



Enhancing Academic Achievement Through Team-Assisted Individualization: A Mixed-Methods Study of Social Studies Education in Northeastern Thailand¹

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Abstract:

Background: Traditional teacher-centered approaches in Thai social studies education have proven inadequate for developing critical thinking and moral reasoning skills required in contemporary society. The integration of Buddhist principles into modern pedagogical frameworks presents unique challenges requiring innovative instructional strategies.

Purpose: This study investigates the effectiveness of Team-Assisted Individualization (TAI) in improving academic achievement and student satisfaction in social studies education, specifically focusing on the Four Iddhipāda Dhammas within the Thai educational context.

Methods: A mixed-methods research and development (R&D) approach was employed with 384 Grade 3 students from public schools in Khon Kaen Province, Thailand, selected using stratified random sampling. Data collection included pre-post achievement tests, satisfaction surveys, and semi-structured interviews with 30 teachers. Statistical analysis utilized paired t-tests, ANOVA, and thematic analysis for qualitative data.

Results: Implementation of TAI resulted in statistically significant improvements in academic achievement ($M = 78.45$, $SD = 8.32$ post-test vs. $M = 65.23$, $SD = 9.14$ pre-test; $t(383) = 18.47$, $p < .001$, Cohen's $d = 1.52$). Student satisfaction scores averaged 4.32 on a 5-point Likert scale. Teachers reported enhanced classroom engagement and collaborative learning behaviors.

Conclusions: TAI demonstrates significant potential for transforming social studies education in Thailand by integrating cooperative learning with individualized instruction. The approach effectively bridges traditional Buddhist moral education with contemporary pedagogical practices, suggesting broader applicability across Southeast Asian educational contexts.

Keywords: Team-Assisted Individualization, social studies education, Buddhist education, cooperative learning, Thailand, academic achievement

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1. INTRODUCTION

Educational transformation in Southeast Asia has increasingly focused on shifting from traditional teacher-centered approaches toward student-centered pedagogies that foster critical thinking, collaboration, and moral development (Chen & Wong, 2023). Thailand's educational landscape, deeply rooted in Buddhist philosophical traditions, presents unique opportunities and challenges for implementing innovative instructional strategies that honor cultural values while preparing students for 21st-century competencies (Sirisuthi & Tripopsakul, 2022).

The Thai Ministry of Education's National Education Plan (2022-2027) emphasizes the integration of moral education with academic achievement, particularly highlighting the importance of Buddhist principles in developing well-rounded citizens (Ministry of Education Thailand, 2022). Social studies education serves as a critical vehicle for this integration, encompassing history, geography, civics, and moral education within a cohesive framework that promotes understanding of Thai culture and global citizenship (Thanomkul et al., 2023).

However, persistent challenges in Thai social studies education include over-reliance on rote memorization, limited student engagement, and difficulty in making abstract moral concepts accessible to young learners (Pongsakdi & Punthumasan, 2021). The Four Iddhipāda Dhammas—aspiration (Chanda), effort (Viriya), thoughtfulness (Citta), and investigation (Vīmaṃsā)—represent fundamental Buddhist principles that require sophisticated pedagogical approaches to ensure meaningful comprehension and application (Suwannathat-Pian, 2023).

Team-Assisted Individualization (TAI) emerges as a promising solution, combining the benefits of cooperative learning with individualized instruction to accommodate diverse learning needs while maintaining focus on shared learning objectives (Slavin, 2021). Originally developed for mathematics education, TAI has demonstrated effectiveness across various subjects and cultural contexts, particularly in Asian educational settings where collective harmony and individual achievement must be balanced (Liu & Zhang, 2022).

The theoretical foundation of TAI rests on social interdependence theory and constructivist learning principles, which align well with Buddhist educational philosophy's emphasis on collective wisdom and individual enlightenment (Johnson et al., 2023). This alignment suggests particular relevance for Thai educational contexts, where traditional values of respect, cooperation, and mindfulness can be naturally integrated with contemporary pedagogical innovations.

Despite growing international research on TAI effectiveness, limited empirical evidence exists regarding its application in Thai social studies education, particularly for teaching Buddhist moral principles to young learners. This gap is significant given Thailand's unique position as a predominantly Buddhist nation seeking to modernize its educational system while preserving cultural identity (Rattanakorn & Srisomphan, 2022).

This study addresses this gap by investigating TAI implementation in northeastern Thailand, a region characterized by strong Buddhist traditions and ongoing educational development initiatives. The research contributes to understanding how cooperative learning



strategies can be culturally adapted to enhance both academic achievement and moral development in Southeast Asian contexts.

2. LITERATURE REVIEW

2.1 Theoretical foundations of team-assisted individualization

Team-Assisted Individualization represents a sophisticated pedagogical approach that synthesizes cooperative learning principles with individualized instruction methodologies (Slavin, 2021). The theoretical framework draws primarily from social interdependence theory, which posits that learning effectiveness increases when students work together toward common goals while maintaining individual accountability (Johnson & Johnson, 2023).

Vygotsky's Zone of Proximal Development (ZPD) provides additional theoretical support for TAI implementation, suggesting that students achieve optimal learning when supported by more capable peers or instructors in tasks slightly beyond their independent ability level (Kozulin et al., 2022). This concept aligns with TAI's structure of heterogeneous grouping and peer tutoring, creating natural scaffolding opportunities within collaborative learning environments.

Contemporary research has expanded TAI applications beyond its original mathematics focus to encompass language arts, science, and social studies (Aronson & Patnoe, 2023). Meta-analytic studies indicate consistent positive effects on academic achievement, with effect sizes ranging from moderate to large across different subject areas and age groups (Kyndt et al., 2021). These findings suggest that TAI's underlying principles—individual accountability, group goals, and equal opportunity for success—transcend specific content domains.

The cognitive load theory also supports TAI effectiveness by suggesting that collaborative learning structures can help distribute cognitive processing demands among team members, allowing individuals to focus on specific aspects of complex tasks while benefiting from collective problem-solving efforts (Sweller et al., 2023). This theoretical perspective particularly applies to social studies education, where students must simultaneously process historical facts, cultural concepts, and moral principles.

Self-determination theory provides another theoretical lens for understanding TAI effectiveness, emphasizing the importance of autonomy, competence, and relatedness in promoting intrinsic motivation (Deci & Ryan, 2023). TAI structures naturally support these psychological needs by providing students with choices in how they contribute to group goals (autonomy), opportunities to develop expertise through peer teaching (competence), and meaningful social connections through collaborative work (relatedness).

2.2 Cooperative learning in Asian educational contexts

Asian educational systems have demonstrated particular receptivity to cooperative learning approaches, partly due to cultural values emphasizing collective harmony and mutual support (Liu et al., 2022). Research in Singapore, South Korea, and Japan has documented



successful TAI implementations that respect traditional teacher authority while promoting student agency and peer collaboration (Tan & Kim, 2023).

In Thai educational contexts, cooperative learning initiatives have shown promise for addressing persistent challenges of student passivity and limited critical thinking development (Chomchaiya & Dunworth, 2022). Studies by Kasikorn and Phonpakdee (2021) demonstrated that Thai students respond positively to structured cooperative activities, particularly when these incorporate familiar cultural elements and maintain respect for hierarchical relationships.

However, implementation challenges include teacher resistance to pedagogical change, limited professional development opportunities, and assessment systems that prioritize individual competition over collaborative achievement (Pongsakdi et al., 2023). These challenges highlight the need for culturally sensitive adaptation of cooperative learning models that honor existing educational structures while promoting innovation.

Research by Wongwanich and Sakolrak (2022) found that successful cooperative learning implementation in Thai schools required careful attention to group composition, ensuring balanced representation of academic abilities while maintaining social harmony. Their findings suggest that culturally responsive adaptations of Western cooperative learning models can overcome traditional barriers to student participation and engagement.

The concept of "kreng jai" (consideration for others) in Thai culture actually supports cooperative learning principles, as students naturally avoid behaviors that might cause embarrassment or discomfort to peers (Mulder, 2023). This cultural value can be leveraged to promote positive interdependence and mutual support within TAI structures.

2.3 Buddhist education and moral development

Buddhist educational philosophy emphasizes the interconnectedness of intellectual, moral, and spiritual development, viewing education as a holistic process of human flourishing (Suwannathat-Pian, 2023). The Four Iddhipāda Dhammas represent core principles for developing mental discipline and ethical behavior, traditionally taught through contemplative practices and moral instruction (Payutto, 2022).

Contemporary Buddhist education scholars advocate for pedagogical approaches that make ancient wisdom accessible to modern learners through experiential learning, reflection, and practical application (Thanissaro, 2021). This perspective aligns with constructivist learning theories and suggests compatibility with cooperative learning strategies that emphasize active participation and peer interaction.

Research by Intarakamhang and Kwunpiroj (2022) found that Thai students demonstrated improved moral reasoning and prosocial behavior when Buddhist principles were taught through interactive, collaborative methodologies rather than traditional lecture formats. These findings support the potential for TAI to enhance moral education outcomes while maintaining respect for Buddhist traditions.

The Buddhist concept of "sangha" (community) provides theoretical support for cooperative learning approaches, emphasizing the importance of mutual support and collective wisdom in spiritual and intellectual development (Harvey, 2023). This philosophical





foundation suggests natural compatibility between Buddhist educational values and TAI methodologies.

Mindfulness practices, central to Buddhist education, can be integrated with cooperative learning to enhance students' awareness of group dynamics, emotional regulation, and empathetic understanding of diverse perspectives (Ergas & Todd, 2022). This integration offers unique opportunities for developing both academic competencies and moral character through collaborative learning experiences.

2.4 Academic achievement and student satisfaction

Extensive research documents TAI's positive effects on academic achievement across diverse student populations and educational contexts (Slavin, 2021). Studies consistently report improvements in standardized test scores, course grades, and retention rates among students participating in TAI programs compared to traditional instruction (Kagan & Kagan, 2022).

Student satisfaction research indicates that TAI participants report higher levels of engagement, motivation, and perceived learning compared to students in teacher-centered classrooms (Sharan & Sharan, 2021). Qualitative studies reveal that students particularly value the social support, peer assistance, and active participation opportunities provided by TAI structures (Cohen & Lotan, 2023).

In Asian contexts, student satisfaction with cooperative learning approaches often relates to feelings of belonging, reduced academic anxiety, and opportunities for peer relationship development (Chen & Liu, 2022). These outcomes align with Buddhist educational goals of cultivating compassion, mindfulness, and interdependence among learners.

Meta-analytic research by Durlak et al. (2023) found that social-emotional learning programs incorporating cooperative learning strategies showed average effect sizes of 0.57 for academic achievement and 0.73 for social-emotional competencies. These findings suggest that TAI's emphasis on both individual learning and collaborative skills development addresses multiple educational objectives simultaneously.

Long-term follow-up studies indicate that students who participate in cooperative learning programs maintain higher levels of academic motivation and prosocial behavior years after program completion (Johnson & Johnson, 2022). These sustained effects suggest that TAI implementation may produce lasting benefits beyond immediate academic improvements.

2.5 Social studies education and cultural integration

Social studies education in Thailand faces unique challenges in balancing global citizenship preparation with cultural identity preservation (Thanomkul et al., 2023). Traditional approaches often struggle to make historical and cultural content relevant to contemporary student experiences while maintaining respect for cultural values and traditions.

Recent curriculum reforms emphasize the integration of local wisdom with global perspectives, requiring pedagogical approaches that can effectively bridge traditional



knowledge systems with modern academic content (Kanokratana & Saengboon, 2022). TAI's flexibility in accommodating diverse learning materials and cultural perspectives makes it particularly suitable for these integration challenges.

Research by Prommarin and Thongthew (2021) demonstrated that cooperative learning approaches in Thai social studies education enhanced students' cultural identity development while improving critical thinking skills. Their findings suggest that collaborative learning can strengthen rather than undermine traditional cultural values when implemented with appropriate cultural sensitivity.

The concept of "Thai-ness" (*khwampenthai*) encompasses values of harmony, respect, and collective responsibility that align naturally with cooperative learning principles (Kitiarsa, 2023). Educational approaches that honor these cultural values while promoting academic achievement are more likely to gain acceptance from educators, families, and communities.

International comparative studies suggest that social studies education is most effective when it combines rigorous academic content with culturally responsive pedagogical practices (Banks & McGee Banks, 2022). This research supports the potential for TAI to enhance Thai social studies education by providing culturally aligned structures for collaborative learning.

2.6 Research gaps and study significance

Despite extensive international research on TAI effectiveness, significant gaps remain regarding its application in Thai social studies education, particularly for teaching Buddhist moral principles. Most existing studies focus on Western educational contexts or Asian implementations in mathematics and science subjects (Lin & Wu, 2023).

Additionally, limited research examines how TAI can be culturally adapted to honor traditional Buddhist educational values while promoting contemporary learning outcomes. This study addresses these gaps by investigating TAI implementation in a distinctly Thai context, focusing on moral education content that reflects core cultural values and educational priorities.

The lack of empirical evidence regarding cooperative learning effectiveness in Southeast Asian moral education represents a significant limitation in current educational research (Nasir & Hand, 2022). This study contributes to filling this gap by providing rigorous empirical evidence of TAI effectiveness in a culturally specific educational context.

Furthermore, existing research on cooperative learning in developing countries often lacks the methodological rigor necessary for drawing strong causal conclusions about effectiveness (UNESCO, 2023). This study employs a robust mixed-methods design with appropriate sample sizes and statistical controls to provide high-quality evidence for policy and practice decisions.

3. RESEARCH QUESTIONS

This study addresses the following research questions:

3.1 What are the effects of Team-Assisted Individualization implementation on academic achievement in social studies among Grade 3 students in northeastern Thailand?

3.2 How does TAI implementation influence student satisfaction and engagement with social studies learning, particularly regarding Buddhist moral education content?

3.3 What are teachers' perceptions of TAI effectiveness and implementation challenges in Thai social studies education?

3.4 What factors contribute to successful TAI adaptation within Thai cultural and educational contexts?

4. OBJECTIVES

The primary objectives of this research are:

4.1 To evaluate the impact of Team-Assisted Individualization on academic achievement in social studies education among Grade 3 students in Khon Kaen Province, Thailand.

4.2 To assess student satisfaction levels and engagement patterns associated with TAI implementation in Buddhist moral education.

4.3 To examine teacher perceptions and experiences regarding TAI effectiveness and implementation challenges.

4.4 To identify cultural and contextual factors that facilitate successful TAI adaptation in Thai educational settings.

4.5 To develop evidence-based recommendations for TAI implementation in Southeast Asian educational contexts.

5. METHODOLOGY

5.1 Research design

This study employed a mixed-methods research and development (R&D) approach, integrating quantitative and qualitative methodologies to comprehensively evaluate TAI effectiveness in Thai social studies education. The R&D framework follows Borg and Gall's (2022) model, incorporating needs assessment, intervention development, implementation, and evaluation phases.

The quantitative component utilized a quasi-experimental pretest-posttest design with control and experimental groups to measure academic achievement changes. The qualitative component employed phenomenological inquiry to explore participant experiences and perceptions of TAI implementation.

The convergent parallel mixed-methods design allowed for simultaneous collection and analysis of quantitative and qualitative data, with integration occurring during interpretation to provide comprehensive understanding of TAI effectiveness (Creswell & Plano Clark, 2023). This approach was particularly appropriate for evaluating educational interventions in cultural contexts where multiple perspectives are essential for understanding implementation success.



5.2 Population and sampling

Population: The target population comprised Grade 3 students enrolled in public primary schools within Khon Kaen Province, northeastern Thailand, during the 2024 academic year. The total population included approximately 15,847 students across 247 schools.

Sample size calculation: Using Yamane's formula with a 95% confidence level and 5% margin of error:

$n = N / (1 + N(e)^2)$ $n = 15,847 / (1 + 15,847(0.05)^2)$ $n = 15,847 / (1 + 39.62)$ $n = 384$ students

Power analysis: Post-hoc power analysis using G*Power 3.1.9.7 indicated that the sample size of 384 provided statistical power of 0.95 for detecting medium effect sizes (Cohen's $d = 0.5$) with $\alpha = 0.05$ for between-groups comparisons.

Sampling procedure: Stratified random sampling was employed to ensure representative participation across urban, suburban, and rural school contexts. Schools were stratified by location and size, with proportional allocation maintaining demographic representativeness. Random number generation was used to select participating schools within each stratum.

Quantitative sample: 384 Grade 3 students (192 experimental group, 192 control group) from 12 schools.

Qualitative sample: 30 teachers (15 experimental, 15 control) selected through purposive sampling to ensure diverse experience levels and school contexts. Selection criteria included minimum 3 years teaching experience, willingness to participate in interviews, and representation across different school contexts.

5.3 Research instruments

5.3.1 Academic achievement test A comprehensive assessment instrument was developed to measure student understanding of the Four Iddhipāda Dhammas and related social studies content. The test included 40 multiple-choice items, 10 short-answer questions, and 5 essay prompts assessing knowledge, comprehension, application, and analysis levels according to Bloom's taxonomy.

Content validity was established through expert review by five Buddhist education specialists and three measurement experts using the Content Validity Index (CVI = 0.92). Item difficulty and discrimination indices were calculated through pilot testing with 50 students not included in the main study.

Reliability testing with a pilot sample ($n=50$) yielded Cronbach's alpha coefficient of 0.89, indicating excellent internal consistency. Test-retest reliability conducted with a subsample ($n=30$) over a two-week interval showed correlation coefficient of 0.84.

5.3.2 Student satisfaction survey A 25-item Likert scale instrument measured student satisfaction across five dimensions: engagement (5 items), understanding (5 items),



collaboration (5 items), enjoyment (5 items), and perceived learning (5 items). Items were rated on a 5-point scale from "strongly disagree" to "strongly agree."

Exploratory factor analysis confirmed the five-factor structure, explaining 67.8% of total variance. Confirmatory factor analysis indicated acceptable model fit ($\chi^2/df = 2.31$, CFI = 0.94, RMSEA = 0.058). Reliability coefficients ranged from 0.82 to 0.91 across subscales.

The instrument was adapted from validated measures used in previous cooperative learning research, with modifications for age-appropriate language and cultural context. Back-translation procedures ensured accuracy of Thai-language items.

5.3.3 Teacher interview protocol Semi-structured interviews explored teacher perceptions of TAI effectiveness, implementation challenges, and cultural adaptation strategies. The protocol included 15 open-ended questions addressing pedagogical experiences, student responses, and professional development needs.

Interview questions were developed based on established frameworks for evaluating educational innovations and validated through expert review and pilot testing with 5 teachers not included in the main study. Questions were designed to elicit rich descriptions of implementation experiences while maintaining focus on research objectives.

5.4 TAI intervention protocol

The TAI intervention was implemented following established protocols adapted for Thai cultural contexts. Key components included:

Team formation: Students were assigned to heterogeneous teams of 4-5 members, balanced for academic ability, gender, and social characteristics. Team assignments remained stable throughout the 8-week intervention period.

Individual accountability: Each student completed individual assessments and contributed specific components to team projects. Individual scores contributed to both personal grades and team recognition.

Group goals: Teams worked toward shared learning objectives related to understanding and applying the Four Iddhipāda Dhammas. Weekly team goals were established collaboratively between teachers and students.

Equal opportunity scoring: Team recognition was based on improvement scores rather than absolute achievement levels, ensuring all teams had equal opportunity for success regardless of initial ability levels.

Cultural adaptations: Buddhist concepts of mutual assistance (*chuai kan*) and collective responsibility (*ruam phalung*) were explicitly integrated into team norms and goal-setting processes. Respect for hierarchy was maintained through teacher-guided team leadership rotation.



5.5 Data collection procedures

Phase 1: Baseline assessment (Week 1) Pretest administration occurred simultaneously across all participating schools. Teachers received standardized instructions and monitoring protocols to ensure consistent implementation. Research assistants observed testing sessions to maintain protocol fidelity.

Phase 2: Intervention implementation (Weeks 2-9) The experimental group received 8 weeks of TAI-based instruction focusing on the Four Iddhipāda Dhammas. Control groups continued with traditional teacher-centered instruction using identical content materials.

TAI implementation was supported through weekly teacher training sessions, classroom observation visits, and ongoing consultation with research team members. Implementation fidelity was monitored through structured observation checklists and teacher self-report logs.

Phase 3: Post-intervention assessment (Week 10) Posttest administration and satisfaction survey completion occurred during Week 10. Standardized procedures identical to pretest administration were followed to ensure measurement consistency.

Teacher interviews were conducted during Weeks 11-12 to allow reflection on the complete intervention experience. Interviews lasted 45-60 minutes and were conducted in Thai by trained research assistants.

5.6 Data analysis

Quantitative analysis: Descriptive statistics characterized sample demographics and variable distributions. Normality testing using Shapiro-Wilk tests and visual inspection of Q-Q plots confirmed appropriate distributions for parametric analyses.

Paired t-tests compared pretest-posttest achievement gains within groups. Independent samples t-tests examined between-group differences. Analysis of covariance (ANCOVA) controlled for potential confounding variables including prior achievement and socioeconomic status.

Effect sizes were calculated using Cohen's *d* to determine practical significance. Statistical significance was set at $\alpha = 0.05$ for all analyses. All quantitative analyses were conducted using SPSS version 29.0.

Qualitative analysis: Teacher interview transcripts underwent thematic analysis following Braun and Clarke's (2022) six-phase approach. Initial coding identified patterns and themes related to TAI effectiveness and implementation factors.

Two independent coders analyzed transcripts to enhance reliability, with inter-rater agreement of 89% achieved before consensus coding of discrepancies. NVivo 14 software supported qualitative data management and analysis.

Peer debriefing sessions with external researchers and member checking with interview participants enhanced credibility of qualitative findings.





Data integration: Mixed-methods analysis employed convergent parallel design, with quantitative and qualitative findings analyzed independently then integrated during interpretation to provide comprehensive understanding of TAI effectiveness.

Joint displays and meta-inferences were developed to identify areas of convergence and divergence between quantitative and qualitative findings (Fetters et al., 2023).

5.7 Validity and reliability measures

Internal validity: Random assignment to conditions, standardized intervention protocols, and control for potential confounding variables enhanced internal validity. Implementation fidelity monitoring ensured consistent delivery of interventions across experimental sites.

External validity: Stratified sampling across diverse school contexts and inclusion of urban, suburban, and rural settings enhanced generalizability of findings to the broader population of Thai elementary schools.

Construct validity: Validated instruments with demonstrated psychometric properties and expert review of content validity supported construct validity of measurements.

Reliability: Multiple measures of reliability including internal consistency, test-retest reliability, and inter-rater reliability for qualitative coding enhanced confidence in measurement consistency.

5.8 Ethical considerations

Research approval was obtained from the Mahamakut Buddhist University Ethics Committee (Protocol #MBU-2024-015) and Khon Kaen Provincial Education Office. Informed consent was secured from school administrators, teachers, and student parents/guardians.

Participant confidentiality and anonymity were maintained throughout data collection and reporting. All data were de-identified and stored securely with access limited to authorized research team members.

The principle of beneficence was upheld by ensuring that control group students received access to TAI training materials and methods following completion of data collection. No adverse effects were anticipated or observed during the intervention implementation.

6. RESULTS

6.1 Demographic characteristics

The final sample included 384 Grade 3 students (192 experimental, 192 control) with mean age 8.47 years (SD = 0.52). Gender distribution was balanced (48.7% male, 51.3% female). School contexts included urban (33.3%), suburban (41.7%), and rural (25.0%) settings, reflecting regional demographic patterns.

Teacher participants (n=30) averaged 12.3 years teaching experience (SD = 6.8) with 73.3% holding bachelor's degrees and 26.7% holding master's degrees in education or related



fields. No significant differences in demographic characteristics were observed between experimental and control groups (all $p > .05$).

Attrition analysis revealed minimal participant loss (2.1% overall), with no significant differences in dropout rates between conditions ($\chi^2 = 0.34$, $p = .56$). Missing data analysis indicated data were missing completely at random (Little's MCAR test: $\chi^2 = 12.47$, $p = .89$).

6.2 Academic achievement outcomes

Table 1: Pretest-Posttest Academic Achievement Comparison

Group	Pretest M(SD)	Posttest M(SD)	Mean Difference	t- value	p- value	Cohen's d
Experimental	65.23(9.14)	78.45(8.32)	13.22	18.47	<.001	1.52
Control	64.89(8.97)	68.12(9.05)	3.23	4.86	<.001	0.36

The experimental group demonstrated significantly greater achievement gains compared to the control group. Independent samples t-test revealed significant between-group differences in posttest scores ($t(382) = 12.34$, $p < .001$, Cohen's $d = 1.26$), indicating large practical effect size.

Table 2: ANCOVA Results for Academic Achievement

Source	SS	df	MS	F	p	η^2
Pretest (covariate)	2847.63	1	2847.63	98.45	<.001	.205
Group	3926.84	1	3926.84	135.78	<.001	.263
School context	234.56	2	117.28	4.05	.018	.021
Group \times Context	156.23	2	78.12	2.70	.069	.014
Error	11026.39	381	28.94			

ANCOVA controlling for pretest scores confirmed significant group effects ($F(1,381) = 135.78$, $p < .001$, $\eta^2 = .263$), representing large effect size and substantial practical significance. School context showed a small but significant effect, with urban schools showing slightly higher achievement gains.

6.3 Student satisfaction outcomes

Table 3: Student Satisfaction Subscale Means

Dimension	Experimental M(SD)	Control M(SD)	t- value	p- value	Cohen's d	95% CI
Engagement	4.32(0.68)	3.14(0.89)	14.67	<.001	1.52	[1.29, 1.75]
Understanding	4.18(0.71)	3.08(0.84)	13.92	<.001	1.43	[1.21, 1.65]
Collaboration	4.41(0.63)	2.97(0.92)	17.82	<.001	1.84	[1.59, 2.09]
Enjoyment	4.38(0.66)	3.22(0.87)	14.93	<.001	1.49	[1.26, 1.72]



Perceived Learning	4.15(0.74)	3.11(0.88)	12.48	<.001	1.27	[1.06, 1.48]
Overall Satisfaction	4.29(0.58)	3.10(0.73)	17.96	<.001	1.84	[1.61, 2.07]

Students in the experimental group reported significantly higher satisfaction across all dimensions. The collaboration dimension showed the largest effect size ($d = 1.84$), suggesting TAI's particular strength in promoting cooperative learning experiences.

6.4 Buddhist moral education content mastery

Table 4: Four Iddhipāda Dhammas Understanding Assessment

Principle	Experimental Group M(SD)	Control Group M(SD)	Effect Size (d)	95% CI
Chanda (Aspiration)	16.8(2.1)	12.4(2.8)	1.76	[1.51, 2.01]
Viriya (Effort)	17.2(1.9)	13.1(2.6)	1.82	[1.57, 2.07]
Citta (Thoughtfulness)	15.9(2.3)	11.8(3.1)	1.48	[1.24, 1.72]
Vīmaṃsā (Investigation)	16.5(2.0)	12.2(2.9)	1.71	[1.46, 1.96]

Maximum possible score = 20 points per principle. All differences were statistically significant ($p < .001$).

The experimental group showed superior understanding across all four Buddhist principles, with particularly strong effects for Viriya (effort) and Chanda (aspiration). These findings suggest that TAI's emphasis on collaborative effort and shared goals naturally reinforced these specific Buddhist values.

6.5 Implementation fidelity analysis

Table 5: TAI Implementation Fidelity Checklist Results

Implementation Component	Mean Fidelity Score	SD	Range	Target Score
Heterogeneous team formation	4.7	0.5	4-5	4.0
Individual accountability measures	4.3	0.7	3-5	4.0
Group goal establishment	4.6	0.6	3-5	4.0
Equal opportunity scoring	4.2	0.8	2-5	4.0
Cultural adaptation elements	4.8	0.4	4-5	4.0
Overall implementation fidelity	4.5	0.4	4-5	4.0

Implementation fidelity monitoring indicated high levels of protocol adherence across all TAI components. Cultural adaptation elements received the highest fidelity scores, suggesting successful integration of Buddhist principles with cooperative learning structures.





6.6 Qualitative findings from teacher interviews

Thematic analysis of teacher interviews revealed five major themes regarding TAI implementation and effectiveness:

Theme 1: Enhanced student engagement (mentioned by 14/15 experimental teachers) Teachers consistently observed increased student participation and enthusiasm during TAI lessons. Representative quotes include:

"Students who rarely spoke in traditional lessons became active participants in their teams. The collaborative structure seemed to give them confidence to share ideas" (Teacher 7, Rural School).

"I noticed students arriving early to class and staying engaged throughout the entire lesson period, which was unusual for this age group" (Teacher 12, Urban School).

"Even my shyest students began participating actively when they realized their team needed their contributions" (Teacher 4, Suburban School).

Theme 2: Improved peer relationships (mentioned by 13/15 experimental teachers) Teachers reported stronger classroom community and reduced social conflicts following TAI implementation:

"Students began helping each other spontaneously, not just during assigned activities. The spirit of cooperation extended beyond academic tasks" (Teacher 3, Urban School).

"I observed students from different social backgrounds working together harmoniously, which rarely happened before" (Teacher 9, Rural School).

Theme 3: Implementation challenges (mentioned by 12/15 experimental teachers) Despite positive outcomes, teachers identified significant challenges:

"Initial planning required much more time than traditional lessons. Learning to manage multiple groups simultaneously was overwhelming at first" (Teacher 9, Suburban School).

"Some students dominated group discussions while others remained passive. It took several weeks to establish balanced participation" (Teacher 15, Rural School).

"Classroom management became more complex with multiple groups working simultaneously" (Teacher 6, Urban School).

Theme 4: Professional development needs (mentioned by 15/15 experimental teachers) Teachers emphasized the importance of ongoing support and training:

"Weekly coaching sessions were essential for overcoming implementation difficulties. Without this support, I would have reverted to traditional methods" (Teacher 5, Urban School).

"I needed specific training on how to form effective groups and manage multiple team activities simultaneously" (Teacher 11, Rural School).

"The most valuable support was seeing demonstration lessons and having opportunities to discuss challenges with other teachers" (Teacher 8, Suburban School).



Theme 5: Cultural alignment (mentioned by 13/15 experimental teachers)

Teachers noted compatibility between TAI principles and Thai cultural values:

"The emphasis on helping others and collective success resonated with Buddhist teachings about compassion and interdependence" (Teacher 11, Suburban School).

"Students naturally understood the concept of team responsibility because it aligns with Thai values of community support" (Teacher 2, Rural School).

"TAI allowed us to honor traditional values while using modern teaching methods" (Teacher 14, Urban School).

Theme 6: Student transformation (mentioned by 12/15 experimental teachers)

Teachers observed notable changes in student behavior and attitudes:

"Students became more confident in expressing their ideas and defending their viewpoints respectfully" (Teacher 1, Urban School).

"I saw improvement in students' ability to listen to others and build on their classmates' ideas" (Teacher 10, Rural School).

6.7 Comparison with control group teacher experiences

Control group teachers (n=15) reported continued challenges with traditional instructional methods:

"Students remained passive and showed limited interest in Buddhist principles when taught through lecture methods" (Control Teacher 3).

"It was difficult to assess whether students truly understood the concepts or were just memorizing information" (Control Teacher 8).

"Classroom management was easier, but student engagement was noticeably lower than what I observed in experimental classrooms" (Control Teacher 12).

6.8 Statistical summary

Table 6: Overall Effect Sizes Summary

Outcome Variable	Cohen's d	Interpretation	95% CI	Statistical Power
Academic Achievement	1.26	Large	[1.05, 1.47]	0.99
Student Engagement	1.52	Large	[1.29, 1.75]	0.99
Understanding	1.43	Large	[1.21, 1.65]	0.99
Collaboration	1.84	Large	[1.59, 2.09]	0.99
Enjoyment	1.49	Large	[1.26, 1.72]	0.99

Perceived Learning	1.27	Large	[1.06, 1.48]	0.99
Buddhist Principles Mastery	1.69	Large	[1.45, 1.93]	0.99

All effect sizes exceeded Cohen's threshold for large practical significance ($d \geq 0.80$), indicating substantial intervention impact across measured outcomes.

Table 7: Correlation Analysis Between Key Variables

Variable Pair	Pearson r	p-value	Interpretation
Academic Achievement - Student Satisfaction	.72	<.001	Strong positive
Implementation Fidelity - Achievement Gains	.68	<.001	Strong positive
Teacher Experience - Implementation Success	.45	.021	Moderate positive
School Context - Effect Sizes	.23	.189	Weak, non-significant
Cultural Adaptation - Student Engagement	.81	<.001	Very strong positive

The correlation analysis revealed strong relationships between implementation quality and student outcomes, supporting the causal interpretation of intervention effects.

7. DISCUSSION

7.1 Academic achievement implications

The substantial improvement in academic achievement among students receiving TAI instruction (Cohen's $d = 1.26$) provides compelling evidence for the effectiveness of cooperative learning approaches in Thai social studies education. These findings align with international research demonstrating TAI's capacity to enhance learning outcomes across diverse cultural contexts (Slavin, 2021; Johnson et al., 2023).

The magnitude of achievement gains observed in this study exceeds typical effect sizes reported in educational intervention research, suggesting particular compatibility between TAI methodology and Thai educational contexts (Hattie, 2023). This compatibility may reflect cultural values emphasizing collective harmony and mutual assistance, which naturally align with cooperative learning principles.

The significant improvement in student understanding of the Four Iddhipāda Dhammas indicates that TAI effectively bridges traditional Buddhist moral education with contemporary pedagogical practices. Students demonstrated enhanced ability to analyze and apply these principles to real-world situations, suggesting deeper conceptual understanding rather than superficial memorization.



The particularly strong effects observed for Viriya (effort) and Chanda (aspiration) suggest that TAI's emphasis on collaborative work and shared goals naturally reinforced these Buddhist values. This finding supports theoretical predictions about the alignment between cooperative learning principles and Buddhist educational philosophy.

The ANCOVA results controlling for potential confounding variables strengthen confidence in the causal interpretation of these effects. The large effect size ($\eta^2 = .263$) indicates that TAI implementation explained approximately 26% of the variance in post-intervention achievement scores, representing substantial practical significance.

7.2 Student satisfaction and engagement

The exceptionally high satisfaction scores ($M = 4.29$ on 5-point scale) and large effect sizes across all satisfaction dimensions indicate that TAI creates engaging, enjoyable learning experiences for Thai elementary students. The particularly strong effect for collaboration ($d = 1.84$) suggests that students value opportunities for peer interaction and mutual support in learning contexts.

These findings address persistent concerns about student passivity and limited engagement in Thai classrooms (Pongsakdi & Punthumasen, 2021). TAI's structured approach to peer collaboration appears to overcome cultural barriers that traditionally discourage student participation and question-asking in hierarchical educational settings.

The positive satisfaction outcomes also suggest that TAI implementation does not require abandoning respect for teacher authority or traditional values. Instead, the approach channels cultural emphasis on collective harmony into productive academic collaboration.

The strong correlation between student satisfaction and academic achievement ($r = .72$) supports the theoretical proposition that engaged, motivated students achieve better learning outcomes. This relationship suggests that TAI's effectiveness may be partially mediated by increased student motivation and engagement.

The finding that collaboration showed the largest effect size aligns with research on Asian educational contexts, where students particularly value opportunities for peer learning and mutual support (Chen & Liu, 2022). This suggests that TAI taps into existing cultural strengths while promoting academic achievement.

7.3 Teacher perspectives and implementation factors

Teacher interviews revealed the complexity of TAI implementation while highlighting its transformative potential for Thai education. The consistent observation of enhanced student engagement validates quantitative findings and provides insights into underlying mechanisms driving improved outcomes.

Implementation challenges identified by teachers—particularly planning time requirements and group management complexity—align with international research on cooperative learning implementation barriers (Kagan & Kagan, 2022). However, teachers' emphasis on the value of ongoing professional development suggests that these challenges can be overcome with adequate support systems.





The cultural alignment theme emerging from teacher interviews supports theoretical predictions about compatibility between Buddhist educational philosophy and cooperative learning principles. Teachers' observations that TAI promoted compassion, interdependence, and collective responsibility align with core Buddhist values integrated into Thai education.

The unanimous agreement among experimental teachers regarding the need for professional development highlights the importance of systematic teacher preparation for successful cooperative learning implementation. The weekly coaching model employed in this study appears to have been crucial for supporting teachers through initial implementation challenges.

The contrast between experimental and control teacher experiences provides additional evidence for TAI's effectiveness. Control teachers' continued struggles with student engagement and passive learning confirm the limitations of traditional instructional approaches in contemporary Thai educational contexts.

7.4 Cultural adaptation and contextual factors

This study's success in adapting TAI to Thai educational contexts demonstrates the importance of culturally responsive pedagogy in educational innovation. The integration of Buddhist principles with cooperative learning methodology created an authentic synthesis that honored traditional values while promoting contemporary learning outcomes.

Key adaptation factors included: (1) maintaining respect for teacher authority within collaborative structures, (2) incorporating Buddhist concepts of mutual assistance and compassion into team formation and goal-setting, (3) utilizing traditional Thai values of collective harmony to motivate group success, and (4) connecting individual accountability to Buddhist concepts of personal responsibility for spiritual development.

The very strong correlation between cultural adaptation measures and student engagement ($r = .81$) provides empirical support for the importance of cultural responsiveness in educational interventions. This finding suggests that successful implementation of Western-origin pedagogical innovations in non-Western contexts requires careful attention to cultural alignment.

The high implementation fidelity scores for cultural adaptation elements ($M = 4.8$) indicate that teachers were able to successfully integrate Buddhist principles with TAI structures. This success may reflect the natural compatibility between cooperative learning values and Buddhist educational philosophy.

These adaptations suggest broader principles for implementing Western-origin pedagogical innovations in Southeast Asian contexts: respect for cultural values, integration with traditional educational philosophy, and careful attention to hierarchical relationships and social harmony.

7.5 Implications for educational policy and practice

The substantial positive outcomes documented in this study have significant implications for Thai educational policy and practice. The Ministry of Education's emphasis



on developing 21st-century skills while preserving cultural identity appears well-served by TAI implementation (Ministry of Education Thailand, 2022).

Professional development emerges as a critical implementation factor requiring systematic attention. The weekly coaching model employed in this study proved essential for supporting teachers through initial implementation challenges. Educational administrators should consider similar support structures when implementing cooperative learning innovations.

The success of TAI in teaching Buddhist moral principles suggests potential applications across the social studies curriculum and possibly other subject areas. Future policy initiatives might explore systematic TAI implementation to address persistent challenges of student engagement and critical thinking development.

The finding that school context had minimal impact on intervention effectiveness (small effect size, $\eta^2 = .021$) suggests that TAI can be successfully implemented across diverse educational settings, from urban to rural contexts. This broad applicability supports the potential for province-wide or national implementation.

Cost-effectiveness considerations favor TAI implementation, as the intervention requires minimal additional resources beyond teacher professional development. The primary costs involve training and ongoing support, which can be scaled efficiently across large educational systems.

7.6 Theoretical contributions

This study contributes to educational theory by demonstrating how social interdependence theory and constructivist learning principles can be effectively operationalized within Buddhist educational frameworks. The successful integration challenges Western-centric assumptions about the universal applicability of educational theories without cultural adaptation.

The finding that cooperative learning principles align naturally with Buddhist educational values supports theoretical frameworks emphasizing the universality of human learning processes while acknowledging the importance of cultural expression of these principles. This suggests that effective educational innovations can bridge cultural boundaries when implemented with appropriate sensitivity.

The strong effects observed for moral education content contribute to understanding how cooperative learning can support character development alongside academic achievement. This dual impact aligns with holistic educational philosophies prevalent in Buddhist and other traditional educational systems.

The study also advances understanding of implementation science by identifying specific cultural adaptation strategies that facilitate successful intervention adoption. The systematic documentation of adaptation processes provides a framework for future cross-cultural educational research.

7.7 Limitations and future research directions

Several limitations should be considered when interpreting these findings. The relatively short intervention period (8 weeks) limits conclusions about long-term sustainability and retention effects. Future research should examine extended implementation periods and follow-up assessments to determine lasting impact on student achievement and moral development.

The focus on Grade 3 students in northeastern Thailand limits generalizability to other age groups and regions. Replication studies across different educational levels and cultural contexts would strengthen confidence in TAI effectiveness for Thai education broadly. Particular attention should be paid to secondary education, where hierarchical relationships and academic pressures may create different implementation challenges.

Additionally, while this study demonstrates TAI effectiveness for Buddhist moral education content, research is needed to evaluate its impact on other social studies topics such as history, geography, and civics. The scalability of observed effects across diverse content areas remains an important empirical question.

The quasi-experimental design, while appropriate for educational field research, does not eliminate all potential threats to internal validity. Future studies employing randomized controlled trial designs would strengthen causal inferences about TAI effectiveness.

Future research should also examine implementation factors more systematically, including optimal teacher training duration, student team composition strategies, and adaptation requirements for different school contexts. Cost-effectiveness analyses would inform policy decisions about resource allocation for TAI implementation.

Long-term follow-up studies are needed to assess whether the positive effects of TAI on academic achievement and moral development persist over time. Particular attention should be paid to whether students maintain higher levels of prosocial behavior and moral reasoning in subsequent educational experiences.

Research examining the scalability of TAI implementation across entire educational systems would provide valuable insights for policy makers. Studies of province-wide or national implementation efforts could identify systemic barriers and facilitators not apparent in smaller-scale research.

8. CONCLUSION

This study provides compelling evidence for the effectiveness of Team-Assisted Individualization in enhancing academic achievement and student satisfaction in Thai social studies education. The substantial effect sizes observed across all measured outcomes ($d > 1.25$) indicate that TAI implementation produces meaningful improvements in student learning and engagement that exceed typical educational intervention effects.

The successful integration of cooperative learning methodology with Buddhist moral education demonstrates the potential for culturally responsive pedagogical innovation that honors traditional values while promoting contemporary learning objectives. The alignment



between TAI principles and Buddhist educational philosophy creates authentic synthesis rather than superficial adoption of Western practices.

Teacher experiences highlight both the transformative potential of TAI and the importance of adequate professional development and ongoing support for successful implementation. The cultural adaptation strategies identified in this study provide a framework for implementing cooperative learning approaches in Southeast Asian educational contexts more broadly.

The findings contribute to educational theory by demonstrating how social interdependence theory and constructivist learning principles can be effectively operationalized within Buddhist educational frameworks. The study also provides practical evidence for educational practitioners and policymakers considering cooperative learning innovations in culturally diverse contexts.

Most significantly, this research demonstrates that traditional educational values and contemporary pedagogical practices need not be viewed as incompatible. Instead, thoughtful integration can create synergistic approaches that enhance both academic achievement and cultural identity preservation. The natural alignment between cooperative learning principles and Buddhist values of compassion, interdependence, and collective responsibility suggests that culturally responsive educational innovations can strengthen rather than undermine traditional educational foundations.

The success of TAI implementation in northeastern Thailand suggests broader potential for cooperative learning approaches across Southeast Asian educational systems. As these nations continue balancing educational modernization with cultural preservation, this study provides evidence that innovative pedagogies can strengthen rather than undermine traditional values when implemented with appropriate cultural sensitivity.

The practical implications for educational policy and practice are substantial. The evidence supports systematic implementation of TAI in Thai social studies education, with particular attention to professional development and ongoing teacher support. The potential for scaling successful cooperative learning implementations across Thai education and beyond warrants continued research attention and policy consideration.

Future educational development initiatives should consider the collaborative model presented here, which emphasizes cultural responsiveness, systematic professional development, and evidence-based adaptation strategies. The demonstrated effectiveness of TAI in promoting both academic achievement and moral development addresses multiple educational objectives simultaneously, making it a particularly valuable approach for educational systems seeking comprehensive student development.

The study's contribution to understanding cross-cultural educational innovation extends beyond the Thai context to inform educational development efforts in other Buddhist and collectivist societies. The systematic documentation of cultural adaptation strategies provides a framework for implementing Western-origin pedagogical innovations in ways that respect and strengthen traditional educational values.

In conclusion, this research demonstrates that educational innovation can successfully bridge cultural traditions and contemporary pedagogical science when implemented with



careful attention to cultural values and systematic support for educators. The potential for TAI to transform social studies education while preserving cultural identity offers hope for educational systems worldwide seeking to prepare students for global citizenship while maintaining strong cultural foundations.

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APPENDICES

Appendix A: Academic Achievement Test Sample Items

Section I: Multiple Choice Questions (Sample Items)

1. According to Buddhist teaching, which Iddhipāda Dhamma represents the quality of aspiration or desire to achieve wholesome goals? a) Viriya (Effort) b) Chanda (Aspiration) c) Citta (Thoughtfulness) d) Vīmaṃsā (Investigation)
2. When working in teams, the Buddhist principle of Viriya (effort) teaches us to: a) Work only when supervised by the teacher b) Apply persistent effort toward shared goals c) Let other team members do most of the work d) Focus only on individual success
3. The principle of Citta (thoughtfulness) in group learning means: a) Thinking only about your own answers b) Being mindful of how your actions affect others c) Avoiding difficult questions d) Completing work as quickly as possible
4. Vīmaṃsā (investigation) encourages students to: a) Accept information without questioning b) Examine ideas carefully and ask questions c) Avoid challenging topics d) Rely only on the teacher's explanations
5. Which behavior best demonstrates the Four Iddhipāda Dhammas in team learning? a) Working silently without interaction b) Helping teammates while taking responsibility for your own learning c) Competing with teammates for better grades d) Depending on others to complete your work

Section II: Short Answer Questions (Sample Items)

6. Explain how the principle of Citta (thoughtfulness) can be applied when making decisions in group work. Provide one specific example.
7. Describe one way that Vīmaṃsā (investigation) helps us learn more effectively in social studies. Give an example from your recent lessons.
8. How can Chanda (aspiration) motivate you to help your teammates succeed? Explain with an example from your team experience.
9. What does Viriya (effort) mean in the context of Buddhist teaching, and how can you apply it in your daily studies?
10. Choose two of the Four Iddhipāda Dhammas and explain how they work together to help students learn better.



Section III: Essay Questions (Sample Items)

11. Choose one of the Four Iddhipāda Dhammas and explain how it can help you become a better student and citizen. Provide specific examples from your daily life and explain why this principle is important for building good character.
12. Imagine you are teaching a younger student about the Four Iddhipāda Dhammas. Write a short story or example that would help them understand how these principles can be used in school and at home.
13. Explain how working in teams has helped you understand the Four Iddhipāda Dhammas better than studying alone. Use specific examples from your team experiences and connect them to Buddhist teachings about community and cooperation.
14. Describe a situation where you had to choose between helping yourself or helping your team. How did the Four Iddhipāda Dhammas guide your decision? What did you learn from this experience?
15. How do the Four Iddhipāda Dhammas relate to being a good Thai citizen? Give examples of how these principles can help solve problems in your community or country.

Appendix B: Student Satisfaction Survey Instrument

Instructions: Please circle the number that best describes your feelings about the social studies lessons. Be honest about your experiences.

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Section A: Engagement

1. I looked forward to social studies lessons 1 2 3 4 5
2. I participated actively in classroom discussions 1 2 3 4 5
3. I paid attention throughout the entire lesson 1 2 3 4 5
4. I asked questions when I didn't understand 1 2 3 4 5
5. I felt motivated to learn during lessons 1 2 3 4 5

Section B: Understanding 6. The lessons helped me understand Buddhist principles 1 2 3 4 5 7. I could explain what I learned to others 1 2 3 4 5 8. The teaching methods made difficult concepts clear 1 2 3 4 5 9. I could apply what I learned to real situations 1 2 3 4 5 10. The lessons connected to my daily experiences 1 2 3 4 5

Section C: Collaboration 11. I enjoyed working with my classmates 1 2 3 4 5 12. My team members helped me learn better 1 2 3 4 5 13. I felt comfortable sharing ideas with my team 1 2 3 4 5 14. Working in groups made learning more effective 1 2 3 4 5 15. I helped my teammates when they needed assistance 1 2 3 4 5

Section D: Enjoyment 16. Social studies lessons were fun and interesting 1 2 3 4 5 17. I smiled and laughed during lessons 1 2 3 4 5 18. Time passed quickly during social studies 1 2 3 4 5 19. I would recommend these teaching methods to friends 1 2 3 4 5 20. I felt happy during social studies lessons 1 2 3 4 5





Section E: Perceived Learning 21. I learned more than in previous social studies classes 1 2 3 4 5 22. I remembered information better after these lessons 1 2 3 4 5 23. I became more interested in Buddhist teachings 1 2 3 4 5 24. My understanding of moral principles improved 1 2 3 4 5 25. I felt more confident about social studies content 1 2 3 4 5

Open-ended Questions: 26. What did you like most about the way social studies was taught this term? 27. What would you change about the lessons to make them even better? 28. How did working in teams help you learn about Buddhist principles? 29. What was the most important thing you learned about the Four Iddhipāda Dhammas?

Appendix C: Teacher Interview Protocol

Pre-Interview Information Collection

- Name (confidential code): _____
- Years of teaching experience: _____
- Educational background: _____
- School context (urban/suburban/rural): _____
- Previous experience with cooperative learning: _____

Opening Questions

1. How would you describe your overall experience implementing Team-Assisted Individualization in your social studies classroom this semester?
2. What were your initial concerns or expectations about using TAI methods?

Student Engagement and Learning 3. What changes did you observe in student engagement and participation compared to traditional teaching methods?

4. How did students respond to working in collaborative teams? What specific behaviors did you notice?
5. Can you describe a particular moment or incident that illustrated the impact of TAI on your students?
6. How did TAI affect different types of learners in your classroom (e.g., shy students, advanced students, struggling students)?
7. What evidence did you see of improved student understanding of the Four Iddhipāda Dhammas?
8. How did collaborative learning impact students' moral development and character formation?

Implementation Experience 9. What challenges did you encounter during TAI implementation? How did you address these challenges?

10. How did TAI affect your role as a teacher? What adjustments did you need to make to your teaching style?
11. What aspects of classroom management became easier or more difficult with TAI?
12. How did you form student teams, and how effective were your grouping strategies?

Cultural and Contextual Factors 13. How well did TAI align with Thai cultural values and educational traditions?

14. What aspects of TAI seemed most compatible with Buddhist educational principles?
15. Did you need to adapt TAI methods to fit Thai classroom contexts? If so, how?





16. How did students' families and the broader school community respond to these teaching methods?

17. How did traditional concepts of teacher authority and student respect affect TAI implementation?

Professional Development and Support 18. What type of training or support was most helpful for implementing TAI effectively?

19. What additional professional development would you need to improve your TAI implementation?

20. How important was ongoing coaching and feedback during the implementation process?

21. What resources or materials were most valuable for successful implementation?

Future Implementation 22. Would you continue using TAI methods in your social studies teaching? Why or why not?

23. What recommendations would you give to other teachers considering TAI implementation?

24. How could schools better support teachers in adopting cooperative learning approaches?

25. What modifications would you make to improve TAI effectiveness in Thai educational contexts?

Closing Questions 26. What was the most surprising outcome of implementing TAI in your classroom?

27. How has this experience changed your thinking about teaching and learning?

28. Is there anything else about your TAI experience that you think is important for other educators to know?

Appendix D: Statistical Analysis Tables

Table D1: Detailed Demographic Characteristics by Group

Characteristic	Experimental Group (n=192)	Control Group (n=192)	Total Sample (N=384)	Statistical Test
Age				$t(382) = 0.38, p = .705$
Mean (SD)	8.46 (0.51)	8.48 (0.53)	8.47 (0.52)	
Range	7.8 - 9.2	7.9 - 9.3	7.8 - 9.3	
Gender				$\chi^2 = 0.03, p = .853$
Male	94 (49.0%)	93 (48.4%)	187 (48.7%)	
Female	98 (51.0%)	99 (51.6%)	197 (51.3%)	
School Location				$\chi^2 = 0.00, p = 1.000$
Urban	64 (33.3%)	64 (33.3%)	128 (33.3%)	



Suburban	80 (41.7%)	80 (41.7%)	160 (41.7%)	
Rural	48 (25.0%)	48 (25.0%)	96 (25.0%)	
SES Background				$\chi^2 = 0.14, p = .933$
Low	58 (30.2%)	61 (31.8%)	119 (31.0%)	
Middle	89 (46.4%)	87 (45.3%)	176 (45.8%)	
High	45 (23.4%)	44 (22.9%)	89 (23.2%)	
Prior Achievement				$t(382) = 0.42, p = .678$
Mean GPA (SD)	3.21 (0.67)	3.18 (0.71)	3.19 (0.69)	

Table D2: Reliability and Validity Coefficients for All Instruments

Instrument/Scale	Cronbach's α	Test - Retest r	Content Validity Index	Number of Items
Academic Achievement Test	0.89	0.84	0.92	55
- Multiple Choice Section	0.86	0.81	0.89	40
- Short Answer Section	0.82	0.78	0.94	10
- Essay Section	0.88	0.85	0.96	5
Student Satisfaction Survey (Total)	0.94	0.87	0.91	25
- Engagement Subscale	0.87	0.82	0.88	5
- Understanding Subscale	0.82	0.79	0.93	5
- Collaboration Subscale	0.91	0.86	0.95	5
- Enjoyment Subscale	0.85	0.81	0.87	5
- Perceived Learning Subscale	0.83	0.80	0.92	5
Implementation Fidelity Checklist	0.88	0.91	0.94	15

Table D3: Detailed Correlation Matrix for All Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Pretest Score	-									
2. Posttest Score	.647**	-								
3. Engagement	.234**	.542**	-							
4. Understanding	.287**	.598**	.731**	-						
5. Collaboration	.198**	.456**	.679**	.652**	-					
6. Enjoyment	.156*	.423**	.768**	.587**	.712**	-				
7. Perceived Learning	.298**	.634**	.698**	.781**	.589**	.623**	-			
8. Implementation Fidelity	.123	.678**	.521**	.589**	.467**	.398**	.612**	-		

9. Teacher Experience	.089	.234*	.156	.198*	.134	.098	.223*	.445**	-
10. School Context	.067	.187*	.134	.145	.089	.112	.156	.198*	.267**

* $p < .05$, ** $p < .01$

Table D4: MANOVA Results for Multiple Dependent Variables

Effect	Wilks' Λ	F	df	Error df	p	η^2
Group	.234	87.45	6	377	<.001	.766
School Context	.892	3.21	12	752	<.001	.056
Group \times Context	.934	1.87	12	752	.038	.034

Follow-up univariate ANOVAs confirmed significant group effects for all dependent variables (all $p < .001$).

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