Implementation of Task-Based Language Learning in Improving Reading Ability in Class 8 of MTsN 9 Boyolali

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Abstract

Reading comprehension is a fundamental skill in English language learning, as it enables students to construct meaning, access information, and develop overall communicative competence. However, many junior high school students still face difficulties in reading due to limited vocabulary, weak grammatical understanding, and low engagement in teacher-centered classrooms. Therefore, this study aims to examine the effectiveness of Task-Based Language Learning (TBLL) in improving students' reading comprehension skills. This study employed a quantitative experimental method using a one-group pretest–posttest design. The participants were 25 eighth-grade students of MTsN 9 Boyolali. Data were collected through reading comprehension tests on advertisement texts and analyzed using descriptive statistics and normalized gain (N-Gain) analysis. The results showed a significant improvement in students' reading performance after the implementation of TBLL. The average score increased from 65.2 in the pretest to 79.6 in the posttest, with an average N-Gain score of 0.4, indicating a medium level of improvement. The greatest improvement was found in the linguistic component, followed by diction, goal, and message. In conclusion, the findings indicate that TBLL is an effective instructional approach for enhancing students' reading comprehension. By promoting communicative, collaborative, and student-centered learning, TBLL supports meaningful interaction and active engagement, which contribute positively to students' reading development.

Keywords: *English language learning, reading skills, Task-Based Language Learning*

INTRODUCTION

The conventional learning process that is still applied in schools, especially in rural areas, has a less significant impact on students. Learning is still centered on the teacher or teacher center with a full lecture method which is of course no longer relevant today and in the future. Because teachers are no longer the only source of learning, effective methods are needed to trigger students to be active in learning processes or activities that are more effective, efficient and enjoyable (Qasserras, 2023; Yahya et al., 2024). Apart from that, the behavior of students who do not focus

on the material being taught makes the classroom atmosphere noisy, especially for students who are hyper active, so it requires extra energy for teachers to control the atmosphere in the classroom (Morris & Sarapin, 2020). And this happens, one of which is the application of conventional methods which makes students feel bored in studying and feel not involved in learning, so they chat, joke or play more with their classmates (Beigzadeh et al., 2024; Qasserras, 2023). Apart from that, the use of online media in learning is not very significant in schools which results in misuse of their gadgets or they are used in vain, there is no added value when students bring their gadgets, just for selfies, gaming, or other things and other useless things (Deng et al., 2025; Morris & Sarapin, 2020). Minimal knowledge for teachers and students in the teaching and learning process is a challenge for the author to share knowledge and knowledge in making the nation's life smarter as a basis for helping government programs in the world of education (Candrawati & Purbani, 2025).

In the context of English language education, the selection of appropriate teaching approaches plays a crucial role in determining students' learning success. Contemporary English Language Teaching emphasizes selecting appropriate approaches and methodologies for classroom implementation (Yahya et al., 2024). Both academics and educators in the field recognize that instructional techniques should substantially enhance learners' communicative language proficiency (Asrul & Dahlan, 2022). Accordingly, educators must continuously refresh and refine their pedagogical strategies to facilitate better learning outcomes by incorporating innovative methodologies aligned with Communicative Methods. Reading is one of the skills that students must master in English. In response to this need for more communicative and innovative instructional approaches, Task-Based Language Learning (TBLL) offers a viable alternative in English language learning (Bygate, 2020a).

Task-Based Language Learning has emerged as a prominent approach in contemporary language pedagogy. Task-Based Language Learning itself is an approach that emphasizes the process of learning to communicate through interaction in the target language (Bygate, 2020a; S. M. Ismail et al., 2023). So, the author uses advertisement texts with essays as one of the pre-test and post-test instruments for students. The author uses advertisement text because it is one of the texts contained in the topic of material discussion. Various forms of text in each discussion group can be used to increase the intensity of student communication with other people. Then students with graded variations can work together in small groups to achieve common goals. In these groups, students will help each other, so it is a social learning situation where students depend on each other positively in achieving a common goal. TBLL focuses more on an approach based on the use of tasks as the core of planning and teaching in language teaching (Thi & Nguyen, 2022). In his research, Marti Bygate (2020) stated that an assignment is an activity that requires students to use language, with an emphasis on meaning, to achieve goals, and the main challenge in learning a foreign language is developing learners' communicative abilities through the assignments they have completed. Task-based language learning has the potential to generate classroom learning environments that more closely mirror organic acquisition

processes, thereby achieving superior overall improvements in linguistic competence (Styati & Khasanah, 2022). This pedagogical framework accomplishes these outcomes by establishing communicative objectives for learners, fostering the necessary interpersonal exchanges to accomplish those objectives, and consequently promoting enhanced language master (Lestari & Margana, 2024).

Task-Based Language Learning has been widely recognized as an effective pedagogical framework in foreign language instruction. Ellis (2003) has been articulated that task-based language learning constitutes a pedagogical methodology for foreign language instruction that motivates learners to employ genuine, real-world language through the assignment of sequential activities requiring successful completion. This approach offers an alternative approach for foreign language teachers. Then, Frost (2004) stated that the task-based learning model provides benefits for students because this approach focuses on students so that it can build students' habits in learning language. Rad & Jafari (2013) state that task-based language teaching suggests that it is important for educators must possess the capability to handle diverse task requirements while offering appropriate scaffolding mechanisms that support the language learning process. At the same time, foreign language learners should also be familiar with those strategies that can enable them to achieve better language learning outcomes. Meanwhile, Lee (2000) defines a task as an activity that achieves goals by interacting between participants and focuses on the exchange of meaning. Language learning requires students to analyze, manipulate and produce the target language. Swan (2005) suggests that tasks can remove teacher dominance, learners are given the chance to initiate and conclude dialogues, engage in spontaneous interaction, make interruptions, assign tasks to peers, and verify task completion. -the task. This will provide a fun and natural environment for students to practice the target language with others. Dailey (2009) indicates that task-based learning and instruction situate learners in authentic, real-life scenarios with minimal teacher interference, which can stimulate student motivation to employ the target language and previously acquired linguistic knowledge for task accomplishment (Bygate, 2020b; S. M. Ismail et al., 2023).

In this research, the author tries to use TBLL to improve students' understanding of reading texts. In this case the author focuses on the part of associating meaning which is closely related to students' reading skills. Mulyadi (2016) stated that the purpose of using this method is to enable students to complete assignments by exploring the language skills that students have, through a series of activities that have been prepared by the teacher. Learning activities designed by teachers involve language that is authentic, practical and functional. By using this approach, the ongoing learning process will be student-centered. According to Nunan (2004), this pedagogical approach cultivates learners' ability to concentrate beyond mere linguistic structures toward actual language production. This aligns with Task-Based Language Teaching principles that create contexts where students attend to both linguistic elements and metacognitive aspects of their learning journey. The TBLL process inherently develops multiple critical competencies, including formulating

inquiries, negotiating meaning, establishing semantic connections, and collaborating effectively within group settings (Bygate, 2020a; S. M. Ismail et al., 2023; Nguyen, 2022).

RESEARCH METHODOLOGY

This study employed an experimental approach using a one-group pre-test–post-test design to examine the effectiveness of the instructional method. Following Cresswell (2017), this design involves administering the same assessment before and after treatment to measure changes resulting from the intervention. The research was conducted at MTsN 9 Boyolali from 22–24 September 2025, involving one experimental class, VIII A, consisting of 25 students. Data were collected through tests analyzed using descriptive quantitative techniques. The essay test used in this study was developed by the researcher based on the Grade VIII English curriculum and learning objectives for reading comprehension of advertisement texts.

The procedure began with administering a 60-minute pre-test consisting of essay questions on advertisement texts to assess students' initial reading comprehension. Based on the pre-test results, students were found to experience challenges in developing ideas and selecting appropriate vocabulary, which informed the subsequent learning treatment using Task-Based Language Learning (TBLL).

The treatment consisted of three stages. In the pre-task stage, the researcher introduced the topic and organized students into groups. During the task stage, students worked collaboratively on advertisement texts using the TBLL framework. In the post-task stage, each group presented their work, received feedback from peers and the researcher, and noted new vocabulary encountered during discussions. After the treatment, a 60-minute post-test on the same type of reading comprehension task was administered to measure learning improvement.

FINDING AND DISCUSSIONS
Findings

With the completion of a series of research stages starting from the pre-test, treatment, to post-test, the following data were obtained:

Table 1.The distribution of pre-test and post-test score

Sample	Linguistics (40)		Goal (20)		Diction (20)		Message (20)		Individual's total score pre-test	Individual's otal score post-test	N-Gain
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test			
N1	20	35	10	15	5	15	10	10	45	75	0,5
N2	30	35	15	15	10	15	10	10	65	75	0,3
N3	15	25	15	15	10	15	5	15	45	70	0,5
N4	30	35	15	20	15	15	15	15	75	85	0,4
N5	30	40	15	15	20	20	15	15	80	90	0,5
N6	35	35	20	20	10	15	15	15	80	85	0,3
N7	20	35	15	15	15	15	10	15	60	80	0,5

(Assessment Criteria)

Assessment Criteria

Sample	Linguistics (40)		Goal (20)		Diction (20)		Message (20)		Individual's total score pre-test	Individual's otal score post-test	N-Gain
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test			
N8	25	30	10	15	10	15	15	15	60	75	0,4
N9	30	35	15	15	10	15	10	15	65	80	0,4
N10	25	30	10	15	15	15	10	15	60	75	0,4
N11	15	25	15	15	15	15	5	15	50	70	0,4
N12	20	25	15	15	10	15	10	15	55	70	0,3
N13	20	30	15	15	15	15	10	15	60	75	0,4
N14	25	35	15	15	10	15	10	15	60	80	0,5
N15	20	35	15	15	15	15	15	15	65	80	0,4
N16	30	35	15	15	15	15	15	15	75	80	0,2
N17	30	35	15	20	20	20	15	15	80	90	0,5
N18	35	35	20	20	10	20	15	15	80	90	0,5
N19	20	30	15	15	15	15	10	15	60	75	0,4
N20	25	35	10	15	10	15	15	15	60	80	0,5
N21	30	30	15	15	10	10	10	15	65	70	0,1
N22	25	35	10	20	15	15	10	10	70	80	0,3
N23	15	40	15	15	15	15	15	15	60	85	0,6
N24	30	40	15	15	15	15	15	15	75	85	0,4
N25	35	35	15	20	15	20	15	15	80	90	0,5
Average Score	**25,4**	**33,4**	**14,4**	**16,2**	**13**	**15,6**	**12**	**14,4**	**65,2**	**79,6**	**0,4**

The data presented in Table 1 indicate a clear improvement in participants' performance after the treatment, as reflected in the transition from pre-test to post-test scores. The average total score increased from 65.2 in the pre-test to 79.6 in the post-test, demonstrating notable learning gains across all four assessed categories—Linguistics, Goal, Diction, and Message. This upward trend appears consistently across almost all participants, with some showing particularly strong improvement, such as N1 (45 to 75), N5 (80 to 90), and N23 (60 to 85). These results align with previous findings suggesting that structured learning interventions typically lead to significant post-test improvement in language-related competencies (Falardeau et al., 2024; Leotta & Ahmad, 2025).

The normalized gain (N-Gain) further reinforces the effectiveness of the instructional treatment. Using Meltzer's (2002) widely adopted classification low (< 0.30), medium (0.30 – 0.70), high (> 0.70), the group's average N-Gain of 0.4 falls within the medium improvement category. Most participants also fall within this medium range, with several demonstrating relatively higher N-Gain values such as N23 (0.6) and participants like N17, N18, and N25 (0.5). These results correspond with previous educational research showing that medium-level N-Gain is common in intervention-based studies, particularly in language learning and instructional design contexts (Anggraeni et al., 2025; N. Y. Ismail,
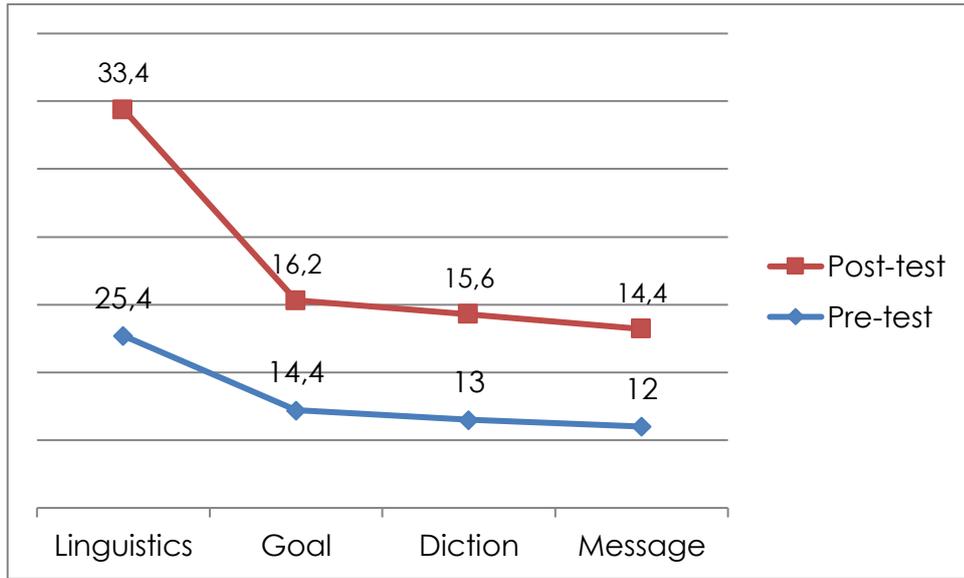
2024).

Figure 1. The differences between pretest and posttest average scores for each category

The category based comparison presented in Figure 1 reveals that the Linguistics component experienced the greatest improvement, rising from a mean score of 25.4 to 33.4, followed by Diction (from 13 to 15.6), Goal (14.4 to 16.2), and Message (12 to 14.4). This pattern suggests that the treatment had its strongest effect on linguistic competence, which may indicate that the instructional content or activities were particularly aligned with linguistic development. Studies in language pedagogy have shown that structured linguistic input, modeling, and scaffolded practice often contribute to greater improvements in linguistic accuracy compared to broader communicative skills (N. Y. Ismail, 2024; Ke et al., 2021).
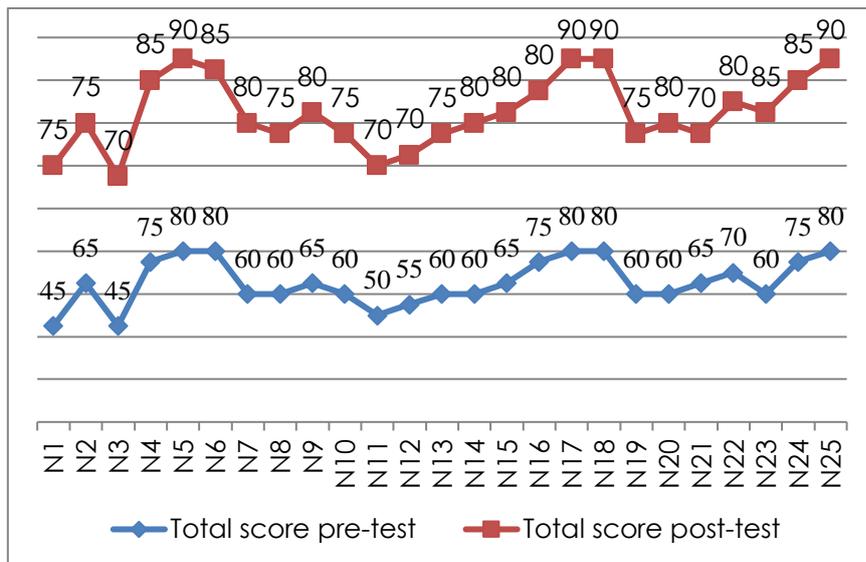

Figure 2. The differences between pretest and posttest total scores for each participants

Figure 2, which compares total pre-test and post-test scores for each participant, illustrates that although all participants gained, the magnitude of improvement varied. Some participants such as N21 (N-Gain 0.1) and N16 (0.2), displayed only minimal improvement, which may indicate individual differences in engagement, prior knowledge, or responsiveness to the instructional method. Research in learning variability suggests that students respond differently to the same instructional approach due to cognitive, motivational, and contextual factors (Riwayatiningsih et al., 2025). In contrast, learners such as N23, N17, and N18 showed stronger improvement patterns, suggesting that the treatment aligned well with their learning needs. Overall, the combined results from the table and diagrams highlight the effectiveness of the treatment while also underscoring natural variation among learners.

Discussions

The improvement in post-test scores observed in this study can be attributed to increased student motivation and engagement during the treatment phase. Research has shown that when learners experience higher levels of enjoyment and motivation in language learning environments, their performance, especially in oral and communicative tasks, tends to improve significantly (Song, 2024). In your case, the treatment likely created a more interactive and stimulating learning atmosphere, which increased learner participation and persistence. This motivational boost may have helped participants perform better in the post-test, as motivation supports sustained effort and willingness to use target language skills in practice (Yan et al., 2024). Furthermore, the strong gains in the "Linguistics" component suggest that the instructional method effectively targeted linguistic competence (grammar, vocabulary, diction), which tends to respond well to structured tasks and explicit focus. Several recent studies of Task-Based Language Teaching (TBLT) report significant improvements in fluency, vocabulary, and overall language proficiency when learners engage in meaningful tasks rather than traditional drills (Febrianti et al., 2024; Syafiq et al., 2023). This suggests that a task-based, communicative approach may have offered learners more authentic contexts for applying linguistic knowledge, thereby yielding higher linguistic scores in the post-test.

At the same time, variation in individual N-Gain scores, some participants showing high gains (0.5–0.6), others lower (0.1–0.3), likely reflects differences in personal factors such as prior proficiency, motivation regulation, learning style, and engagement. Research into language pedagogy indicates that not all learners respond equally to the same intervention; individual differences mediate how much benefit a learner derives from a treatment (Febrianti et al., 2024). In addition, factors such as anxiety, self-efficacy, and perseverance influence how effectively students translate learning opportunities into performance gains (Song, 2024; Yan et al., 2024). Thus, the variation observed in your data is not unexpected and aligns with broader findings in EFL/ESL research.

Finally, the overall medium-level normalized gain (average N-Gain 0.4) suggests that while the intervention was effective, it was not uniformly transformative, a pattern consistent with many empirical studies in

contemporary language education. For instance, combining motivational techniques with TBLT, or using authentic, relevant tasks, has been shown to yield moderate to substantial improvements, though outcomes still vary across learners depending on contextual and individual factors (Febrianti et al., 2024; Tsai, 2024). This underscores that while your treatment was beneficial, maximizing effectiveness may require additional supports, such as varied task design, individualized scaffolding, or motivation regulation strategies, to reach higher levels of improvement for more learners.

CONCLUSION AND SUGGESTION
Conclusion

The notable improvement in average scores, supported by a medium-level N-Gain, indicates that the TBLL successfully met the research objectives by offering a communicative, participatory, and student-centered learning strategy. The discussion further highlights that the success of TBLL lies not merely in task completion but also in the interactive processes, meaning negotiation, and active learner engagement fostered during instruction. Additionally, the variability in students' improvement suggests that individual characteristics, such as motivation, self-efficacy, and prior learning experiences, play an essential role in shaping learning outcomes. Thus, the application of TBLL aligns with the aims of this study and meets the demands of contemporary English language pedagogy, particularly in cultivating authentic and meaningful learning experiences.

Suggestion

In practical terms, this study recommends that teachers integrate TBLL more frequently into reading instruction, especially when working with texts that require deeper comprehension. Teachers are also encouraged to provide differentiated scaffolding to accommodate diverse learner needs and to establish a collaborative learning environment that supports authentic communication. For future research, it is suggested that similar studies involve larger sample groups, employ control groups, or investigate the effects of TBLL on other language skills, such as writing or speaking—in order to yield a more comprehensive understanding of its pedagogical effectiveness.

REFERENCES

Anggraeni, S., Mujiyanto, & Rustipa, D. (2025). The effect of structured writing interventions on EFL students' performance: A quasi-experimental study. *Journal of Language Teaching and Learning*, *11*(1), 45–63.

Asrul, A., & Dahlan, D. (2022). The use of Communicative Language Teaching (CLT) method in improving students' English vocabulary. *Journal of Language and Literature Teaching (JOLLT)*, *10*(4), 493–501. https://doi.org/https://doi.org/10.33394/jollt.v10i4.5669

Beigzadeh, A., Bazyar, H., Delzendeh, M., Razmi, M. H., & Sharifi, N. (2024). Comparing the effect of lecture method and cooperative teaching method on the learning , communication skills , and attitudes of students : a quasi-experimental study. *Frontiers in Education*,

December. https://doi.org/10.3389/feduc.2024.1449538

Bygate, M. (2020a). Some directions for the possible survival of TBLT as a real world project. *Language Teaching*, 1–14. https://doi.org/10.1017/S0261444820000014

Bygate, M. (2020b). *Tasks in second language learning*. John Benjamins Publishing.

Candrawati, A., & Purbani, W. (2025). Teaching English in rural settings : A systematic review of challenges and strategies in non-technological classrooms. *English Language Teaching Educational Journal*, *8*(2), 66–77. https://doi.org/https://doi.org/10.12928/eltej.v8i2.14081

Cresswell, J. W. (2017). Planning, Conducting, and Evaluating Quantitative and Qualitative Research. In *Knowledge and Power in the Global Economy: The Effects of School Reform in a Neoliberal/Neoconservative Age: Second Edition* (Vol. 4, Issue 1). Ney Jersey: Person Education, Inc.

Dailey, A. (2009). Implementing task-based language teaching in the EFL classroom. *TESOL Review*, *21*(2), 45–58.

Deng, Z., Cheng, Z. A., Ferreira, P., & Pavlou, P. A. (2025). From Smartphones to Smart Students : Learning vs . Distraction Using Smartphones in the Classroom From Smartphones to Smart Students : Learning vs . Distraction Using Smartphones in the Classroom. *Information Systems Research*, *December*, 1–18. https://doi.org/10.1287/isre.2022.0078

Ellis, R. (2003). *Task-based Language Learning and Teaching*. Oxford University Press.

Falardeau, É., Guay, F., Dubois, P., & Pelletier, D. (2024). Effects of teacher-implemented explicit writing instruction on the writing self-efficacy and writing performance of 5th grade students. *Journal of Writing Research*, *16*(1), 1–38.

Febrianti, M., Dinata, P. R., Miranty, D., Rasita Gloria, I., & Imran, M. C. (2024). Effectiveness of the Task Based Language Teaching method in improving foreign language writing skills. *International Journal of Language and Ubiquitous Learning*, *2*(1), 57–67. https://doi.org/https://doi.org/10.70177/ijlul.v2i1.774

Frost, R. (2004). *A task-based approach*. British Council Teaching English.

Ismail, N. Y. (2024). Enhancing Iraqi EFL students' discourse competence by using explicit instruction. *Journal of Tikrit University for Humanities*, *31*(8), 77–96. https://doi.org/https://doi.org/10.25130/jtuh.31.8.2024.25

Ismail, S. M., Wang, C., & Jamalyar, R. (2023). The impact of task - based instruction on learners ' reading comprehension , L2 grit , anxiety , and motivation for L2 reading. *Asian-Pacific Journal of Second and Foreign Language Education*, *8*(42). https://doi.org/10.1186/s40862-023-00216-2

Ke, H., Luo, Y., Piggott, L., & Steinkrauss, R. (2021). *Long-term effects of explicit versus implicit instruction on EFL writing*. *2000*, 1–25. https://doi.org/10.51751/dujal9361

Lee, J. (2000). *Tasks and communicating in language classrooms*. McGraw-Hill.

Leotta, P., & Ahmad, M. (2025). Improving Writing Skills in Academic English Through Explicit Instruction and Process Writing. *International Journal*

of Linguistics, *17*(2), 80–94. https://doi.org/10.5296/ijl.v17i2.22811

Lestari, N. P. W., & Margana, M. (2024). Communicative Language Teaching (CLT) implementation in Kurikulum Merdeka: A lesson from English teachers' voices. *Journal of Language and Literature Teaching (JOLLT)*, *12*(4), 1802–1814. https://doi.org/https://doi.org/10.33394/jollt.v12i4.11266

Meltzer, D. E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores. *American Journal of Physics*, *70*(12), 1259–1268. https://doi.org/https://doi.org/10.1119/1.1514215

Morris, P., & Sarapin, S. (2020). Mobile phones in the classroom : Policies and potential pedagogy. *Journal of Media Literacy Education*, *12*(1), 57–69. https://doi.org/https://doi.org/10.23860/JMLE-2020-12-1-5

Mulyadi, S. (2016). *Penerapan task-based language learning dalam pembelajaran bahasa Inggris*. Bandung: Alfabeta.

Nguyen, T. P. (2022). Task-based language teaching: Current perspectives and classroom applications. *International Journal of Language Education*, *6*(2), 101–115.

Nunan, D. (2004). *Task-based language teaching*. Cambridge University Press.

Qasserras, L. (2023). Systematic Review of Communicative Language Teaching (CLT) in Language Education : A Balanced Perspective. *European Journal OfEducation and Pedagogy*, *4*(6). https://doi.org/10.24018/ejedu.2023.4.6.763 Ibn

Rad, N. S., & Jafari, S. M. (2013). The effects of task-based language teaching on EFL learners' language performance. , 4(1), . *International Research Journal of Applied and Basic Sciences*, *4*(1), 82–91.

Riwayatiningsih, R., Yuliasri, I., Rukmini, D., & Pratama, H. (2025). The Differential Impact of Specific Metacognitive Strategies on EFL Academic Writing Performance. *Forum for Linguistic Studies*, *07*(01), 219–231. https://doi.org/https://doi.org/10.25130/jtuh.31.8.2024.25

Song, Y. (2024). Assessing the interactions between learning enjoyment, motivation, burnout, and grit in EFL students: A mixed methods approach. *BMC Psychology*, *12*(769). https://doi.org/https://doi.org/10.1186/s40359-024-02303-6

Styati, E. W., & Khasanah, R. (2022). The impact of task-based activities in reading skill for the students during Covid 19 pandemic. *Journal of English Educators Society*, *7*(1), 18–26. https://doi.org/10.21070/jees.v7i1.1532

Swan, M. (2005). Legislation by hypothesis: The case of task-based instruction. *Applied Linguistics*, *26*(3), 376–401.

Syafiq, A. N., Oktaviana, T., Anwari, & Prasetiyanto, M. A. (2023). The effect of Task Based Language Teaching on students' speaking skill for non English study program. 3(2). *Journal of Applied Language and Literacy Studies,* *3*(2). https://doi.org/https://doi.org/10.32497/jolali.v3i2.5832

Thi, N., & Nguyen, T. (2022). The effects of task - based instruction on reading comprehension of non - English major students at a university in the Mekong Delta. *International Journal of TESOL & Education*, *2*(4),

1–20. https://doi.org/https://doi.org/10.54855/ijte.22241

Tsai, Y.-R. (2024). Leveraging gamification to enhance motivation and engagement among EFL learners. *English Language Teaching Educational Journal*, *7*(3), 177–190. https://doi.org/https://doi.org/10.12928/eltej.v7i3.12010

Yahya, A., Sumaryoto, & Prasetyono, H. (2024). The Implementation of Communicative Language Teaching (CLT) Method in English Courses at New Concept English Education Centre. *Eduvest – Journal of Universal Studies*, *4*(11), 10752–10772.

Yan, R., Liu, B., & Zhang, L. J. (2024). Effects of pedagogical intervention on Chinese EFL learners' use of motivational regulation strategies and oral English proficiency improvement. *Heliyon*, *10*(19), e38355. https://doi.org/https://doi.org/10.1016/j.heliyon