on teachers' cognitive flexibility and teaching self-efficacy. This study offered insighted into optimizing teacher preparation in resource-constrained setting.

The purpose of this study is to compare the levels of teaching self-efficacy and cognitive flexibility between novice teachers who graduates from the 12+2 program and those from the 12+4 program. A second purpose is to examine the nature of the relationship between these two variables (teaching self-efficacy and cognitive flexibility) and the effects of teaching self-efficacy on cognitive flexibility within the Cambodian teaching context. The research questions in this study are:

1. Is there a statistically significant difference in the level of teaching self-efficacy between novice teachers from 12+2 and 12+4 training models?
2. Is there a statistically significant difference in the level of cognitive flexibility between novice teachers from 12+2 and 12+4 training models?
3. What the relationship between teaching self-efficacy and cognitive flexibility among the novice teachers from 12+2 and 12+4 training models?

2. LITERATURE REVIEW

2.1. Teaching Self-Efficacy

Teaching self-efficacy which grounded in Bandura's Social Cognitive Theory was defined as a teacher's belief in their capacity to organize and execute actions to achieve specific instructional outcomes [5], [10]. For the TSE, Bandura [10] stated that "unless people believe they can produce desired effects by their actions, they have little incentive to act" (p. 3). It referred to the activities that highlighted self-efficacy as a critical motivator. In education, teaching self-efficacy significantly influenced teacher persistence, teaching quality, and student achievement [11]. Tschannen-Moran and Hoy [5] described it as a teachers' judgement of his or her capabilities to bring about desire outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (p.783). Research identified three key sub-constructs of teaching self-efficacy: (1) Efficacy for instructional strategies referred to teachers' confidence in selecting and implementing effective teaching methods to facilitate student learning [12]. It meant that teachers with high

efficacy in this domain were more likely to apply divers pedagogies approaches such as inquiry-based learning [13], the 5E instructional model , differentiated instruction, which enhanced student outcome [14], [15].

Bandura [16] identified four primary sources through which novice teachers develop their teaching self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. Mastery experiences were derived from the practical teaching opportunities which novice teachers encountered during their initial classroom experiences such as teaching student or early career placements. According to Bandura [16], Tschannen-Moran, et al. [17] self-efficacy theory, successful teaching experiences bolternovice teachers confidence were considered the most powerful influence on teaching self-efficacy. Research support this, showing that positive classroom experiences significantly enhanced novice teachers' self-efficacy [11], [18]. Vicarious experiences occurred when novice teachers observed others such as mentor teachers, colleagues, or even own recorded teaching, performing tasks. Bandura [16] suggested that individuals gauged their own abilities by comparing themselves to others with similar skills. Novice teachers can observe successful teaching by peer or mentors; these can boost their confidence, while witnessing failures may lead to self-doubt. These experiences manifested in four ways: (1) actual modeling which novice teachers can observe mentor teachers or colleagues, (2) symbolic modeling which watching credible teachers in videos or other media, (3) self-modeling which reflecting on one's own recorded teaching, (4) cognitive self-modeling which mentally visualizing successful teaching. Studies indicated that these vicarious experiences significantly contribute to strengthening novice teachers' teaching self-efficacy [18]-[20]. Verbal persuasion involved the feedback and encouragement novice teachers received from mentors, colleagues, or supervisors. Positive feedback fostered self-efficacy while negative feedback can hinder it [16]. Many researches highlighted that constructive feedback from mentor teachers and colleagues played a critical role in enhancing novice teachers' confidence in their teaching abilities [11], [21], [22].

Studies indicated that teachers with strong instructional efficacy positively impacted on students' achievement by adapting strategies to meet diverse learner needs [23]. (2) Efficacy for classroom management involved teachers' beliefs in their ability to maintain an orderly and productive classroom environment [12]. High efficacy in classroom management was associated with better behavior management and made fewer disruptions [24]. This high efficacy created a conducive learning environment [25]. In addition, Brouwers & Tomic in 2000 found that teachers with strong classroom management efficacy experience lower burnout. This was due to they felt more capable of handling challenging student behaviors. (3) Efficacy for student engagement (ESE) was the act of reflective teachers' confidence in motivating and engaging students in learning activities [12]. It meant that teachers with high engagement efficacy support intrinsic motivation and actively participation which were linked to improve academic performance [26]. In making higher level of students' engagement like Cambodia where linked class size and limited resource has posed challenges [27], [28]. Efficacy for students' engagement has been critical but ESE often underdeveloped due to limited training [29]. These sub-constructs influenced teachers' effectiveness, yet their development in Cambodia pre-service training models remains underexplored.

Table 1. Summary of key research on teaching self-efficacy and related variables

Author and year	Purpose	Methods	Main findings
Tschannen-Moran and Hoy [5]	To propose an integrated model of TSE, reconciling different theorical strands and emphasizing its context-specific, multidimensional nature.	Scale development and validation with multiple samples of in-service and preservice teachers	Developed the TSE scale (Instruction, Management, Engagement). Confirmed specificity of the constructs.
Caprara, et al. [23]	To examine the longitudinal impact of teachers' self-efficacy beliefs on student academic achievement.	Longitudinal study with Italian middle school teachers and students over one academic year.	Teachers' self-efficacy beliefs significantly predicted students' academic achievement in Mathematics and perceived academic self-efficacy one year later, controlling for prior achievement.
Hoy and Spero [30]	This study looks at how teachers' confidence in their ability changes from the time they started teacher training through their first year on the job. Evolution of efficacy from preservice to early career.	Longitudinal study tracking efficacy changes in teachers from their final year of training through their first year of teaching.	Found a significant increase in efficacy during student teaching but a decline during the first year of in-service teaching. This finding highlighted the critical role of induction support.
Klassen and Tze [26]	Relationship between self-efficacy, job satisfaction, stress,	Large scale survey samples: 1430 practicing teachers	Self-efficacy was positively correlated with job satisfaction and negatively

	and teaching behaviors.	assessing demographics, self-efficacy and occupational well-being.	with job stress. Classroom management efficacy showed the strongest relationship with these variables.
Zee and Koomen [25]	To systematically review the relationship between TSE and teacher and student related outcome variables in primary and secondary education.	Mata analysis of 165 studies from 1998 to 2014.	Found strong, positive associations between TSE and teachers' psychological well-bring: commitment, job satisfaction; instructional behavior: quality of instruction, supportiveness. Relationship with student outcomes: achievement, motivation) were positive but moderate, often mediated through teacher behavior.
Lauermann and Hagen [31]	To examine how TSE developed during the critical transition phase from teacher education into the first years of teaching in term of teacher competent belief and their effects on students.	Longitudinal mixed methods study following 120 German teachers from preservice and induction.	Found a reality shock with significant decline in TSE after the first year of teaching particularly in classroom management. Recovery and growth were linked to access to supportive resources (mentoring, collaborative culture) ad the interpretation of early challenges as learning opportunities.
Kim and Burić [32]	To explore the relationship between teachers' emotions (enjoyment and anger) and TSE and their combined effect on burnout.	Longitudinal dairy study (experience sampling method) with 102 Korean secondary teachers over two weeks.	Identified a reciprocal relationship: TSE predicted higher daily teaching enjoyment and lower anger while positively daily emotions, in turn, boosted consequent TSE judgments. This reciprocal cycle was a strong predictive factor against emotional exhaustion.
Gimarino [33]	To examine the career choices and self-efficacy of senior high school student and how these were influenced by demographic profiles.	Used a descriptive-correlational design with a customized questionnaire covering demographics, job preferences and self-efficacy. Data were collected from 308 grade 12 students through Google forms, analyzed by using SPSS.	The senior high school strand was significantly related to career choices and self-efficacy while setting career goals and choosing training.
Mancera [34]	The study examined the relationship between physical self-efficacy and the quality of life among rural Filipino youth.	The research utilized a quantitative correlational design. Data were gathered from 378 respondents chose by simple random sampling, utilizing a validated physical self-efficacy scale and a quality-of-life evaluation instrument.	Students showed moderate physical self-efficacy and quality of life. There was a clear positive link between them, meaning greater confidence in physical abilities was tied to better life satisfaction.

The result of this table showed the establishment of teacher self-efficacy as a foundational psychological resource that was context sensitive, malleable, and multidimensional. TSE was powerfully shaped by mastery experience, and support systems, and it served as a key driver of teacher effectiveness, resilience and career transitions. Despite robust evidence linking teacher self-efficacy to critical outcomes, the field remains constrained by significant limitation. The overreliance in self-report surveys and western-centric samples obscure the complex, context- specific mechanisms through which efficacy was built or eroded in diverse classroom. Crucially, we lack fine-grained understanding of how domain-specific efficacy operates for challenging pedagogies or underserved student populations.

2.2. Cognitive Flexibility

Cognitive flexibility was defined as ability to adapt cognitive processing strategies to new and unexpected environmental conditions [35]. It involved learning through experience, adapting strategies rather than single responses, and responding effectively to environmental changes. A lack of this adaptability leaded to cognitive inflexibility where individual persisted in effective behaviors despites changing circumstances. Cognitive flexibility relied on attentionally process (which detecting situational changes and redirecting focus), and knowledge restructuring which allowed individuals to reinterpreted new task demands. Spiro and Jehng's [7] cognitive flexibility theory suggested that representing knowledge from multiple perspectives enhanced one's

ability to respond adaptively to change. The relationship between cognitive flexibility, expertise, and error revealed that expert may sometimes display cognitive inflexibility due to reliance on automated routines [36]. However, other researches including Spiro and Jehng [7] argued that experts' multifaced knowledge allowed them to adapt better to new conditions. Cañas, et al. [35] drawing from Vicente and Wang's [37] constraint attunement hypothesis, proposed that cognitive flexibility depended on whether environmental changes were relevant to the strategies one has developed. Thus, expert's inflexibility occurred only when changed affect the critical constraints of their strategies. This perspective integrated the cognitive and ecological context of adaptive behavior. Cognitive flexibility also related to phenomena such as cognitive blockade, hysteresis, functional fixation, and functional reduction, all involving persistence in ineffective strategies. Training programs to enhance cognitive flexibility which focused on two main approaches. The first approach improved knowledge representation. Learners or doer were exposed to different and variable scenarios instead of repeat the same one. This helped them learner how to adapt their strategies when situation changed. The second approach focused on attentional processes. Learners/doer were trained to shift their attention between different tasks or parts of a task. This helped them became faster and more flexible in responding to new demands [38], [39]. Neuropsychological evidence linked cognitive flexibility to the prefrontal cortex and basal ganglia, areas associate executive functions and attentional control [40]. Collectively, these studies showed that cognitive flexibility as a dynamic and multidimension ability essential for adaptive human performance in complex and changing environments.

When teachers had the ability to adapt cognitive processes and behaviors to new, changing, or unexpected situations, so-called cognitive flexibility [41], [42], in classroom, it enabled to teachers to navigate dynamic environments by responding to unpredictable student behaviors, differentiating instruction, and adapting lesson plans [7]. Moreover, cognitive flexibility encompassed two key dimensions: (1) Alternatives referred to ability to produce multiple solutions or approaches to a problem. Teachers with high cognitive flexibility was able to devise varied instructional strategies to address divers student needs or unexpected classroom challenges [42], [43]. Meanwhiles, Kazu and Pullu [44] found that pre-service teachers who excel at generating alternatives were better equipped to adapt lesson plan in real-time so they enhanced their teaching effectiveness. (2) Control involved the ability to regulate cognitive processes to stay focused and hardly shift the arranged strategies [42]. This opposed alternative construct was crucial in chaotic classroom settings where teachers must balance competing demands such as managing disruptions while delivering content [7], [42]. Research by Scheibling-Sève, et al. [45] indicated that teachers with strong cognitive control were more adept at prioritizing tasks and unforeseen events which was particularly relevant in resource constrained setting like Cambodia. However, the extent to which Cambodia's teacher training programs support these dimensions of cognitive flexibility of cognitive flexibility remains understudied.

Table 2. Summary of key research on cognitive flexibility and related variables

Author and year	Purpose	Methods	Main findings
Martin and Rubin [46]	To define and create an initial measure of cognitive flexibility as a communication construct	Scale development and validation across multiple samples: For both study students and professionals around five hundred and twenty two.	Developed the cognitive flexibility scale, identifying it as a multi-dimensional trait that involved cognitive flexibility, communication flexibility and rigidity of attributes.
Dennis and Wal [42]	To refine the measurement of cognitive flexibility, distinguishing it from related constructs like cognitive rigidity.	Scale validity study which using factor analysis with a large adult sample	Developed the cognitive flexibility inventory, a more robust measure with two core factors: (1) tendency to perceive difficult situations as controllable, and (2) the ability to generate multiple alternative solutions.
Kartal, et al. [47]	To examine the self-efficacy of physical education and sprots teachers about inclusive education and to evaluate the influence of cognitive flexibility.	The study included 157 physical education teachers from Sakarya. Participants who mostly male with an average age of 41, completed survey on their self-efficacy and cognitive flexibility. The researchers analyzed the data to find relationships between these factors.	Teachers with greater cognitive flexibility reported higher self-efficacy in teaching students with special needs, and flexibility was a significant predictor of this efficacy. All participants showed high average scores in both areas, regardless of whether they had taken a related course.
Öztürk, et al. [48]	To examine the relationship between pre-service teachers' cognitive flexibility and techno-pedagogical competencies across various factors	The study involved 616 pre-service teachers and was structured utilizing the exploratory correlational research approach. Convenience sampling was used to choose the sample. Data from	The study found that pre-service teachers exhibited high levels of both cognitive flexibility and techno-pedagogical competency. Cognitive flexibility scored varied significantly by gender, program type, and access to technology while

		cognitive flexibility and techno-pedagogical education competencies scales was analyzed for relationship.	competency scores only differed based on technology access. A moderate which positive correlation was found between the two variables, supported the theoretical link that cognitive flexibility may aid in developing techno-pedagogical skills.
Colé, et al. [49]	To determine if cognitive flexibility (both general and reading-specific) predicts early reading skills in a transparent language (French), and to clarify if its role is unique to opaque orthographies like English.	Two cognitive flexibility tasks (one word-based, one picture-based) and three reading assessments pseudoword decoding, passage comprehension) were administered to 60 French second-grades.	Cognitive flexibility helped with reading comprehension, even in languages with simpler spelling. CF also predicted how a child can read single words. The results showed this flexibility was important for reading in general, not just for reading-specific tasks.
Stein, et al. [50]	To examine the correlation between high school teachers' comprehension of student involvement and their capacity to consistently involve students in their classes.	A three-year-methods case study at one high school used student survey to identify more and less engaging teachers and analyzed focus group comments from 18 teachers to compare how they expressed cognitive flexibility in understanding student engagement.	This research showed that teachers perceived as more engaged exhibited greater cognitive flexibility in their discourse around engagement. Conversely, teachers whom students perceived as less engaging sometimes viewed interaction in more basic and fragment manners.

The empirical research consistently showed that higher levels of cognitive flexibility were associated with positive educational outcomes, including greater teacher self-efficacy, enhanced techno-pedagogical competence, improved student engagement, and stronger reading skills among learners. Across both pre-service and in-service teachers, cognitive flexibility emerges as a key predictor of effective teaching practices, adaptability to diverse learner needs, and the ability to generate alternative strategies in complex instructional situations.

2.3. The link Between Cognitive Flexibility and Self-Efficacy

The Theoretical connection between cognitive flexibility and teaching self-efficacy was rooted in Bandura's Social Cognitive Theory which emphasized the interplay of personal factors, environmental influences, and behavior [12], [46], [51]. Luszczynska and Schwarzer [52] claimed that "people who have perceived self-efficacy, believe they have the ability to resist temptation, deal with stress, and use their resources to meet the demands of the situations (p. 129)". These meant that cognitive flexibility enhanced teachers' ability to create multiple solutions and reduce the maintained control. This fostered a sense of mastery and capability that strengthened self-efficacy. According to Bandura [12] noted that self-efficacy was shaped by mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states. All of which were influenced by cognitive flexibility. Hence, teachers who generated alternative strategies (mastery experience) or observed other teachers' adaptive approaches (vicarious experience) was likely to develop greater confidence in teaching which teachers choose the appropriate methods to match students need accordingly.

Empirical studies support this relationship. Kazu and Pullu [44] reported that a positive correlation between cognitive flexibility and teaching self-efficacy among pre-service teachers, particularly, in efficacy for instructional strategies and classroom management. Similarly, Scheibling-Sève, et al. [45] found that cognitive flexibility enabled teachers to approach problems from multiple perspectives which enhanced their belief in managing complex teaching tasks. In Cambodia, cognitive flexibility may be critical for fostering self-efficacy across all three constructs (Efficacy for instructional strategies, efficacy for classroom management, and efficacy for students engagement) where teachers faced large classes and limited resources [53], [54], yet comparative research on training model is lacking.

2.4. Teacher education in Cambodia: The 12+2 and 12+4 Models

Cambodia's teacher education system comprises two main pre-service training model: 12+2 and 12+4 program. The 12+2 model, a two-year program which followed 12 years of general education, aimed to rapidly address teacher shortages, particularly in rural areas. It emphasized basic pedagogical skills and foundational content knowledge but was often criticized for its brevity and limited practical training [29]. The 12+4 model was a four-year bachelor's degree which provided extended training with deeper subject matter knowledge, modern pedagogical approaches, and more teaching practices that aligned with global standard [1], 55]. These structure differences likely influenced cognitive flexibility and self-efficacy. The 12+4 model's longer duration allowed for comprehensive training in content knowledge, critical for instructional efficacy [56], [57]. It has focused on modern pedagogies such as student-centered learning. It may enhance cognitive flexibility by encouraging teachers to create alternative strategies and reduce control in divers setting [7]. Conversely, the

12+2 models' condensed timeline; it may limit opportunities to develop these competencies which potentially resulting in lower efficacy and adaptability [29]. No studies have compared how these models' impact on in-service teachers' cognitive flexibility and teaching self-efficacy that represent a critical research gap.

3. RESEARCH METHOD

3.1. Research Procedure

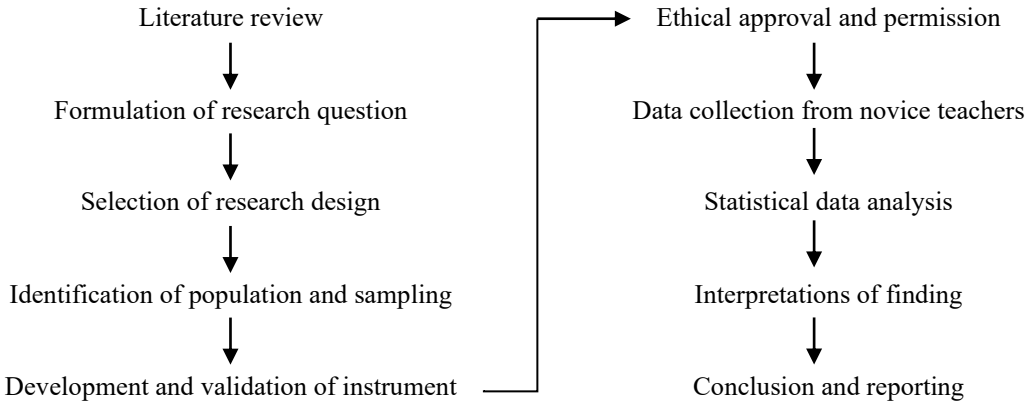

Figure 1. Procedural diagram for the research

3.2. Research Design

This study applied the quantitative research design to examine the reported level of teaching self-efficacy and cognitive flexibility among novice teachers who trained under Cambodia's 12+2 and 12+4 pre-service training models. the constructs of teaching self-efficacy and cognitive flexibility was validated. As it allowed for statistical analysis of effects and differences between groups [58], [59]. The qualitative design was used to examine different effect of training models (12+2 and 12+4) on novice teachers' teaching self-efficacy and cognitive flexibility.

3.3. Participants

Cambodia's teacher education system for secondary school teachers comprises two main pre-service training model: 12+2 and 12+4 program. The 12+2 model, a two-year program at regional pedagogy training center which followed 12 years of general education, aimed to rapidly address teacher shortages, particularly in rural areas. It emphasized basic pedagogical skills and foundational content knowledge but was often criticized for its brevity and limited practical training [29]. The 12+4 model was a four-year bachelor's degree which provided extended training with deeper subject matter knowledge, modern pedagogical approaches, and more teaching practices that aligned with global standard [1], [55]. These structure differences likely influenced cognitive flexibility and self-efficacy. The 12+4 model's longer duration allowed for comprehensive training in content knowledge, critical for instructional efficacy [56], [57]. It has focused on modern pedagogies such as student-centered learning approach. It may enhance cognitive flexibility by encouraging teachers to create alternative strategies and reduce control in divers setting [7]. Conversely, the 12+2 models' condensed timeline; it may limit opportunities to develop these competencies which potentially resulting in lower efficacy and adaptability [29].

The study targets novice teachers who completed either 12+2 or 12+4 pre-service training programs and have taught in secondary schools in Cambodia. A convenience sampling strategy was used to collect data. The sample in this study consist of 313 novice teachers (152 from 12+4 training model (41% male and 59% female) and 161 (41 % male and 59% female) from 12+2 training model). Mean year of experience is 2.02 , SD = 0.91. Sample selecting criteria included having two to four years of teaching experience to ensure sufficient classroom exposure.

3.4. Measures

The instrument measurement each subconstruct of teaching self-efficacy (i.e., efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement), and cognitive flexibility (i.e., alternatives). The instrument translated into Khmer followed Klotz, et al. [60], Behling and Law [61] back-translation method to ensure cultural and linguistic accuracy. Items were rated on the 5-point Likert scale (1= strongly disagree, 5 = strongly agree). The Khmer version of teaching self-efficacy and cognitive flexibility was checked for face validity by 33 secondary teachers. Next, using the data that collected from 313 novice teachers,

conducted confirmatory factor analysis for the constructs of teaching self-efficacy and cognitive flexibility scale to fit Cambodian novice teachers' context.

Table 3. Items, Factor Loading, Cronbach's Alpha, CRs, and AVE

No	Items	Factor Loadings	Cronbach's Alpha (α)	CR	AVE
1	EIS1: I can use a variety of teaching methods effectively.	0.69			
2	EIS2: I can use different assessment strategies effectively in my teaching.	0.71			
3	EIS3: I can use various examples to explain concepts that students find difficult or misunderstand.	0.77	0.88	0.86	0.50
4	EIS4: I can use different type of questions that help improve students' learning.	0.70			
5	EIS5: I can create good questions for students.	0.75			
6	EIS6: I can respond to students' difficult questions.				
7	ECM1: I can manage disruptive activities during my teaching.	0.74			
8	ECM2: I can ensure that students follow academic discipline.	0.80	0.82	0.79	0.50
9	ECM3: I can manage students during discussion activities.	0.79			
10	ECM4: I can prevent problematic students from disrupting the entire class.	0.83			
11	ESE1: I can motivate students who show little interest in learning to try harder.	0.78			
12	ESE2: I can help students value their own learning.	0.78			
13	ESE3: I can make students believe that they can complete school work successfully.	0.72	0.86	0.84	0.52
14	ESE4: I can improve the understanding of low- achieving students.	0.74			
15	ESE5: I can help parents continue to support their children's effective participation in learning at school.	0.75			
16	ALT1: I can adapt my teaching methods when lesson plans do not work as expected.	595			
17	ALT2: I often explore different perspectives to address students' misconceptions.	.575			
18	ALT3: I can adjust my teaching methods to suit students' different learning style.	.689			
19	ALT4: When facing challenging situations, I generate multiple solutions before choosing instructional actions.	.521			
20	ALT5: I can quickly change my teaching approach when unexpected situations occur in the classroom.	.619	0.84	0.81	0.53
21	ALT6: I fell it is easy to select teaching methods that match student abilities.	.607			
22	ALT7: I seek feedback from other teachers to improve my teaching practices.	.676			
23	ALT8: I can manage my emotional responses when there is no clear answer to students' question by finding alternative and clearer explanations.	.683			
24	CON1: I feel confident in my ability to manage unexpected classroom problems by following established classroom rules.	.735			
25	CON2: I believe I have the skills to maintain classroom activities in difficult situations based on my routine experience.	.694			
26	CON3: I can implement and finish my prepared lesson plans to achieve the intended learning objectives even though my students do not understand what I teach.	.738			
27	CON4: I feel that I can continue teaching according to my lesson plan even unexpected disruptions occur.	.667	.905	0.89	0.53
28	CON5: I believe that one teaching methods influence students' participation and learning outcomes.	.717			
29	CON6: I trust my judgement to make quick decisions by choosing a teaching method for yearly instruction.	.691			
30	CON7: I cannot teach if there is not teaching material as I need.	.702			

Teaching Self-Efficacy

Teaching self-efficacy was assessed by utilizing the Teachers' Sense of Efficacy Scale (TSES) by Tschannen-Moran and Hoy [5], Chan, et al. [11]. The 15-items of TSES measured three sub-constructs: Efficacy for instructional strategies (6 items) (e.g. "I can create good questions for students."), efficacy for classroom management (4 items) (e.g. "I can manage students when conducting discussion activities."), and efficacy for student engagement (5 items) (e.g." I can encourage students who are not interesting in learning to work harder). The Cronbach's alpha values (α) indicated as following: Efficacy for instructional strategies (α = 0.88, AVE = 0.50), Efficacy for classroom management (α = 0.82, AVE = 0.50), efficacy for student engagement (α = 0.86, AVE = 0.52). Based on the Cronbach's alpha and AVE, the construct reliability values suggested adequate convergent validity and the AVE of each sub-scale showed average shared variance which suggested good discriminant validity that the three sub-scales were distinct between them [62].

Cognitive Flexibility

Cognitive flexibility measured by using the cognitive flexibility inventory (CFI). The 15-item self-report scales was developed by Dennis and Wal [42], Martin and Rubin [46]. The CFI assessed with alternative (8items) (e.g. "I can change my teaching methods when the lesson plan does not work as expected."); Control (7 items) (e.g., "I cannot teach if there is not teaching material as I need"). The Cronbach's alpha was 0.84 and 0.88, respectively. AVE of both sub-scale were 0.53 and 0.53, respectively, which indicated adequate convergent validity and its AVE demonstrated good discriminant validity [62].

3.5. Data Collection Procedures

A demographic questionnaire collected data on participants' age, gender, years of experiences, school type (Urban/rural). These variables were used as covariates to control for potential confounding effects, as prior research suggested that teachers' experience and context influenced teaching self-efficacy [63] and cognitive flexibility [64]. Data collected through self-administered surveys distributed in both paper and digital formats to accommodate participants' preferences and access to technology through Google form. Surveys administered during school visits and semester meeting sessions to maximize response rates. To ensure ethical compliance, the informed consent was obtained in order to emphasize voluntary participation. The data collection process followed the permission paper from the ministry of Education, Youth, and Sport of Cambodia. The ethical approval released from institutional review board. Data collection was expected to take three months, with trained research assistants overseeing the process to ensure consistency and address language barriers. The self-report survey was lasted around 15-20minutes.

3.6. Data Analysis

Data was analyzed which involved descriptive statistics (means, standard deviation) and bivariate correlations that summarized teaching self-efficacy and cognitive flexibility scores for novice teachers from both training models. The data were separated analyzed for the three self-efficacy's sub-constructs (efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement). To compare the two training models, independents samples t-test was conducted. To examine the relationship between cognitive flexibility and teaching self-efficacy Regression was used. Assumptions of normality and homogeneity of variance were tested by using Peason correlation coefficients tests respectively. Effect sizes (Cohen's d) were reported to assess the magnitude of differences between groups [65]. In addition, regression analysis was applied to predict the effects of teaching self-efficacy on cognitive flexibility.

4. RESULTS AND DISCUSION

The following results addressed the four research questions that examined differences in teaching self-efficacy and cognitive flexibility between novice teachers who trained under Cambodia's 12+2 and 12+4 pre-service training models, and the relationship between these constructs as well as the effects of teaching self-efficacy on cognitive flexibility.

4.1. Results

Research question 1: Is there a statistically significant difference in the level of teaching self-efficacy between novice teachers from the 12+2 and 12+4 training model?

Teaching self-efficacy was measured by using Self-Efficacy Theory which included three sub-constructs: efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement. Independent sample t-test were conducted to compare self-efficacy scores between the 12+2 (n=161 and 12+4 (n = 152) groups.

Table 1 indicated that the 12+4 group significantly reported that the overall teaching self-efficacy (M = 3.06, SD = 0.27) was higher than the 12+2 group (M = 2.41), SD = 0.27), t(313) = 21.60, $p < 0.001$, Cohens' d = 0.27, which indicated a moderate to large effect size. Significant differences were also found across all sub-constructs except efficacy for classroom management: efficacy for instructional strategies [(t (313) = 24.21, $p <$

0.001, d = 0.36], efficacy for classroom management [t(313) = -0.41, p > 0.001, d = 0.56], and efficacy for student engagement [t(313) = 26.77, *p < 0.001*, d = 0.33]. These finding suggested that the extended duration and modern pedagogical focus of the 12+4 model enhanced teachers' confidence in their teaching abilities except efficacy for classroom management which addressed that the two models were not different.

Table 4. Comparison of teaching self-efficacy scores between 12+2 and 12+4 training models

Sub-construct	Training model	N	Mean	SD	t-value	p-value	Cohen's d
Overall self-efficacy	12+4	152	3.06	.27	21.60	<.001	.27
	12+2	161	2.41	.27			
Efficacy for Instructional Strategies	12+4	152	3.22	.35	24.21	<.001	.36
	12+2	161	2.24	.36			
Efficacy for Classroom Management	12+4	152	2.78	.53	-.41	>.001	.56
	12+2	161	2.81	.59			
Efficacy for Student Engagement	12+4	152	3.19	.33	26.77	<.001	.33
	12+2	161	2.19	.34			

Research Question 2: Is there a statistically significant difference in the level of cognitive flexibility between novice teacher from 12+2 and 12+4 training model?

Cognitive flexibility was measured by using the Cognitive Flexibility Inventory (CFI) [42], [46]. This construct was assessed by two dimensions: alternatives and control. For the result, independent samples t-test compared score between the 12+2 and 12+4 groups.

Table 5. Comparison of Cognitive flexibility scores between 12+2 and 12+4 training models

Sub-constructs	Training model	N	Mean	SD	t-value	p-value	Cohen's d
Overall cognitive flexibility	12+4	152	3.42	.38	11.57	<.001	.36
	12+2	161	2.94	.34			
Alternatives	12+4	152	3.83	.25	34.86	<.001	.24
	12+2	161	2.86	.24			
Control	12+4	152	2.79	.57	30.43	<.001	.22
	12+2	161	3.02	.44			

Table 5 showed that the 12+4 group significantly demonstrated that the overall cognitive flexibility (M = 3.42, SD = 0.38) was higher than the 12+2 group (M = 2.94, SD = 0.34), t(313) = 11.57, *p < 0.001*, Cohen's d = 0.36. Significant differences were observed for generating alternative of 12+4 group (M = 2.79, SD = 0.57), [t (313) = 30.43, *p < 0.001*, d = 0.22], and control (M = 3.02, [t(313) = 30.43, *p < 0.001*, d = 0.22. These results indicated that the 12+4 model's emphasis on comprehensive training fostered greater adaptability except control which indicated that the 12+2 training model engage to control than the 12+4 training model.

Research Question 3: What was the relationship between cognitive flexibility and teaching self-efficacy among the entire sample of novice teachers?

Peason correlation analyses examined the relationship between cognitive flexibility (CF) total score) and teaching self-efficacy (TSE) total score and sub-constructs) across the entire sample (313).

Table 6. Pearson correlations between cognitive flexibility and teaching self-efficacy (12+4: N=152)

Variable	TSE	CF	EIS	ECM	ESE	ALT	CON
TSE	-						
CF	.46**	-					
EIS	.60**	.49**	-				
ECM	.70**	.12	-.03	-			
ESE	.68**	.41**	.42**	.13	-		
ALT	.43**	.83**	.42**	.14	.39**	-	
CON	.42**	.97**	.47**	.10	.37**	.67**	-
Mean	3.10	3.42	3.22	2.79	3.19	3.83	3.00
SD	.28	.38	.35	.53	.33	.25	.57
Skewness	.55	-.38	1.41	.23	1.99	-1.49	.07
Kurtosis	.11	-.001	1.24	.-1.22	2.79	1.48	-.21

**p < .01.

Note: TSE = Teaching Self- Efficacy, CF = Cognitive Flexibility, EIS = Efficacy for Instructional Strategies, ECM = Efficacy for Classroom Management, ESE = Efficacy for Student engagement, ALT = Alternatives, CON = Control

Table 6 presented bivariate correlations, means, standard deviations, skewness, and kurtosis of 12+4 model. Correlation analysis of 12+4 model indicated that all latent variables had small to high (-0.03 up to 0.97), solving these issues with multicollinearit [66]. Teaching self-efficacy, cognitive flexibility, efficacy for instructional strategies, efficacy for student engagement, alternatives, were positively correlated with one another, except: efficacy for student engagement and efficacy for instructional strategies were negatively correlated. Efficacy for classroom management was not significantly with cognitive flexibility while efficacy for classroom management was not significantly with efficacy for student engagement, alternatives, and control.

Table 7. Pearson correlations between cognitive flexibility and teaching self-efficacy (12+2: N=161)

Variable	TSE	CF	EIS	ECM	ESE	ALT	CON
TSE	-						
CF	.35**	-					
EIS	.53**	.52**	-				
ECM	.72**	-.06	-.06	-			
ESE	.55**	.37**	.29**	.005	-		
ALT	.29**	.75**	.37**	.011	.28**	-	
CON	.32**	.96**	.51**	.08	.36**	.52**	-
Mean	2.41	2.94	2.24	2.81	2.19	2.86	3.02
SD	.27	.34	.35	.59	.34	.24	.54
Skewness	.79	-.27	1.44	.13	2.13	-2.23	.14
Kurtosis	.73	-.07	1.50	-1.38	3.24	2.89	-.40

**p < .01.

Note: TSE = Teaching Self- Efficacy, CF = Cognitive Flexibility, EIS = Efficacy for Instructional Strategies, ECM = Efficacy for Classroom Management, ESE = Efficacy for Student engagement, ALT = Alternatives, CON = Control

Table 7 addressed bivariate correlations, means, standard deviations, skewness, and kurtosis of 12+2 model. Correlation analysis of 12+2 model indicated that all latent variables had small to high (-0.06 up to 0.96), solving these multicollinearity problems with [66]. Teaching self-efficacy, cognitive flexibility, efficacy for instructional strategies, efficacy for student engagement, alternatives, were positively correlated with one another, except: efficacy for classroom management was negatively correlated with cognitive flexibility, efficacy for instructional strategies. Efficacy for classroom management was not significantly with cognitive flexibility and efficacy for instructional strategies while efficacy for classroom management was not significantly with efficacy for student engagement, alternatives, and control.

The differences in teaching self-efficacy and cognitive flexibility between the 12+2 and 12+4 groups remained significant (p<.001) except efficacy for classroom management and control were not significant (p > .001).

Table 8. Predicting ALT

Group	Model		*B*	*β*	*t*	*df*	*F*	*P*	R^2	*Adjust* R^2
12+4	1	(Constant)	2.87		16.57					
		EIS	.29	.42	5.60	1 (150)	31.38	<.001[b]	.17	.17
	2	(Constant)	2.47		12.01					
		EIS	.22	.38	3.88	2 (149)	22.07	<.001[c]	.23	.22
		ESE	.20	.22	3.28					
12+2	1	(Constant)	2.31		21.13					
		EIS	.24	.51	5.06	1 (159)	25.58	<.001[b]	.13	.13
	2	(Constant)	2.11		15.54					
		EIS	.21	.44	4.21	2 (158)	16.13	<.001[c]	.17	.16
		ESE	.13	.23	2.42					

a. Predictors: (Constant), Efficacy for Instructional Practice (EIS)
b. Predictors: (Constant), Efficacy for Instructional Practice (EIS), and Efficacy for student engagement (ESE)
c. Dependent Variable: Alternatives (ALT)

In table 8, a multiple regression analysis was carried out to examine how efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE) influence alternative among novice teachers from two different training models. For 12+4 training model, the result from Table 5 shows that about 22% of variability in alternative can be explained by efficacy for instructional strategies (EIS), efficacy for student engagement (ESE), Adjusted R^2 = 0.22, $F(2,149)$ = 22.07, $P < 0.001$. For the 12+4 training model, the

coefficients table shows that both EIS and ESE are statistically significant predictors of control. The significant values for both are less than 0.05 (EIS &ESE < .001. This case indicates that efficacy for instructional strategies (EIS), efficacy for student engagement (ESE) have significant and positive effects on novice teachers' alternative.

For 12+2 training model, the result from Table 5 shows that about 16% of variability in control can be explained by efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE), Adjusted $R^2 = 0.16$, $F(2,158, P < 0.001$. For the 12+4 training model, the coefficients table shows that both EIS and ESE are statistically significant predictors of control. The significant values for both are less than 0.05 (EIS &ESE < .001. This case indicates that efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE) have significant and positive effects on novice teachers' alternative.

Table 9: Predicting Cognitive Flexibility (CON)

Group	Model		*B*	*β*	*t*	*df*	*F*	*P*	R^2	*Adjust* R^2
12+4	1	(Constant)	.59		1.59					
		EIS	.74	.47	6.46	1 (150)	41.68	<.001[b]	.22	.21
	2	(Constant)	-.12		-.29					
		EIS	.60	.38	4.83	2 (149)	25.61	<.001[c]	.26	.25
		ESE	.37	.22	2.77					
12+2	1	(Constant)	1.31		5.67					
		EIS	.76	.51	7.45	1 (159)	55.49	<.001[b]	.25	.25
	2	(Constant)	.74		2.61					
		EIS	.66	.44	6.38	2 (158)	35.00	<.001[c]	.31	.29
		ESE	.36	.23	3.32					

a. Predictors: (Constant), Efficacy for Instructional Practice (EIS)
b. Predictors: (Constant), Efficacy for Instructional Practice (EIS), and Efficacy for student engagement (ESE)
c. Dependent Variable: Control (CON)

A multiple regression analysis was carried out to examine how efficacy for instructional strategies (EIS), efficacy for student engagement (ESE) influence control among novice teachers from two different training models. For 12+4 training model, the result from Table 9 shows that about 25% of variability in control can be explained by efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE), Adjusted $R^2 = 0.25$, $F(2,149, P < 0.001$. For the 12+4 training model, the coefficients table shows that both EIS and ESE are statistically significant predictors of control. The significant values for both are less than 0.05 (EIS &ESE < .001. This case indicates that efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE) have significant and positive effects on novice teachers' control.

For 12+2 training model, the result from Table 9 shows that about 29% of variability in control can be explained by efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE), Adjusted $R^2 = 0.29$, $F(2,158, P < 0.001$. For the 12+4 training model, the coefficients table shows that both EIS and ECM are statistically significant predictors of cognitive flexibility. The significant values for both are less than 0.05 (EIS < .001. This case indicates that efficacy for instructional strategies (EIS), and efficacy for student engagement (ESE) have significant and positive effects on novice teachers' control.

4.2. Discussions

The goal of this study was to investigate the levels of teachers' teaching self-efficacy and cognitive flexibility between novice teachers who graduates from the 12+2 program and those from the 12+4 program. A second purpose is to examine the effects of teaching self-efficacy on cognitive flexibility within the Cambodian teaching context.

The results of this study provided significant insights into the influence of Cambodia's 12+2 and 12+4 pre-service training models on novice teachers' teaching self-efficacy and cognitive flexibility as well as the effects of these constructs. The findings aligned the theoretical frameworks and prior empirical research.

Differences in Teaching Self-Efficacy between 12+2 and 12+4 Training Models

The study found that novice teachers who trained under the 12+4 model significantly exhibited higher teaching self-efficacy across two sub-constructs (efficacy for instructional strategies, efficacy for student engagement) compared to those trained under the 12+2 model, except efficacy for classroom management (Table 1). This aligned with the Ersoy and Ayaz-Alkaya [67] claimed that the fourth-year students had significantly higher levels of self-efficacy than those in the lower level. Meanwhile Sumrall, et al. [68] asserted that extended

training program for the four-year model provide deeper content knowledge and more opportunities for practicing experiences that fostered greater confidence in teaching capabilities. The moderate to large effect size (Cohens' d ranging from 0.33 to 0.56) suggested that the additional two-year training in the 12+4 model substantially enhanced teachers' belief in their ability to deliver effective instruction, and engage students. The higher efficacy for instructional strategies among 12+4 teachers may be attributed to the model's emphasis on modern pedagogies approaches such as student-centered learning approach which equipped teachers with diverse strategies to address learners' needs [67], [69]. Similarly, the efficacy for instructional strategies and student engagement likely stemmed from the 12+4 model's extended practicum opportunities (year 1 = 2 weeks "student teachers as observers", year 2 = 5weeks " student teachers as observers and assistant", year 3 = 5weeks " student teachers as teaching assistants , and year 4 = 10weeks "student teachers as teachers) which allowed pre-service teachers to develop practical skills in real classroom settings [63], [68]. In contrast, the condensed 12+2 model which designed to solve teachers' shortages quickly, may lack sufficient depth and practical training, limiting teachers' confidence in these areas of teaching self-efficacy [29], [68]. And their teaching practicum opportunities occurred two times: year one = 5 weeks "student teachers as observers" and year two = 15 weeks "student teachers as teachers". However, student teachers form both training models are not significant in the efficacy for classroom management. This is critical issue for Cambodia where large class sizes and resource constraints demand robust teacher competencies [1]. Moreover, the situation in their teaching practicum classes are on the same as their real classes. In the practicum class, student teachers always teach students with the present of mentors in the class; but in their real class, there is no the present of their mentors anymore. So, that is another issue for novice teachers in classroom management. These findings suggested that investigating in longer and more comprehensive pre-service training could yield significant returns in teacher effectiveness.

Differences in Cognitive Flexibility between 12+2 and12+4 training Models

The results also revealed in Table 2 (comparison of cognitive flexibility to the 12+2 and 12+4) that the 12+4 teachers demonstrated significantly higher cognitive flexibility in the dimension of alternatives and lower in dimension of control. The moderate to large effect size (Cohen's d = 0.24-0.36) highlighted the 12+4 model's effectiveness in fostering adaptability which is a critical skill in dynamic classroom environments [44]. The extended duration of the 12+4 program likely provided more opportunities for pre-service teachers to engage in complex problem-solving and reflective practice. These skills have been essential for developing cognitive flexibility [43] It meant that the focus on alternatives aligned with the 12+4 model's inclusion of student-centered pedagogies that encourage teachers to devise multiple instructional approaches [44]. In contrast, the emphasis on the 12+2 teachers' higher score in maintaining control may reflect to the model focus on structure, directing teaching methods which prioritized classroom order and routine over adaptability [29]. The condensed 12+2 curriculum may emphasize standardize strategies which enabled teachers to maintain control in predicable setting but limiting their ability to generate alternatives approaches or trained to be able to be flexible according to classroom environment. The lower control scores among 12+4 teachers indicated that their training encouraged experimentation with diverse teaching methods which teachers could initially challenge their ability to regulate competing classroom demands [68]. This finding suggested that a potential trade-off in the 12+4 model where fostering creativity and adaptability may temporarily reduce perceived control in complex environments [44].

Relationship between Teaching Self-Efficacy and Cognitive Flexibility

The strong positive correlations between teaching self-efficacy and cognitive flexibility (Table 3) supported Bandura [51] Social Cognitive Theory which posited that cognitive flexibilities such as flexibility that interacted with self-efficacy to influence behavior. The results also revealed that the strongest correlation with efficacy for instructional strategies (-0.03 up to 0.97) suggested that the ability to create alternative teaching approaches enhanced confidence in delivering effective instruction except efficacy for classroom management which released that 12+4 and 12+2 were not significant. However, this was consistent with Kazu and Pullu [44] who found that cognitive flexibility bolstered teachers' confidence in adapting pedagogical strategies. The correlations with cognitive flexibility and teaching self-efficacy (.46) further indicated that cognitive flexibility, particularly in alternatives; it supported teachers' confidence in managing dynamic classroom environments and motiving students to learn.

Interestingly, the higher control scores among 12+2 teachers suggested that their training which likely emphasized structure and directive teaching methods, prioritized classroom order and adherence to established routines [29]. However, their lower scores in alternatives indicated the lack of flexibility. It meant that they may relied heavily on the past leaning and standardized approaches, limiting their ability to create choices for diverse student abilities. This rigidity could hinder their effectiveness in dynamic classroom settings where adaptability was essential [7]. The 12+2 models focused on control over creativity aligned with its goal of rapidly producing teachers but may not adequately prepare them for the complexities of modern teaching as students' needs.

The effects of Teachers' teaching self-efficacy on cognitive flexibility

The current study examined how two dimensions of teaching self-efficacy (efficacy for instructional strategies (EIS) and efficacy for student engagement (ESE) predict the cognitive flexibility dimensions (alternatives (ALT) and control (CON) among novice teachers from two training models (12+4 and 12+2). Consistent regression results showed that both EIS and ESE are significant and positive predictors of ALT and CON across both training models with explained variances ranging approximately from 16% to 29%. These finding align with and extend prior research on teaching self-efficacy and adaptive cognitive processes.

These effects make sense in the light of Bandura's Social Cognitive Theory which posits that teaching self-efficacy influence on cognitive, motivational, and behavioral processes for novice teachers from 12+4 training model. Specially teachers who believe they are capable of organizing and implementing effects instructional strategies and engaging students, are more likely to persist, reflect, adapt their practice. For novice teachers from 12+2 training model, they manage and control their cognitive process in classroom contexts [70] than those from novice teachers from12+4 training model. The difference in explained variance between Alt and CON of novice teachers from 12+2 training model suggests that teaching self-efficacy may play a significantly stronger role on controlling and regulating cognitive flexibility (i.e., CON sub-scale) than novice teachers from 12+4 training model in generating alternatives approach (ALT) which may involve other factors (i.e., creativity, situation constraints). Furthermore, research on teacher's self-efficacy emphasizes that task-specific and context-specific self-efficacy are stronger predictor of behavior [71]. In our case, EIS ad ESE subscales map directly onto teaching tasks, supporting the strong predictive results we found. The results also reinforce findings that teaching self-efficacy is the key variables in shaping teacher behaviors, adaptive capacity, and responsiveness in instructional settings [72]. Although both training models showed significant effects, the novice teachers from 12+2 model exhibited higher variance explained for the CON subscale (about 29%) compared with the 12+4 model (around 25%). One explanation is that the 12+2 model, which offers often shorter practiced-orientated, may foster more intermediate linkages between teaching self-efficacy and sense of control in the classroom which maintains rule and regulation in teaching. Conversely, the novice teachers from 12+4 model may provide more theoretical and practical-orientated preparation and hence stronger influence on ALT subscale and lower in CON which means that novice teachers from 12+4 model get the sense of teaching self-efficacy to adapt instructional strategies alternatively.

Implications for Teacher Education in Cambodia

The finding highlighted that the 12+4 model's effectiveness in scaffoldings flexible, confident teachers who could generate alternatives to meet diverse student needs. Policymakers should prioritize expanding access to the 12+4 model or integrating its components such as extended micro-teaching surplus practicums and student-centered pedagogies into the 12+2 curriculum to enhance cognitive flexibility and teaching self-efficacy [29]. To address the lower control scores among 12+4 teachers were a great insight in training because the target strategies for teaching were teaching self-efficacy and cognitive flexibility (which was alternatives but not much control).

For 12+2 teachers, professional development programs should focus on fostering cognitive flexibility through workshops on problem-solving and adaptive teaching strategies. This could address their lower scores in creating alternatives which enabled them to create choices for diverse student abilities and improved their effectiveness in dynamic classrooms [1], [44]. The strong relationship between cognitive flexibility and teaching self-efficacy suggested that curricula emphasizing adaptability which allowed case-based learning, reflective practice and scenario-based training could enhance both constructs (cognitive flexibility and teaching self-efficacy), and creating positive feedback loop [12].

Limitations and Future Directions

The reliance on self-report measures (TSE and CF) may introduce bias, as teachers' perceptions may not fully reflect their actual abilities [58]. Future studies could incorporate observational data or students' outcome to validate these findings. Qualitative research could provide deeper insights into how teachers perceive the impact of their training on their flexibility and confidence, particularly, regarding to improve alternatives and reduce control. Moreover, Longitudinal studies tracking teachers over time could clarify whether these differences persist or evolve with experiences. Exploring the role of ongoing professional development in addressing the 12+2 model's limitations could also inform scalable interventions. Interestingly, beside the two constructs, novice teachers may influence from other variables (e.g., peer, school principal, and school environment).

5. CONCLUSION

This study underscored the 12+4 model's effectiveness in producing flexible, confident teachers who exceled in generating alternatives, enabled them to meet diverse student needs in Cambodia's challenging

classrooms. The 12+2 model, while fostering control, limited teachers' ability to adapt, highlighting the need for reforms to enhance cognitive flexibility. The strong relationship and the effects between cognitive flexibility and teaching self-efficacy emphasized the importance of designing teacher education programs that foster adaptability and reduce control to maximize teacher effectiveness. These findings contribute to the global discourse on teacher preparation and offer actionable recommendations for improving Cambodia's education system.

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