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MINDSET, GRIT, AND RESILIENCE IN TEACHER PREPARATION: PSYCHOMETRIC EVIDENCE FROM THAI PRE-SERVICE TEACHERS

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Abstract: This study examined the development of professional mindsets and grit among Thai pre-service teachers (PSTs) enrolled in a dual-track teacher education program. A total of 402 fourth-year PSTs completed mindset and grit inventories before and after their teaching practicum. Results showed a moderate positive correlation between mindset and grit ($r = .47$, $p = .001$). While grit increased significantly ($t = 2.31$, $p = .021$), changes in mindset were not significant ($t = 0.68$, $p = .50$). Female students reported higher mindset scores than males, and mindset varied significantly across disciplines, though grit did not. Taken together, the findings suggest that teaching practice enhances perseverance but may also highlight structural constraints leading to checked patterns of growth-oriented construct perceptions. According to this study, mindset and grit behave synergistically as predictors of teacher resilience for sustained professional engagement in Thai teacher education.
Keywords: grit, mindset, pre-service teachers, resilience, Thailand

INTRODUCTION

“Do not judge me by my successes, judge me by how many times I fell and got back up again." – Nelson Mandela (Woldemichael et al., 2022).

This quote epitomizes the core of grit and resilience, two psychological attributes increasingly shaping educational research and policy (Jonker et al., 2025). Educational psychology has increasingly shifted away from purely cognitive measurements in recent years, looking instead to character qualities like grit, which is defined as long-term passion and perseverance for significant goals (Duckworth et al., 2007). Researchers identified grit as a characteristic that has emerged as an important predictor of success, even rivaling traditional measures such as intelligence or prior achievement, particularly in challenging contexts in academia and professional settings. Furthermore, the resilience that strengthens the outlook and characteristics of pre-service teachers (PST) can thrive by understanding their mindset, grit, and adversity quotients, enhancing teacher morale, confidence, and self-esteem as future educators (Yazon et al., 2021).

Grit consists of two major components: consistency of interest and perseverance of effort. Grit is also defined as courage and conscientiousness (Duckworth, 2018). These factors help individuals maintain resilience post-adversity, learn and grow from their mistakes, and consistently pursue their long-term goals over their lifetime (Duckworth, 2018). Numerous studies have demonstrated the predictability of grit in academic, vocational, and psychological well-being (Fernández Martín et al., 2020; Muenks et al., 2018). However, the burgeoning literature is not without critique. For example, in one study by Minnigh et al. (2024), grit did not significantly predict academic performance when conscientiousness was controlled for, suggesting a considerable overlap between grit and previously established personality constructs. Using structural equation modeling, the study found that cognitive ability and conscientiousness diminish the predictive effect of grit on academic performance, encouraging a more refined or domain-specific way of measuring grit.

While the debate continues, teacher education research provides further direction on the practical significance of grit. For example, Owusu et al. (2020) identified grit as the "strongest construct in determining academic achievement among PSTs in Ghana" (p. 11), above gender, age, and motivation, further supporting the suggestion that grit is educationally relevant in demanding training contexts where the capacity to persevere over time is crucial to success. Their research recommended institutional support systems to monitor and foster grit, stating that support systems for fostering and monitoring their candidates' grittiness will help improve the persistence and retention of PSTs in higher education institutions.

Complementing grit is Carol Dweck's mindset theory, which contrasts a fixed mindset (the belief that one's abilities are innate and unchangeable) with a growth mindset (the belief that one's abilities can be improved through effort and experience) (Dweck, 2017). Growth mindset is associated with resilience, seeking out challenges, and sustained motivation; in other words, the success-promoting factors encapsulated by grit (Yeager & Dweck, 2012). Duckworth (2016) noted that grit is built on growth, resilience, integrity, and tenacity, suggesting that mindset is an implicit basis for developing grit.

Within educational practice, particularly within teacher education, mindset and grit are increasingly conceptualized as mutually dependent traits that drive professional growth and persistence. For example, Kaya and Yuksel (2022) examined this issue in a large sample of Turkish PSTs. They found that a growth

mindset was significantly associated with greater effort, while fixed mindsets negatively correlated with sustained interest. Their analysis also suggested that "4th grade students are significantly better in terms of effort than 1st graders" (p. 94), suggesting that teacher training can support the natural development of grit over time. Significant gender differences were also identified "in favor of women PSTs in growth mindset and all subscales of grit" (p. 94). It was also found that students within different subject areas displayed specific trends in mindset and grit. Mathematics education students had significantly higher fixed mindsets. In contrast, English language education students had significantly lower levels of grit [More generally,] growth mindset differs significantly in terms of department, and the difference is in favor of special education department students (p. 94). This highlights the need for context-specific strategies to support the development of mindset and grit.

Moreover, recent work by Kashi and Hod (2025) pushes against the duality between a fixed and a growth mindset. In an extensive holistic case study, they argue for the incorporation of self-awareness, recognizing cognitive bias, and reflection into enriched learning environments, as the norm, both to leverage the learning and growth potential therein to its fullest potential, but also to create a picture of developing a learner that is ill-fitted to traditional mindset interventions or survey-style tests and assessments. This suggests mindset and grit may be highly adaptable and dependent on context, coming from internal beliefs about oneself, but also influenced through pedagogy and the broader ecosystem in which an individual is constituting development. This body of research supports a synergistic view of mindset and grit as critical, developable traits that underpin resilience, effort, and success in pre-service teacher education. Educator preparation programs that deliberately cultivate these traits—through reflective practices, scaffolded challenge, and supportive learning environments—can better equip future teachers to thrive in the face of classroom adversity, persist through certification and evaluation hurdles, and ultimately remain committed to the teaching profession over the long term (Keesey et al., 2018; Nalipay et al., 2019).

LITERATURE REVIEW

Growth vs. Fixed Mindset in Teacher Development

Dweck's (2006) theory of mindsets distinguishes between a fixed mindset, in which people view abilities as innate traits that cannot be changed, and a growth mindset, or the belief that abilities can be developed through learning and effort. In teacher education, a growth mindset has been found to foster openness to change in pedagogy and resilience when faced with classroom challenges (Dweck, 2018). Teachers who believe their teaching capabilities can change and grow are more likely to reflect on practice, actively seek feedback, and exhibit adaptivity in their instructional strategies (Nalipay et al., 2019). Recently, Kashi and Hod (2025) questioned the standard binary view of fixed vs. growth mindset and suggested a more nuanced, holistic stance of educational growth orientation.

Its analysis deconstructs common mindset interventions and assessment tools (such as short self-reported questionnaires), arguing that those tools frequently reduce complex psychological processes into essentialized components, where epistemic change or growth is neither credible nor lasting. They find that growth orientation is adequately approximated in rich, reflective, and open structures of learning, which reconcile personal epistemic development with the enterprise of knowledge constitution, not with isolated measures of mindsets.

Grit: A Predictor of Educational Long-Term Success

Grit, a construct theorized as predictive of achievement in multiple domains, is the individual's dispositional tendency to pursue long-term goals with sustained passion and perseverance (Duckworth et al., 2007). Grit comprises two components: (1) consistency of interest, i.e., holding a long-term orientation and being devoid of frequently changing goals (polarity); and (2) perseverance of effort, i.e., sustained application to achieve a long-term goal (Duckworth, 2016). In educational contexts, grit has been found to relate to university students' academic success, and teacher effectiveness and retention in the teaching profession in the long run (Duckworth, 2016; Duckworth & Quinn, 2009). Notably, with a focus on the domain of teacher education, Cormier et al. (2019) obtained evidence of grit as a domain-specific phenomenon in that domain-specific grit differed across domains, and participants seemed to attain higher grit scale scores in familiar or identity-related domains than in family.

Mindset-Grit Interplay in Teacher Education

People who believe intelligence and abilities can be incrementally developed and changed through effort are more likely to be gritty. They are more likely to persist, show resilience, choose complex and challenging tasks, and exert greater effort in the face of failure (Dweck & Yeager, 2019). Incremental beliefs are particularly salient in teacher education contexts, as pre-service educators are exposed to diverse implementation social arenas, which are organized by variations and complexities in classrooms, and novice teachers face the changing social-emotional and occupational demands they encounter. Motivation (including implicit theories of intelligence) is the basic building block of personality development and decision making (Dweck, 2024). Within this framework, growth mindsets are predictive of academic

outcomes, and they provide the cognitive-emotional architecture that underlies perseverance, adaptability, and the capacity for self-control, core characteristics of grit.

Research findings further corroborate this claim that mindset-related intervention can enhance academic resilience and capacity to deal with stress across developmental trajectories (Dweck, 2017; Yeager & Dweck, 2012). In the teacher preparation context, promoting a growth mindset also prepares PSTs to tackle and address instructional challenges, persevere, and stick to tasks over the long haul. Promoting the development of teachers' mindsets and grit is critical to enhancing emotional endurance and longevity in the profession (Keesey et al., 2018).

Moreover, as Dweck (2015, 2019) escalates in her retrospective commentary, growth mindset interventions must include and promote both growth-oriented beliefs. These must be accompanied by challenge-seeking environments, feedback relevant to the effort and strategies put into that challenge, and affirmation of developing capabilities—these conditions are prerequisites for the emergence of grit. Hence, fostering mindset and grit in teacher education is not an additive exercise but a symbiotic and synergistic one.

Without a growth mindset to provide the motivational scaffolding for the development of grit, grit cannot sustain itself for long (Credé, 2018). With a growth mindset, PSTs are more likely to demonstrate a sense of purposeful persistence, learn from mistakes, and continue to engage over the long haul in their professional learning and growth. Emerging research supports an ongoing dynamic interaction of the growth mindset and grit, suggesting that a belief in the possibility of change of qualities can be a psychological antecedent to perseverance (Duckworth, 2018; Yeager & Dweck, 2012). Individuals who believe intelligence and abilities are incremental and malleable by effort tend to be more gritty. They are more likely to persist, demonstrate resilience, choose complex and challenging tasks, and exert greater effort in response to failure (Dweck & Yeager, 2019).

Influence of Gender and Academic Discipline on Mindset and Grit

Studies on gender differences in mindset and grit have produced mixed findings. While some studies suggest no significant differences based on gender (Meierdirk & Fleischer, 2022; Sigmundsson et al., 2021), others note that, as a socialized variable, gender may affect how learners perceive their own grit and perseverance (Whipple & Dimitrova-Grajzl, 2020). Departments may also be a factor because students from different disciplines may have different orientations toward challenge and failure. However, previous research has not sufficiently considered these variables in the context of dual-track teacher preparation programs, leaving this study to address this gap.

Grit and Growth Mindset in Demanding Professional Training Contexts

Studies across demanding professional preparation contexts have increasingly considered the interaction between grit and growth mindset to support persistence and adaptability better. Gray et al. (2022), for instance, examined grit and growth mindset among undergraduate athletic training students, an academically and clinically intensive program, and found significant lower grit scores compared to non-athletic students, albeit insignificant differences between mindsets. Weak but positive correlations between grit and growth mindset suggest they are related but independent constructs that may be differently shaped across contexts.

Related results have also been found in teacher education. PSTs are often placed into emotionally demanding, high-pressure practicum contexts that test beliefs in improving through effort and remaining committed to long-term goals (Kaya & Yuksel, 2022; Keesey et al., 2018). Resilience in such practicum contexts and teaching more generally requires a degree of psychological flexibility and endurance that suggests that grit and mindset should be considered together rather than in isolation. Similarly, Farrow (2021) considers the issue of grit against the broader perspective of organizational adaptability.

Examining staff responses to artificial intelligence in high-stakes change scenarios, the author found that participants with a growth mindset demonstrated greater capacity for adaptation and futures literacy, the ability to imagine and prepare for the not-yet-realized, with fixed-mindset peers more likely to feel disempowered and unwilling to adapt. Farrow's (2021) use of scenario-based reflection identifies a more direct link between mindset and the ability to thrive under pressure and to imagine alternative potential futures. This is similar to the challenges faced in teacher education where, on their own, PSTs must reconcile idealistic teacher training programs and the contested reality of the classroom.

Such research highlights the importance of developing a mindset and grit in high-pressure professional contexts. Previous studies have shown that a growth mindset increases adaptability and prepares individuals for uncertain futures, while grit enhances an individual's motivation and stamina to manage setbacks. The development of mindset and grit within teacher education programs may help PSTs prepare for both the classroom demands, whilst supporting their exposure to the complexities of educational reform.

LITERATURE GAPS

Although the construct of mindset has attracted increasing interest alongside that of grit, relatively few studies have examined the evolution of these constructs in response to teacher training processes, especially in the Southeast Asian context. Moreover, most existing studies involve cross-sectional research approaches

and stem from educational systems in the Western world. In addition, the Thai dual-curriculum teacher education system presents unique challenges and opportunities that have not been well-explored in extant research. This study seeks to help fill these gaps by exploring how professional mindset and grit are shaped through concrete practicum experiences of PSTs at one Thai university. Situated within Dweck's theory of self-beliefs (Clifton & Crum, 2024; Jones & Košir, 2024; Lüftenegger & Muth, 2024) and Duckworth's theory of non-cognitive traits (Pretorius et al., 2024), the current study specifically examines how the growth mindset and grit are shaped and evolve within the teacher education pipeline.

Research Objectives (RO) and Research Questions (RQ)

RO1: To study the grit and mindsets of PSTs undergoing professional teaching experience training.
RO 2: To examine the relationship between grit and mindset among PSTs.
RO 3: To compare the grit and mindset of PSTs before and after their professional teaching experience training.
RO 4: Comparing the grit and mindset of PSTs with different genders and academic disciplines.
This study posed the following questions:
RQ1: What are PSTs' grit and mindset levels before and after their professional training?
RQ2: Is there a relationship between grit and mindset among PSTs?
RQ3: Do grit and mindset vary by gender and field of study?
RQ4: After experiencing real-life teaching, do PSTs maintain their mindset and desire to pursue teaching?
By answering these questions, the author hopes the study contributes to the theoretical and applied knowledge of PST mindsets and grit in education (Figure 1).

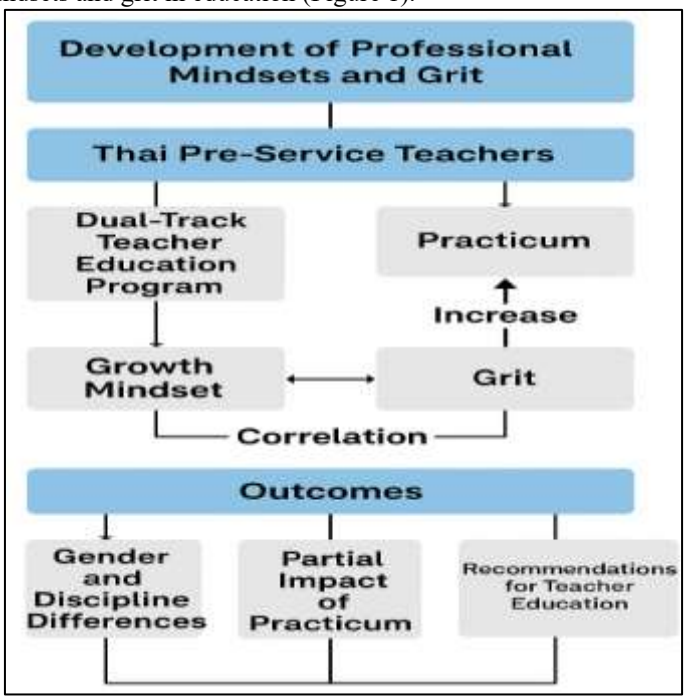

FIGURE 1 PST Mindset and Grit Development Conceptual Model

METHODOLOGY

Population and Sample

The population for the current study was 575 fourth-year PSTs enrolled in the "Teaching Practice in Educational Institutions IV" course in the second semester of the academic year 2024 at the University of Phayao (Table 1). Stratified random sampling was used by observing the number of subgroups by field of study (i.e., major) used as strata to obtain a proportional, rigorous sample relative to the population for each stratification group. Based on Krejcie and Morgan's formula (1970), the minimum sample required to satisfy a 95% confidence level (CL) at a 5% margin of error (MOE) was 234 students. In total, 402 students participated in the pre-practicum and post-practicum phases of the study. The most responses came from Thai Language, English Language, and Mathematics education students. This distribution was reasonable for balancing content areas, as the key focus of this part of the study was to explore the variability in mindset and grit in academics.

TABLE 1 Stratified Sampling by Academic Fields (n = 402).

Discipline	Population	Sample	Response
Mathematics	111	45	83
Physics	6	2	6
Chemistry	16	7	9
Biology	31	13	23
Physical Education	35	14	15
Thai Language	157	64	114
English Language	134	55	94
Social Studies	58	24	36
Chinese Language	17	7	17
Music and Dance	10	4	5
Totals	575	234	402

Research Scope and Design

The research examined professional mindset and grit among PSTs in a dual teacher education program. The conceptual scope was divided into two psychological constructs: mindset (including fixed and growth orientations) and grit (comprising consistency of interest and perseverance of effort). Independent variables included gender and academic field. Dependent variables were mindset (fixed and growth) and grit (interest, consistency, and perseverance).

The study adopted a quantitative survey design. Participants completed instruments before and after their teaching practicum to allow comparative and correlational analysis across time and subgroups.

Instruments

Two validated instruments were employed in this study. The PST Mindset Inventory (PSTMI) was adapted from Kaya and Yuksel (2022) and is grounded in Dweck's (2006) implicit theories of intelligence. The inventory comprised seven items rated on a 6-point Likert scale, with four items assessing fixed mindset and three measuring growth mindset (Table 2). Content validity of the adapted items was reviewed by three educational psychology experts using the Index of Item-Objective Congruence (IOC), with most items scoring 1.0; one item was revised after scoring 0.33.

The second instrument was the Short Grit Scale (Grit-S), translated from Duckworth and Quinn (2009). It contained eight items rated on a 5-point Likert scale, divided into two subscales: consistency of interest (items 1–4) and perseverance of effort (items 5–8). The scale was translated into Thai using forward and backward translation procedures, followed by expert review to ensure semantic and conceptual equivalence. Both tools demonstrated acceptable internal consistency in the pilot study, with Cronbach's alpha values ranging from 0.73 to 0.80 across subscales (Jonker et al., 2025).

Instrument Validation and Reliability

Instrument validity was established using the Index of Item-Objective Congruence (IOC), with most items receiving a score of 1.0, indicating strong content alignment with intended constructs (Binheem et al., 2021). One item was revised after scoring 0.33, reflecting low congruence. Internal consistency was assessed using Cronbach's alpha. Pilot testing was conducted with 39 participants for the Mindset scale and 37 for the Grit scale. Reliability coefficients ranged from 0.73 to 0.80, indicating acceptable internal consistency across all subscales (Table 2).

TABLE 2 Pilot-Test Instrument Reliability Scores.

Instrument	Component	n	Cronbach's Alpha
Mindset	Fixed Mindset	39	0.80
	Growth Mindset		0.74
Grit	Consistency of Interest	37	0.79
	Perseverance of Effort		0.73

Data Collection

Data collection was administered online via Google Forms, with coordination from the university's academic affairs office. The first round of data was collected before the practicum began, and the second round followed its completion, approximately four months later. Data was gathered before students started their teaching practicum in the 2nd semester of the 2024 academic year, which was coordinated with each student's academic affairs office. The duration of the teaching practicum was approximately 2 weeks.

Data Analysis

Descriptive statistics were used to summarize mean scores and standard deviations (SD), while Pearson's Product-Moment Correlation (PMMC) was utilized to assess the relationship between mindset and grit. Correlation (r) strength was interpreted as: 0.00 indicated no correlation, less than 0.40 indicated a low

correlation, 0.40 to 0.60 indicated a moderate correlation, and greater than 0.60 indicated a strong correlation (Pimdee et al., 2023), with positive or negative signs denoting the direction of the relationship. To examine differences before and after the training, as well as across gender and academic disciplines, inferential statistical tests were applied, including a dependent sample t-test to compare mindset and grit before and after the practicum, an independent sample t-test to evaluate gender-based differences, and a one-way ANOVA to analyze group differences by academic field.

RESULTS

General Mindset and Grit Trends Before and After the Practicum

The study involved 402 fourth-year PSTs, primarily female (78.6%) and concentrated in Thai Language, English, and Mathematics programs. A central objective was to examine how the teaching practicum shaped their professional mindset and grit (Table 3).

Fixed-mindset scores increased after the practicum (from 2.30 to 4.76), while growth-mindset scores remained stable (5.65 to 5.63), producing an overall increase in mindset from 3.74 to 5.13. This numerical rise, however, reflects greater endorsement of fixed beliefs rather than a more growth-oriented outlook. The result may indicate that exposure to rigid school systems and hierarchical structures during practicum challenged participants' prior beliefs about personal change and instructional adaptability.

Grit scores showed modest improvement, with the overall mean rising from 3.40 to 3.72 (Table 4). Consistency of interest increased from 2.73 to 3.28, and perseverance of effort from 4.06 to 4.16. These results suggest that real teaching experiences strengthened persistence and focus, aligning with Duckworth and Quinn's (2009) observation that structured, demanding contexts foster perseverance over time.

A moderate positive correlation was found between overall mindset and grit ($r = .47$, $p = .001$), significant at the $p < .01$ level. Students who maintained stronger growth-oriented beliefs tended to demonstrate higher grit. This pattern mirrors findings from international studies (e.g., He et al., 2023), reinforcing the belief that self-improvement supports sustained effort and professional resilience.

TABLE 3 Mindset Scores Before and After the Teaching Practicum (n=402).

Description	Before		After	
	mean	SD	mean	SD
1. The kind of teacher someone is, something fundamental about them and cannot be changed very much. (F)	2.36	1.33	4.53	1.49
2. Some teachers do not benefit from professional learning because they have natural abilities. (F)	2.01	1.24	5.00	1.13
3. Teachers can change how they teach in the classroom, but cannot change their teaching ability. (F)	2.67	1.55	4.49	1.45
4. Some teachers will be ineffective no matter how hard they try to improve. (F)	2.15	1.31	5.00	1.23
Fixed mindset (avg.)	2.30	1.36	4.76	1.32
5. No matter your natural ability, you can always find important ways to improve. (G)	5.50	0.85	5.51	0.79
6. Every educator has the capacity to develop and refine their teaching practices. (G)	5.74	0.68	5.71	0.65
7. Educators can develop their teaching skills at every stage of their professional journey. (G)	5.72	0.66	5.67	0.77
Growth Mindset (avg.)	5.65	0.73	5.63	0.74
Overall Mindset (F + G)	3.74	1.09	5.13	1.07

Note. F = Fixed mindset items; G = Growth mindset items (PST Mindset Inventory). I = Consistency of Interest; P = Perseverance of Effort (Short Grit Scale).

This shift, although numerically positive, is conceptually puzzling. A rise in fixed mindset indicators post-practicum could suggest that the realities of the teaching environment (e.g., bureaucratic constraints, workload, or lack of autonomy) undermined students' belief in developmental potential—an insight echoed in Duckworth's (2016) assertion that institutional context can significantly affect individual perseverance and outlook.

On the other hand, grit scores did improve, with the average increasing from 3.40 to 3.72. More specifically, consistency of interest—the ability to stay committed to goals—increased from 2.73 to 3.28, and perseverance of effort from 4.06 to 4.16 (Table 4). These findings align with research by Duckworth and Quinn (2009), who observed that structured, demanding environments like teaching can foster perseverance over time, particularly through routine, responsibility, and reflective practice.

TABLE 4 Grit Scores Before and After the Teaching Practicum (n=402).

Description	Before		After	
	Mean	SD	Mean	SD
1. I often set a goal but later pursue a different one. (I)	2.69	1.05	3.31	1.06
2. I have been obsessed with a particular idea or project for a short time, but later lost interest. (I)	2.62	1.07	3.49	1.05
3. I have difficulty focusing on projects that take over a few months to complete. (I)	2.66	1.20	3.32	1.20
4. New ideas and projects sometimes distract me from previous ones. (I)	2.97	1.11	3.02	1.10
Consistency of Interest (avg.)	**2.73**	**1.11**	**3.28**	**1.10**
5. I finish whatever I begin. (P)	4.34	0.77	4.44	0.69
6. Setbacks do not discourage me. (P)	3.97	0.98	4.01	0.97
7. I am diligent. (P)	4.13	0.78	4.22	0.79
8. I am a hard worker (P)	3.80	0.94	3.97	0.92
Perseverance of Effort (avg.)	**4.06**	**0.87**	**4.16**	**0.85**
Overall Grit (I + P)	**3.40**	**0.99**	**3.72**	**0.97**

Note. F = Fixed mindset items; G = Growth mindset items (PST Mindset Inventory). I = Consistency of Interest; P = Perseverance of Effort (Short Grit Scale).

Relationship Between Mindset and Grit

A key finding of this study is the moderate positive correlation between mindset and grit ($r = .47$, $p = .001$), indicating statistical significance at the $p < .01$ level. In other words, students with stronger growth mindsets tended to demonstrate higher grit levels. This mirrors international studies (He et al., 2023), suggesting that belief in one's capacity to improve is a precursor to sustained effort and perseverance. The results highlight that mindset and grit operate synergistically as teacher resilience and long-term engagement predictors.

Statistical Differences Before and After Practicum

While the increase in grit was statistically significant ($t = 2.31$, $p = .021$) (Table 6), the change in mindset was not ($t = 0.68$, $p = .50$) (Table 5). This suggests that although participants became marginally more persistent after their practicum, their underlying beliefs about teaching ability did not shift significantly. This echoes findings from Keesey et al. (2018), who emphasize that while short-term experiences can build stamina, deep-seated beliefs often require more sustained and reflective intervention.

TABLE 5 Comparison of PST Grit and Mindset Before and After the Practicum.

Group-Grit	Mean	SD	n	t	df	Sig.
Before Practicum	3.67	.59	402	2.31	401	.02
After Practicum	3.73	.60	402			
Group-Mindset	**Mean**	**SD**	**n**	**t**	**df**	**Sig.**
Before Practicum	5.11	.69	402	.68	401	.50
After Practicum	5.13	.75	402			

Differences by Gender and Academic Discipline

Gender was a significant variable in mindset but not in grit. Female students scored significantly higher in mindset (mean = 5.18) than males (mean = 4.95) (Table 6), suggesting they were more likely to view teaching abilities as improvable. This challenges earlier studies (e.g., Whipple & Dimitrova-Grajzl, 2020), which argued that males typically report higher self-efficacy. Grit scores, however, did not differ significantly by gender, indicating that perseverance may be a more stable trait across demographics (Sigmundsson et al., 2021).

TABLE 6 Comparison of PST Mindset and Grit by Gender.

Group-Mindset by Gender	Mean	SD	n	F	Sig	t	df	Sig
Male	4.95	.84	82	4.48	.04	-2.55	396	.01
Female	5.18	.72	316					
Group-Grit by Gender	**Mean**	**SD**	**n**	**F**	**Sig**	**t**	**df**	**Sig**
Male	3.67	.58	82	.38	.54	-.91	396	.37
Female	3.74	.60	316					

Mindset scores varied significantly by academic discipline (Table 7). Notably, students from Mathematics, English, and Thai education programs scored significantly higher than those in Chinese Language, suggesting disciplinary cultures may shape professional beliefs. No such trend was found for grit, which remained statistically consistent across disciplines. This may reflect how certain subject areas emphasize pedagogical development and reflective growth more than others. Alternatively, it may highlight programmatic differences in instructional mentorship or assessment philosophy.

TABLE 7 Analysis of PST Mindset and Grit in the Dual-Track Teacher Preparation Program by Discipline.

Mindset by Discipline	**n**	**Mean**	**SD**	**F**	**Sig.**
Mathematics	83	5.27	0.64	4.124	.001
Physics	6	5.07	0.37		
Chemistry	9	4.92	0.85		
Biology	23	4.75	0.84		
Physical Education	15	4.96	0.79		
Thai Language	114	5.24	0.72		
English Language	94	5.27	0.69		
Social Studies	36	4.84	0.85		
Chinese Language	17	4.46	0.82		
Music and Dance	5	4.94	1.11		

Grit by Discipline	**n**	**mean**	**SD.**	**F**	**Sig.**
Mathematics	83	3.88	0.61	2.437	.010
Physics	6	3.61	0.24		
Chemistry	9	3.52	0.60		
Biology	23	3.61	0.64		
Physical Education	15	3.68	0.53		
Thai Language	114	3.83	0.61		
English Language	94	3.65	0.57		
Social Studies	36	3.54	0.51		
Chinese Language	17	3.41	0.52		
Music and Dance	5	3.73	0.82		

DISCUSSION

RQ1: What are PSTs' mindsets and grit levels before and after their professional training?

The findings show slight changes with fixed mindset scores increasing substantially, while growth mindset remained stable, and grit improved modestly. The unexpected increase in fixed mindset may reflect PSTs' exposure to hierarchical and rigid teaching systems during practicum, which could constrain their belief in malleable teaching ability. This echoes findings by Meierdirk and Fleischer (2022), who found that teachers embedded in rigid institutional structures were more likely to endorse fixed beliefs about competence.

The slight improvement in grit, particularly consistency of interest, aligns with Duckworth's (2016) theory that grit is cultivated through real-world challenges rather than theoretical instruction. However, the practicum may not have drastically shifted mindsets, and it is likely fostered persistence, responsibility, and goal orientation.

RQ2: Is there a relationship between mindset and grit among PSTs?

The results demonstrated a moderate positive correlation between mindset and grit ($r = .465$), suggesting that the belief that an individual can change and improve was related to sustained effort and perseverance. This aligns with recent findings from He et al. (2023), who showed that the relationship between growth mindset and grit was reciprocal. Teacher preparation programs should consider mindset and grit as characteristics that reinforce each other instead of considering them as individual constructs.

RQ3: Gender and Field Differences.

Gender differences were found for mindset but not for grit. Female PSTs reported higher growth-oriented beliefs than their male counterparts. This pattern supports the cultural expectations surrounding women's societal roles and their adaptability and reflection in the Thai educational setting (Whipple & Dimitrova-Grajzl, 2020). As for grit, the results found similar grit scores across gender. This further proves that grit was a dispositional trait and was thus less susceptible to demographic difference (Sigmundsson et al., 2021).

Across disciplines, Mathematics, English, and Thai majors had higher mind-sets than science or language majors, such as Chinese Education, which may reflect teaching-learning cultures of reflection and adaptation versus rule-based learning. No discipline differences were found for grit. This suggests perseverance of effort may develop more universally across academic disciplines.

RQ4: Sustained Motivation After Practicum

The steady growth mindset and modestly stronger grit suggest that PSTs largely retained motivation to pursue teaching, even amid systemic constraints. However, the simultaneous rise in fixed beliefs indicates potential cognitive dissonance—students may feel capable of personal growth yet perceive teaching ability as externally limited by institutional rigidity. This underscores the importance of mentorship and reflective debriefing during practicum to help PSTs reconcile belief and reality, reinforcing resilience and long-term professional engagement.

CONCLUSIONS

This study aimed to investigate pre-service teachers' mindsets and grit levels (PSTs) before and after their professional training. Moreover, an examination was undertaken concerning the relationships between grit and mindset and gender, discipline, and professional teaching experience. The results showed that the growth mindset appeared stable, but the fixed mindset unexpectedly increased, which might be attributed to the practicum's hierarchical and inflexible school context. At the same time, the improvement of grit was modest. However, consistency of interest improved significantly, meaning that professional teaching experience contributed to PSTs' grit, translating into goal, self-orientation, and perseverance.

The positive moderate correlation between growth mindset and grit suggests that the belief in developing intelligence could be a positive consequence of self-determined effort. A gender differentiation occurred in the mindset but not in grit. Analysis of variance revealed a statistically meaningful difference in favor of gender but not for grit. Also, mindset scores differ meaningfully according to the cognitive fields. Thus, it could be suggested that the pedagogical culture surrounding the academic field of studies is related to the PSTs' mindset. Finally, despite the cognitive dissonance caused by the systemic rigorousness, PSTs' propensity to pursue a career in teaching was satisfied with the strength of their professional identity, boosted by grit.

SUGGESTIONS/RECOMMENDATIONS

Teacher education programs should incorporate structured reflection sessions during practicum to help PSTs process institutional rigidity and reaffirm growth-oriented beliefs. Mentors and supervisors can be trained to scaffold growth mindsets by giving constructive criticism, modeling adaptive teaching, and offering concrete career pathways. Programs can scaffold experiences so PSTs can participate in productive struggles without excessively challenging PSTs. Grit could be cultivated through goal-setting so that PSTs can deliberately practice and improve their teaching and resilience. Mindset scores were variable by field, suggesting that subject-specific interventions might be valuable. For instance, science teacher education might be better situated to promote a growth mindset in their PSTs by incorporating constructivist and inquiry-based teaching strategies grounded in learning as a developmental process. Institutions may wish to assess for shifts towards a fixed mindset during times when PST anxiety is high, such as during practicum, as a way to prevent longer-term feelings of disillusionment. While not a magic indicator of PST success, program coordinators could track grit to flag PSTs who may benefit from additional supports to improve their perseverance and long-term goal orientation.

LIMITATIONS

While this research suggests valuable insights into the psychological development of PSTs, several limitations must be acknowledged. These include that no interviews or focus groups were conducted, limiting the depth of understanding behind participants' mindsets and grit scores. Qualitative follow-up enriched the interpretation of cognitive dissonance and contextual influences. The study was conducted in a specific cultural and institutional context (Thai teacher education), which may limit generalizability to other regions or educational systems. The post-test was administered immediately after the practicum. Longitudinal studies better assess whether mindset and grit changes are sustained over time. As with many psychological constructs, the reliance on self-reported data may have introduced social desirability or response biases.

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