
IMPLEMENTATION OF SOLO-HOTS APPROACH AMONG GRADE 10 STUDENTS: BASIS FOR ACTION PLAN

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Abstract

Philippines participated in the Program for International Student Assessment (PISA) in 2018, which evaluates the ability of 15-year-old learners to apply higher-order thinking skills (HOTS) in Reading, Mathematics, and Science to real-life situations. Out of 79 participating countries, the Philippines ranked last in Reading and second-to-last in both Mathematics and Science. These results indicate that many Filipino learners are not adequately prepared to face real-world challenges.

In response, the school conducted an assessment on the implementation of HOTS, focusing on Grade 10 students. The findings revealed that while students acknowledged being introduced to the SOLO-HOTS approach and recognized its role in enhancing their ability to analyze, evaluate, and create, many were still unfamiliar with the concept. They also agreed that teachers frequently apply the approach in classroom discussions and that it improves students' academic performance.

Teachers expressed strong familiarity with the SOLO-HOTS taxonomy. They reported having attended relevant trainings and consistently using the approach in lesson planning and instructional activities. Teachers also affirmed its effectiveness in developing students' critical and creative thinking skills. However, they only moderately agreed on its integration in assessments and discussions due to existing challenges. Among the major challenges identified were time constraints, limited student engagement in reading, insufficient resources, and gaps in teachers' assessment skills. Additional concerns included varied learning needs and classroom management. It was recommended that an action plan be developed, orientations conducted, and targeted programs implemented to strengthen both teacher capacity and student engagement in HOTS.

Keywords: *HOTS, SOLO Taxonomy, Assessment, Student Engagement*

INTRODUCTION

Learners of the 21st century are students growing up in an increasingly interconnected, technology-driven world. Their learning environment is shaped by rapid technological advancements and globalization, which, in reality, affect their way of thinking. The way they answer activities and solve problems determines their level of thinking.

The Philippines, for the first time in 2018, took part in the Programme for International Student Assessment (PISA). It is an assessment that measures 15-year-olds' ability to use their higher-order thinking skills (HOTS) in Reading, Mathematics and Science to meet real-life challenges. Among the 79 countries participating in PISA, the Philippines ranked last in Reading and second-to-last in Mathematics and Science. These results suggest that most Filipino students are not ready for life after school.

HOTS, or Higher Order Thinking Skills, together with creative and critical thinking skills, are expected skills that need to be developed among students.

The manner in which the implementation of these skills will determine learners' capability to deal with and face real-life scenarios.

With this, the school needs to assess the implementation of HOTS among students, specifically Grade 10. Moreover, it focuses on possible interventions for both teachers and students to develop learners' higher-order thinking skills. In the long run, this will help subsequent learners improve their academic performance.

Specifically, this study will serve as the basis for various projects and programs to develop higher-order thinking skills among grade 10 students.

Statement of the Problem

This study aimed to assess the implementation of SOLO-HOTS among Grade 10 of Ananias C. Hernandez Memorial National High School. Specifically, this study was guided by the following objectives:

1. Assess the level of awareness of students and teachers about the implementation of the SOLO-HOTS approach
2. Identify the primary challenges teachers face in implementing SOLO-HOTS in grade 10 classrooms
3. Propose a plan of action to address the challenges of teachers in the implementation of SOLO-HOTS

Scope and Delimitation

This study focuses on the implementation of SOLO-HOTS (Structure of Observed Learning Outcomes–Higher Order Thinking Skills) among Grade 10 students at Ananias C. Hernandez Memorial National High School. Specifically, it examines how SOLO-HOTS is integrated into classroom instruction and its influence on students' higher-order thinking skills.

The respondents of the study are limited to selected Grade 10 students enrolled during the School Year 2025–2026. The study covers selected subject areas where SOLO-HOTS is applied. It utilizes data gathered through survey questionnaires, classroom observations, and possibly assessment results to determine the extent of implementation and its perceived effectiveness.

However, this study is delimited in several ways. It does not include students from other grade levels, nor does it cover other schools outside Ananias C. Hernandez Memorial National High School. The research is also limited to the duration of data collection within the specified school year and does not attempt to measure long-term impacts of SOLO-HOTS implementation. Furthermore, external factors such as students' socioeconomic background, prior academic performance, and other teaching strategies not related to SOLO-HOTS are beyond the scope of this study.

Review of Related Literatures

Higher-Order Thinking Skills (HOTS) are essential in developing learners' ability to think critically, solve problems, and apply knowledge in real-life situations. Based on Bloom's Taxonomy, higher-order cognitive processes include analyzing, evaluating, and creating (Anderson & Krathwohl, 2001). These skills go beyond rote memorization and are necessary for meaningful learning.

Studies indicate that integrating HOTS in instruction improves students' academic achievement and engagement. According to Brookhart (2010), teaching for HOTS encourages learners to interpret, analyze, and synthesize information, which leads to deeper understanding. In the Philippine context, the Department of Education has emphasized the importance of HOTS to address students' low performance in international assessments such as PISA (Department of Education, 2016).

The Structure of Observed Learning Outcomes (SOLO) Taxonomy, developed by Biggs and Collis (1982), provides a model for assessing the quality of students' learning in terms of levels of understanding. The taxonomy includes five levels: pre-structural, uni-structural, multi-structural, relational, and extended abstract.

SOLO Taxonomy focuses on the depth and complexity of learning rather than the quantity of knowledge acquired. Biggs and Tang (2011) emphasized that SOLO is useful in designing learning outcomes, aligning teaching strategies, and developing assessment tasks. It allows teachers to evaluate how well students understand a concept and guides them toward higher levels of cognitive performance.

The integration of SOLO Taxonomy and HOTS provides a structured framework for developing students' higher-order thinking. SOLO supports the progression of learning from simple to complex understanding, aligning with HOTS goals. At the relational and extended abstract levels, learners demonstrate critical thinking by making connections, generalizing ideas, and applying knowledge to new contexts (Biggs & Tang, 2011).

Studies show that combining SOLO and HOTS enhances students' cognitive development. Hattie and Brown (2004) noted that the use of SOLO Taxonomy helps learners move toward deeper understanding and independent thinking. This integration also supports differentiated instruction, as teachers can design tasks that match students' levels of understanding.

The implementation of SOLO-HOTS in classroom instruction has been found to improve student engagement and learning outcomes. According to Biggs (1999), aligning teaching strategies with assessment using SOLO leads to constructive alignment, which enhances the overall learning process.

Furthermore, a study conducted by Hook and Mills (2011) demonstrated that SOLO-based teaching encourages active learning and reflection. Students become more involved in the learning process as they are guided to think critically and creatively. This results in better academic performance, especially in tasks that require analysis and evaluation.

Despite its benefits, implementing SOLO-HOTS presents several challenges. Teachers may lack adequate training and experience in applying SOLO Taxonomy effectively in instruction and assessment (Biggs & Tang, 2011). Time

constraints and large class sizes also hinder the consistent use of higher-order thinking strategies.

Additionally, students who are accustomed to traditional teaching methods may find it difficult to adapt to HOTS-based learning. According to Brookhart (2010), developing higher-order thinking requires continuous practice and support. Therefore, professional development for teachers and gradual integration of SOLO-HOTS are necessary for successful implementation.

The reviewed literature emphasizes the importance of Higher-Order Thinking Skills in improving students' learning outcomes and preparing them for real-life challenges. The SOLO Taxonomy serves as an effective framework for assessing and developing deeper understanding. The integration of SOLO and HOTS enhances students' ability to think critically and independently.

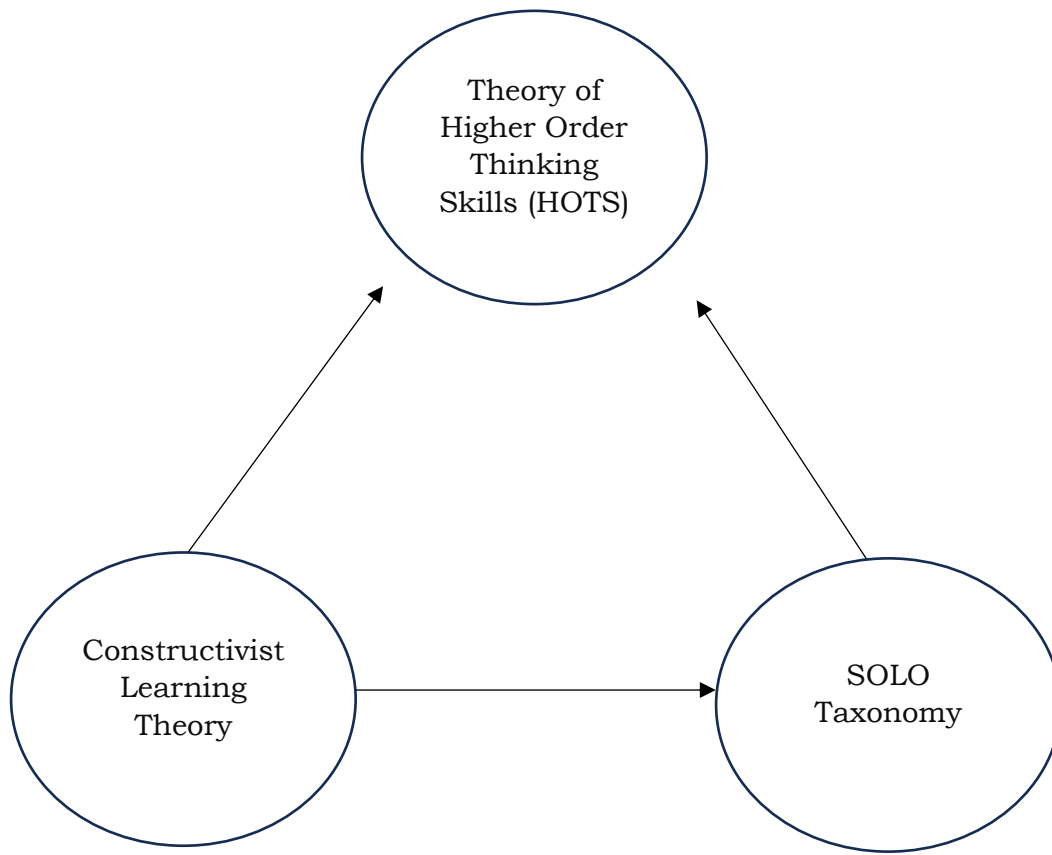
However, the successful implementation of SOLO-HOTS depends on teachers' competence, instructional design, and students' readiness. These findings highlight the need to examine how SOLO-HOTS is implemented in specific contexts, such as among Grade 10 students in Ananias C. Hernandez Memorial National High School.

Theoretical Framework

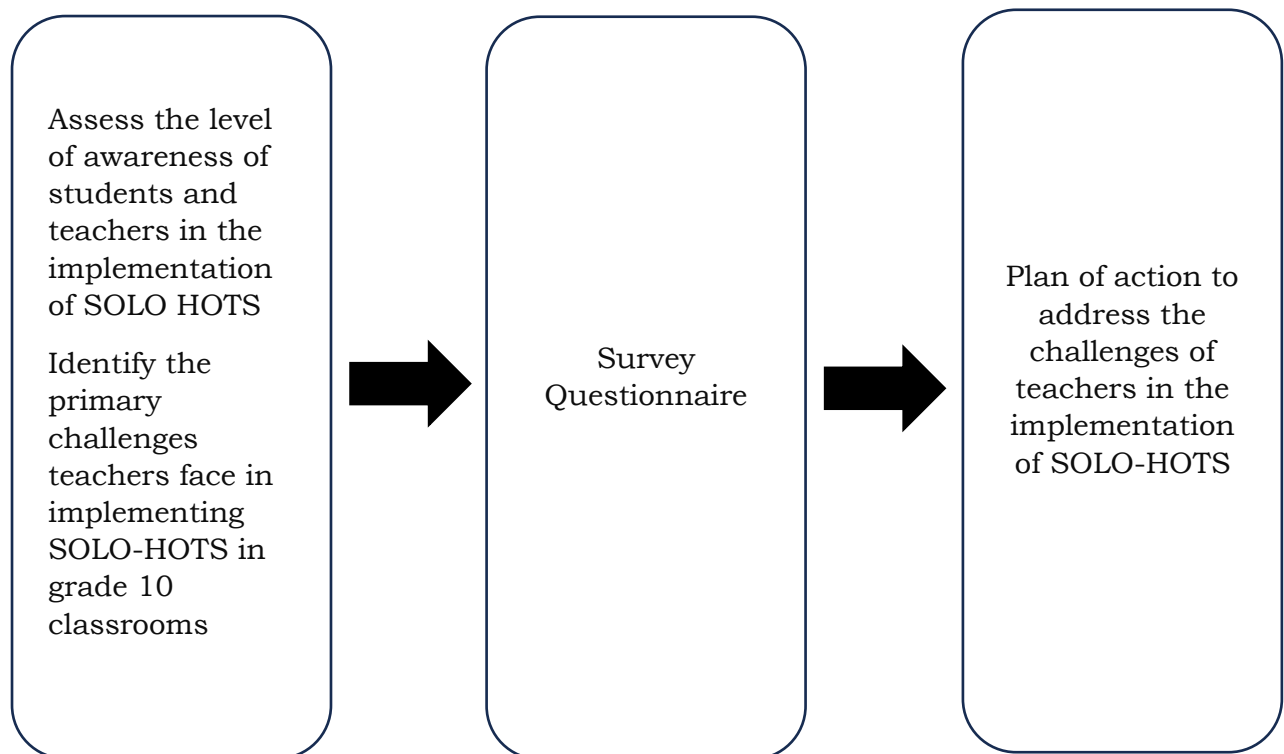
The study is grounded in the synergy between Constructivism, the SOLO Taxonomy, and the concept of Cognitive Rigor. Constructivist Learning Theory of Jean Piaget & Lev Vygotsky, which posits that learners do not passively absorb knowledge but actively construct it from prior experiences. In the context of Grade 10 students at Ananias C. Hernandez Memorial National High School, this theory suggests that implementation is not just about teaching facts but about providing a scaffold that helps students move from simple to complex understanding.

The SOLO Taxonomy of Biggs and Collis (1982) served as the primary lens for assessing the quality of student responses. Unlike Bloom's Taxonomy, which classifies the *task*, SOLO classifies the result of pre-structural, which the student misses the point. Unistructural/Multistructural (LOTS) where students focus on gathering one or many independent pieces of information. Relational/Extended Abstract (HOTS), which focuses on connecting pieces into a whole and generalizing to new contexts.

The Theory of Higher-Order Thinking Skills (HOTS) is derived from the top tiers of cognitive processing (analyzing, evaluating, and creating). By utilizing the SOLO levels as a pedagogical tool, Grade 10 students will transition from "surface learning" (Multistructural) to "deep learning" (Relational and Extended Abstract).



Conceptual Framework



METHODOLOGY

Research Design

The study used a descriptive research design within a quantitative research approach. Descriptive studies aim to identify what is present in the study using a survey questionnaire, which is frequently used to collect descriptive data (Borg & Gall, 1989). Under this design, the researcher derived data from survey responses.

Participants/Subject of the study

The study was conducted with 60 Grade 10 students who were randomly selected and 8 Grade 10 subject teachers.

Table 1
Respondents

Respondents	Number of Respondents
Student	
Brilliance	20
Knowledge	20
Wisdom	20
Teacher	8
Total	68

The main
used in

Questionnaire.
instrument
gathering data

was the researcher-made questionnaire, which consisted of two parts. Part I dealt with the respondents' assessment of their level of awareness on the implementation of HOTS both students and teachers. Followed by the part which determined the challenges met by the respondents.

Construction. The instrument was developed based on the study's objectives, and relevant literature related to the implementation of SOLO HOTS in the classroom.

Administration. The researcher sought permission to conduct the study by submitting a formal letter to the school principal. Once permission was granted, the researcher personally administered the questionnaire to students and teachers. The researcher informed the respondents that their information would be kept confidential.

Scoring of Responses. The questionnaire items were graded on a 4-point scale, with 1 representing the lowest score and 4 representing the highest. The following scale was used to assess the management capabilities and challenges encountered by the respondents:

Table 2. Scoring and interpretation

Response Scale	Mean Score	Interpretation
4	3.50-4.00	Strongly Agree
3	2.50-3.49	Agree
2	1.50-2.49	Disagree
1	1.00-1.49	Strongly Disagree

Study Limitations and Ethical Considerations

The study was limited to Grade 10 teachers and students only and focused on the aforementioned research statements as well as the responses of the participants to the prepared and administered questionnaire. Participants were fully informed of what will be asked of them, how the data will be used, and what are the consequences there could be. They were provided with clear, active, signed consent to participate in the research, which included an understanding of their rights to access their information and the option to withdraw at any time. They were also informed that their individual questionnaire responses would remain private and would solely be used for research purposes. All of their information was kept confidential throughout the entire research process. All of their information were kept confidential throughout the entire research process.

RESULTS and DISCUSSION

SOP 1. Assess the level of awareness of students and teachers about the implementation of SOLO-HOTS approach

Table 3
Students' Response

Item	Weighted Mean	Interpretation
1. I am familiar with the concept of SOLO Taxonomy and its different levels of understanding.	2.00	Disagree
2. The SOLO-HOTS approach has been introduced to me in my classroom activities.	2.33	Agree
3. I understand how SOLO-HOTS helps in developing my ability to analyze, evaluate, and create.	2.53	Agree
4. My teachers frequently use the SOLO-HOTS approach to structure classroom discussions.	2.54	Agree
5. The SOLO-HOTS framework helps me understand how to improve my academic performance.	2.58	Agree

It can be gleaned from the table that students agreed that this SOLO-HOTS approach helps them improve their academic performance. As assessed by student, teachers frequently used this approach in classroom which helps them develop their ability to analyze, evaluate and create. However, they responded with disagreement that they were familiar with the concept of this SOLO-HOTS taxonomy.

Students were not familiar about the implementation of SOLO-HOTS since they don't have any concept about the approach. Although this approach was agreed to be introduced in the classroom, but the depth understanding was not grasp by students.

Table 4
Teachers' Response

Item	Weighted Mean	Interpretation
1. I am aware of the SOLO-HOTS approach and its application in the classroom.	4	Strongly Agree
2. I have received training or professional development on the SOLO-HOTS framework.	3.75	Strongly Agree
3. I use the SOLO-HOTS taxonomy to design lesson plans and learning activities.	3.13	Strongly Agree
4. I integrate the SOLO-HOTS approach when assessing students' understanding and skills.	3.00	Agree
5. The SOLO-HOTS approach is effective in helping students develop critical and creative thinking abilities.	3.63	Strongly Agree

The table shows that teachers strongly agreed that they were aware about the SOLO-HOTS approach and its application in the classroom. They also received trainings or professional development through INSET about the SOLO-HOTS. Furthermore, they also strongly agreed that they used the framework in designing lesson plans and learning activities. With strong conviction, teachers were aware that this approach is effective in helping students develop critical and creative thinking abilities among grade 10 students.

However, in item no.4 about integrating the SOLO-HOTS when assessing students' understanding and skills, teacher just agreed. This response of teachers had underlying factors why they were not able to thoroughly integrate HOTS in the assessment part and even the discussion part during the daily class session.

SOP 2. Identify the primary challenges teachers face in implementing SOLO-HOTS in grade 10 classrooms

Table 5

Challenges of Teachers in implementing SOLO-HOTS

Item	Weighted Mean	Interpretation	Rank
Varied Learning Activities	2.88	Agree	5
Limited Resources	3.38	Strongly Agree	3
Time Constraints	3.50	Strongly Agree	1.5
Competency in Assessment Strategies	3.13	Strongly Agree	4
Professional Development	2.63	Agree	6
Student Engagement in Reading	3.50	Strongly Agree	1.5
Classroom Management	2.50	Agree	7

It can be denoted on the table that teachers have challenges in the implementation of SOLO-HOTS in the classroom. They strongly agreed that time constraints, students' engagement in reading, limited resources and their competency in assessment strategies challenged them to implement and use SOLO-HOTS in the classroom. On the other hand, teachers agreed that varied learning activities, professional development and classroom management were somehow factors also in the implementation of SOLO-HOTS.

SOLO-HOTS with its different level needs ample time to fully help students develop their creative and critical thinking skills. The time allotted in each subject is short with different parts in lesson plan that need to be executed hamper the objective of developing higher order thinking skills among learners.

Since SOLO-HOTS requires analysis through reading, the interest and engagement of students in analyzing the data given or the articles to be read should be given consideration for the success of this approach.

SOP 3. Plan of action can be taken to address the challenges of teachers in the implementation of SOLO-HOTS

Action Plan

Activity	Objective	Person's Involved	Time	Success Indicator
Introducing SOLO-HOTS to Grade 10 learners	To familiarize students in Grade 10 about SOLO-	Subject Teachers of Grade 10	October, 2025	100% of the students were fully aware about SOLO-HOTS

	HOTS Taxonomy			
Project HOTS (Higher and Open-ended Test items for Students' higher-order thinking skill)	To help teachers craft test items that will help students develop HOTS	Grade 10 teachers	October 2025 to March 2026	75% of the teachers develop SOLO-HOTS type of questions
Project Kay SCIE-yang Bumasa	To engage students in reading science texts, articles, and questions to develop HOTS.	Grade 10 science teachers YES-O officers Grade 10 and 9 students	October 2025 to March 2026	75% of the students will develop reading habit

Based on the results of the study, the researcher designed an action plan to address the challenges the teachers faced in the implementation of SOLO-HOTS and to help students be aware of the approach to help them develop their higher-order thinking skills.

Summary

The study aimed to assess the level of awareness of students and teachers in the implementation of SOLO HOTS in the classroom, with the ultimate goal of proposing a plan of action to address the challenges in the implementation of SOLO HOTS. Using a descriptive research design, data were gathered via a researcher-developed questionnaire. A total of 60 Grade 10 students, through random sampling, and 8 subject teachers participated in the study. Data were analyzed using statistical tools such as the weighted mean. Results revealed that students acknowledged being introduced to the SOLO-HOTS approach and recognized its role in enhancing their ability to analyze, evaluate, and create; however, many were still unfamiliar with the concept. They also agreed that teachers frequently apply the approach in classroom discussions and that it improves students' academic performance. Teachers expressed strong familiarity with the SOLO-HOTS taxonomy. They reported having attended relevant trainings and consistently using the approach in lesson planning and instructional activities. Teachers also affirmed its effectiveness in developing students' critical and creative thinking skills. However, they only moderately agreed on its integration in assessments and discussions due to existing challenges. Among the major challenges identified were time constraints, limited student engagement in reading, insufficient resources, and gaps in teachers' assessment skills. Additional concerns included varied learning needs and classroom management. An action plan was designed to conduct orientations and implement targeted programs to strengthen both teacher capacity and student engagement in HOTS.

Conclusions

From the results of the study and thorough discussions and interpretations, it can be concluded that students disagreed that they were familiar with the SOLO-HOTS approach in the classroom although they agreed that it has been introduced in the classroom, helps in developing their ability to analyze, evaluate, and create, their teachers frequently use the approach in classroom discussions and helps them understand how to improve their academic performance. Teachers strongly agreed that they were familiar with the SOLO-HOTS taxonomy, had received training and professional development, used the taxonomy to design lesson plans and learning activities, and that it was effective in helping students develop critical and creative thinking abilities. However, the integration of SOLO-HOTS into assessment and discussion was only agreed upon by them due to some challenges. Time constraints and students' engagement in reading were the most strongly agreed-upon challenges that teachers faced in implementing SOLO-HOTS in the classroom, along with limited resources and teachers' competence in assessment strategies. Other challenges, such as varied learning activities, professional development, and classroom management, were agreed upon by teachers.

Recommendations

Based on the conclusions, the researcher recommends designing an action plan to address the challenges teachers face in fully implementing the SOLO-HOTS approach among grade 10 students. There should be an orientation and introduction of SOLO-HOTS in the classroom so that students are familiar with and aware of this concept. There should also be programs, projects, and activities to help teachers develop test items that will develop HOTS among students, even though there is limited time, and to help students engage in reading to develop comprehension and analysis.

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