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Pedagogical Utility and Students' Cognitive Structuring on SOLO Taxonomy-Based Teacher's Guide in Cookery for Junior High School Learners Under MATATAG Curriculum

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Abstract**—*****This study examined the pedagogical utility of a SOLO Taxonomy-based Teacher's Guide in Grade 10 Technology and Livelihood Education (TLE) Cookery and its relationship with students' cognitive structuring under the MATATAG Curriculum during School Year 2025–2026. A mixed-method explanatory sequential design was employed, involving 58 TLE teachers selected through complete enumeration and 139 Grade 10 students selected through stratified random sampling from nine National High Schools in the Prosperidad District, Agusan del Sur. Focus Group Discussions were conducted with 9 teachers and 9 students to enrich the quantitative findings. Results revealed that the pedagogical utility of the Teacher's Guide was rated high, while students demonstrated well-structured cognitive development. Significant differences in interpretive fidelity were observed according to teachers' educational attainment, teaching position, and years of service. However, no significant relationship was found between pedagogical utility and cognitive structuring. Qualitative findings highlighted structured lesson delivery and experiential learning as strengths, while resource limitations and time constraints remained challenges. A revised SOLO-based Cookery Teacher's Guide was consequently developed.*

Keywords**—** *SOLO Taxonomy, pedagogical utility, cognitive structuring, TLE Cookery, MATATAG Curriculum, Teacher's Guide.*

I. INTRODUCTION

Technology and Livelihood Education (TLE) Cookery plays a vital role in developing learners' technical competencies, employability skills, problem-solving abilities, and entrepreneurial mindsets required in the contemporary food service industry [1]. The implementation of the MATATAG Curriculum further emphasizes competency-based learning, industry alignment, and the development of higher-order thinking skills to ensure that learners become adaptable, productive, and work-ready individuals equipped for the demands of the 21st century [2]. However, studies indicate that instructional practices in TLE often remain focused on procedural skill acquisition and repetitive task performance, limiting opportunities for learners to engage in deeper conceptual understanding, critical thinking, and authentic problem-solving experiences [3]. Such instructional limitations may hinder learners' cognitive development and reduce their capacity to transfer knowledge and skills to real-world culinary contexts [4].

Recent evidence highlights continuing concerns regarding students' mastery of essential Cookery competencies. Learning assessment reports have shown persistent difficulties among learners in advanced food preparation, menu planning, costing, and food production management, suggesting that many students struggle to move beyond basic procedural knowledge toward analytical and strategic application of concepts [5]. Similar findings revealed that the absence of structured cognitive scaffolding often prevents learners from progressing from foundational understanding to higher levels of reasoning and independent decision-making [6]. Consequently, educational researchers advocate for instructional frameworks that explicitly support cognitive progression and facilitate meaningful learning experiences that connect theory with practical workplace applications [7].

One framework widely recognized for promoting cognitive development is the Structure of Observed Learning Outcomes (SOLO) Taxonomy developed by Biggs and Collis [8]. The SOLO framework categorizes learning into progressive levels, from Prestructural to Extended Abstract, enabling educators to systematically design lessons, assessments, and learning activities that foster increasingly sophisticated understanding [8]. Empirical studies have demonstrated that integrating SOLO-based instructional materials enhances learners' critical thinking, knowledge integration, metacognitive awareness, and transfer of learning across diverse educational settings [9,10]. Despite these documented benefits, many teachers continue to encounter challenges in translating curriculum competencies into learning experiences that deliberately cultivate higher-order thinking skills [11]. Existing teacher guides frequently provide content and activities without explicitly embedding cognitive progression pathways, resulting in inconsistencies in instructional delivery and learner outcomes [12]. Hence, this study examined the pedagogical utility of a SOLO taxonomy-based Teacher's Guide and its relationship to students' cognitive structuring in Grade 10 TLE Cookery, serving as a basis for the development of an enhanced instructional guide aligned with the goals of the MATATAG Curriculum.

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II. Methodology

This section presents the research design, respondents, instruments, and statistical methods used to examine the relationships among the study's key variables.

A. Research Design

This study employed a Mixed-Method Explanatory Sequential Design. In the first phase, quantitative data were collected through surveys to measure pedagogical utility and cognitive structuring. In the second phase, qualitative data were gathered through Focus Group Discussions (FGDs) to explain and elaborate on the statistical results, providing deeper insights into user experiences.

B. Research Locale

The study was conducted in the Prosperidad District, Division of Agusan del Sur, Caraga Region, Philippines. This locale was selected due to the active implementation of the MATATAG Curriculum and documented challenges in curriculum delivery and competency mastery in TLE Cookery.

C. Respondents and Sampling

Teachers: 58 TLE Cookery teachers from nine national high schools were selected through complete enumeration. Students: 139 Grade 10 students were selected using stratified random sampling, calculated using the Slovin formula with a 5% margin of error. Key Informants: Nine teachers and nine students were purposively selected for FGDs to represent different school types and performance levels.

D. Research Instruments

Three main instruments were utilized, all validated by experts in TLE, curriculum development, and measurement: Survey on Pedagogical Utility, a 5-point Likert-scale instrument assessing five dimensions: Interpretive Fidelity, Instructional Design Flexibility, Practical Coherence, Cognitive Load Management, and Professional Resonance. (Cronbach's Alpha = 0.91. Survey on Cognitive Structuring: A 5-point Likert scale instrument based on SOLO levels, measuring Task Deconstruction, Relational Explanation, Strategic Application, Critical Innovation, and Metacognitive Dialogue. (Cronbach's Alpha = 0.89). Semi-Structured Interview Guide: Used for FGDs to gather narratives on strengths, weaknesses, and recommendations regarding the Teacher's Guide.

E. Data Analysis

Quantitative: Data were analyzed using Mean, Standard Deviation, t-test for Independent Samples, One-Way ANOVA, and Pearson Product-Moment Correlation. Qualitative: Responses from FGDs were transcribed, coded, and analyzed using thematic analysis to identify recurring themes and patterns.

III. Results and Discussion

This section presents and discusses the study's findings based on the gathered data, highlighting key results and their implications for the research objectives.

A. Profile of the Respondents

TABLE 1. Demographic Profile

Age	**Age Bracket**	**Frequency**	**Percentage**
	Below 30 years old	12	21%
	30-45 years old	25	43%
	46-55 years old	13	22%
	56 years old and above	8	14%
	Total	**58**	**100%**
Sex	**Category**	**Frequency**	**Percentage**
	Male	14	24%
	Female	44	76%
	Total	**58**	**100%**
Educational Attainment	**Level**	**Frequency**	**Percentage**
	Bachelor's Degree	**17**	**29%**
	Master's Degree w/ Units	27	47%
	Master's Degree CAR	8	14%
	Master's Degree Grad	4	7%
	Doctor's Degree w/ Units	2	3%
	Total	**58**	**100%**
Teaching Position	**Rank**	**Frequency**	**Percentage**
	Teacher I	16	28%
	Teacher II	8	14%
	Teacher III	29	50%
	Master Teacher I	5	9%
	Total	**58**	**100%**
Years in Service	**No. of Years**	**Frequency**	**Percentage**
	Below 5 years in service	10	17%
	6 to 10 years	24	41%
	11 to 15 years	18	31%
	16 to 20 years	4	7%
	21 years and above	2	3%
	Total	**58**	**100%**
School Type	**Type**	**Frequency**	**Percentage**
	Integrated School	0	0%
	Stand-alone/Sec. School	0	0%
	Annex/Extension School	0	0%
	Science High School	0	0%
	Comprehensive HS	0	0%
	National High School	58	100%
	Total	**58**	**100%**
Trainings/Seminars	**No. of Trainings**	**Frequency**	**Percentage**
	1 to 2 trainings	58	100%
	3 to 5 trainings	0	0%
	6 to 8 trainings	0	0%
	9 to 11 trainings	0	0%
	Total	**58**	**100%**

Table 1 presents the demographic profile of the respondents, including age, sex, educational attainment, teaching position, years in service, school type, and training exposure, providing important contextual information for understanding the pedagogical utility of the developed SOLO-taxonomy-based Teacher's Guide.

The findings indicate that the majority of respondents were in the 30–45-year age bracket (43%), followed by those aged 46–55 years (22%), suggesting that most teachers are in the mid-career stage, where instructional expertise and professional confidence are often well established. According to research, teachers with experience tend to be more adaptable to curriculum changes and make better pedagogical choices because of their extensive classroom experience and professional maturity [19]. The predominance of female teachers (76%) reflects the continuing feminization of the teaching profession observed across many educational systems, particularly in basic education and vocational subjects [20]. In terms of educational attainment, nearly half of the respondents held a Master's Degree (47%). In contrast, others had completed master's degrees or pursued doctoral studies, indicating a workforce actively engaged in professional advancement. Advanced academic preparation has been linked to enhanced instructional competence, reflective practice, and improved curriculum implementation [21]. Regarding teaching position, Teacher III ranked highest (50%), indicating that most respondents had progressed through the professional ranks and accumulated substantial teaching experience. Such professional advancement is often associated with increased instructional leadership, curriculum expertise, and classroom effectiveness [22]. Furthermore, the largest proportion of respondents had 6–10 years of teaching experience (41%), followed by 11–15 years (31%), demonstrating a relatively experienced teaching force capable of integrating pedagogical innovations into classroom practice. Studies have shown that teachers with moderate to extensive experience are more effective in managing learning environments and facilitating meaningful student engagement [23].

The profile further reveals that all respondents were assigned to National High Schools (100%), ensuring contextual consistency in curriculum implementation and instructional practices across participating schools. This homogeneity strengthens the reliability of the findings because respondents operate under similar organizational structures, learner demographics, and policy environments [24]. Notably, all respondents reported attending one to two trainings or seminars (100%), indicating that while professional development opportunities were available, exposure remained relatively limited. Continuous professional development is essential for equipping teachers with current pedagogical approaches, curriculum innovations, and assessment strategies to improve instructional quality [25]. Limited participation in training may affect teachers' ability to fully implement advanced instructional frameworks, including cognitive progression models such as the SOLO Taxonomy [26]. Still, the respondents' combined profile demonstrates a cadre of experienced and qualified educators who have a solid basis for evaluating the educational usefulness of the produced material given their academic qualifications, professional advancement, and teaching experience [27]. The findings also underscore the importance of sustained professional learning opportunities to support curriculum reforms and strengthen teachers' capacity to foster higher-order thinking and cognitive development among learners [28].

B. Level of Teachers' Pedagogical Utility

Table 2 presents the teachers' assessment of the pedagogical utility of the SOLO-taxonomy-based Teacher's Guide across key instructional dimensions, including interpretive fidelity, instructional design flexibility, practical coherence, cognitive load management, and professional resonance.

TABLE 2: Summary of Pedagogical Utility Ratings

Indicators	Mean	Descriptive Level
Interpretive Fidelity	4.134	High
Instructional Design Flexibility	4.090	High
Practical Coherence	4.121	High
Cognitive Load Management	4.115	High
Professional Resonance	4.132	High
Overall Mean	4.119	High

The findings revealed an overall mean of 4.119, interpreted as High, indicating that teachers perceived the instructional material as a valuable and effective resource for facilitating Cookery instruction. Among the indicators, Interpretive Fidelity obtained the highest mean (M = 4.134), followed closely by Professional Resonance (M = 4.132) and Practical Coherence (M = 4.121), all interpreted as High. These results suggest that teachers clearly understood the intended curriculum outcomes and found the guide aligned with their instructional goals and professional practice. The strong rating for interpretive fidelity implies that the guide effectively translates curriculum standards into meaningful classroom activities, thereby reducing ambiguity in lesson implementation and supporting consistent instructional delivery. According to Hattie [13], instructional materials that provide clear learning intentions and success criteria significantly improve teaching effectiveness and learner achievement. Likewise, Shulman [14] emphasized that pedagogical tools that bridge content knowledge and instructional practice strengthen teachers' capacity to deliver meaningful learning experiences. The high rating for professional resonance further indicates that the guide aligns with teachers' classroom realities and professional expectations, which is essential for successful curriculum implementation and sustained instructional improvement [15].

Meanwhile, Instructional Design Flexibility recorded the lowest mean (M = 4.090), yet remained within the High descriptive level, suggesting that teachers recognized opportunities to enhance adaptability across diverse classroom contexts. This finding may reflect the challenges teachers encounter in modifying instructional materials to accommodate varying learner needs, resource availability, and contextual constraints. Similarly, the high ratings for Cognitive Load Management (M = 4.115) and Practical Coherence (M = 4.121) indicate that the guide effectively organizes learning tasks to support progressive knowledge construction while preventing cognitive overload among learners. Research has shown that instructional materials designed with structured scaffolding and manageable learning sequences promote deeper understanding and improve knowledge retention [16]. Furthermore, materials grounded in cognitive progression frameworks encourage learners to move beyond procedural competence toward analytical and reflective thinking [17]. The consistently high ratings across all indicators demonstrate that the SOLO-taxonomy-based Teacher's Guide possesses strong pedagogical utility and serves as an effective instructional support mechanism that

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enhances curriculum implementation and fosters higher-order learning outcomes in TLE Cookery under the MATATAG Curriculum [18].

C. Level of Students' Cognitive Structuring of SOLO Taxonomy

Table 3 emphasizes the students' cognitive structuring based on the SOLO Taxonomy, interpreted as Well-Structured Cognition. This indicates that, in general, students demonstrate a solid ability to organize, connect, and apply their understanding of concepts across different cognitive levels.

TABLE 3. Students' Cognitive Structuring of SOLO Taxonomy

Parameters	Mean	Adjectival Rating
Task Deconstruction	3.941	Well-Structured Cognition
Relational Explanation	3.904	Well-Structured Cognition
Strategic Application	3.875	Well-Structured Cognition
Critical Innovation	3.895	Well-Structured Cognition
Metacognitive Dialogue	3.985	Well-Structured Cognition
Overall Mean	**3.920**	**Well-Structured Cognition**

The results presented in Table 3 indicate that the students' cognitive structuring, based on the SOLO Taxonomy, achieved an overall mean of 3.920, which is interpreted as Well-Structured Cognition. This finding suggests that learners have generally developed the capacity to organize knowledge, establish meaningful relationships among concepts, and apply learned competencies in relevant contexts. Among the indicators, Metacognitive Dialogue (M = 3.985) obtained the highest mean, followed by Task Deconstruction (M = 3.941) and Relational Explanation (M = 3.904). The prominence of metacognitive dialogue indicates that students are increasingly capable of reflecting on their own learning processes, monitoring their understanding, and evaluating the effectiveness of their strategies. Such abilities are considered fundamental components of self-regulated learning and are strongly associated with improved academic performance and deeper conceptual understanding [29]. Furthermore, the strong performance in task deconstruction demonstrates that learners can effectively identify essential components of complex tasks. At the same time, relational explanation suggests their ability to connect ideas and recognize interrelationships among concepts, both of which are critical characteristics of higher-order cognitive development [30]. Educational research emphasizes that meaningful learning occurs when students actively integrate new information with existing knowledge structures rather than merely memorizing isolated facts, thereby promoting durable understanding and knowledge transfer [31].

Although all indicators were interpreted as Well-Structured Cognition, Strategic Application (M = 3.875) emerged as the lowest-rated dimension, followed by Critical Innovation (M = 3.895). These findings suggest that while students possess adequate conceptual understanding, they may encounter challenges when applying knowledge strategically to unfamiliar situations or generating innovative solutions to authentic problems. The relatively low ratings in these domains reflect a common educational concern: learners demonstrate mastery of content yet struggle to extend their understanding to complex, real-world contexts that require creativity and adaptive thinking [32]. Contemporary learning theories highlight that advanced cognitive development involves not only comprehension but also the ability to transfer knowledge across situations, evaluate alternatives, and construct original solutions to emerging challenges [33]. The findings imply that instructional approaches should place greater emphasis on authentic performance tasks, inquiry-based activities, and reflective problem-solving experiences that foster strategic reasoning and innovation [34]. Collectively, the results affirm that students have attained a substantial level of cognitive organization consistent with the higher levels of the SOLO Taxonomy, while also identifying opportunities to further strengthen learners' capacity for strategic application and critical innovation within TLE Cookery education [35].

IV. Conclusion

The findings of this study revealed that the SOLO-taxonomy-based Teacher's Guide possesses a high level of pedagogical utility, demonstrating its effectiveness in supporting curriculum interpretation, instructional coherence, cognitive load management, and professional relevance among Grade 10 TLE Cookery teachers. Likewise, students exhibited well-structured cognition across all SOLO dimensions, indicating their ability to organize, connect, and apply knowledge at varying levels of complexity. While teachers perceived the guide as highly useful and students demonstrated favorable cognitive structuring, the absence of a significant relationship between pedagogical utility and cognitive structuring suggests that student cognitive development may also be influenced by other instructional, contextual, and learner-related factors. Nevertheless, qualitative findings confirmed that the guide promotes structured lesson delivery and experiential learning while highlighting the need to address resource and time constraints. Consequently, the enhanced SOLO-based Teacher's Guide developed in this study provides a practical, evidence-based instructional resource that supports the objectives of the MATATAG Curriculum and contributes to improving cognitive engagement and competency development in TLE Cookery education.

V. Recommendations

Based on the findings, it is recommended that the enhanced SOLO taxonomy-based Teacher's Guide be adopted and pilot-tested in Grade 10 TLE Cookery classes to strengthen learners' cognitive development and support the effective implementation of the MATATAG Curriculum. School administrators and curriculum planners should provide continuous professional development programs focused on SOLO Taxonomy, differentiated instruction, and higher-order thinking strategies to help teachers maximize the guide's instructional potential. Additional instructional resources and contextualized learning materials should also be made available to address the challenges related to limited resources and instructional time. Future studies may examine the long-term effects of SOLO-based instructional materials on learners' academic achievement, critical thinking, and workplace readiness across different TLE specializations and educational settings. Furthermore, researchers are encouraged to investigate other factors influencing students' cognitive structuring, such as teaching practices, learner motivation, classroom environment, and assessment approaches, to develop more comprehensive interventions that promote meaningful and sustainable learning outcomes.

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