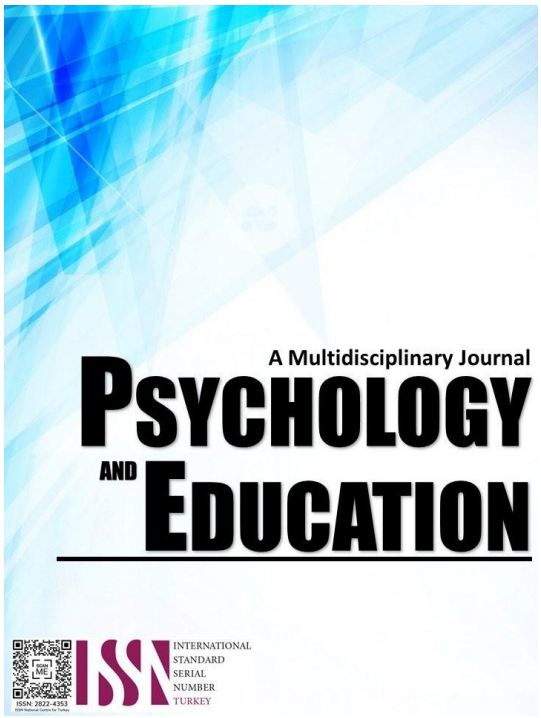
APPLICATION OF SOLO TAXONOMY IN TEACHING ENGLISH



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Research Article

Application of Solo Taxonomy in Teaching English

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Abstract

This study assessed the effectiveness of the SOLO (Structure of Observed Learning Outcomes) Taxonomy in improving the reading comprehension proficiency of Grade 7 students. The research focused on the integration of SOLO-based questioning strategies and their impact on critical thinking and higher-order thinking skills (HOTS) in English reading tasks aligned with the MATATAG curriculum. Using a quasi-experimental design, two existing sections from a public secondary school were selected—the experimental group that the received SOLO-integrated instruction, while the control group received conventional reading instruction. A total of 64 students participated in the study. Pre-tests and post-tests were administered, with researcher-made instruments consisting of PISA-based questions and researcher-made questions aligned to SOLO levels. Results revealed a notable increase in proficiency among the experimental group from "Fair" to "Very Satisfactory," with significant gains particularly at higher SOLO levels (relational and extended abstract). In contrast, the control group remained at the "Satisfactory" level. Statistical analysis using the Wilcoxon Signed-Rank Test confirmed significant differences in performance before and after the intervention. The findings underscored the effectiveness of the SOLO framework in promoting deeper learning, metacognition, and structured cognitive progression. The study recommends integrating the SOLO Taxonomy in instructional planning, providing professional development for teachers, and aligning curriculum resources to support critical reading development. Further research is suggested to explore SOLO's application in other subject areas and grade levels.

Keywords: *SOLO Taxonomy, proficiency in reading, pre-structural, unistructural, multi-structural, relational, extended, abstract levels of implementation, teaching English*

Introduction

The Program for International Student Assessment (PISA) 2022 results revealed a concerning reality for Philippine education. Among 81 participating countries, the Philippines ranked in the bottom ten in reading comprehension (OECD, 2023). This alarming statistic underscores the urgent need for effective teaching strategies that promote critical thinking and higher-order thinking skills (HOTS) among Filipino learners. In response, the Department of Education (DepEd) has mandated teacher training programs to strengthen students' critical thinking abilities, as stated in DepEd Order No. 42, s. 2017.

Aligned with this directive, DepEd introduced a teacher resource package incorporating the SOLO (Structure of Observed Learning Outcomes) Taxonomy to support the effective implementation of instruction that fosters deep thinking. This initiative addresses both national and international assessments' demands, including PISA. Likewise, Surigao del Norte Division issued Division Memorandum No. 379, s. 2023, which launched the Division Training of Trainers (DTOT) on Higher-Order Thinking Skills Professional Learning Package (HOTS-PLPs) for English Teachers. The training aims to equip public school teachers in Grades 7 to 10 with pedagogical and assessment strategies that enhance students' higher-order thinking.

Within this context, the SOLO Taxonomy emerges as a promising framework for deepening learning. Developed by Biggs and Collis (1982), the SOLO Taxonomy classifies student understanding into five hierarchical levels: prestructural (no understanding), unistructural (simple understanding), multistructural (understanding of several ideas), relational (integration of ideas), and extended abstract (application in new contexts). Unlike other frameworks such as Bloom's Taxonomy, SOLO focuses on the quality and structure of student responses, offering a clearer progression from surface to deep understanding.

Recent studies support the effectiveness of SOLO Taxonomy in language learning. Idek (2020) showed that using SOLO-based questions in ESL reading helped students move from basic understanding to higher-order thinking. Likewise, the Singapore Ministry of Education (2023) found that SOLO rubrics improved analytical responses in Chinese reading comprehension. These findings suggest that the SOLO Framework may also enhance English language learning, particularly in developing reading comprehension and critical thinking skills.

Guided by this background, the study aimed to assess the proficiency level of Grade 7 students in English using the SOLO Taxonomy Questioning Framework. It specifically examined how the framework was integrated into instruction and evaluated its effectiveness in enhancing students' critical thinking and higher-order thinking skills (HOTs).

Research Questions

This study aimed to assess the proficiency level in reading comprehension of the students using the SOLO Taxonomy in teaching English reading among Grade 7 students. Specifically, it sought to answer the following questions:

1. What is the level of proficiency of the students in reading comprehension as per the initial English Reading Task based on their pre-test scores?
2. How is the SOLO Taxonomy used in teaching English Reading?
3. What is the level of proficiency of the students in reading comprehension based on their post-test scores in English Reading using the SOLO Taxonomy, as to the following levels of implementation:
    3.1 pre-structural;
    3.2 unistructural;
    3.3 multistructural;
    3.4 relational; and
    3.5 extended abstract?
4. Is there a significant difference in students' reading comprehension proficiency level using SOLO Taxonomy as shown in their pre-test and post-test scores?
5. What are the implications of the SOLO Taxonomy in teaching reading in a Grade 7 classroom?

Literature Review

SOLO Taxonomy

SOLO taxonomy levels refer to observed learning outcomes, where the learning outcomes achieved by students are studied to explore the reasons behind the differences between students in the performance of particular tasks. It has qualitatively distinct levels, hierarchically ranging from the imperfect level at the base of the pyramid in which the responses are non-constructive and de-linked to higher experience with high abstraction levels (Ladiaset al., 2022) The taxonomy consists of five major levels: pre-structural, unistructural, multistructural, relational, and extended abstract.

The SOLO (Structure of Observed Learning Outcomes) taxonomy offers a valuable framework for educators to understand and enhance student learning. This model, developed by Biggs and Collis (1982), outlines five distinct stages of learning complexity, applicable across various contexts, even gamified environments (Putra, 2020). The stages range from "pre-structural" where students have limited understanding, to "extended abstract" where they can apply knowledge in new contexts. Utilizing SOLO-based feedback fosters engagement and directs students towards learning challenges (Roy et al., 2022).

The SOLO Taxonomy provides a systematic approach to developing a profound understanding and can be used for enhancing the learning quality in the classroom (Damopolii, 2020). The SOLO model could be helpful in structuring the definition of the levels of education by curriculum content outcomes, and also considering potential levels of students' thinking (Adeniji, Baker, & Schmude 2022). This will thus be a good platform for creating more efficient teaching practices.

The SOLO (Structure of Observed Learning Outcomes) Taxonomy categorizes learning into five hierarchical levels: prestructural, unistructural, multistructural, relational, and extended abstract (Biggs & Collis, 1982). Unlike Bloom's Taxonomy, SOLO emphasizes observable outcomes, enabling educators to scaffold tasks from surface-level understanding, to deep, conceptual thinking. Recent study by Haksoy (2021), highlight its role in aligning curriculum design, instruction, and reading outcomes, particularly in language education.

Additionally, analyzing student responses through the SOLO lens allows teachers to tailor instruction and design effective strategies to address specific misconceptions (Claudia et al., 2020). Tools based on the SOLO taxonomy also provide valuable insights into student comprehension, enabling teachers to offer timely interventions or personalized support (Dumaraos, 2022). Furthermore, studies suggest that applying SOLO principles can foster strong teacher-student relationships (Ljungblad, 2022).

Ultimately, the SOLO taxonomy empowers educators to create a nurturing learning environment, equip students with the necessary tools for deeper understanding, and effectively guide them on their journey towards achieving desired learning outcomes.

SOLO Taxonomy in Teaching English Language

Some studies showed the feasibility of SOLO taxonomy to be used in language learning, especially in English language teaching. In another study on applying the use of SOLO taxonomy in ESL writing, it was found that students must be aware of what level they are at in thinking and what is missing from their thinking ability and how to move to the next level, otherwise, they would continuously require teachers to spoon-feed them to reach a particular level. This is because the students have not been able to cover the lower-order thinking skills level, something that prevents them from making strategic and systematic advances in their learning (Hyland, 2020).

Research by Chan, Tsui, Chan, and Hong (2019) examined the use of SOLO taxonomy as an assessment strategy for marking ESL work on 28 students at Hong Kong Polytechnic University. They found that numerous teachers believed that SOLO was able to be used effectively to evaluate mastery of content and language skills in ESL classes.

As per Richards (n.d.), SOLO taxonomy provides an applicable method for evaluating the extent to which students develop from pre-structural proficiency to productive proficiency, which entails employing higher levels of SOLO taxonomy. This indicates the level of learning that students are capable of at higher SOLO model levels, particularly at the final level, extend abstract, which enhances their

ability to apply and conceptualize. It provides a crucial point of departure for developing curricula and lesson plans within the classroom that result in deep, relevant, and beneficial outcomes.

In that research, they explained that SOLO taxonomy offers a practicable way of how to assess students' development from pre-structural capability to productive 7 proficiency with the inclusion of higher SOLO taxonomy levels. This illustrates the deep learning that is achieved by students as they ascend to upper levels of the SOLO model, specifically extending abstract, the last level of the taxonomy, to develop more competence in applying and conceptualizing knowledge. It offers a basic building block to the construction of curriculum and classroom teaching designs for outcomes that are deep, relevant, and applicable.

A study by Idek, M. S. B. (2020) to cope with the prospect of using SOLO taxonomy as a model for question construction in ESL reading comprehension outlined the methods in question design allow students to shift from lower level of understanding to higher level of thinking and also there is a necessity to create cognitive conflict, which provokes students to think about more possibilities while developing their opinions from knowledge acquired through reading materials that they are exposed to. It is apparent that SOLO taxonomy has been applied stringently in examinations to assess the level of thought processes and also in curriculum content to determine academic accomplishments. This means that SOLO taxonomy-based critical thinking can be used to help students mold their thinking patterns, and this may potentially be achieved through its usage as a questioning strategy.

Therefore, SOLO taxonomy can serve as a pedagogical model for teachers to teach students to develop their thinking systematically and strategically. Subsequently, these might have a positive implication in developing their critical thinking skills in reading.

SOLO Taxonomy in Reading Comprehension

Some studies have shown the effectiveness of the SOLO (Structure of Observed Learning Outcomes) Taxonomy in the improvement of English language teaching, especially reading comprehension and higher-level thinking. Idek (2020) explored the effect of SOLO-related questioning on ESL learners in a rural Malaysian environment. During an eight-week intervention, students received guided questions addressing main reading strategies like prediction, inference, questioning, and connecting. The research indicated a 30% increase in critical reading scores, with students advancing from identifying simple vocabulary (unistructural level) to examining relationships within the text (relational level). Nevertheless, some students struggled to advance from multistructural to relational levels, suggesting the need for scaffolded support. Additionally, the application of concept maps and reflective interviews identified students' increasing metacognitive awareness, although many needed assistances to explain deeper connections.

Likewise, the Singapore Ministry of Education (2023) employed SOLO rubrics in Chinese Language reading comprehension among secondary school students and noticed a 37% rise in relational-level responses. Students were better able to identify implicit themes and judge the author's intention. The SOLO model also promoted self-assessment, where students utilized the rubric to identify areas of weakness in their arguments and enhance them through peer revision. Although conducted in the Chinese Language, the study's outcomes are relevant to English language instruction, particularly in multilingual classrooms where cognitive scaffolding with order is needed.

Shao et al. (2024) also highlighted the significance of multi-structural tasks in remembering academic vocabulary. Their results showed that there was a 25% increase in vocabulary learning when students did organizing activities like sorting synonyms and contextualizing words. These are in line with the SOLO framework's goal of advancing learners from disconnected factual knowledge to integrated, meaningful understanding. The research also highlighted how multi-structural tasks provide the basis for relational thinking, which is essential in learning more sophisticated academic language.

Together, these studies advocate for the use of SOLO Taxonomy in English language instruction, especially in reading. The findings reflect SOLO's efficiency in facilitating cognitive advancement through scaffolding, promoting metacognitive capabilities, and addressing a variety of learners. Under this study, where the implementation of the SOLO Taxonomy Questioning Framework in Grade 7 English classes within the MATATAG Curriculum is researched, such international findings solidify that structured questioning not only improves reading understanding but also elevates students' abilities to think critically. The framework serves as a powerful tool for guiding learners from surface-level understanding to deeper, more independent engagement with texts.

Teaching Approaches in SOLO Taxonomy Teaching Questions and Answers (QAR)

Raphael (n.d.) explained Question-Answer Relationship (QAR) as a questioning strategy that focuses on the relationship between questions, text, and existing knowledge. There are four types of questions that can guide students on how to provide acceptable answers to these different types of questions based on the text or their existing knowledge. One of the most important techniques in teaching reading strategies is to identify questions that can encourage students to think.

Raphael and Simmonds (n.d.) argued for the importance of making students aware of the classification of questions that can assist them in formulating their responses to questions. This awareness can benefit readers of lower levels to strategically answer comprehension questions. There are two major categories: questions with answers that can be found in the text (In the Text) and questions that require readers to use their knowledge to answer (In my Head).

The two major questions can each be further categorized into two types. There are two specific types of “In the Text” questions. The

first one is “Right There,” in which the exact answers are in the text that readers can simply cite. The second category is “Think and Search”, the answers can be found in the text, but in different sentences that the readers have to put together to form a complete answer.

The two specific questions in the second major category, “In the Head,” are “Author and You” and “On My Own”. In “Author and You” questions, the readers have to link the texts with their existing knowledge in order to provide adequate and correct answers to the questions. Lastly, the “On My Own” questions, the answers cannot be found in the text as the readers have to use their knowledge in order to answer the questions. The different types of questions are coherent with the SOLO levels. The first two sub-categories of the “In the Text” main category of questions is consistent mainly with unistructural and multistructural levels.

These reading techniques can be made more systematic if the processes in each technique are applied in a hierarchical manner the way SOLO levels are, and the outcomes are assessed in a similar manner.

Differentiated Instruction

Differentiated instruction through the SOLO Taxonomy enables educators to design learning tasks and tests to the students' immediate levels of understanding, facilitating individualized learning streams. Caridade et al. (2024) illustrated that when tasks were matched to the SOLO levels-ranging from elementary recall to sophisticated synthesis-teachers closed the achievement gaps by 22%. This method acknowledges that students learn at varying rates, and therefore, they need suitably demanding tasks to spur growth. By clustering students or planning activities in relation to SOLO level, teachers are better able to target scaffolding support that can encourage learners from superficial to profound cognition.

This serves not just to increase interest, but to address equity too, as students receive specific support in which they are pushed cognitively, without having to remain restricted to the 'one-size-fits-all' curriculum model (Structural Learning, 2021; Ajarn Mieder, 2023).

Formative Feedback

Formative feedback aligned with SOLO levels provides more specific and actionable advice than universal comments. In keeping with the Singapore Ministry of Education (2023), students who were given feedback directly linked to their SOLO level rewrote their essays 50% better than students who were given non-specific feedback. This focused feedback enables learners to recognize the extent of their understanding and the particular cognitive functions they must acquire-whether it's progressing from recognizing isolated facts to establishing relational connections or developing sustained abstract thinking. SOLO thus enables metacognitive reflection by having students reflect on their own learning and take responsibility for their learning process.

Teachers, in return, are able to track student growth more precisely and modify teaching accordingly, resulting in a dynamic and interactive learning environment (Caridade et al., 2024; Ajarn Mieder, 2023).

Digital Integration

The embedding of digital tools in SOLO Taxonomy also increases its impact by streamlining progression monitoring and promoting self-assessment. A 2024 meta-analysis emphasized the application of AI-enabled SOLO rubrics that offer instant feedback on students' cognitive levels, increasing the accuracy of self-assessment by 35%.

The digital platforms allow students to see their learning journey through the SOLO levels and locate precise areas where they need improvement. For teachers, such systems simplify the assessment process and produce data-driven feedback to guide instruction. The union of SOLO's cognitive structure with digital technology is a promising development in personalized learning, bringing deep learning more within reach and measurable at scale (Keskin et al., 2024; Singapore MOE, 2024).

Role Of Critical Thinking Skills in English

SOLO Taxonomy's higher orders- relational and extended abstract- hold key status in the development of critical thinking ability through nudging learners past isolated facts into combined and abstract thinking. Intervention in 2023 illustrated how secondary students making use of SOLO-based questions detected biases within news articles at 35% higher rates compared to others, underlining how the relational system aids higher scrutiny of multi-part information.

At the relational level, learners are encouraged to link several ideas and identify underlying assumptions, critical to the evaluation of texts and the media (Structural Learning, 2021; LinkedIn, 2024). This process helps build learners' capacity to synthesize evidence and pick up subtle cues, skills that lie at the heart of evidence-based citizenship and scholarly research.

In argument writing, SOLO models have also demonstrated significant gains. Shao et al. (2024) indicated that 40% of students could build extended abstract arguments by successfully connecting evidence to real-world situations. The extended abstract level demands that students not only synthesize information but also generalize, hypothesize, and apply concepts in new contexts, promoting higher-level critical thinking and creativity.

This is consistent with the general education objective of helping students to apply knowledge outside of the classroom to address practical issues (Creatrix Campus, 2023; Hook, 2022). Through its process of leading students through these thought stages, SOLO

Taxonomy facilitates the development of metacognitive skills to allow learners to think about how they think and improve the complexity of their arguments.

Composing, these observations highlight SOLO's power as a critical thinking development, transformative model. It enables teachers to outline a distinct line of instruction, enabling them to systematically craft learning environments that increasingly nudge learners into analyzing, synthesizing, and evaluating data with the higher-level thinking required in academic and lifetime learning success (LinkedIn, 2024; AIP, 2023).

Another study by Hudson (2007) also highlighted that critical reading skills are essential part of critical reading because students need to have the abilities to analyze, synthesize, and evaluate what they read. As students become familiar with critical thinking skills in reading, they will be able to connect ideas, identify ideas underlying a text and develop critical perspectives of the given text. Indeed (2022) presented the Informal Assessments that are less formal methods for evaluating critical thinking skills. They can be used in a variety of settings, such as classrooms, workplaces, and even at home. Some common informal assessments for critical thinking include: Open-ended questions: Questions that require more than a yes or no answer can help to assess a person's ability to analyze information, identify assumptions, and develop well-reasoned arguments; Debates and discussions: Engaging in debates and discussions can help to develop critical thinking skills by forcing people to consider different perspectives and defend their own ideas; Problem-solving activities: Activities that require people to solve problems can help to assess their ability to think critically and creatively; and Self-reflection: Encouraging people to reflect on their own thinking processes can help them to identify areas where they can improve.

SOLO Taxonomy in English Language

The current research is grounded in Biggs and Collis' (1982) initial model and its subsequent development by Biggs and Tang (2011), referred to as the SOLO (Structure of the Observed Learning Outcome) Taxonomy. This model describes five increasingly sophisticated levels of students' understanding: Pre-structural, Uni-structural, Multi-structural, Relational, and Extended Abstract. It has been extensively utilized to facilitate cognitive development in a range of learning tasks, with significant application in English language teaching.

Idek (2020) discovered that SOLO-based questioning techniques considerably enhanced ESL learners' reading comprehension by leading them from easy vocabulary knowledge to examining deeper text connections. Likewise, Shao et al. (2024) noted a 25% increase in students' academic word knowledge through multistructural activities such as classifying synonyms and applying words to context. The Singapore Ministry of Education (2023) also noted a 37% improvement in the capacity of students to provide relational-level responses following the application of SOLO rubrics in Chinese Language reading lessons.

Ghunaimat et al. (2024) noted the advantages of SOLO-supported writing exercises, reporting increased student creativity and idea generation. Caridade et al. (2024) also added support by indicating that SOLO-designed strategies narrowed achievement gaps and enhanced students' reflective reading and analytical writing. The Journal of Education and Educational Research (2024) also stressed the ways in which SOLO encourages metacognition and deeper text analysis.

In metacognitive development, research by Singapore MOE (2023) and Caridade et al. (2024) indicated that learners were more cognizant of their learning process when led by SOLO-based formative feedback and personalized learning strategies. These instruments enabled learners to detect their strengths and weaknesses and correct their work more efficiently.

Shao et al. (2024) and an intervention study in 2025 illustrated how SOLO also improves persuasive writing and speaking by assisting students in connecting ideas and building well-supported arguments.

Synthesis. This study is grounded in the use of the SOLO Taxonomy as a model for guiding students' learning from basic understanding to more complex and critical thinking. While earlier research has shown the effectiveness of SOLO-based questioning in enhancing reading comprehension and vocabulary skills, much of it focused on multilingual or higher education settings. Other studies highlighted the value of SOLO in developing writing and broader literacy abilities. In contrast, this research centers on applying the SOLO framework specifically in reading instruction for Grade 7 students under the MATATAG Curriculum. By using structured and tiered questioning aligned with the SOLO levels, the study aims to strengthen learners' comprehension and critical thinking. It also offers a localized view of how SOLO can support metacognitive learning strategies and contribute to the curriculum's goals of mastery and deeper understanding in junior high school English classrooms.

Methodology

Research Design

This study used a quasi-experimental research design to assess the effectiveness of the SOLO Taxonomy Framework in teaching English reading. Two existing Grade 7 sections were selected as the participants of the study. One section was designated as the experimental group, which received instruction incorporating the SOLO Framework, while the other served as the control group, receiving conventional instruction. Random assignment was not used, as the participants were grouped based on their current class enrollment.

Respondents

The participants of this study were the sixty-four (64) Grade 7 students enrolled in Bacuag National Agro-Industrial School, Bacuag District, Surigao del Norte during the school year 2024-2025. Table 1 below shows the distribution of participants by grade and section, as well as the sample size.

Table 1. *Distribution of Participants*

	Grade and Section	*Group*	*N*
1.	Grade 7 - Grateful	Experimental	33
2.	Grade 7 - Helpful	Control	31
	Total		64

Instrument

The primary tools used in this study were the researcher-made pre-tests and post-tests, which measured students' level of proficiency in reading comprehension before and after the intervention. These tasks were aligned with the PISA sample reading passages and questions that focused on assessing students' reading comprehension, inference, vocabulary, and critical thinking skills. The reading materials were the same for both the experimental and control groups; however, only the experimental group was exposed to questioning strategies based on the five levels of the SOLO Taxonomy: Pre-structural, Uni-structural, Multi-structural, Relational, and Extended Abstract.

The reading passages that were employed in the pre-test and post-test were kept the same with regard to content so that any difference in performance was due to the intervention and not the reading material. But the structure and nature of questions varied.

The pre-test comprised four (4) reading passages taken from the Programme for International Student Assessment (PISA), with five questions each, making 20 items. They were standard reading comprehension questions in international style.

On the other hand, the post-test employed the same reading passages but with researcher-made questions constructed using the SOLO Taxonomy. This aimed to make the students through progressively higher levels of critical thinking from Pre-structural through to Extended Abstract. This integration was carried out in accordance with the recommendation during the research pre-defense in order to properly measure the intervention effects while keeping test content valid.

This shift permitted the researcher to assess not just reading performance improvement but also the development of higher-order thinking abilities developed through SOLO-matched tasks.

Validity. The instrument's content was subjected to validation. The draft was presented to the panel of examiners and professionals who were experts in constructing the instrument. Their comments and suggestions were carried out and revised before the crafting of the final reading task.

Student outputs were evaluated using a standardized scoring rubric and a proficiency rating scale to ensure consistent assessment of comprehension and language use. The results from both the pre- and post-tests provided insights into the effectiveness of the SOLO Framework in enhancing students' reading proficiency levels.

Procedure

A letter asking permission for the conduct of study and administration of the research instrument was forwarded to the Principal of Bacuag National Agro-Industrial School. Upon approval of the request to conduct the study, the researcher administered the necessary procedures to gather data in response to the specific problems of the study. Before the intervention, a pre-test was administered to both the experimental and control groups to establish baseline data on their performance in English reading tasks.

Following this, the intervention phase was carried out over a period of 3–4 weeks, during which the experimental group was taught using the SOLO Taxonomy. This involved the application of structured questioning techniques based on the levels of the SOLO Taxonomy. Meanwhile, the control group received conventional reading instruction as part of their regular English lessons.

After the intervention, a post-test was conducted with both groups to assess any changes in their reading performance. The instruments were personally administered by the researcher to ensure consistency and reliability of responses. Student scores from the pre-test and post-test were collected and analyzed to determine the effectiveness of the SOLO Taxonomy. All activities were conducted with strict adherence to existing school policies and health protocols.

Data Analysis

To analyze the data, the following tools were used:

Mean and Standard Deviation. These were computed to describe the central tendency and dispersion of scores from both the pre-test and post-test. These descriptive values provided an overview of students' comprehension levels before and after the intervention.

Shapiro-Wilk Method. This was used to test the normality of the data gathered from the pre-test and post-test scores of both the

experimental and control groups. This test determines whether the distribution of scores follows a normal pattern, which is a requirement for selecting the appropriate statistical treatment.

Wilcoxon Signed Rank Test. This was used to compare the pre-test and post-test results within each group. This test assessed whether there was a significant difference in student performance before and after the application of the SOLO Taxonomy Questioning Framework in the experimental group and standard instruction in the control group. The use of this test was appropriate due to the paired nature of the data and the non-normal distribution of the scores.

Student responses were scored based on a standardized SOLO assessment rubric, which categorized performance into five levels: Pre-structural, Uni-structural, Multi-structural, Relational, and Extended Abstract. Each level corresponded to a specific range of scores and performance descriptors such as "Not Proficient," "Somewhat Proficient," up to "Highly Proficient." (Balagtas, 2021). This rubric enabled the identification of students' depth of understanding and the cognitive levels they demonstrated through their answers to reading tasks.

This analysis addressed the research questions on students' level of proficiency in English reading across SOLO levels, and whether there was a statistically significant improvement in performance following the intervention. The findings from the analysis provided insights into the effectiveness and pedagogical implications of the SOLO Taxonomy in enhancing reading comprehension skills among Grade 7 learners.

The following table shows the assessment rubrics of SOLO levels to include the pre-structural, uni-structural, multi-structural, relational, and extended abstract, as well as the descriptions of each level, the indicators based on the responses, the general score ranges, and the interpretations.

Table 2.

SOLO Level	*Description*	*Indicators Based on Responses*	*General Score Range*	*Interpretation*
Pre-structural	Student shows minimal understanding across all stories.	- Correct mostly on Pre-structural questions only (Q1s) - Incorrect or off-topic in other levels	0–4 total correct answers	Not Proficient
Uni-structural	Student shows isolated understanding of individual ideas.	- Correct on most Q1s and Q2s - May have some correct Q3s - No meaningful connections in higher-level questions	5–8 total correct answers	Somewhat Proficient
Multi-structural	Student identifies multiple ideas but treats them separately.	- Correct on Q1s to Q3s - Answers are factual but not linked - Limited or no relational or extended responses	9–12 total correct answers	Nearly Proficient
Relational	Student links ideas together across the stories.	- Correct on Q1s to Q4s - Shows ability to relate and explain ideas clearly - Few or no extended abstract answers	13–16 total correct answers	Proficient
Extended Abstract	Student demonstrates deep understanding and can apply or generalize ideas.	- Correct in all question types - Especially strong in Q5s - Insightful, critical, or creative responses	17–20 total correct answers	Highly Proficient

Results and Discussion

This chapter presents the quantitative and qualitative results and analysis of the data gathered from the study.

Level of Proficiency of the Students in English Reading Based on Pre-test Scores

Table 3 illustrates the level of performance of the students in an English reading task using the conventional strategy, based on pre-test scores.

Table 3. *Level of Proficiency of the Students in English Reading Task Based on the Pre-test Scores*

Group	*Test*	*N*	*Mean*	*SD*	*Verbal Interpretation*	*Qualitative Description*
Experimental Group	Pre test	33	8.97	4.88	Fair	Less Proficient
Control Group	Pre test	31	9.32	4.85	Satisfactory	Proficient

Legend: 17–20 – Excellent (Highly Proficient); 13–16 – Very Satisfactory (Very Proficient); 9–12 – Satisfactory (Proficient); 5–8 – Fair (Less Proficient); 0–4 – Poor (Not Proficient)

Table 3 presents the proficiency levels of Grade 7 students in English reading tasks before the intervention. The data shows the comparison between the experimental group, which received instruction using the SOLO Taxonomy, and the control group, which was

taught using conventional strategies aligned with the MATATAG curriculum.

The table shows that experimental group has mean pre-test score of 8.97 (SD=4.88), verbally interpreted as Fair and qualitatively described as Less Proficient. Meanwhile, control group scored slightly higher with a mean of 9.32 (SD = 4.85), interpreted as Satisfactory and described as Proficient. This suggests that both groups started with moderate reading comprehension skills, with the control group having a slightly stronger foundation. The baseline supports previous findings that students often demonstrate surface-level understanding without guided questioning strategies (Idek, 2020; Singapore MOE, 2023), highlighting the need for structured cognitive scaffolding such as the SOLO Taxonomy to improve comprehension.

Implementation of SOLO Taxonomy in Teaching Reading

The Structure of Observed Learning Outcomes (SOLO) Taxonomy was applied in this research as a guide for the creation, presentation, and evaluation of English reading activities for Grade 7 students. The application of SOLO was put into practice by the lesson exemplars that were developed by the researcher (see attached Annex G), which assigned each reading task to questions for every SOLO levels—Pre-structural, Unistructural, Multistructural, Relational, and Extended Abstract. These exemplars acted as both instructional guides and formative assessment tools, maintaining that learning activity and question scaffolded students' thinking from surface to deep understanding. This tiered questioning approach scaffolded learners' thinking from basic recall to deep analysis, supporting cognitive development and metacognitive awareness (Idek, 2020; Caridade et al., 2024).

Students in the Pre-structural and Unistructural levels practiced activities like recognition of unknown words, searching for literal data, and answering simple comprehension questions. These activities were employed to establish basic knowledge and stimulate previous learning.

For the Multistructural level, students examined several components of the text and recognized multiple details or ideas without necessarily connecting them. Tasks involved making lists of story features, noting forms of conflict, and sorting information through graphic organizers.

At the Relational level, the students were directed to relate and link information between various sections of the text. Through systematic questioning techniques and group assignments, students described relations between themes, characters, and authorial purpose and thereby reinforced their understanding.

Finally, the Extended Abstract level forced students to transcend the text through application to real-life situations, development of critical opinions, and creation of innovative responses. Reflections were written, alternative endings were created, and arguments were posed based on students' analysis of universal themes.

For this to be achieved, SOLO-based question prompts were made throughout the lessons, and respective rubrics were used to assess the depth of student responses. These levels were organized in the reading worksheets, performance tasks, and assessment rubrics. Systematic integration of the SOLO taxonomy as part of routine instruction guaranteed that students were not only attaining literal comprehension but were also enhancing higher-order thinking skills, aligned with the MATATAG Curriculum goals.

Level of Proficiency of the Students in an English Reading Task Using the SOLO Taxonomy Based on Post-test Results

Table 4 shows the level of performance of the students in two sections in an English Reading Task using the SOLO Taxonomy based on the post-test results.

Table 4. *Level of Proficiency of the Students in an English Reading Task Using the SOLO Taxonomy as to Pre-Unistructural, Multistructural, Relational, and Extended Abstract*

Solo Levels	*Experimental Group*			
	M	*SD*	*Verbal Interpretation*	*Qualitative Description*
Pre structural	3.85	0.44	Excellent	Highly Proficient
Unistructural	3.45	1.12	Excellent	Highly Proficient
Multistructural	2.85	1.25	Very Satisfactory	Very Proficient
Relational	1.76	1.41	Satisfactory	Proficient
Extended Abstract	2.27	1.21	Satisfactory	Proficient
Overall	2.84	1.09	Very Satisfactory	Very Proficient

Solo Levels	*Control Group*			
	M	*SD*	*Verbal Interpretation*	*Qualitative Description*
Pre structural	3.77	0.50	Excellent	Highly Proficient
Unistructural	3.06	1.15	Very Satisfactory	Very Proficient
Multistructural	2.19	1.35	Satisfactory	Proficient
Relational	1.23	1.23	Fair	Less Proficient
Extended Abstract	1.39	1.05	Fair	Less Proficient
Overall	2.33	1.06	Satisfactory	Proficient

Legend: 3.20–4.00 – Excellent (Highly Proficient); 2.40–3.19 – Very Satisfactory (Very Proficient); 1.60–2.39 – Satisfactory (Proficient); 0.80–1.59 – Fair (Less Proficient); 0.00–0.79 – Poor (Not Proficient)

Students from both groups achieved the highest level of proficiency at the Pre-structural level. The experimental group obtained a mean score of 3.85 with a standard deviation of 0.44, while the control group had a mean score of 3.77 with a standard deviation of 0.50. Both were interpreted as Excellent and described as Highly Proficient. These results reflect students' ability to identify isolated ideas or vocabulary tasks, indicating surface-level comprehension.

This aligns with Idek (2020) SOLO-based study on ESL critical reading, which emphasizes that foundational vocabulary recognition and basic idea identification are prerequisites for deeper textual engagement.

In the Uni-structural level, the experimental group maintained an Excellent rating and was described as Highly Proficient with a mean of 3.45 (SD = 1.12), while the control group received a Very Satisfactory interpretation, described as Very Proficient with a mean of 3.06 (SD = 1.15). This shows that students in both groups were generally capable of understanding and responding to single ideas in the text.

However, the experimental group performed better, suggesting that the SOLO-based scaffolding encouraged students to build upon initial comprehension. Recent research by Shao et al. (2024) confirms this, demonstrating that structured questioning at the unistructural level improves students' focus on key textual elements, fostering early-stage comprehension

At the Multi-structural level, students were assessed on their ability to identify multiple aspects or details in the reading task. The experimental group achieved a mean of 2.85 (SD = 1.25), interpreted as Very Satisfactory, and was described as Very Proficient, while the control group recorded a mean of 2.19 (SD = 1.35), interpreted as Satisfactory and described as Proficient.

The difference implies that the SOLO questioning framework helped the experimental group progress further in extracting and organizing multiple relevant ideas, which is a crucial step before integration and synthesis. A 2024 study on SOLO-based college English reading instruction found that explicit training in multistructural tasks (e.g., listing details, categorizing information) significantly improved students' ability to synthesize fragmented ideas, mirroring these results.

The relational level measures the ability of students to connect various pieces of information and explain their relationship. The experimental group received a mean of 1.76 (SD = 1.41), interpreted as Satisfactory and described as Proficient, while the control group scored significantly lower with a mean of 1.23 (SD = 1.23), interpreted as Fair and described as Less Proficient.

This suggests that while both groups began to demonstrate developing higher-order thinking, only the experimental group reached a level where some connections between ideas were made. These findings are supported by Suryani and Syahbani (2023), who found that structured strategies rooted in the SOLO Taxonomy promote relational thinking and learner engagement.

A 2023 action research project in Singaporean Chinese Language classrooms demonstrated that SOLO rubrics explicitly teaching connection-making strategies increased students' ability to analyze text relationships by 37% compared to traditional methods.

The highest level of the SOLO Taxonomy, the extended abstract, which involves application, abstraction, or generalization, the experimental group achieved a mean of 2.27 (SD = 1.21), categorized as Satisfactory and described as Proficient, while the control group scored 1.39 (SD = 1.05), interpreted as Fair and described as Less Proficient. This indicates that students exposed to SOLO-based instruction were better prepared to apply their understanding beyond the text, although mastery at this level remains in progress for both groups.

These findings align with the conclusions of Sari and Sakhiyya (2020), who emphasized the need for instructional practices that develop higher-order thinking skills and discourage overreliance on surface-level tasks. A 2024 study of Ghunaimat, M. et al., integrates SOLO with coordinate geometry instruction revealed similar trends, noting that structured, taxonomy-aligned tasks enabled students to generalize concepts 25% more effectively than control groups, even in non-STEM disciplines like reading.

Significant Difference in Students' Proficiency Level Between the initial English Reading Tasks and the Reading Tasks using the SOLO Taxonomy

Table 5. *Difference in Students' Proficiency Level using the SOLO Taxonomy*

	Group	*W*	*df*	*p-value*	*Decision*
Experimental Group	Initial English reading Tasks - Reading tasks Using SOLO Taxonomy	-26.3	32	< 0.001	Reject Ho
Control Group	Initial English reading Tasks - Reading tasks Using SOLO Taxonomy	-13.2	30	< 0.001	Reject Ho

** if p value is <0.05 then there is a significant difference*

Table 5 shows the significant difference between students' performance in initial English reading tasks and tasks using the SOLO Taxonomy. Normality testing via the Shapiro-Wilk method confirmed non-parametric distributions (Experimental: $p < 0.001$; Control: $p = 0.012$), necessitating Wilcoxon Signed Rank Tests.

A statistically significant improvement was observed for Experimental Group ($W = -26.3$, $p < 0.001$), indicating strong alignment between the SOLO intervention and enhanced reading outcomes. While significant gains occurred for Control Group ($W = -13.2$, $p < 0.001$), the smaller effect size suggests conventional instruction lags behind structured SOLO strategies.

There is no significant difference in foundational comprehension tasks (Pre-structural and Uni-structural levels) between groups, as both achieved high proficiency. However, the experimental group's marked advantage at Multi-structural, Relational, and Extended Abstract levels ($p < 0.001$) highlights SOLO Taxonomy's role in connecting surface understanding to deeper thinking.

In terms of foundational skills, both teaching methods were effective in helping students learn basic vocabulary and understand single ideas. These skills, which relate to the Pre-structural and Uni-structural levels of the SOLO Taxonomy, were addressed well by both the experimental and control groups. This shows that both approaches were successful in teaching basic reading skills or surface-level understanding.

However, a clear difference was observed in higher-level thinking skills. The students in the experimental group performed significantly better at the Relational and Extended Abstract levels, with a p-value less than 0.001. This means they were more capable of connecting ideas and applying what they learned. In contrast, the control group had difficulty reaching these higher levels of thinking.

This result suggests that traditional teaching methods may not be enough to support deeper understanding and critical thinking. The structured questions used in the experimental group helped students follow a clear path from basic ideas to more complex thinking. This approach also better matched the goals of the lesson, the teaching strategies, and how students were assessed, as also shown in the study by Ghunaimat et al. (2024).

Implications of SOLO Taxonomy in Teaching Reading in Grade 7 Classroom

The results of this study show that using the SOLO Taxonomy helps students improve both their reading and thinking skills. Students who were taught using questions based on SOLO levels performed better, especially in tasks that required deeper thinking, making connections, and applying what they learned. The clear improvement in the experimental group shows that the SOLO approach helped guide students from simple understanding to more advanced thinking levels (Ghunaimat et al., 2024).

These results have several important implications for Grade 7 reading instruction:

Instruction Planning

The SOLO Taxonomy gives teachers a clear way to plan reading lessons. It helps organize questions—from basic recall to more complex reasoning so that learning can be built step by step. This makes it easier for teachers to match lessons to the students' current abilities and to gradually push them toward deeper understanding (Idek, 2020). Teachers can also use this approach to plan more focused and intentional lessons that develop students' thinking skills over time (Keskin et al., 2016).

Student Engagement and Assessment

Using SOLO-based questions encourages students to get more involved in lessons. In this study, students in the experimental group participated more actively and showed more confidence in answering reading questions. The SOLO Taxonomy also helps teachers assess not just whether students answered correctly, but how deeply they understood the content. Students can reflect on their thinking and track their own progress, which supports independent learning (Singapore Ministry of Education, 2023; Caridade & Pereira, 2024).

Curriculum Development

The SOLO Taxonomy supports the objectives of the MATATAG curriculum, which promotes mastery and critical thinking. With SOLO-based questioning, reading lessons can go beyond surface-level understanding and encourage students to use higher-order thinking skills. Curriculum developers can use SOLO levels to create reading tasks and lesson plans that help students grow from simple to complex ideas in a more organized and effective way (Ghunaimat et al., 2024; Shao et al., 2024).

Conclusions

Based on the findings, the following conclusions are drawn:

Students in the control group were proficient, while the students in the experimental group were less proficient in terms of reading comprehension before SOLO was implemented.

Pre-structural, Unistructural, Multistructural, Relational, and Extended Abstract were the levels used in the implementation of the SOLO Taxonomy in teaching reading.

The experimental group improved from "Less Proficient" to "Very Proficient" in reading comprehension. They scored "Highly Proficient" in pre-structural and unistructural levels, "Very Proficient" in multistructural, and "Proficient" in relational and extended abstract. In contrast, the control group maintained a general "Proficient" level, with higher scores in pre-structural ("Highly Proficient") and unistructural ("Very Proficient"), but only "Proficient" in multistructural and "Less Proficient" in relational and extended abstract levels.

The experimental group recorded a stronger statistical improvement, confirming the effectiveness of the SOLO Taxonomy.

The SOLO Taxonomy presents clear implications for instructional planning, student engagement and assessment, and curriculum

development.

In light of the findings and conclusions of the study, the following recommendations are given:

English Teachers. They are encouraged to integrate the SOLO Taxonomy into reading instruction to guide students from basic understanding to critical thinking. This involves designing tasks aligned with SOLO levels and using structured questions to deepen comprehension. Participation in professional development programs focused on higher-order thinking, scaffolding techniques, and formative assessment is also recommended to enhance instructional effectiveness.

School Administrators. They should support SOLO-based instruction by offering training, providing resources, and allowing time for collaborative planning. They are also encouraged to lead curriculum alignment efforts through workshops that promote SOLO Taxonomy strategies and ensure school goals focus on developing students' critical thinking and reading comprehension.

Curriculum Developers. They should integrate the SOLO Taxonomy into lesson exemplars, assessment tools, and reading modules for junior high school English. This ensures materials promote deeper understanding and support a learner-centered, outcomes-based curriculum.

Future Researchers. They are encouraged to apply the SOLO Taxonomy in other subjects like Araling Panlipunan, Science, and TLE, and across various grade levels. They may also conduct comparative studies and explore its long-term effects on student performance and independent learning.

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