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| RESEARCH ARTICLE

Managing Cognitive Load in Task-Based Learning: Effects on Language Retention among 4th Year BSEd English Students at Bulacan State University - Sarmiento Campus

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| ABSTRACT
Task-Based Learning (TBL) has emerged as a highly effective pedagogical approach in language education, promoting authentic learning experiences through meaningful tasks. However, its complexity can impose substantial cognitive demands, potentially hindering language retention if cognitive load is not effectively managed. Cognitive load management strategies, such as task segmentation, scaffolding, and cognitive pauses, are designed to optimize learners' mental resources and enhance retention. This study investigated how managing cognitive load within TBL impacts language retention among 4th-year BSEd English students at Bulacan State University – Sarmiento Campus. The study adopted an Explanatory Sequential Mixed Methods Design. In the quantitative phase, data were collected from 40 purposely selected students using Likert-scale survey questionnaires measuring perceived cognitive load, effectiveness of cognitive load management strategies, and language retention outcomes. Descriptive statistics (frequency, mean, standard deviation) and Spearman Rank-Order Correlation were applied to analyze the data. The qualitative phase involved collecting open-ended responses, which were examined using Collaizi's Thematic Analysis with descriptive coding to identify patterns in student experiences. Findings revealed that 57.5% of students experienced high intrinsic cognitive load due to conceptually difficult tasks and complex sentence structures, while 50% struggled with grammar and vocabulary. Extraneous load was primarily linked to unclear instructions (47.5%) and disorganized materials (40%). Despite these challenges, 67.5% connected tasks to prior learning, and 62.5% actively applied retention strategies, indicating strong germane cognitive load. Scaffolding emerged as the most effective strategy (45%), followed by task segmentation (35%) and cognitive pauses (20%). Correlation analysis showed a strong positive relationship between effective cognitive load management and improved language retention. Qualitative findings highlighted themes of instructional clarity, real-life relevance of tasks, and the positive role of structured pacing in reducing overload. The study concludes that managing cognitive load in TBL significantly enhances language retention by balancing task complexity with strategic instructional support. Scaffolding and task segmentation were particularly effective in reducing intrinsic load, while cognitive pauses facilitated reflection and consolidation. These findings underscore the importance of intentional cognitive load management in designing language learning tasks, providing valuable implications for instructional strategy and curriculum development in higher education language programs.

| KEYWORDS

Task-based learning, cognitive load, language retention

| ARTICLE INFORMATION

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1. Introduction

Language acquisition is a complex cognitive process that requires effective instructional strategies to optimize learning and retention (Tiya Anisyah Firdaus, 2024). In recent years, Task-Based Learning (TBL) has emerged as a dynamic approach in language education, focusing on engaging students in meaningful tasks rather than traditional rote memorization (Olusegun, 2024).

While TBL promotes active learning, it also presents challenges, particularly in managing cognitive load, which can impact students' ability to process and retain language effectively (Darby et al., 2023). Cognitive Load Theory (CLT) posits that learners have a limited

capacity for processing new information, and excessive cognitive demands may hinder comprehension and retention (Williams, 2022). To mitigate this, educators have explored strategies such as task segmentation, scaffolding, and cognitive pauses to balance cognitive load and optimize learning outcomes (Liu, 2024). Understanding how these strategies function within the TBL framework is crucial in enhancing language instruction, particularly for students engaged in intensive language education programs (Burgess et al., 2020).

This study aimed to examine the relationship between Task-Based Learning and cognitive load management among 4th-year Language Education students at Bulacan State University – Sarmiento Campus. Specifically, it seeks to identify how TBL influences cognitive load, determine which strategies effectively manage it, and analyze its impact on language retention. By investigating these factors, the research intends to contribute valuable insights into improving language education methodologies.
The findings of this study have significant implications for curriculum development and pedagogical strategies in language instruction. By understanding the role of cognitive load in TBL, educators can refine their teaching approaches to enhance language retention and overall student performance. Ultimately, this research aims to bridge the gap between cognitive psychology and language pedagogy, offering practical solutions for more effective and engaging language learning experiences.

1.1 Research Questions

The General Problem of the Study is: How can cognitive load be effectively managed in task-based learning to optimize language retention among 4th-year language education students at Bulacan State University Sarmiento Campus?

Specifically, the study sought answers to the following questions:

1. How does task-based learning (TBL) influence the cognitive load of 4th-year language education students during language learning?
2. What strategies among the following (task segmentation, scaffolding, cognitive pauses) (Choi et al., 2021, Spanjers et.al, 2024) effectively manage cognitive load in Task-Based Learning?
3. How does managing cognitive load in Task-Based Learning affect students' language retention and overall learning outcomes?
4. What is the correlation between cognitive load and language retention in students engaged in task-based learning?
5. What are the implications of task-based learning (TBL) on suggested teaching strategies towards curriculum development for language instruction?

2. Literature Review

Task-Based Learning (TBL) has gained prominence in language education for its emphasis on authentic, communicative tasks that mirror real-world scenarios. Scholars such as Olusegun (2024) and Arturo & Santiago (2023) highlight its effectiveness in enhancing vocabulary retention, speaking fluency, and learner autonomy. Unlike traditional methods that rely on rote memorization, TBL encourages learners to engage with language meaningfully, fostering deeper cognitive and linguistic connections. However, the complexity of TBL tasks—often requiring simultaneous processing of instructions, linguistic input, and contextual meaning—can impose significant cognitive demands, especially when not properly scaffolded.

Cognitive Load Theory (Sweller, 1988) provides a framework for understanding these demands by categorizing mental effort into intrinsic, extraneous, and germane cognitive load. Intrinsic load stems from the inherent complexity of the material, while extraneous load arises from poor instructional design, and germane load reflects the effort invested in meaningful learning and schema construction. In TBL contexts, managing these loads is critical. Studies by Van Merriënboer & Sweller (2005) and Kalyuga (2007) emphasize that strategies such as scaffolding, task segmentation, and cognitive pauses can significantly reduce unnecessary strain and enhance learning outcomes. These strategies allow learners to process information more efficiently, build competence gradually, and reflect meaningfully on their learning experiences.

Further literature supports the integration of schema theory and metacognitive strategies into instructional design. Chi (2006) and Veenman (2011) argue that learners retain information more effectively when tasks connect to prior knowledge and when they actively monitor and regulate their understanding. Mayer (2009) and Moreno & Mayer (2007) also advocate for multimedia integration and spaced learning to optimize cognitive processing. Overall, the reviewed studies converge on the idea that effective cognitive load management within TBL not only improves comprehension and retention but also empowers learners to engage more deeply with language tasks, making instruction both cognitively sound and pedagogically impactful.

3. Materials and Methods

The researcher utilized an Explanatory Sequential Mixed Methods Design to examine the relationship between Task-Based Learning (TBL), cognitive load management strategies, and language retention. In the first phase, quantitative data was collected using

Likert-scale survey questionnaires to measure students' perceptions of cognitive load, the effectiveness of TBL strategies (such as task segmentation, scaffolding, and cognitive pauses), and their language retention outcomes. Descriptive statistics and Spearman Rank-Order Correlation was used to analyze this data.

In the second phase, qualitative data were gathered through open-ended responses to explore students' learning experiences in greater depth. Thematic analysis using Collaizi's method and descriptive coding were employed to identify recurring patterns and insights, particularly concerning the impact of TBL on cognitive processing and retention. This mixed methods approach allows for a deeper understanding of how students experience TBL and how these experiences relate to cognitive load and language retention. Participants included 4th-year BSEd English students at Bulacan State University – Sarmiento Campus, selected through purposive sampling to ensure that respondents have prior engagement with task-based language learning activities.

To effectively gather data for this study, a combination of qualitative and quantitative research instruments were utilized. A survey questionnaire will be administered to measure cognitive load, assess the effectiveness of cognitive load management strategies, and determine the correlation between cognitive load and language retention (Krieglstein et al., 2023). The questionnaire included a Cognitive Load Scale, such as Paas' Cognitive Load Measurement Scale, along with Likert-scale questions to gauge students' perceived mental effort during task- based learning (TBL) activities (Schneider & Léger, 2020).

To complement the quantitative data, structured interviews were conducted with students and educators to gain deeper insights into their experiences with TBL and cognitive load management (Darby et al., 2023). These interviews followed a semi-structured format, allowing respondents to elaborate on their perspectives while maintaining a structured flow of discussion. The researcher explored shared experiences and challenges in managing cognitive load during TBL.

Also, classroom observations were also carried out to assess real-time cognitive load and the effectiveness of TBL strategies in practice. An observation checklist will be used to document student engagement, signs of cognitive overload (such as frustration or disengagement), and the application of strategies like scaffolding and task segmentation by instructors.

3.1 Data Analysis

The statistical treatment of the data in this study employed both quantitative and qualitative methods to analyze the perceived impact of Task-Based Learning (TBL) with cognitive load management strategies on language retention. The analysis aimed to summarize students' perceptions, explore relationships between variables, and derive meaningful insights from their experiences. In order to quantitatively analyze the cognitive load, strategies, and language retention of 4th year language students, the researcher utilized descriptive statistics including frequency, mean, and standard deviation. Descriptive statistics were utilized.

These include:

1. Frequency – to identify how often each response category occurs;
2. Mean – to measure the central tendency of the responses;
3. Standard Deviation – to determine the variability or dispersion of the scores;

These statistical tools will provide an overview of the learners' perceptions and language retention levels before and after the intervention. Also, Spearman Rank-Order Correlation Coefficient (Spearman's Rho) will be used to determine the relationship between cognitive load and language retention (Laerd Statistics, 2018). This nonparametric test is appropriate for ordinal data derived from Likert scales and is used to determine the strength and direction of the monotonic relationship between two ranked variables.

Formula for Spearman's Rho:

Where:

ρ is Spearman's rank correlation coefficient
d is the difference between the paired ranks
n is the number of paired ranks

For the qualitative component of the study, Collaizi's Method of Thematic Analysis will be employed to analyze participants' open-ended responses (Praveena & Sasikumar, 2021).

A deductive coding approach using descriptive coding will be utilized to categorize and summarize the essence of the students' responses based on pre-established themes related to Task-Based Learning and cognitive load management (Delve, 2022).

This method will allow the researcher to draw meaningful insights from students' experiences, providing deeper contextual understanding that complements the quantitative findings and informs recommendations for instructional practices and curriculum development.

3.2 Ethical Consideration

This study adhere to the ethical guidelines and academic integrity for educational research. The researchers submitted the required documents to seek approval from the Ethics Review Committee in Bulacan State University in Malolos to peer review the researchers' observation checklist, survey instruments, and semi-structured interview guide questions, as well as the informed consents, before they can be distributed to the target participants of the study.

All the qualitative and quantitative data that will be gathered in this study will be handled with strict confidentiality and will be used solely for the purpose of academic research. Personal identities, including the sensitive information of the respondents, will not be disclosed and linked to the individual report and overall findings of the study. The data of the participants will remain anonymous to protect their right to privacy as stated in the Data Privacy Act of 2012.
By adhering to the highest ethical standards of academic research, the researchers uphold research integrity, protecting the rights, promoting a conducive and comfortable environment for the research participants throughout the implementation phase of the intervention program.

The study also followed proper protocol, referring to Republic Act No. 10173, and informs the participants that by signing the informed consent, they grant their permission to voluntarily participate in the study. It is to emphasize that the participants willingly participate in the study without offering bribes or coercion.

The research participants will also be given a copy of the interview guide questions before the actual recorded interview to assess whether they feel comfortable answering the given questions. Participants may choose not to answer all the interview questions, and if they decide to withdraw from the study, they may do so at any time without facing any personal or legal consequences. The researcher declares no conflicts of interest and confirms that the study was conducted independently, without external funding or sponsorship that could influence the outcomes or interpretations.

4. Results and Discussion

This section covers an in-depth discussion of the data presented. This part sought to answer the research questions which were previously stated as follows (1) Influence of Task-based learning on the cognitive load (2) Using Teaching Strategies (a) task segmentation (b) scaffolding (c) cognitive pauses for Cognitive Load Management (3) Effect of Cognitive Management in Language Retention and Over-all Learning Outcomes (4) Correlation between Cognitive Load and Language Retention (5) Implications of Using TBL Strategies towards Curriculum Development for Language Instruction.

Influence of Task-based Learning on the Cognitive Load
Table 1.

Intrinsic Cognitive Load of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	The language tasks assigned were inherently difficult to understand.	1	23	14	2	2.58	0.64	A
2	I found the grammar and vocabulary content challenging, even with effort.	1	20	15	4	2.45	0.71	D
3	The language learning tasks required me to think hard to make sense of them.	14	17	7	2	3.08	0.86	A
4	Understanding the instructions of the task was mentally demanding.	3	23	13	1	2.70	0.65	A
5	I struggled to grasp the lesson content regardless of the task format.	10	20	9	1	2.98	0.77	A
					Overall	**2.76**	**0.46**	**A**

Analysis of the table revealed that the overall intrinsic cognitive load of the students is 2.76 with a verbal description of agree. This means that they agree that mental effort is required to understand the complexity of their tasks or subject matter. Interestingly, the education students disagree that they found grammar and vocabulary content challenging with a mean score of 2.45. This is expected considering that their expertise lies on language which includes grammar and vocabulary. On the other hand, the highest is that language learning tasks required me to think hard to make sense of them with a mean score of 3.08.

The findings in Table 1 affirmed that Task-Based Learning (TBL) imposes a moderate level of intrinsic cognitive load on 4th-year language education students, as evidenced by their agreement that language tasks require substantial mental effort. This aligns with Sweller's Cognitive Load Theory, which emphasizes that intrinsic load is determined by the complexity of the material and the learner's prior knowledge (Sweller, 1988). In the context of TBL, learners engage in authentic, communicative tasks that demand simultaneous processing of linguistic input, task instructions, and meaning-making, thereby increasing cognitive demands (Van Merriënboer & Sweller, 2005). The highest-rated item—"The language learning tasks required me to think hard to make sense of them"—reflects the nature of TBL, where students must integrate multiple elements such as grammar, vocabulary, and discourse strategies to complete tasks. According to Ellis (2003), task complexity in TBL directly influences cognitive engagement, especially when learners are required to produce language under real-time conditions.

Moreover, studies by Choi et al. (2021) highlighted that cognitive load can be moderated through instructional strategies such as scaffolding, segmentation, and cognitive pauses, which help learners manage mental effort more effectively. Interestingly, the lower mean score for grammar and vocabulary difficulty suggests that students' prior expertise in language structures reduces intrinsic load in these areas, supporting the idea that familiarity with content mitigates cognitive strain (Kalyuga, 2007). Overall, the literature supports the interpretation that while TBL promotes deeper cognitive engagement, its effectiveness depends on how well instructional design aligns with learners' cognitive capacities.

Influence of Task-based learning on the Cognitive Load
Table 2.

Extraneous Cognitive Load of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	The instructions for the TBL activities were unclear or confusing.	3	7	19	11	2.05	0.88	D
2	I found myself distracted by unnecessary information during the tasks.	4	17	15	4	2.53	0.82	A
3	I had difficulty completing the tasks because of poorly organized materials.	7	16	12	5	2.63	0.93	A
4	The way the lessons were presented made it harder for me to learn.	3	10	22	5	2.28	0.78	D
5	I spent more time figuring out the task requirements than learning the content.	7	12	16	5	2.53	0.93	A
					Overall	**2.40**	**0.64**	**D**

In terms of extraneous cognitive load, the language education students disagree that there's unnecessary mental effort caused by extraneous load with an overall mean of 2.40. This means that the students disagree that there's unnecessary mental effort caused by how information is presented. Additionally, the highest is having difficulty completing task because of poorly organized materials with a mean score of 2.63 verbally described as agree. This indicates that the highest extraneous cognitive load is due to poorly organized materials. On the other hand, the lowest is instructions for the TBL activities were unclear or confusing with a mean score of 2.05 verbally described as disagree.

The results in Table 2 suggested that extraneous cognitive load among 4th-year language education students is generally low, with an overall mean of 2.40, indicating disagreement that unnecessary mental effort was caused by the presentation of information. This aligned with Cognitive Load Theory, which identifies extraneous load as the mental effort imposed by poorly designed instructional materials or unclear presentation that does not contribute to learning (Sweller, 1988; Van Merriënboer & Sweller, 2005).

The highest-rated item—difficulty completing tasks due to poorly organized materials—highlights how disorganized content can increase extraneous load, diverting cognitive resources away from meaningful learning (Kalyuga, 2007). Studies emphasize that instructional design in Task-Based Learning (TBL) must minimize extraneous load by integrating text and visuals, segmenting information, and avoiding split-attention effects (Mayer, 2009; Spanjers et al., 2024).
Choi et al. (2021) and Moreno & Mayer (2007) further argued that clarity of instructions is essential, as ambiguous or fragmented directions can overload working memory and hinder task performance. In language education, well-structured materials and concise instructions are especially critical, as learners must simultaneously process linguistic input and task demands (Ayres & Paas, 2007). When instructional design is optimized, learners can allocate more cognitive effort toward germane load—

constructing schemas and deepening understanding—rather than being distracted by irrelevant or confusing elements (De Jong, 2010). Thus, the relatively low extraneous load reported by students may reflect effective instructional practices in their TBL environment, though the issue of material organization remains an area for improvement.

Influence of Task-based learning on the Cognitive Load

Table 3.

Germane Cognitive Load of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	I was focused on learning the key concepts during the tasks.	19	19	2	0	3.43	0.59	SA
2	I connected the tasks to what I had learned previously.	27	10	3	0	3.60	0.63	SA
3	I used strategies that helped me retain language content while doing the task.	25	11	4	0	3.53	0.68	SA
4	I was actively thinking about how to improve my understanding.	24	13	3	0	3.53	0.64	SA
5	I was engaged in learning while performing the TBL activities.	19	18	3	0	3.40	0.63	SA
					Overall	**3.50**	**0.54**	**SA**

The results in Table 3 revealed a high level of germane cognitive load among 4th-year language education students, with an overall mean of 3.50, indicating strong agreement that they were cognitively engaged in meaningful learning during TBL activities. Germane cognitive load refers to the mental effort devoted to constructing schemas, integrating new knowledge, and engaging in deep learning processes (Sweller, 1988; Van Merriënboer & Sweller, 2005).

The consistently high ratings across all items—particularly in connecting tasks to prior knowledge and using retention strategies—suggest that students were actively involved in schema construction, a key indicator of germane load. Schema theory posits that learners interpret and organize information based on existing cognitive frameworks, which enhances comprehension and retention when instructional tasks are aligned with prior knowledge (Chi, 2006; De Jong, 2010). In TBL, this alignment is critical, as tasks are designed to simulate real-world communication and problem-solving, thereby promoting meaningful engagement and deeper processing (Ellis, 2003).

Metacognitive strategies also play a central role in enhancing germane load. When students monitor their understanding, reflect on their learning, and apply strategies to retain content, they activate metacognitive awareness that supports schema development (Kalyuga, 2007; Veenman, 2011). The high mean scores for items such as "I was actively thinking about how to improve my understanding" and "I used strategies that helped me retain language content" reflect this metacognitive engagement. Research shows that instructional designs that minimize extraneous load and maximize germane load—through scaffolding, segmentation, and multimedia integration—lead to improved learning outcomes in language education (Mayer, 2009; Spanjers et al., 2024).

Moreover, active engagement in TBL has been shown to foster germane cognitive load by encouraging learners to make meaningful connections, reflect on their performance, and construct long-term knowledge (Choi et al., 2021; Moreno & Mayer, 2007). These findings affirm that well-structured TBL environments not only support language acquisition but also optimize cognitive processing for deeper learning.

Influence of Task-based learning on the Cognitive Load

Table 4.

Cognitive Load of 4th Year Language Education Students

No.	Cognitive Load	Mean	Standard Deviation	Verbal Description
1	Intrinsic Cognitive Load	2.76	0.46	A
2	Extraneous Cognitive Load	2.40	0.64	D
3	Germane Cognitive Load	3.50	0.54	SA
	Overall	**2.88**	**0.37**	**A**

The table indicated that 4th year language education students have the highest germane cognitive load with a mean score of 3.50 and standard deviation of 0.54 verbally described as strongly agree.

This means that the students have good kind of mental effort to actually learn the task at hand. On the other hand, the lowest is the extraneous cognitive load with a mean score of 2.40 verbally described as disagree. This indicates that the students disagree that the issues they experience is associated with how information is presented to them. Overall, the students agree that they cognitive load in studying with an overall mean score of 2.88. Additionally, the low standard deviation of 0.37 indicates that their answers are not far apart from each other indicating that there really is a cognitive load.

The overall cognitive load score of 2.88 (Agree) and a low standard deviation of 0.37 suggest a consistent perception among students, reinforcing the validity of the findings. This balance across cognitive load dimensions reflects effective instructional design in TBL, which aims to minimize extraneous load, manage intrinsic complexity, and maximize germane engagement for optimal learning outcomes (Choi et al., 2021; Van Merriënboer & Sweller, 2005). Research further supports that when cognitive load is properly regulated, learners demonstrate higher satisfaction, improved retention, and better performance in language tasks

Using Teaching Strategies such as Task Segmentation, Scaffolding and Cognitive Pauses for Cognitive Load Management

Table 5.

Effective Strategies in Managing Cognitive Load in Task- Based Learning of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	Task segmentation (breaking tasks into smaller steps) helps me understand language concepts better.	29	10	1	0	3.70	0.52	SA
2	Scaffolding (receiving step-by-step guidance) reduces my cognitive load in TBL activities.	25	12	3	0	3.55	0.64	SA
3	Cognitive pauses (short breaks between tasks) help me retain information better.	23	14	3	0	3.50	0.64	SA
4	The strategies used in TBL make learning more manageable for me.	21	17	2	0	3.48	0.60	SA
5	I feel that my overall cognitive load is well-managed in TBL activities.	15	21	4	0	3.28	0.64	SA
					Overall	**3.50**	**0.49**	**SA**

Table 5 reveals that 4th-year language education students strongly agree (M = 3.50, SD = 0.49) that specific strategies—task segmentation, scaffolding, and cognitive pauses—effectively help manage cognitive load during Task-Based Learning (TBL). The highest-rated strategy, task segmentation (M = 3.70), supports the idea that breaking tasks into smaller, sequential steps enhances comprehension and reduces mental strain. This aligns with Sweller's Cognitive Load Theory, which emphasizes that segmenting complex tasks minimizes overload and improves schema acquisition (Sweller, 1988; Van Merriënboer & Sweller,

2005). Scaffolding (M = 3.55) also plays a vital role, as step-by-step guidance enables learners to focus on essential content while gradually building autonomy—an approach supported by Kalyuga (2007), who notes that tailored support reduces extraneous load and enhances germane processing.

Cognitive pauses (M = 3.50) were similarly valued, reflecting the benefit of brief breaks in promoting retention and reducing fatigue. Mayer (2009) and Moreno & Mayer (2007) affirm that spaced learning and rest intervals allow learners to consolidate information and maintain cognitive efficiency. The overall agreement that cognitive load is well-managed in TBL (M = 3.28) suggests that these strategies collectively foster a balanced cognitive environment, enabling deeper engagement and improved learning outcomes. These findings reinforce the importance of intentional instructional design in TBL, where managing cognitive load through strategic supports leads to more effective language acquisition (Spanjers et al., 2024; Choi et al., 2021).

Effects of Cognitive Management on Language Retention and Over-all Learning Outcomes

Table 6.

Frequency of Use in Language Retention of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	I often recall and use the language concepts I learned during tasks.	14	21	5	0	3.23	0.66	A
2	I apply newly learned vocabulary in my writing or speaking.	17	17	6	0	3.28	0.72	SA
3	I remember task-based lessons during my exams or class discussions.	20	18	2	0	3.45	0.60	SA
4	I use the grammar structures I learned in my daily communication.	12	22	6	0	3.15	0.66	A
5	I revisit or reflect on the language tasks even after class.	11	17	11	1	2.95	0.81	A
					Overall	**3.21**	**0.56**	**A**

Table 6 shows that 4th-year language education students generally agree (M = 3.21, SD = 0.56) that they frequently recall and apply language concepts learned through Task-Based Learning (TBL). The highest-rated item—*"I remember task-based lessons during my exams or class discussions"* (M = 3.45)—suggests that TBL fosters long-term retention and contextual recall, which is consistent with research indicating that meaningful, real-world tasks enhance memory and retrieval of language content2. Students also strongly agree that they apply newly learned vocabulary in writing and speaking (M = 3.28), reflecting TBL's emphasis on communicative competence and fluency over isolated grammar instruction.

The consistent agreement across items—especially in grammar usage and post-task reflection— supports the idea that TBL promotes active engagement and deeper processing, which are essential for retention. Studies show that when learners negotiate meaning, solve problems, and reflect on performance during TBL, they develop stronger cognitive and linguistic connections that support long-term use6. Moreover, the integration of vocabulary and grammar into authentic tasks encourages learners to use language naturally, increasing confidence and fluency in both academic and real-life contexts7. These findings affirm that TBL is an effective approach for enhancing language retention, especially when paired with strategies like peer interaction, self-assessment, and contextualized learning.

Effects of Cognitive Management on Language Retention and Over-all Learning Outcomes

Table 7.

Context of Learning in Language Retention of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	The tasks were related to real-life language use.	23	17	0	0	3.58	0.50	SA
2	I was able to relate the task topics to my personal experiences.	22	16	2	0	3.50	0.60	SA
3	The activities reflected authentic language situations.	19	20	1	0	3.45	0.55	SA
4	The context of the tasks helped me remember the language better.	22	17	1	0	3.53	0.55	SA
5	I found the lessons meaningful in my day-to-day communication.	21	16	3	0	3.45	0.64	SA
					Overall	**3.50**	**0.48**	**SA**

Table 7 reveals that 4th-year language education students strongly agree (M = 3.50, SD = 0.48) that the context of learning in Task-Based Learning (TBL) significantly supports language retention. The highest-rated item—"The tasks were related to real-life language use" (M = 3.58)—indicates that students benefit from tasks grounded in authentic, communicative situations. This aligns with the principles of Task-Based Language Teaching (TBLT), which emphasize meaningful interaction and real-world relevance as key drivers of language acquisition and retention2. When learners engage in tasks that mirror everyday communication, they are more likely to internalize language structures and vocabulary, leading to improved fluency and long-term recall.

Additionally, students reported strong agreement that they could relate task topics to personal experiences (M = 3.50) and found the lessons meaningful in daily communication (M = 3.45). These findings support research showing that contextual learning—where tasks connect to learners' lives—enhances motivation, engagement, and retention6. Authentic materials and personalized contexts foster deeper cognitive processing, allowing learners to construct meaning and apply language in varied situations8. The consistent ratings across all items suggest that TBL, when designed with real-life relevance and personal connection, creates a rich learning environment that promotes both communicative competence and lasting language retention.

Effects of Cognitive Management on Language Retention and Over-all Learning Outcomes

Table 8.

Motivation and Interest in Language Retention of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	I was motivated to complete the language tasks.	14	20	6	0	3.20	0.69	A
2	The tasks were interesting and kept me engaged.	16	19	5	0	3.28	0.68	SA
3	I enjoyed participating in TBL activities.	19	17	4	0	3.38	0.67	SA
4	I was curious to learn more through the task.	15	23	2	0	3.33	0.57	SA
5	I felt excited to use the language I learned from the tasks.	14	23	3	0	3.28	0.60	SA
					Overall	**3.29**	**0.55**	**SA**

Tables 8 and 9 reveal that 4th-year language education students exhibit strong motivation and interest (M = 3.29, SD = 0.55) and moderate use of learning techniques (M = 3.17, SD = 0.53) in relation to language retention during Task-Based Learning (TBL). Students strongly agreed that the tasks were engaging, enjoyable, and sparked curiosity, with the highest item being *"I enjoyed participating in TBL activities"* (M = 3.38). This supports research showing that motivation and emotional engagement are critical drivers of language retention, especially when learners find tasks meaningful and personally relevant. TBL

environments that incorporate authentic, communicative tasks have been shown to increase learner enjoyment, reduce anxiety, and promote sustained attention, all of which contribute to deeper cognitive processing and improved retention.

Effects of Cognitive Management on Language Retention and Over-all Learning Outcomes

Table 9.

Motivation and Interest in Language Retention of 4th Year Language Education Students

No.	Item Statement	4	3	2	1	Mean	SD	VD
1	I used note-taking, highlighting, or other techniques during the task.	19	14	6	1	3.28	0.82	SA
2	I created mental images or associations to remember the lessons.	15	21	4	0	3.28	0.64	SA
3	I practiced the language content outside the classroom.	9	24	5	2	3.00	0.75	A
4	I reviewed or summarized what I learned from the tasks.	11	25	3	1	3.15	0.66	A
5	I used repetition and practice to retain the language concepts.	14	18	7	1	3.13	0.79	A
					Overall	**3.17**	**0.53**	**A**

Table 9 further showed that students frequently used cognitive strategies such as note-taking, mental imagery, and repetition, which are proven techniques for enhancing memory and retention. The use of dual-coding (combining verbal and visual information), spaced repetition, and active review are supported by cognitive science as effective methods for strengthening memory pathways. Although practicing language outside the classroom scored slightly lower (M = 3.00), the overall agreement suggests that students are actively engaged in reinforcing language concepts beyond task completion.

Effects of Cognitive Management on Language Retention and Over-all Learning Outcomes

Table 10.

Language Retention of 4th Year Language Education Students

No.	Language Retention in terms of…	Mean	Standard Deviation	Verbal Description
1	Frequency of Use	3.21	0.56	A
2	Context of Learning	3.50	0.48	SA
3	Motivation and Interest	3.29	0.55	SA
4	Learning Techniques	3.17	0.53	A
	Overall	**3.29**	**0.42**	SA

Table 10 consolidates these findings, showing that **context of learning** (M = 3.50) and **motivation and interest** (M = 3.29) are the strongest contributors to language retention, followed by **frequency of use** and **learning techniques**. This affirms that TBL's emphasis on real-world relevance, learner engagement, and strategic cognitive support fosters meaningful and lasting language acquisition.

Correlation between Cognitive Load Management and Language Retention

Table 11.

Relationship of Cognitive Load and Language Retention of 4th Year Language Education Students

Measures	Analysis	Frequency of Use	Context of Learning	Motivation & Interest	Learning Techniques	Overall Language Retention
Intrinsic Cognitive Load	**ρ p-value**	0.055	-0.059	-0.007	0.159	0.085
	VD	*0.738*	*0.720*	*0.968*	*0.329*	*0.602*
		Negligible	Negligible	Negligible	Negligible	Negligible
Extraneous Cognitive Load	**ρ p-value**	0.203	-0.044	-0.136	0.082	-0.005
	VD	0.210	0.788	0.401	0.616	0.975
		Negligible	Negligible	Negligible	Negligible	Negligible
Germane Cognitive Load	**ρ p-value**	.751**	.642**	.399*	.556**	.750**
	VD	0.000	0.000	0.011	0.000	0.000
		Strong	Strong	Weak	Moderate	Strong
Overall Cognitive Load	**ρ p-value**	.499**	.330*	0.133	.421**	.435**
	VD	0.001	0.038	0.413	0.007	0.005
		Moderate	Weak	Negligible	Moderate	Moderate

The negligible correlation between intrinsic and extraneous cognitive load on the different aspects of language retention of 4th year language education students indicate that correlation cannot be established. However, it appears that among the three categories of cognitive load, germane cognitive load influences language retention the most. Additionally, germane cognitive load have a strong relationship with frequency of use, context of learning, and overall language retention with a spearman rho of .751, .642, and .750 respectively. All of which obtained a p-value of .000 which indicates that the null is rejected. Thus, significant relationship is established. Furthermore, germane cognitive load is moderately correlated with the learning techniques used by the language students.

To support the following quantitative data analysis, the next section presented the common codes, subthemes, emergent themes based from the semi-structured interviews conducted with the participants. The qualitative data analysis underscored the following implications on using the teaching strategies on Task-based learning to effectively manage cognitive load among 4th year Education students.

These implications will serve as guide towards curriculum development of language instruction. The presentation of thematic analysis were segmented as follows: (1) Task Segmentation (2) Scaffolding (3) Cognitive Pauses. Further elaborations were made per table discussed below.

Implications of Using TBL Strategies towards Curriculum Development of Language Instruction

Table 12.

Common Codes, Subthemes and Emergent Themes on the Implications of using Task Segmentation towards curriculum development for language instruction

Common Codes	Subthemes	Emergent Theme
Supports deeper learning by breaking down complex ideas	Pedagogical Advantages	Task Segmentation
Reduces passive learning and improves retention		
Helps learners gradually master macro skills		
Poorly segmented tasks may overload learner's memory.	Instructional Challenges	
Over-segmentation may fragment learning and reduce authenticity		
Time consuming, limiting coverage of competencies		

The thematic analysis presented in Table 12 underscored the dual impact of task segmentation on curriculum development for language instruction, revealing both pedagogical advantages and instructional challenges. On the pedagogical front, segmentation supports deeper learning by breaking down complex ideas into manageable units, thereby enhancing learner retention and reducing passive engagement.

This aligns with recent studies in Task-Based Language Teaching (TBLT), which emphasize that well-structured tasks foster communicative competence and contextualized learning through meaningful interaction.

Additionally, gradual mastery of macro skills—such as speaking, writing, and comprehension— is facilitated when tasks are sequenced to build fluency and confidence, a principle supported by curriculum frameworks that prioritize student-centered learning and real-world language use. However, instructional challenges arise when segmentation is poorly executed. Overloading learners' memory through fragmented or excessive task breakdowns can hinder cognitive processing and reduce the authenticity of language experiences. As highlighted by recent literature, over-segmentation may also disrupt holistic skill integration and compromise curriculum pacing, especially when time constraints limit coverage of essential competencies. These findings suggest that while task segmentation is a powerful tool for curriculum design, its effectiveness depends on strategic implementation, teacher training, and alignment with communicative goals.

Implications of Using TBL Strategies towards Curriculum Development of Language Instruction

Table 13.

Common Codes, Subthemes and Emergent Themes on the Implications of using Scaffolding towards curriculum development for language instruction

Common Codes	Subthemes	Emergent Theme
Provides structured support, boosting learner's confidence.	Educational Contribution	Scaffolding
Encourages active engagement and learner autonomy		
Enhances problem solving and collaboration skills		
Strengthen curriculum by embedding different strategies		
Risk of over dependence on teacher's guidance.	Educational Drawbacks	
Requires high teacher expertise and preparation.		
Hard to sustain with large classes or limited resources.		

Table 13 presented above explained that scaffolding in language instruction revealed its significant implications for curriculum development, particularly in balancing educational contributions and drawbacks. As an instructional strategy, scaffolding provides structured support that boosts learner confidence and encourages active engagement, autonomy, and collaboration. These benefits are well-documented in recent studies, such as those by Alghamdi and Ahmed (2021), who emphasized that scaffolding enhances learners' problem-solving abilities and promotes deeper language processing when integrated into curriculum design. Moreover, embedding varied scaffolding techniques—such as modeling, chunking, and contextualizing—strengthens curriculum responsiveness to diverse learner needs, especially in multilingual classrooms. The approach aligns with Vygotsky's Sociocultural Theory and the Zone of Proximal Development, which remain foundational in modern curriculum frameworks emphasizing guided learning and social interaction.

However, scaffolding also presents notable challenges. Over-dependence on teacher guidance can hinder learner autonomy and reduce opportunities for independent language use. As highlighted by recent research, effective scaffolding requires high teacher expertise and reflective practice, which may be difficult to sustain in large classes or resource-constrained environments4. These drawbacks suggest that while scaffolding is a powerful tool for curriculum development, its success depends on strategic implementation, ongoing teacher training, and adaptive planning to ensure both support and gradual release of responsibility. Thus, curriculum designers must strike a balance between providing meaningful scaffolds and fostering learner independence in language acquisition.

Implications of Using TBL Strategies towards Curriculum Development of Language Instruction

Table 14.

Common Codes, Subthemes and Emergent Themes on the Implications of using Cognitive Pauses towards curriculum development for language instruction

Common Codes	Subthemes	Emergent Theme
Encourages reflection and deeper cognitive processing.	Cognitive Benefits	Cognitive Pauses
Reduces cognitive load making tasks more effective.		
Promotes metacognition and critical thinking.		
Aligns with higher order learning goals in the curriculum.		
Risk of over dependence on teacher's guidance.	Cognitive Constraints	
Requires high teacher expertise and preparation.		
Hard to sustain with large classes or limited resources.		

The thematic analysis of cognitive pauses in language instruction revealed a nuanced impact on curriculum development, balancing cognitive benefits with instructional constraints. Strategically implemented pauses encourage reflection, metacognition, and deeper cognitive processing, allowing learners to consolidate ideas and engage in higher-order thinking aligned with curriculum goals. Recent studies affirm that pausing during second language (L2) writing and oral production activates cognitive and metacognitive functions, supporting idea generation, planning, and revision processes that enhance overall language performance2. These pauses also reduce cognitive load, making tasks more effective by refreshing mental resources and facilitating better organization of language output.

However, cognitive pauses must be carefully managed to avoid instructional drawbacks. If misused or poorly timed, they may disrupt task flow and reduce learner engagement, especially among students who perceive pauses as wasted time. Research showed that variability in pause duration and frequency—affected by linguistic structure and speaker differences—can influence fluency perceptions and challenge instructional pacing4. Moreover, balancing cognitive pauses with tight curriculum schedules remains a concern, particularly in large classes or standardized programs where time is limited. These findings suggested that while cognitive pauses offer substantial pedagogical value, their integration into curriculum design requires thoughtful calibration, teacher training, and learner awareness to maximize their cognitive potential without compromising instructional coherence.

5. Conclusion and Recommendations

This research confirmed that Task-Based Learning (TBL) has a significant impact on the cognitive load of 4th-year BSEd English students in Bulacan State University – Sarmiento Campus. As TBL facilitates authentic and meaningful interaction with language tasks, it also presents moderate to high intrinsic and extraneous cognitive loads because of conceptual difficulty, ambiguous instructions, and unorganized materials. Yet, the existence of germane cognitive load—where learners are actively linking tasks to previous knowledge and utilizing retention strategies— indicates that TBL can promote deep learning where cognitive engagement has been appropriately facilitated.

The implementation of cognitive load management strategies like scaffolding, task segmentation, and cognitive pauses was found to be crucial in maximizing students' learning experience. Scaffolding was the most effective among these strategies, which allowed the learners to construct competence incrementally and mitigate confusion. Task decomposition facilitated control of intrinsic load through the provision of manageable units of information for the students to process, while cognitive pauses facilitated germane processing through the creation of opportunities for learners to reflect and internalize information. Together, these strategies ensured enhanced retention of language, as was evident through students' better recall of vocabulary, grammar, and sentence structures.

In addition, the research identified a strong link between successful cognitive load management and language retention performance. Learners whose cognitive effort was diminished through paced guidance and support were more likely to internalize and access language concepts. This supports the instructional benefit of matching teaching design with cognitive principles in TBL contexts. By strategically managing cognitive load, teachers are able to turn cognitively taxing tasks into vehicles for effective and enduring language learning.

Based on the conclusions, language teachers are advised to embed structured scaffolding and task segmentation as key elements of Task-Based Learning. These practice areas should be incorporated in planning classes and instructional delivery so that learners are not bogged down by task complexity. Scaffolding can be achieved through guided modeling, procedural instructions, and formative feedback, while task segmentation should entail segmenting activities into smaller, sequential steps that correspond to learners' cognitive readiness.

Moreover, the developers of curriculum and instructional designers may incorporate cognitive pauses into TBL models. These pauses—either through reflective journaling, short discussions, or periods of silent processing—can augment germane cognitive load by enabling learners to internalize knowledge and consolidate it before the next task. Through the integration of these practices into curriculum design, institutions can facilitate more efficient retention of language and develop a cognitively conducive learning environment that is cognizant of the needs of higher education and professional language pedagogy.

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