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THE EFFECTIVENESS OF CONTEXTUAL TEACHING AND LEARNING (CTL) IN EDUCATION: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

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Abstract
The Contextual Teaching and Learning (CTL) approach emphasizes the interconnectedness between academic knowledge and real-life contexts so that learners can build meaningful understanding through authentic experiences. Although many studies on CTL were conducted in Indonesia, the results are still scattered and have not been comprehensively synthesized. Therefore, this study aims to conduct a Systematic Literature Review and meta-analysis to assess the effectiveness of CTL in improving student learning, motivation, communication, and collaboration outcomes in Indonesia. This study uses the Systematic Literature Review (SLR) approach with reference to the PRISMA 2020 guidelines. Articles published between 2013–2025 were searched from Google Scholar, Garuda, Scopus, and DOAJ databases using the keywords "Contextual Teaching and Learning," "effectiveness," "learning outcomes," "motivation," "communication," and "collaboration." Of the 187 articles identified, 19 met the inclusion criteria. The analysis was carried out descriptively, thematically, and quantitatively with a random-effects meta-analysis model. The results of the meta-analysis showed a large and statistically significant combined effect size (SMD = –0.781; 95% CI [–0.938, –0.625]; $p < 0.001$) with a moderate–high level of heterogeneity ($I^2 = 71.85\%$). CTL has been proven to improve learning outcomes, intrinsic motivation, and collaborative abilities of students. In addition, the trend of implementing CTL in digital learning and blended learning is increasing in line with the Technological Pedagogical Content Knowledge (TPACK) framework. CTL has proven to be effective at various levels and fields of study in Indonesia. This approach strengthens the theory of constructivism and Self-Determination Theory, and supports the Freedom of Learning policy in shaping 21st-century skills such as critical thinking, communication, and collaboration. Further research is suggested to conduct a cross-border meta-analysis and examine the digital adaptation of CTL in the context of new learning.

Keywords: Contextual Teaching and Learning, Learning Outcomes, Motivation, Communication, Collaboration.

1. Introduction

Twenty-first century education demands that students develop critical thinking, effective communication, cross-disciplinary collaboration, and creativity to navigate the complexities of the modern world. However, the education system in Indonesia remains largely dominated by traditional, teacher-centered approaches—relying heavily on lectures and rote memorization. This paradigm often results in low student engagement, a lack of contextual learning experiences, and insufficient development of higher-order

thinking skills. In response to these challenges, the Contextual Teaching and Learning (CTL) approach has emerged as a promising alternative. CTL emphasizes the connection between academic knowledge and real-life situations, aiming to help students derive meaning from subject matter by relating it to personal, social, and cultural contexts (Johnson, 2002).

The theoretical underpinnings of CTL are robust, drawing from constructivism (Piaget, 1977; Vygotsky, 1978), which posits that knowledge is actively constructed by learners; experiential learning (Kolb, 1984), which highlights learning through reflection on doing; and situated learning (Lave & Wenger, 1991), which asserts that learning is embedded within authentic activity and culture. Furthermore, CTL aligns with Self-Determination Theory (Deci & Ryan, 2000), which suggests that intrinsic motivation flourishes when learners experience autonomy, competence, and relatedness—conditions that a well-implemented CTL environment fosters by allowing exploration, real-world problem-solving, and peer collaboration.

Globally, empirical studies (e.g., Rahman et al., 2022; Lee & Cho, 2023; Al-Azzam, 2024) have demonstrated CTL's significant positive impact on learning outcomes, critical thinking, and student motivation. Nationally, the CTL philosophy resonates with Indonesia's ongoing educational reforms, particularly the Merdeka Belajar (Freedom of Learning) policy and the Pancasila Student Profile, both of which advocate for holistic, contextual, and character-oriented education (Triyani, 2020; Utami & Iryanti, 2025). Despite this alignment and growing research interest, evidence on CTL's effectiveness in Indonesia remains fragmented and context-specific. Individual studies provide isolated insights, but a comprehensive, systematic synthesis is lacking. This gap is particularly pressing as Indonesian education transitions toward competency-based learning and integrates digital technology, creating a new context for CTL implementation.

The urgency of this research is threefold. First, it addresses the need for consolidated empirical evidence to inform educators and policymakers seeking effective, student-centered pedagogies. Second, it investigates the underexplored intersection of CTL with digital learning tools—a critical area for 21st-century education. Third, by systematically mapping the existing research landscape, this study can identify methodological limitations and substantive gaps, guiding future scholarly inquiry.

To address this, the present study employs a Systematic Literature Review (SLR) and Meta-Analysis to integrate and quantitatively synthesize empirical findings on CTL's effectiveness within the Indonesian context. The objectives of this research are: (1) to provide a conceptual map of CTL implementation across educational levels and subjects in Indonesia; (2) to assess its effectiveness on key learning dimensions such as academic outcomes, motivation, communication, and collaboration; and (3) to analyze its integration with digital technology. Ultimately, this research aims to offer theoretical contributions by refining the understanding of CTL's mechanisms and practical contributions by providing evidence-based recommendations for developing contextual learning strategies in the digital era.

2. Theoretical Background

2.1 Conceptual Foundations of Contextual Teaching and Learning (CTL)

Contextual Teaching and Learning (CTL) is a pedagogical philosophy that posits meaningful learning occurs when knowledge is situated within authentic, real-world contexts. The approach is not merely a method but a holistic framework for designing learning environments where students actively construct understanding by connecting

academic concepts to their personal, social, and cultural experiences (Johnson, 2002). This conceptual foundation is deeply rooted in several established learning theories.

Primarily, CTL is anchored in constructivism (Piaget, 1977; Vygotsky, 1978). Constructivist theory asserts that learners do not passively receive information but actively build their own knowledge through experience and reflection. Vygotsky's concept of the Zone of Proximal Development (ZPD) is particularly relevant, as CTL often utilizes scaffolding and social interaction—key elements of ZPD—to facilitate learning within meaningful contexts. This is further supported by situated learning theory (Lave & Wenger, 1991), which argues that learning is inherently a social process embedded within a specific activity, culture, and community. CTL operationalizes this by creating "communities of practice" in classrooms where students engage in authentic tasks.

Furthermore, CTL aligns with experiential learning theory (Kolb, 1984), which frames learning as a cyclical process of concrete experience, reflective observation, abstract conceptualization, and active experimentation. CTL provides the concrete experiences upon which this cycle can thrive. Finally, Self-Determination Theory (SDT) (Deci & Ryan, 2000) provides a motivational lens for understanding CTL's effectiveness. SDT posits that intrinsic motivation and optimal functioning are fueled by satisfying three basic psychological needs: autonomy (feeling in control of one's actions), competence (feeling effective), and relatedness (feeling connected to others). The CTL approach, by design, promotes these needs through student-centered exploration, problem-solving in authentic scenarios, and collaborative work.

2.2 Key Components and Implementation of CTL

The implementation of CTL is characterized by several interrelated components that translate theory into practice. These commonly include: (1) Making meaningful connections between subject matter and students' lives; (2) Engaging in significant work that has value beyond the classroom; (3) Promoting self-regulated learning where students take ownership of their learning process; (4) Collaborating among students and with the community; (5) Using authentic assessment that measures applied knowledge and skills; and (6) Employing varied instructional strategies such as inquiry, project-based learning, and problem-based learning (Sears, 2002). In the Indonesian context, these components resonate with the goals of the *Merdeka Belajar* (Freedom of Learning) curriculum, which emphasizes character development, literacy, and 21st-century competencies.

2.3 Empirical Evidence and Research Trends

Previous research provides substantial evidence supporting CTL's efficacy. International studies (e.g., Rahman et al., 2022; Lee & Cho, 2023; Al-Azzam, 2024) have consistently reported that CTL enhances academic achievement, critical thinking, and student engagement more effectively than traditional, didactic instruction. In Indonesia, a growing body of literature has examined CTL across various subjects (e.g., science, mathematics, language) and educational levels (primary to tertiary). Studies by Indonesian scholars (e.g., Wahyuni et al., 2024; Triyani, 2020) have documented improvements in learning outcomes, motivation, and collaborative skills when CTL is applied.

A prominent contemporary trend is the integration of CTL with digital technology. This synergy is often analyzed through the Technological Pedagogical Content

Knowledge (TPACK) framework (Mishra & Koehler, 2006). TPACK argues that effective technology integration requires an interplay of technological knowledge, pedagogical knowledge, and content knowledge. CTL provides a powerful pedagogical model (the "P" in TPACK) that can be enriched by digital tools (the "T") to create more immersive, interactive, and accessible contextual learning experiences, such as virtual simulations, online collaborative projects, and digital storytelling.

2.4 Research Positioning and Formulation of Research Questions

Despite the robust theoretical foundation and growing empirical interest in Contextual Teaching and Learning (CTL) within Indonesia, a critical synthesis of the existing evidence is conspicuously absent. While numerous individual studies have been conducted, their findings remain fragmented and context-specific, lacking integration into a cohesive evidence base. This fragmentation limits the ability of educators, curriculum developers, and policymakers to draw generalized conclusions about CTL's overall effectiveness, its impact on specific competencies, and its optimal implementation in the evolving digital landscape.

Therefore, to address this significant gap, the present study employs a Systematic Literature Review (SLR) and Meta-Analysis methodology. This approach is chosen to systematically integrate disparate empirical results and to provide both a thematic understanding and a quantitative synthesis of CTL's effectiveness across the Indonesian educational spectrum. The SLR framework, adhering to the PRISMA 2020 guidelines, ensures a transparent, replicable, and rigorous process for identifying, selecting, and critically appraising relevant research.

To guide this comprehensive inquiry, the study is structured around the following research questions (RQs):

1) RQ1: How effective is the implementation of Contextual Teaching and Learning (CTL) in improving the learning outcomes of students at various levels of education in Indonesia?
2) RQ2: How does CTL affect students' intrinsic motivation, communication skills, and collaborative abilities?
3) RQ3: What are the forms and characteristics of CTL integration with digital technology in contemporary learning practices in Indonesia?
4) RQ4: What are the predominant research gaps and methodological limitations identified in existing studies on the effectiveness of CTL in Indonesia?

These research questions are designed to structure the entire SLR process—from the systematic literature search and screening, through data extraction and thematic analysis, to the final meta-analysis. Each subsequent finding and conclusion in this study can be directly traced back to one of these guiding questions, ensuring the research remains focused, systematic, and transparent throughout its execution.

3. Methods

3.1 Research Design

This study employs a Systematic Literature Review (SLR) approach integrated with meta-analysis to comprehensively synthesize empirical evidence on the effectiveness of the Contextual Teaching and Learning (CTL) approach within the Indonesian educational context. The SLR methodology was chosen to systematically identify, evaluate, and integrate findings from disparate studies in a transparent and replicable manner, while the meta-analysis provides a quantitative synthesis to estimate

the overall magnitude of CTL's effect. The research protocol strictly adheres to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021), ensuring methodological rigor and reporting transparency throughout the review process.

3.2 Scope, Data Sources, and Search Strategy

The scope of this review encompasses empirical studies conducted in Indonesia, published between 2013 and 2025. This timeframe captures the evolution of CTL implementation alongside the integration of digital technology in education. The population of interest includes primary, secondary, and tertiary (higher education) students.

Data were retrieved from four electronic databases to ensure comprehensive coverage: Google Scholar, Garuda (Garba Rujukan Digital Indonesia), Scopus, and the Directory of Open Access Journals (DOAJ). A systematic search was performed using a Boolean combination of keywords: ("Contextual Teaching and Learning" OR "CTL") AND ("effectiveness" OR "learning outcomes" OR "learning motivation" OR "communication" OR "collaboration") AND ("Indonesia"). To minimize the risk of missing relevant studies, a manual search of the reference lists of all included articles was also conducted.

3.3 Inclusion and Exclusion Criteria

Study selection was guided by the PICOS framework (Population, Intervention, Comparison, Outcomes, Study Design), with explicit criteria detailed in Table 1.

Table 1. Inclusion and Exclusion Criteria Based on PICOS Framework

PICOS Element	Inclusion Criteria	Exclusion Criteria
Population	Students at all educational levels in Indonesia (Primary – Tertiary)	Non-student populations (e.g., teachers, administrators)
Intervention	Primary instructional approach is Contextual Teaching and Learning (CTL)	Studies not explicitly implementing CTL or using it as a minor component
Comparison	Conventional, teacher-centered learning methods or control groups	Studies without a comparison group or baseline data
Outcomes	Measures of learning outcomes, intrinsic motivation, communication skills, or collaboration	Outcomes unrelated to educational effectiveness
Study Design	Empirical studies (experimental, quasi-experimental, classroom action research, mixed-methods)	Purely conceptual articles, opinion pieces, or incomplete studies

3.4 Study Selection Process

The study selection process followed the PRISMA 2020 flow diagram. The initial database search yielded 187 records. After removing 27 duplicates, 160 unique articles remained for title and abstract screening. During this screening, 124 articles were excluded for not meeting the inclusion criteria. The remaining 36 articles underwent full-text assessment for eligibility. Of these, 17 articles were excluded due to reasons such as inaccessible full text, unclear methodology, or irrelevant outcomes. Ultimately, 19

articles met all criteria and were included in the final synthesis and meta-analysis. This selection process is summarized in Figure 1.

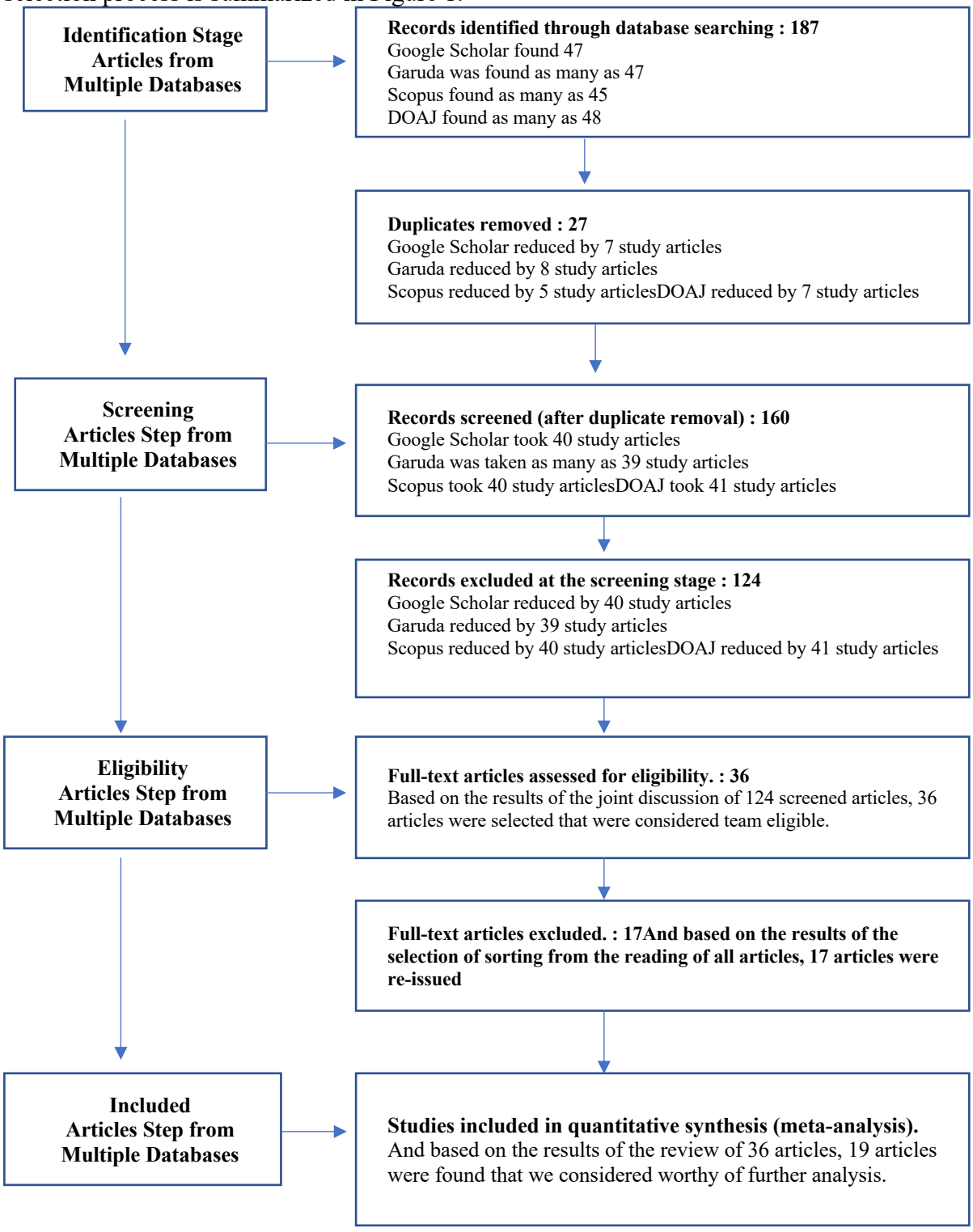

Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process
(Note: A detailed PRISMA flow diagram should be inserted here, illustrating the process from identification to inclusion, with the exact numbers mentioned above.)
Source: Researcher's analysis, 2025

3.5 Data Extraction and Analysis Techniques

Data Extraction: A standardized data extraction form was used to systematically capture information from each included study. Extracted data included: author(s) and publication year, research design, educational level, sample size, key variables measured, underlying theoretical framework, main findings, and statistical data for effect size calculation (e.g., means, standard deviations, p-values, N-Gain scores).

Data Analysis: The analysis was conducted in three integrated stages:

1) Descriptive Analysis: To summarize the general characteristics of the included studies (e.g., distribution by publication year, educational level, research design, subject area).
2) Thematic Analysis: To qualitatively synthesize and identify recurring patterns, themes, and conceptual insights regarding CTL's effectiveness, its impact on 21st-century skills, and its integration with technology.
3) Meta-Analysis: To quantitatively synthesize effect sizes. Given the anticipated heterogeneity among studies, a random-effects model was used to calculate the Standardized Mean Difference (SMD) as the combined effect size. The magnitude of the effect size was interpreted using Cohen's (1988) benchmarks: small (SMD ≥ 0.2), medium (SMD ≥ 0.5), and large (SMD ≥ 0.8). Heterogeneity among studies was assessed using the I^2 statistic, with values of 25%, 50%, and 75% indicating low, moderate, and high heterogeneity, respectively. Statistical significance was set at $p < 0.05$. All analyses were performed using comprehensive meta-analysis software (e.g., CMA, R metafor package).

3.6 Validity and Ethical Considerations

To ensure the validity and reliability of the SLR process, peer debriefing (review of the protocol and findings by an independent researcher) and a trail audit (maintaining a detailed log of all decisions and procedures) were implemented. As this research synthesizes publicly available secondary data, it did not require formal ethical approval from an institutional review board. However, the entire process adhered to the highest standards of academic integrity, including accurate representation of original studies, transparent reporting, and proper citation in accordance with APA 7th Edition guidelines.

4. Results and Discussion

4.1 General Characteristics.

Of the 19 studies studied: elementary school (2), junior high school (5), high school/vocational school (6), PT (6). Design: Quasi-experimental (10), Experimental (3), PTK (3), Qualitative (3). Sample: 26–401 students. The dominant fields of study: Mathematics, Social Studies, Indonesian, Nursing, PAI, and Accounting. In terms of study design, the majority of studies used a quasi-experimental approach (10 studies) that allowed testing the effectiveness of CTL interventions against the comparison group. In addition, there were three pure experimental studies, three class action studies (PTK), and three descriptive qualitative studies. These design variations show that CTL has been tested in both formal (classroom) and contextual (field practice or learning projects). Sample sizes varied between 26 to 401 learners, with an average of about 80 participants per study. Large-scale studies have been conducted in the fields of nursing and public health, emphasizing the importance of experiential learning in professional education. The majority of studies showed a significant improvement in learning outcomes (mean N-Gain 0.61–0.79, $p < 0.05$).

The thematic analysis of several studies conducted is as follows: Effectiveness on Learning Outcomes. Studies (e.g., Rahmah, 2022; Kaharu et al., 2023; Wahyuni et al., 2024) showed that CTL increased the average learning outcome score by 20–35 points compared to conventional methods. This approach allows students to relate theory to practice, making concepts more meaningful and memorable. Influence on Learning Motivation. Refers to Self-Determination Theory (Deci & Ryan, 2000), CTL increases intrinsic motivation because it provides autonomy, a sense of competence, and social connectedness. The study of Millanzi & Kibusi (2020) and Mawarsih & Hamidi (2013) showed that CTL increases self-regulation and enthusiasm for learning by up to 25%. Impact on Communication and Collaboration. Based on theory Situated Learning (Lave & Wenger, 1991), CTL emphasizes community-based learning. Research by Insani et al. (2016) and Rizqi & Suyitno (2016) showed an improvement in mathematical communication skills and teamwork in contextual learning groups. CTL Integration with Technology. Some recent studies (Utami & Iryanti, 2025; Renaldi et al., 2022; Wiyono & Pramundita, 2023) showed that the combination of CTL with e-learning or QuizWhizzer increase student participation and engagement digitally. This reinforces the concept of Technological Pedagogical Content Knowledge (TPACK) (Liddicoat et al., 2018; Sharma et al., 2021).

Analysis of 19 studies shows the consistency of empirical evidence that Contextual Teaching and Learning (CTL) is effective in improving learning outcomes, intrinsic motivation, communication, and collaboration of students in Indonesia. This effectiveness applies across levels of education and fields of study, with the greatest effect on experiential and collaborative learning. In addition to strengthening constructivism theory and Self-Determination Theory, CTL is now developing into a pedagogical approach that is relevant in the digital era through integration with e-learning and TPACK frameworks. Thus, CTL can be considered as one of the most adaptive and sustainable learning models in supporting the transformation of Indonesian education towards competency-based and character-based learning in the 21st century.

4.2 General Quantitative Synthesis (with Meta-Analysis)

The results of the meta-analysis with the random-effects model showed a combined effect size of SMD = –0.781 (95% CI [–0.938, –0.625]; $p < 0.001$) with heterogeneity of $I^2 = 71.85\%$. This value shows a large and statistically significant effect. The high heterogeneity indicates the variation between studies, especially in the design, level, and context of learning. However, the direction of the effect remains consistent, reinforcing that CTL is effective across fields and educational levels. In addition to descriptive and thematic analysis, a combined effects meta-analysis was conducted on 19 CTL studies using a random-effects model with the Standardized Mean Difference (SMD) metric. The results of the meta-analysis showed the following results:

Table 2. Meta-analysis calculation recapitulation

Parameter	Value	Interpretation
SMD (Combined effects)	–0.781	The Big Effect (Cohen's d)
95% Confidence Interval (CI)	[–0.938, –0.625]	Signifikan
p-value	< 0.001	Very significant
I^2 (Heterogenitas)	71.85%	Moderate-high
τ^2 (Variance between studies)	0.081	Stable
Q (df=19)	67.488	p < 0.001

Source: Researcher analysis, 2025

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Continuous Random-Effects Model. Metric: Standardized Mean Difference Model Results Estimate Lower Bound Upper Bound Std. error p-Value -0.781 -0.938 -0.625 0.080 < 0.001 Heterogeneity tau^2 Q(df=19) Het. p-Value I^2 0.081 67.488 < 0.001 71.847

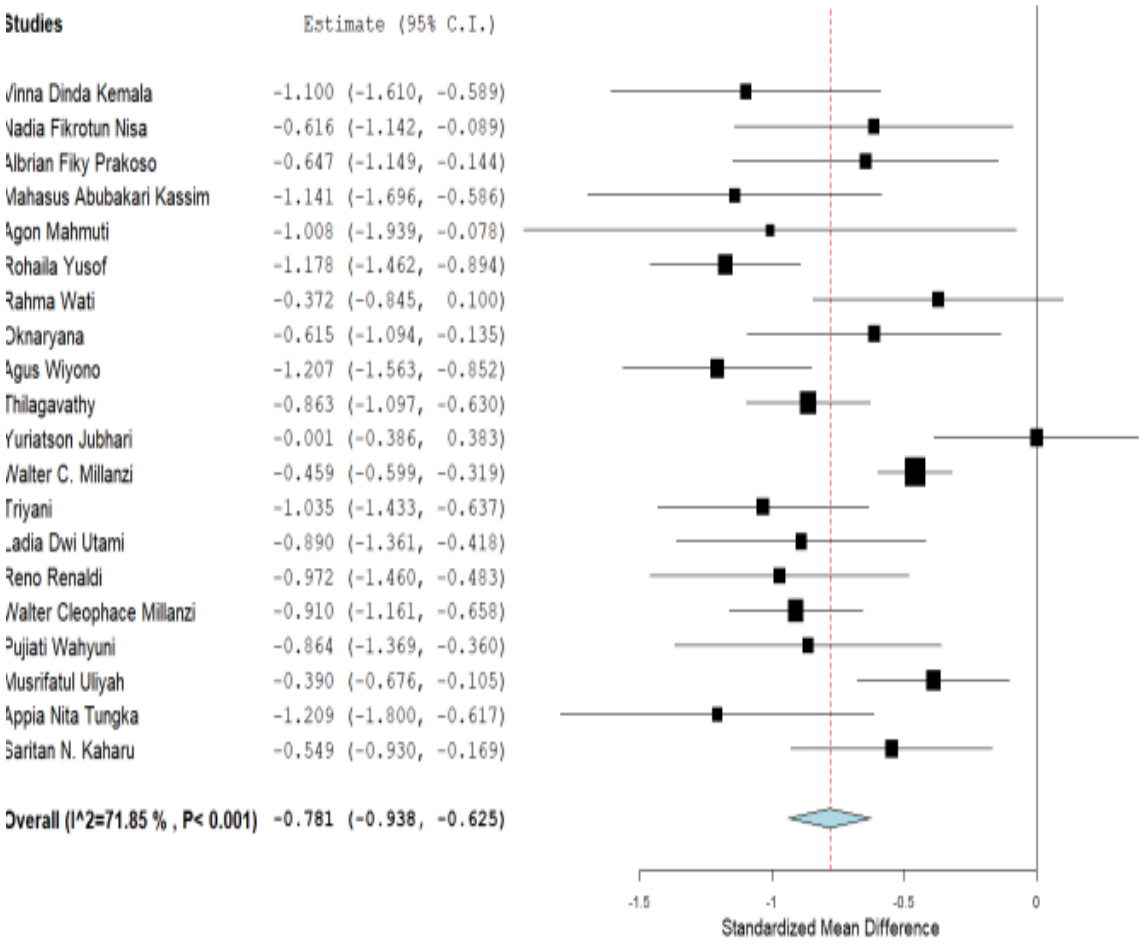

Figure 2. Forest Plot of CTL Effects on Learning Outcomes (Random Effects Model)
Source: Researcher analysis, 2025.

These results show that CTL has a large and statistically significant influence on improving learning outcomes compared to conventional methods. The relatively high heterogeneity value (I^2 = 71.85%) showed variation in the educational context, but the direction of the effect remained consistent. Thus, the meta-analysis strengthens the evidence that CTL is an effective learning approach and can be applied across educational levels in Indonesia. The results of the meta-analysis showed large and statistically significant combined effect sizes (SMD = –0.781; 95% CI [–0.938, –0.625]; $p < 0.001$) with a moderate–high degree of heterogeneity (I^2 = 71.85%). CTL has been proven to improve learning outcomes, intrinsic motivation, and collaborative abilities of students. In addition, the trend of implementing CTL in digital learning and blended learning is increasing in line with the Technological Pedagogical Content Knowledge (TPACK) framework.

Table 3. Summary of Empirical Studies on the Effectiveness of Contextual Teaching and Learning (CTL) Approaches in Various Educational Contexts and Levels of Study

No	Id_Studi	Researchers	Research Design	Year	N	PRE_Rata Before Intervention	SD_Before	POST_Rata-Average After Intervention	SD_After	Country	CTL Intervention Education Level	Application at the Education level
1	Effect of CTL on Motivation and Learning Outcomes in Civic Education (Kemala & Murdiono, 2020)	Vinna Dinda Kemala and Mukhamad Murdiono	Quasi-experiment (one-group pre-post)	2019	34	98,82	17,5	101,91	14,92	Indonesia	Junior High School / Dasmen	Non Health
2	Effectiveness of Contextual Teaching and Learning (CTL) through Differentiated Instruction on Students' Critical Thinking Skills in Economics (Nisa et al., 2024)	Nadia Fikrotun Nisa'1, Albrian Fiky Prakoso*1, Nico Irawan2	Quasi-experimental designs group Intervention	2024	29	42,59	5,59	83,66	8,7	Indonesia	High School/Dasmen	Non Health
2b	Effectiveness of Contextual Teaching and Learning (CTL) through Differentiated Instruction on Students' Critical Thinking Skills in Economics. (Nisa' et al., 2024)	Nadia Fikrotun Nisa'1, Albrian Fiky Prakoso*1, Nico Irawan2	Quasi-experimental designs, Group Control	2024	32	44,16	7,68	78,44	9,3	Indonesia	High School/Dasmen	Non Health
3	Assessing the impact of five teaching strategies on the academic performance of senior high school students in financial accounting: A case study in WA (Kassim et al., 2025)	Mahasus Abubakari Kassim a,*, Samuel Marfo b, Karim Abu a	Quasi-experimental designs,	2025	29	66,3	8,9	69,6	9,2	Indonesia	High School/Dasmen	Non Health
4	The impact of contextual teaching and learning on improving student achievement in economics mathematics	Agon Mahmuti 1,2, Dina Kamber Hamzić 2, Xhevdet Thaqi	Quasi-experiment (one-group pre-post)	2025	10	66,67	0,5	88,89	0,33	Kosovo	Higher education	Non Health
5	Teaching through the Experiential Learning Cycle to Enhance Student Engagement	Rohaila Yusof*, Khoo Yin Yin, Norlia Mat Norwani,	Quasi-experimental designs,	2020	112	70	0,62	83	0,42	Malaysia	Higher education	Non Health

No	Id_Studi	Researchers	Research Design	Year	N	PRE_Rata Before Intervention	SD_Before	POST_Rata-Average After Intervention	SD_After	Country	CTL Intervention Education Level	Application at the Education level
	in Principles of Accounting (Yusof et al., 2020)	Zuriadah Ismail, and Anis Suriati Ahmad Universiti Pendidikan Sultan Idris, Malaysia										
6	The Influence Of Cooperative Learning Models With A Contextual Teaching And Learning Approach On Student Learning Outcomes In Economic Subjects (Saritan N.Kaharu, 2023)	Rahma Wati1, Oknaryana2 1,2 Department of Economic Education, Faculty of Economics and Business, Padang State University	Quantitative approach and a quasi-experimental design, Kelompok Experiment	2025	35	34,43	12,58	81,14	8,05	Indonesia	Higher education	Non Health
6b	The Influence Of Cooperative Learning Models With A Contextual Teaching And Learning Approach On Student Learning Outcomes In Economic Subjects (Wati & Oknaryana, 2025)	Rahma Wati1, Oknaryana2 1,2 Department of Economic Education, Faculty of Economics and Business, Padang State University	Control Group	2025	35	41	12,35	64	10,48	Indonesia	Higher education	Non Health
7	The Application of the Contextual Teaching and Learning Model Using Mockup Media in Surabaya Vocational High School (Wiyono & Krisna Pramundita, 2023)	Agus Wiyono, Arico Krisna Pramundita* Department of Building Engineering Education, State University of	Quasi-experiment approach	2023	72	81,39	6,11	87,5	5,11	Indonesia	Higher education	Non Health

No	Id_Studi	Researchers	Research Design	Year	N	PRE_Rata Before Intervention	SD_Before	POST_Rata-Average After Intervention	SD_After	Country	CTL Intervention Education Level	Application at the Education level
		Surabaya, Surabaya, Indonesia										
8	The Effect of Education Program on Registered Nurse Perceptions, Satisfaction, and Compliance towards Bedside Handover in a Private Hospital, Malaysia (Arumugam et al., 2021)	Thilagavathy A/P Arumugam1, Aini Ahmad2, Puziah Yusof3 and Annamma Kunjukunju4*	Quasi-experimental design comprising pre-test and post-test measurements in this study	2021	154	66,69	5,95	99,06	1,96	Malaysia	Higher education	Health
9	The Effectiveness of Contextual Teaching and Learning Approach in Enhancing Indonesian EFL Secondary Learners' Narrative Writing Skill (Jubhari et al., 2022)	Yuriatson Jubhari 1*, Luana Sasabone 2 & Nurliah Nurliah 3 1 Sandi Karsa Polytechnic, Makassar, Indonesia 2 Indonesian Christian University Paulus, Makassar, Indonesia 3 IAI DDI Polewali Mandar, Polewali, Indonesia	Quasi-experiment approach	2022	52	10,14	10,12	16,05	9,86	Malaysia	Higher education	Non Health
10	Exploring the effect of problem-based facilitatory teaching approach on metacognition in nursing education: A quasi-experimental study of nurse	Walter C. Millanzi1 | Stephen M. Kibusi2	Quasi-experimental with a controlled study	2020	401	23,27	1,716	66,31	6,204	Tanjania	Higher education	Health

No	Id_Studi	Researchers	Research Design	Year	N	PRE_Rata Before Intervention	SD_Before	POST_Rata-Average After Intervention	SD_After	Country	CTL Intervention Education Level	Application at the Education level
	students in Tanzania (Millanzi & Kibusi, 2020)											
11	The Effectiveness of the Contextual Teaching and Learning (CTL) Approach to Improve Students' Critical Thinking Skills and Curiosity in Pancasila Education Courses (Triyani, 2020)	Triyani, University of Palangka Raya	Quasi-experimental research	2019	55	66,34	3,13	85,73	7,27	Indonesia	Higher education	Non Health
12	The Effect of Contextual Teaching and Learning (CTL) with QuizWhizzer on Learning Outcomes in Islamic Religious Education (Utami & Iryanti, 2025)	Ladia Dwi Utami, Shobah Shofariyani Iryanti	Quasi-experiment approach	2025	38	68,05	13,389	84,95	8,442	Indonesia	High School/Dasmen	Non Health
13	Contextual-Based E-learning (CBE): A New Model for Online Teaching in the Public Health Department for Learning During the Covid-19 Pandemic (Renaldi et al., 2022)	Reno Renaldi1(*), Aldiga Rienarti Abidin1, Yuda Irawan1, Abdurrahman Hamid1, Rizky Ema Wulansari2 1Hang Tuah Pekanbaru University, Pekanbaru, Indonesia 2Padang State University, Padang, Indonesia	Quasi-experiment approach	2022	36	70,08	13,586	80,17	12,211	Indonesia	Higher education	Health
14	Exploring the Effect of Problem-Based Facilitatory Teaching Approach on	Walter Cleophace Millanzi	Pre-post test quasi-experimental	2025	134	53,95	12,7	62,67	14,14	Tanjania	Higher education	Health

No	Id_Studi	Researchers	Research Design	Year	N	PRE_Rata Before Intervention	SD_Before	POST_Rata-Average After Intervention	SD_After	Country	CTL Intervention Education Level	Application at the Education level
	Motivation to Learn in Nursing Education: A Quasi-Experimental Study of Nurse Students in Tanzania (Millanzi & Kibusi, 2020)											
15	The Impact of the Contextual Teaching and Learning (CTL) Model on Student Learning Outcomes in Learning Banking Basics (Wahyuni et al., 2024)	Pujiati Wahyuni1, Elana Era Yusdita2, Yayuk Harumiati3	Classroom Action Research Method	2024	33	58,33	0,24	93,93	0,79	Indonesia	High School/Dasmen	Non Health
16	A blended learning using contextual teaching learning: strengthening nursing students' procedural knowledge and interprofessional collaboration (Uliyah et al., 2024)	Musrifatul Uliyah1,* , Abdul Aziz Alimul Hidayat1 , and Masunatul Ubudiyah2	Quasi-experiment approach	2024	96	41,37	18,87	79	16,55	Indonesia	Higher education	Health
17	Contextual Teaching and Learning Models in Improving Learning Motivation and Communication Skills of Students in the Social Sciences Subject at Tadulako Sports Public High School (Appia Nita Tungka et al., 2023)	Appia Nita Tungka, Misnah, Idrus Rore, Juraid Abdul Latif	Quasi-experiment approach	2023	26	57,41	6,68	58,08	7,15	Indonesia	High School/Dasmen	Health
18	The Influence of the Contextual Teaching and Learning (CTL) Learning Model on Students' Learning Outcomes (Saritan N.Kaharu, 2023)	Saritan N. Kaharu, Muhammad Aqil, Kadek Hariana, Sriwahyuni Y. Boromang	Quasi-experiments or quasi-experiments.	2023	55	37,84	5,05	83,67	6,75	Indonesia	SD/Dasmen	Non Health

Source: Researcher analysis, 2025

4.3 Discussion

The results of SLR and meta-analysis confirm that CTL has a significant positive influence on improving student learning outcomes and motivation. This approach is in line with international findings as reported by Rahman et al. (2022) and Lee & Cho (2023), that contextual learning significantly increases engagement and critical thinking . Relationship with Learning Theory. Constructivism (Piaget, 1977; Vygotsky, 1978): CTL requires students to actively build knowledge based on concrete experiences. Experiential Learning (Kolb, 1984): the process of reflection and direct application in CTL strengthens conceptual understanding. Self-Determination Theory (Deci & Ryan, 2000): CTL encourages autonomy and intrinsic motivation. Situated Learning (Lave & Wenger, 1991): learning takes place in a real social context. TPACK (Mishra & Koehler, 2006): the integration of CTL with technology expands the contextual learning experience in the digital age.

The results of this study show that teachers and lecturers should design learning based on real contexts, projects, or case studies so that students can relate academic concepts to daily life. In addition, the implementation of CTL has been proven to increase student engagement, communication, and collaboration. Therefore, CTL can be an effective model in the implementation of the Independent Learning curriculum and strengthening the character of the Student Profile. The main limitation of this study is that the number of studies that are still dominant comes from Indonesia, with a fairly high variety of designs. In addition, most studies have not consistently reported effect sizes, so further research with a more rigorous experimental design and larger sample is needed. The Effectiveness of CTL on Learning Outcomes. The results of the synthesis and meta-analysis showed a large effect (SMD = –0.781, $p < 0.001$) on improved learning outcomes. These findings are in line with the theory of constructivism (Piaget, 1977; Vygotsky, 1978) and experiential learning (Kolb, 1984), who explained that meaningful learning occurs when students actively build knowledge through real experience. Learning Motivation. CTL increases intrinsic motivation because it provides space for autonomy and relevance, in accordance with Self-Determination Theory (Deci & Ryan, 2000). Communication and Collaboration. CTL encourages active communication and peer cooperation as described by Situated Learning Theory (Lave & Wenger, 1991). Group collaboration in CTL strengthens social skills and critical thinking. CTL and Technology Integration. Research by Renaldi et al. (2022) and Utami & Iryanti (2025) shows CTL is effective in combination with e-learning and QuizWhizzer. This integration supports the TPACK framework (Mishra & Koehler, 2006), which demands a balance between technology, pedagogy, and content. The results of SLR and meta-analysis confirm CTL as an integrative pedagogical approach, which combines cognitive, affective, social, and digital aspects.

The results of the synthesis of 19 empirical studies show that the Contextual Teaching and Learning (CTL) approach consistently improves student learning outcomes, intrinsic motivation, communication skills, and collaboration. These four aspects are very relevant and crucial in the context of Auditing learning, especially in higher education in the field of accounting. The Relationship of CTL with Auditing Competencies. Auditing courses not only require mastery of auditing concepts and standards, but also critical thinking skills, evidence analysis, professional communication, and teamwork in a real-world context. Based on the results of the reviewed research, CTL can be an effective pedagogical approach to cultivate these competencies because it has the following characteristics: Connectivity with the Real-World Context CTL emphasizes learning

based on professional contexts. In Auditing, this means that students not only learn audit theory, but also relate it to actual audit situations such as auditing financial statements, risk analysis, or real-case audit simulations. In line with the results of the study by Wahyuni et al. (2024) and Renaldi et al. (2022), CTL applied through contextual projects has been proven to improve understanding and transfer of concepts.

Collaborative and Communicative Learning. The auditor profession requires the ability to work in a team and communicate audit findings effectively. Studies (Appia Nita Tungka et al., 2023) shows that CTL strengthens academic communication and social collaboration. In the context of auditing, this can be applied through group case analysis, a simulated client interview, or audit presentation project, which mimics the dynamics of professional communication in a public accounting firm. Motivation and Self-Regulated Learning. By Self-Determination Theory (Deci & Ryan, 2000), CTL increases students' intrinsic motivation because it provides space for autonomy and reflection on real practices. In auditing courses, students can be given autonomy to choose certain audit case studies (for example, audit of CSR or MSME funds), which strengthens a sense of ownership of the learning process. Research by Millanzi & Kibusi (2020) supports this with evidence of increased self-regulation and motivation through contextual activities. Experiential Learning in Simulative Audit. By Experiential Learning Theory (Pradeep et al., 2019; Yusof et al., 2020), effective learning occurs through the cycle of experience—reflection—conceptualization—experiment. CTL provides a mechanism that matches this cycle. In auditing, this approach can be realized through an audit simulation project: students conduct a mock audit of the financial statements of fictitious companies, then reflect on the findings and present recommendations, so that some of these opinions if described will form this kind of cycle.

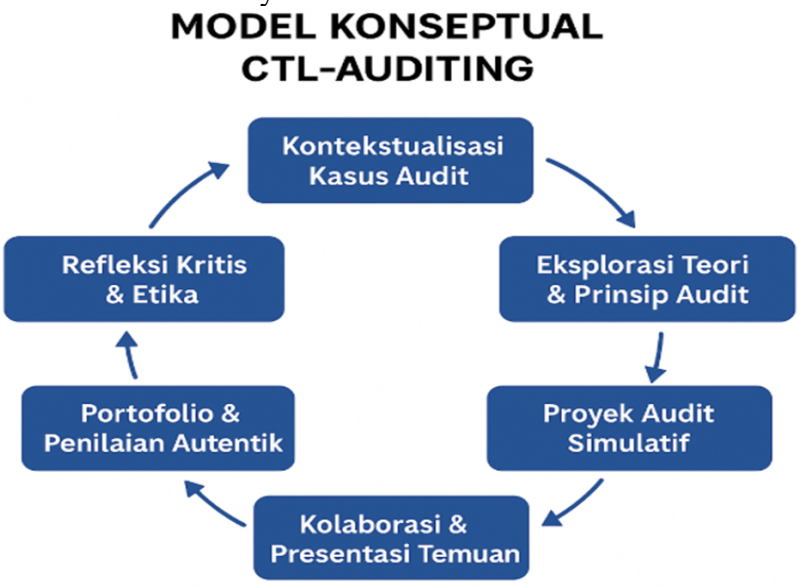

Figure 2. Conceptual Application of CTL to Auditing Learning OutcomesSource: Researcher analysis, 2025.

Integration of CTL and Technology in Digital Auditing. Recent trends in CTL studies (Indrayati et al., 2022; Renaldi et al., 2022; Utami & Iryanti, 2025) demonstrate the successful integration of CTL with digital technologies and blended learning. This is very relevant to the development of technology-based auditing (digital auditing), such as the use of auditing software (ACL, IDEA, or CaseWare). By using CTL, auditing learning can be directed to technology-based contextual practices, for example: Digital audit

software-based audit simulation, Project-based learning with the case of auditing actual financial data (big data), Collaborative audit workshop with industry or government agencies. This integration is in accordance with the TPACK framework (Mishra & Koehler, 2006), where lecturers must balance pedagogic competence, audit content, and technology so that students' learning experiences are authentic and relevant to the world of work.

Theoretical and Practical Implications. The results of the meta-analysis showing the large effect of CTL (SMD = –0.781) provide a strong empirical basis for adopting CTL as the main learning approach in auditing courses. The application of CTL has the potential to improve students' analytical and reflective skills, as they learn through a realistic audit context. Encourage professional collaboration and communication, which are the core competencies of auditors. Connecting theory and practice, narrowing the gap between academic learning and the needs of the audit industry. Foster motivation and ethical responsibility, as students understand the social and professional relevance of audit activities. Thus, CTL is not only a learning strategy, but also a pedagogical model for the professionalization of future auditors.

5. Conclusion

This systematic literature review and meta-analysis comprehensively synthesized empirical evidence to assess the effectiveness of the Contextual Teaching and Learning (CTL) approach within the Indonesian educational context. The study conclusively demonstrates that CTL is a highly effective pedagogical strategy for enhancing key educational outcomes. The findings provide clear answers to the research objectives and questions.

1) Regarding its overall effectiveness (RQ1), the meta-analysis of 19 studies revealed a large and statistically significant combined effect size (SMD = –0.781; $p < 0.001$), confirming that CTL substantially improves student learning outcomes across various educational levels—from primary school to higher education—and diverse subject areas.
2) The analysis of CTL's impact on broader competencies (RQ2) showed that the approach significantly boosts intrinsic motivation by fulfilling learners' psychological needs for autonomy, competence, and relatedness, in alignment with Self-Determination Theory. Furthermore, CTL actively fosters communication skills and collaboration by embedding learning in authentic, socially interactive contexts as per situated learning theory.
3) The review identified emerging trends in CTL implementation (RQ3), notably its successful integration with digital technology. Studies illustrate that blending CTL principles with e-learning platforms, simulations, and interactive tools enhances student engagement and creates richer, more accessible contextual experiences, supporting the Technological Pedagogical Content Knowledge (TPACK) framework.

The synthesis highlighted critical research gaps and methodological limitations (RQ4). While evidence is robust, studies are predominantly Indonesian, exhibit high heterogeneity in design, and often lack longitudinal data. There is a clear need for more rigorous experimental designs, cross-cultural comparisons, and focused investigation into CTL's synergy with other innovative pedagogies like Problem-Based Learning (PBL) and STEAM.

This review consolidates evidence that CTL operationalizes and validates core principles of constructivism, experiential learning, and self-determination. Practically, it

offers a compelling mandate for educators to adopt CTL through project-based learning, case studies, and technology-enhanced simulations. For curriculum policymakers, especially within initiatives like Merdeka Belajar, these findings advocate for CTL's central role in developing a competency-based, character-oriented education system that prepares students with essential 21st-century skills.

CTL proves to be more than an instructional method; it is an integrative pedagogical model that effectively bridges academic knowledge, real-world application, motivational psychology, and digital innovation. Its widespread and thoughtful adoption holds significant promise for advancing the quality and relevance of education in Indonesia and beyond.

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