Buletin Poltanesa Vol. 26 No. 1 (June 2025) 276-282 p-ISSN 2721-5350 e-ISSN 2721-5369
https://doi.org/10.51967/tanesa.v26i1.3287 © 2025 Politeknik Pertanian Negeri Samarinda

The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension

Puji Astuti Amalia *
Technica, Politeknik Negeri Samarinda
Samarinda, 75242, Indonesia
pujiastutiamalia@polnes.ac.id
**Corresponding author*

Fabiola Bulimasena Luturmas
Commercial Shipping and Port Management, Politeknik Negeri Samarinda, Samarinda, 75242, Indonesia
Fabiolaluturmas@polnes.ac.id

Sektalonir Oscarini Wati Bhakti
Civil Engineering, Politeknik Negeri Samarinda,
Samarinda, 75242
Ocha.ririn@yahoo.com

Andri Kurniawan
Industrial Chemical Engineering, Politeknik Negeri Samarinda
Samarinda, 75242, Indonesia
andaikujadiawan717@gmail.com

Setya Ariani
English Literature, Universitas Mulawarman,
Samarinda, 75123
Setya.ariani@fib.unmul.ac.id

Rizky Sulvika Pusparinda
Mechanical Engineering, Politeknik Negeri Samarinda,
Samarinda, 75242
rinda.rizky@polnes.ac.id

Submitted: 2025-04-25; Accepted: 2025-05-22; Published: 2025-06-05

***Abstract*—** The implementation of Computational Thinking (CT) in language instruction has drawn interest due to its potential in improving students' analytical and problem-solving abilities. However, its uses in specific fields, such Maritime English especially in reading comprehension, is still not well established. This study is a qualitative study that aims to explore how students perceive the use of CT in Maritime English reading instruction. 31 Students from a maritime higher education institution participated in semi-structured interviews. The result indicates that students view CT as a useful technique for enhancing reading comprehension and engagement. Moreover, the perception is divided into abstraction, algorithm, decomposition, evaluation and pattern recognition. In terms of abstraction, students claim that they can ignore irrelevant information and pick relevant information. In terms of algorithm, students believe that they can apply strategies in reading to make a better comprehension such as underline keywords. In terms of decomposition, students feel confident in breaking down long and complex sentences to find the meaning. In terms of evaluation, students can evaluate the information in the text. In terms of pattern recognition, students are aware of common pattern/sentence structure and organization in the text. The study emphasizes the value of contextualized CT education and offers suggestions for integrating CT into Maritime English learning reading instruction. The finding of this study offers potential instructional strategies for maritime education.

***Keywords*—** Computational Thinking, Maritime English, Reading Comprehension, Students' Perception.

I. INTRODUCTION

Reading Comprehension is a crucial skill in language learning especially English as a foreign language (EFL). As a basic skill, reading does not only support the linguistic aspect, but it also facilitates students' success (Amalia et al., 2024; Lázaro-Ibarrola et al., 2025).. However, Students may find it difficult to read and comprehend well(Kurniawan et al., 2024; Wilawan, 2022). These challenges may happen due to limited vocabulary, difficulty in understanding sentence structure, lack of motivation, lack of learning media and traditional reading approach (Jago et al., 2025a, 2025b).

Extensive studies have investigated research related to reading comprehension in response to this issue. Studies found that the implementation of computational thinking improved students' reading comprehension. Computational thinking engages students in reading activity. Students tend to pay more attention to reading activities. Moreover, students participate actively in the reading activities. As a result, students have a good understanding about the story (Amalia et al., 2024; Jacob et al., 2018; Jacob & Warschauer, 2018; Nur Marifah et al., 2022; Yu et al., 2024).

The ability to communicate effectively in English, especially in specialist contexts like Maritime English, is essential for seafarers and maritime professionals in the quickly changing global maritime industry (Amalia et al., 2020). Maritime English, the universal language of international shipping, includes both general and technical terms necessary for effective and safe maritime operations(Mursandi et al., 2019). To meet this need, maritime education institutions must not only teach

Amalia, P. A., Laturmas, F. B., Bhakti, S. O. W., Kurniawan, A., Ariani, S., & Pusparinda, R. S. (2025). The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension. Buletin Poltanesa, 26(1). https://doi.org/10.51967/tanesa.v26i1.3287

language skills but also give students the mental skills they need to comprehend and use information critically.

There are growing studies discuss about computational thinking in college students. The results show that computational thinking studies in higher education are developing. However, more studies are expected to discuss its implementation (Lyon & J. Magana, 2020). Furthermore, there is lack of empirical study on the use of CT in English for specific purpose especially Maritime English contexts, even though it is becoming more and more popular across curriculum. Although CT-based approaches have started to be investigated in general English language training in higher education, Maritime English presents opportunities and problems for CT integration because of its domain-specific vocabulary and context-driven activities. This gap in the literature emphasizes the necessity of looking into the practical and efficient integration of CT into reading teaching for Maritime English.

It is essential to comprehend how students view this integration. The attitudes and experiences of learners can have a big impact on how well educational innovations work. Teachers can modify their lesson to optimize learning outcomes if students perceive CT techniques to be clear, interesting, and useful in improving their understanding of Maritime English texts. On the other hand, if students struggle to use CT in this setting, it can indicate that more thorough training or pedagogical changes are required.

Moreover, existing research focuses on the effectiveness of computational thinking in enhancing comprehension (Parsazadeh et al., 2021; Rottenhofer et al., 2022). However, there is a lack of empirical study that delves into students' experiences and perception regarding the use of computational thinking in reading activity especially in Maritime English. This research aims to fill the gap by providing a deep understanding about students' perception on the use of computational thinking approach in reading activity especially in Maritime English Text.

Thus, the novelty of this research is to investigate the students' perceptions toward computational thinking approach in Maritime English reading instruction. By focusing on students' perceptions, this study may understand students' perspective and improve teaching instruction especially in reading activity. It also offers a more holistic understanding of their pedagogical value in EFL reading classroom.

II. LITERATURE REVIEW

A. Reading Comprehension

Reading is a sophisticated cognitive activity that involves deciphering words and characters to determine their meaning. Reading can be seen as the result of two essential elements: language comprehension and decoding (Jago et al., 2025b). While decoding entails identifying written words, comprehension is being able to comprehend and interpret those words in a particular situation

Reading is more than just word recognition; it's a dynamic exchange between the reader and the text in which language proficiency, prior knowledge, and cognitive methods are all important (Lázaro-Ibarrola et al., 2025). Readers must synthesize and integrate information, draw conclusions, and critically assess what they read.

Reading is essential for education and self-improvement. It is a skill that influences academic achievement in many areas, but especially in language, science, and social studies (Amalia et al., 2024; Jago et al., 2025b). Students who read well can access, comprehend, and interact critically and creatively with information. Strong reading comprehension skills are becoming more and more important for lifetime learning and social engagement in today's information-rich world (Liu et al., 2024).

Despite its significance, reading is a challenge for many students. The first problem that may affect students' reading comprehension is students' lack of motivation (Ma & Zhao, 2025). Students who are uninterested or disengaged frequently read passively, which lowers comprehension. There are some factors in reading activity that make students disengaged with the reading activity (Hingstman et al., 2023).

Traditional approach in reading appears frequently on traditional comprehension questions, vocabulary drills, and rote memorization (Parsazadeh et al., 2021). These methods might overlook active learning techniques, interpersonal relationships, and critical thinking. Instead of actively creating meaning, students become passive learners. Lessons are frequently teacher-centered and provide little opportunity for student participation or conversation.

Furthermore, important comprehension techniques including visualization, prediction, and inference-making are not well developed. Traditional settings frequently use texts that are out-of-date, irrelevant, or overly challenging, which lowers participation. Effective comprehension training requires modeling, scaffolding, and specific teaching strategies.

B. Computational Thinking

Computational Thinking (CT) is a fundamental skill for everyone. CT is a problem-solving approach that originated in the field of computer science but is applicable across disciplines. It entails decomposing complex problems into manageable parts, identifying patterns, abstracting important details, and creating step-by-step solutions (algorithms)(Yu et al., 2024).

Important elements of CT include decomposition in which students divide a problem into smaller parts, pattern recognition in which students identify similarities or trends, abstraction in which students identify the essential information and algorithmic thinking in which students create step-by-step instructions to solve problems(Rottenhofer et al., 2022).

Reading is a cognitive process that calls for interpretation, analysis, and logical thought, much like solving problems. Students that use CT to read can analyze texts more actively. CT encourages reading in some steps. First, students deconstruct literature into their characters, setting, storyline, and themes with the aid of decomposition. Second, students find literary techniques,

Amalia, P. A., Laturmas, F. B., Bhakti, S. O. W., Kurniawan, A., Ariani, S., & Pusparinda, R. S. (2025). The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension. Buletin Poltanesa, 26(1). https://doi.org/10.51967/tanesa.v26i1.3287

recurrent themes, or text structures is made possible by pattern recognition. Third, students are encouraged to filter out irrelevant details and concentrate on the main ideas through abstraction. Fourth, students can follow a series of understanding techniques (such as summarizing, questioning, and prediction) with the help of algorithmic thinking (Amalia et al., 2024; Azizah et al., 2022; Parsazadeh et al., 2021; Robledo-Castro et al., 2023; Sabitzer et al., n.d.; Su & Yang, 2023).

One of the advantages of implementing computational thinking into reading instruction is enhancing comprehension of texts. By using logical stages to assess meaning, find correlations, and draw conclusions, CT techniques assist students in better analyzing and comprehending complex texts.

C. Perception

People interpret and make meaning of their surroundings through the psychological and cognitive process of perception. To create meaningful knowledge, perception entails organizing, recognizing, and interpreting sensory inputs(Astuti, 2013). Perception in the context of education refers to how students perceive, interact with, and react to educational events such as reading activity. Learners are more likely to engage fully and perform better when they believe a task is relevant, manageable, and meaningful(Amalia et al., 2022).

III. METHOD

This study is a qualitative approach. It uses a set of questions in interview sessions. The subject of this study is 31 students of class A and B Maritime Department. This study takes all students in class A and B as the subject. The researchers divide 31 students into two classes. The researchers give 4 times treatments using CT and English maritime text with the title such as the seafarer, A new vessel, Logistics services, and Incidents at sea. Then, the researchers divide the students into five focus groups discussions to understand their perception deeper regarding the implementation of CT in reading instruction. The researchers collect the data through semi-structured interviews. In the data analysist, the researchers transcribe the interview. The researchers code the script of interviews and triangulate the data to the relevant valid and reliable studies to make it reliable (Lockwood et al., 2015).

IV. RESULT AND DISCUSSION

This study applies computational thinking in reading comprehension activity using four different texts with the title the seafarer, A new vessel, Logistics services, and Incidents at sea. The treatment involving aspects of abstraction, algorithm thinking, decomposition, evaluation and pattern recognition. In the abstraction phase, students extract the main ideas from each paragraph while filtering out unnecessary details to focus on the core message of the texts. Through algorithmic thinking, they sequence the events or processes described in the texts, such as the steps in responding to a maritime incident into clear, logical steps. In the decomposition phase, students try to break down each text into smaller components like characters, settings, problems, and solutions, making complex information more manageable. In pattern recognition, students identify recurring situations across the texts, such as safety procedures, navigation issues, or crew responses to challenges at sea. Finally, in the evaluation stage, students would assess the effectiveness of actions taken in the stories, comparing outcomes and drawing conclusions about the decisions made. This integration of computational thinking aims to improve comprehension by encouraging analytical reading, systematic thinking, and deeper engagement with the text.

Since the reading process involving those five aspects, therefore, the explanation of the student's perception of reading instruction using computational thinking in this study is divided into five aspects of computational thinking, abstraction, algorithm thinking, decomposition, evaluation and pattern recognition. In terms of abstraction, the researchers find out the students' perception on sorting relevant and ignoring irrelevant information in the reading text. In terms of algorithm thinking, the researchers find out the students' perception in developing strategies in reading text. In terms of decomposition, the researchers find out students' perception in breaking down a complex text into smaller parts. In terms of evaluation, the researchers find out the students' problem-solving skill in reading text. In terms of pattern recognition, the researchers find out the students' ability in identifying specific patterns in reading text.

Overall, students are enthusiastic about the reading activity. They apply strategies in the reading activity and engage actively in the process. The researchers also find that students have challenges in reading complex sentences and specific terminologies in maritime English. Yet they can guess and make a comprehension using specific strategies such as breaking down sentences and identifying repetitive words and patterns. The students' perception on the implementation of computational thinking in maritime English reading instruction are stated in table 1.

Table 1. Students' Perception toward the implementation of Computational Thinking in Reading Instruction

CT Aspect	Students' Perception
Abstraction	Students claim that they can identify main idea.
	Students believe they can focus on important information
	Students claim that they can ignore irrelevant information
	Students believe they can summarise the text
	Students claim that they can get the purpose of the text
	Students believe they can differentiate main idea and supporting sentence
Algorithm thinking	Students claim that they can apply approaches or strategies in reading the text and feel confident about it
	Students believe they can break down the text into smaller parts to better understand the whole

Amalia, P. A., Laturmas, F. B., Bhakti, S. O. W., Kurniawan, A., Ariani, S., & Pusparinda, R. S. (2025). The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension. Buletin Poltanesa, 26(1). https://doi.org/10.51967/tanesa.v26i1.3287

CT Aspect	Students' Perception
	Students claim that they can use logical processes to understand the text
	Students read the questions before reading the text.
	Students claim that they can organize information from the text
	Students underline keywords and use outlines while reading
Decomposition	Students can divide difficult text into smaller part
	Students can break down long and complex sentences to find the meaning
	Students can understand each paragraph before looking at the overall meaning
	Students can analyze the text into different parts of organization such as definition and example, cause and result.
	Students re-read the specific parts to clarify detailed information needed
	Students highlight different parts of a text to have a better comprehension
Evaluation	Students evaluate the text of incidents at sea to the procedure when there is incidents as sea using their prior knowledge and relevant literature.
	Students know how to manage time effectively.
	Students skip or skim through parts of the text
	Students can evaluate which parts of a text are worth focusing more attention on.
	Students are aware of their reading strategies
	Students can use, compare and decide different reading approaches and strategies suit them
Pattern Recognition	Students are aware of repetitive words in the text
	Students are aware of common pattern/sentence structure in the text to show the purpose of the text
	Understanding patterns in complex sentences helps students to understand the complex sentences
	Students are aware of different organization texts such as cause-effect,
	Students are aware of transition words used in the text
	Students can predict the precede and following paragraph

A. The process of abstraction in reading the seafarer text

The students claim that they can identify important information and irrelevant information. In the "the seafarer text" students focus on the characteristics of the seafarers the pick the relevant information such as the name of the seafarer, the age of seafarer, the nationality of the seafarer, the company the seafarer works and other related information to the seafarer. The findings reveal that reading activity using CT helps them to recognize important information in the text. Students believe they can recognize and distinguish the important part in texts, especially those that discuss "the seafarer profile". They appear to have confidence in their ability to understand what they read. They know which information important and which information is irrelevant. Moreover, noticing important parts of information in the text helps them to find the main idea which is the description of the seafarer. Furthermore, it also helps them to make a good summary and notice the purpose of the author writing the text.

Study suggests that reading requires creating meaning from the text (Duke et al., 2021). However, some texts in English for specific purpose, especially maritime English are challenging. Thus, students frequently find it is not easy to find the main idea of a paragraph. According to study, computational thinking helps students manage complex material and notice patterns which are two abilities necessary for identifying the main idea (Yu et al., 2024).

Students may naturally engage in pattern identification when using CT in text by identifying text structures (e.g., introduction paragraphs explaining ship characteristics). Students use abstraction process to separate important information from supporting details to get the main idea. Moreover, even if they have not introduced CT learning, students may be unconsciously using these computational habits of thought so that they can recognize and distinguish between key ideas. Furthermore, research states that integrating computational thinking into literacy training improves students' ability to reason analytically, especially in reading technical and nonfiction literature(Shute et al., 2017).

B. The process of algorithm thinking in reading the vessel text

The findings show that students notice the linking words especially "in contrast, on the other hand" and they notice that the organization of the paragraph is comparative, in which the author compares the specification of two vessels. Moreover, Students also can break down the complex sentences and find the meaning. In this paragraph, students read sentences using comparative structures. Instead of questioning the meaning of the complex sentences written in comparative, students try to notice the adjective word as well its detail information in the text and guess the meaning. Students' ability in identifying important words, especially adjectives, help them to re-read and highlight specific parts in the text to make sure or make clarification. This algorithm thinking helps students to divide difficult text into smaller parts and make comprehension.

The implementation of computational thinking in reading instruction facilitates students to use logical reasoning in comprehending the texts. It relates to following systemically explanations, recognizing links among the text, and examining sentence patterns in reading comprehension. This method is particularly relevant in English for specific purpose especially Maritime English (Suhendra et al., 2024).

C. The process of decomposition in reading the logistics services text

The results indicate that students can divide difficult text into smaller parts, the names of the company, the brief

Amalia, P. A., Laturmas, F. B., Bhakti, S. O. W., Kurniawan, A., Ariani, S., & Pusparinda, R. S. (2025). The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension. Buletin Poltanesa, 26(1). https://doi.org/10.51967/tanesa.v26i1.3287

descriptions of the company and their logistics services. Students can break down long sentences that contain complex and compound sentences and pick the important information that is related to those parts, students also can re-read and highlight specific information that is related to the certain part which they want to clarify.

Decomposition process in CT requires breaking down complicated problems into manageable sub-problems, is in line with students' habit of breaking texts into smaller portions. This technique helps students concentrate on specific passages in reading comprehension, which leads to a deeper comprehension of the text. To properly understand each component, students divide technical service specifications of logistics services into the text

Studies suggest that Successful readers actively interact with texts by arranging and rearranging information (Yapp et al., 2023). Students frequently breakdown when they read, especially texts with complex structures or specialized topics such as English for specific purpose, like breaking down sentences and text, skimming, scanning, identifying organization of text, cause-effect and sequences. These strategies in line with the decomposition in CT suggest a strong cognitive process (Andrian & Hikmawan, 2021).

D. The process of evaluation in reading the logistics services text

The findings show that Students read the text about the incidents at the sea and get the information about specific procedure in emergency, then the students evaluate that information with their prior knowledge and experience when they have research on board. They also claim that they can use reading strategies while reading the text, such as managing the time by identifying important parts of the text, do skimming, scanning. Moreover, they also can ignore irrelevant information. They also can use different strategies while reading to find the best strategy that can help them comprehend better. Reading text using CT helps students to assess information critically, comprehending the information and reflecting. This process helps them to comprehend the text well (Jacob & Warschauer, 2018).

Students report applying a range of techniques when interacting with incidents at sea text, including recognizing and emphasizing keywords (such as "collision," "engine failure," and some emergency command), creating written or mental summaries, making predictions, making connections between existing information to comprehend technical sequences. According to studies, Evaluation thinking is an aspect of computational thinking that entails evaluating, analyzing, and forming opinions regarding the efficacy, precision, and ramifications of data or solutions (Shute et al., 2017). This shows up in reading when students examine the accuracy of the data such as the procedure of leaving the vessel, analyze critically how well the crew responded in the incident. These activities show higher-order thinking, as students go beyond just decoding text to critically understand and assess its quality. These strategies align with the concept of intentional actions that readers select and control to achieve specific comprehension goals (Beek et al., 2019) Strategic readers pay attention to their comprehension and modify their approach according to the text's requirements.

Pattern Recognition

Students' belief that they can identify repetitive words such as “collision”, sentence patterns such as grammatical structure of past tense verb (V2), transitional language such as “as a result”, and text organization especially cause and effect paragraph during reading. they also claim that they can predict the preceded and following paragraph. Studies find that these are not just a reading habit; rather, it is an example of higher-order pattern recognition abilities, which are fundamental to computational thinking (CT) (Jacob et al., 2018).

Using outlines and underlining phrases are strategies that fit with computational thinking pattern recognition. Students can better understand texts and anticipate content by recognizing repetitive phrases and structures. Students' comprehension and accurate interpretation of technical texts are improved when they can identify common words and terminologies in marine English. The formation of a specific vocabulary necessary for maritime communication is supported by this practice.

Skilled readers regularly look for and make use of these patterns to create meaning and predict content (Duke et al., 2021). Finding patterns in complicated data or text is the goal of pattern recognition, a fundamental component of computational thinking (Grover & Pea, 2018). In the context of reading, it allows students to identify lexical and syntactic components that indicate the text's main ideas or purposes. It also asks them to identify discourse-level indicators such subject changes or emphasis conveyed by noticing paragraph forms or transitions. It helps students make predictions or classifying data using well-known textual structures. Moreover, Learners successfully lower cognitive load and improve reading efficiency by recognizing these patterns, exhibiting strategic literacy behaviours that complement both CT and metacognitive reading techniques (Wing, 2017).

V. CONCLUSION

This study investigates students’ perception toward maritime English reading instruction. The data indicates that students have positive perception generally. Moreover, the study divides the perception into five aspects of computational thinking. They are abstraction, algorithm thinking, decomposition, evaluation and pattern recognition.

In terms of abstraction students perceive CT helps them to identify main ideas, focus on important information, find important and irrelevant information, summarize the text, get the purpose of text, differentiate main idea and supporting sentence. In terms of algorithm thinking students experience that CT helps them to use strategies while reading, break down the text into smaller parts, use logical thinking in comprehension, read the questions then read the text, organize information, notice and underline keywords.

In terms of decomposition, students claim that CT helps them to divide difficult text into smaller parts,

understand and break down complex sentences, understand each paragraph before getting the overall meaning, analyze the text organization, re-read and highlight important detail. In terms of evaluation, students believe that CT helps students to notice which part contains relevant information, manage reading time effectively, skip or skim certain parts, aware of their reading strategies and use, compare as well as decide some reading strategies suit them. In terms of pattern recognition students argue that they notice repetitive words and common sentence structures, they are aware of different organization text and transition words, and they can predict the preceded and following paragraph of the text. Future study is suggested to analyze the effectiveness of computational thinking in students reading comprehension especially in Maritime English field using quantitative approach to measure the impact of computational thinking on students' reading comprehension skills more objectively.

REFERENCES

Amalia, P. A., Adham, M., & Bhakti, S. (2022). Learners' Perception Towards Online Classroom Environment during Pandemic of COVID-19, TPACK in EFL Context. *Atlantis Press*, *647*, 7–13.

Amalia, P. A., Adham, M., & Rusman. (2020). Metode Pengajaran Bahasa Inggris Maritim. *Isas Publishing*, *6*(2), 456–463.

Amalia, P. A., Kurniawan, A., Fahmimroah, F., & Arditiya, A. (2024). Computational Thinking in Developing Students' Reading Comprehension Skill. *Buletin Poltanesa*, *25*(2), 202–207. https://doi.org/10.51967/tanesa.v25i2.3204

Andrian, R., & Hikmawan, R. (2021). The Importance of Computational Thinking to Train Structured Thinking in Problem Solving. *Jurnal Online Informatika*, *6*(1), 113–117. https://doi.org/10.15575/join.v6i1.677

Astuti, S. P. (2013). Strategies in an Indonesian high school teachers' and students' perceptions of motivational teaching context. *TEFLIN Journal*, *24*(1), 14–31. http://journal.teflin.org/index.php/journal/article/view/152/141

Azizah, N. I., Roza, Y., & Maimunah, M. (2022). Computational thinking process of high school students in solving sequences and series problems. *Jurnal Analisa*, *8*(1), 21–35. https://doi.org/10.15575/ja.v8i1.17917

Beek, ter M., Opdenakker, M. C., Spijkerboer, A. W., Brummer, L., Ozinga, H. W., & Strijbos, J. W. (2019). Scaffolding expository history text reading: Effects on adolescents' comprehension, self-regulation, and motivation. *Learning and Individual Differences*, *74*. https://doi.org/10.1016/j.lindif.2019.06.003

Duke, N. K., Ward, A. E., & Pearson, P. D. (2021). The Science of Reading Comprehension Instruction. *The Reading Teacher*, *74*(6), 663–672. https://doi.org/10.1002/trtr.1993

Hingstman, M., Warrens, M. J., Doolaard, S., & Bosker, R. J. (2023). The effects of Success for All in the Netherlands on the reading achievement of first-grade students at risk of reading problems. *Studies in Educational Evaluation*, *77*, 101257. https://doi.org/10.1016/j.stueduc.2023.101257

Jacob, S. R., Nguyen, H., Tofel-Grehl, C., Richardson, D. J., & Warschauer, M. (2018). Teaching Computational Thinking to English Learners. *NYS TESOL Journal* , *5*(2), 1–13. https://www.researchgate.net/publication/331844224

Jacob, S. R., & Warschauer, M. (2018). Computational Thinking and Literacy. *Journal of Computer Science Integration*, *1*(1). https://doi.org/10.26716/jcsi.2018.01.1.1

Jago, L. S., Monaghan, P., Alcock, K., & Cain, K. (2025a). The effect of preschool vocabulary and grammar on early reading comprehension and word reading: A systematic review and meta-analysis. *Educational Research Review*, *47*, 100680. https://doi.org/10.1016/j.edurev.2025.100680

Jago, L. S., Monaghan, P., Alcock, K., & Cain, K. (2025b). The effect of preschool vocabulary and grammar on early reading comprehension and word reading: A systematic review and meta-analysis. *Educational Research Review*, *47*, 100680. https://doi.org/10.1016/j.edurev.2025.100680

Kurniawan, A., Amalia, P. A., & Indrawati, I. (2024). Improving Students' Reading Comprehension through Storytelling Frame. *Buletin Poltanesa*, *25*(2), 217–222. https://doi.org/10.51967/tanesa.v25i2.3183

Lázaro-Ibarrola, A., Luquin, M., & Roothooft, H. (2025). The reading rainbow of young multilingual learners: Reading comprehension in the majority (Spanish), regional (Basque) and foreign (English) language. *System*, *131*, 103665. https://doi.org/10.1016/j.system.2025.103665

Liu, H., Yang, D., Nie, S., & Chen, X. (2024). Identifying key factors of reading achievement: A machine learning approach. *IScience*, *27*(10), 110848. https://doi.org/10.1016/j.isci.2024.110848

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis: Methodological guidance for systematic reviewers utilizing meta-aggregation. *International Journal of Evidence-Based Healthcare*, *13*(3), 179–187. https://doi.org/10.1097/XEB.0000000000000062

Lyon, J. A., & J. Magana, A. (2020). Computational thinking in higher education: A review of the literature. *Computer Applications in Engineering Education*, *28*(5), 1174–1189. https://doi.org/10.1002/cae.22295

Ma, L., & Zhao, Z. (2025). Reading motivation and reading comprehension achievement among English majors in China: A descriptive correlational study.

Amalia, P. A., Laturmas, F. B., Bhakti, S. O. W., Kurniawan, A., Ariani, S., & Pusparinda, R. S. (2025). The Students' Perception on the Implementation of Computational Thinking in Maritime English Reading Comprehension. Buletin Poltanesa, 26(1). https://doi.org/10.51967/tanesa.v26i1.3287

Heliyon, *11*(3), e42427. https://doi.org/10.1016/j.heliyon.2025.e42427

Mursandi, M., Bhakti, S., Astuti Amalia, P., & Adham, M. (2019). A Case Study: Factors Contributing to Anxiety Possessed by Bunga in Learning Maritime English at Maritime Department Politeknik Negeri Samarinda. *Atlantis Press*, *647*, 7–13.

Nur Marifah, S., Mu'iz L, D. A., & Wahid M, M. R. (2022). Systematic Literatur Review: Integrasi Computational Thinking dalam Kurikulum Sekolah Dasar di Indonesia. *Journal of Elementary Education*, *5*(5), 1–11.

Parsazadeh, N., Cheng, P. Y., Wu, T. T., & Huang, Y. M. (2021). Integrating Computational Thinking Concept Into Digital Storytelling to Improve Learners' Motivation and Performance. *Journal of Educational Computing Research*, *59*(3), 470–495. https://doi.org/10.1177/0735633120967315

Robledo-Castro, C., Hederich-Martínez, C., & Castillo-Ossa, L. F. (2023). Cognitive Stimulation of Executive Functions through Computational Thinking. *Journal of Experimental Child Psychology*, *235*. https://doi.org/10.1016/j.jecp.2023.105738

Rottenhofer, M., Kuka, L., Leitner, S., & Sabitzer, B. (2022). Using Computational Thinking to Facilitate Language Learning: A Survey of Students' Strategy Use in Austrian Secondary Schools. *IAFOR Journal of Education: Technology in Education*, *10*(2), 52–70.

Sabitzer, B., Demarle-Meusel, H., & Jarnig, M. (n.d.). *Computational Thinking Through Modeling In Language Lessons*.

Shute, V. J., Sun, C., & Asbell-Clarke, J. (2017). Demystifying computational thinking. *Educational Research Review*, *22*, 142–158. https://doi.org/10.1016/j.edurev.2017.09.003

Su, J., & Yang, W. (2023). A Systematic Review of Integrating Computational Thinking in Early Childhood Education. *Computers and Education Open*, *4*, 100122. https://doi.org/10.1016/j.caeo.2023.100122

Suhendra, E., Muhid, A., & Tanashur, P. (2024). Using Computational Thinking to Enhance Problem-Solving in English for Specific Purposes Classrooms. *Humanitatis : Journal of Language and Literature*, *11*(1), 121–132. https://doi.org/10.30812/humanitatis.v11i1.4660

Wilawan, S. (2022). Development and validation of ESL/EFL reading strategies inventory. *Ampersand*, *9*, 100095. https://doi.org/10.1016/j.amper.2022.100095

Yapp, D., de Graaff, R., & van den Bergh, H. (2023). Effects of reading strategy instruction in English as a second language on students' academic reading comprehension. *Language Teaching Research*, *27*(6), 1456–1479. https://doi.org/10.1177/1362168820985236

Yu, X., Soto-Varela, R., & Gutiérrez-García, M. Á. (2024). How to Learn and Teach a Foreign Language Through Computational Thinking: Suggestions Based on a Systematic Review. *Thinking Skills and Creativity*, *52*. https://doi.org/10.1016/j.tsc.2024.101517