

Effect of Cognitive Load Theory Based Instruction on Arabic-English Translation Performance among Hausa Speaking Undergraduates in North-West Nigeria

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ABSTRACT

Arabic-English translation is essential for professional, academic, and religious communication in multilingual settings like North-West Nigeria. However, due to the cognitive demands of processing two languages at once, Hausa-speaking undergraduates frequently have ongoing challenges in completing efficient translation tasks. The study investigates how cognitive load theory-based instruction affects Arabic-English translation performance among Hausa-speaking undergraduates. It also looks at how important translation components—text segmentation and comprehension, expression clarity and fluency, and handling complex structures—respond to cognitively informed instructional strategies. A pre-experimental one-group pre-test and post-test design is used in the study. Using random sampling methods, sixty third-year Arabic undergraduate students from three universities in North-West Nigeria were chosen. Structured translation tests were used to gather data both before and after a six-week Cognitive Load Theory-based instructional intervention. Descriptive statistics and paired sample t-tests were used to assess the data. The results show that following the intervention, pupils' translation proficiency improved statistically significantly ($p < .001$). Notably, managing complicated structures showed the biggest gain, followed by text segmentation and comprehension, clarity, and fluency. The findings show that cognitively informed teaching methods improve translation proficiency and successfully lessen cognitive overload. The study concludes that Cognitive Load significantly influences translation performance in multilingual contexts and suggests incorporating Cognitive Load Theory into translating education to enhance overall learning outcomes, accuracy, and fluency.

Keywords: Cognitive Load Theory (CLT) , Arabic–English Translation . Translation Performance, Hausa-speaking Undergraduates , Multilingual Education

INTRODUCTION

Arabic-English translation is an important academic and communicative skill in multilingual countries such as Nigeria. This is particularly noticeable in the Northwest region where the language of religious scholarship and Islamic education is Arabic, and the language of instruction and wider communication is English (Ihenacho, 2020; Garba, 2020). Competence in Arabic–English translation is critical for Hausa-speaking undergraduates of Arabic in institutions such as Bayero University Kano, Ahmadu Bello University Zaria, and Umaru Musa Yar'adua University Katsina (Adebisi & Mukadam, 2020) in interpreting academic and religious texts, engaging in scholarly discourse, and accessing professional opportunities in fields such as education, administration, and diplomacy.

Hausa-speaking undergraduates in Northwest Nigeria continue to face intractable problems in Arabic–English translation despite its importance (Adebisi & Mukadam, 2020; Ibrahim & Garba, 2018). The challenges can be better understood in the context of the Cognitive Load Theory, which explains the limits of working memory on learning and task performance, (John Sweller, 1988; John Sweller et al., 2011). In translation tasks students have to understand the source text (Arabic), process meaning, and produce an accurate target text (English) at the

same time, which imposes a heavy cognitive load on them (Daniel Gile, 2009). Structural and morphological differences between Arabic and English raise the intrinsic cognitive load, which often causes lexical inaccuracies and syntactic distortions (Baker, 2011; Al-Shloul, 2023).

Research in second language acquisition has demonstrated that cross-linguistic transfer can lead to interference when learners apply structures from previously acquired languages to a new language. and this can result in grammatical and lexical errors (Odlin, 1989; Jarvis & Pavlenko, 2008). In multilingual contexts such as Hausa, Arabic and English, the competition between languages poses a great cognitive challenge to learners, who must inhibit competing linguistic systems to select the appropriate form. Therefore, these processes impose an additional load on working memory and reduce the overall efficiency of translation (Sweller et al., 2011).

Adding to these challenges is the trilingual linguistic environment in which learners exist. They are Hausa (L1), Arabic (L2), and English (L3). The interference of these languages often happens in interaction, which complicates the cognitive process of translation tasks. For instance, negative transfer may occur because of differences in the grammatical systems. At the same time, competing linguistic systems raise the mental effort for decision-making and restructuring. Thus, these conditions impose an additional burden on working memory, thereby decreasing processing efficiency and increasing the likelihood of errors, as postulated by the Cognitive Load Theory (Sweller, Ayres, & Kalyuga, 2011; Paas, Renkl, & Sweller, 2003).

From the pedagogic point of view, the teaching of translation in many Northern Nigerian universities is still largely influenced by traditional grammar–translation approaches which emphasize rote learning rather than active mental engagement. Such approaches tend to increase extraneous cognitive load by providing information in a manner that does not facilitate efficient processing or skill development. In addition, learners have limited exposure to practical translation strategies and there is a lack of process-integrated instruction which limits their ability to cope with cognitive demands effectively during translation tasks (Ibrahim& Garba, 2018). This often leads to mechanical translation by students and to the lack of acquisition of the cognitive strategies necessary for successful performance.

Both domestic and international research has analyzed issues related to Arabic-English translation, with examples including those by Abu Bakar and Elrem (Adebisi and Mukadam, 2020) and Ihenacho and Ibrahim and Garba. Additionally, studies have been made on the matter in other countries such as China (Qassem 2022; Tabatabaee, 2023). Despite the focus on cognitive aspects of translation, most scholars have concentrated on linguistic difficulties and neglected their cognitive dimensions. More importantly, there are few empirical studies on the cognitive aspects of Arabic English translation amongst Hausa-speaking undergraduates in Northwest Nigeria.

Therefore, a significant gap remains in understanding how cognitive load, processing limitations, and cross-linguistic interference interact to influence translation performance in this context. Addressing this gap is essential for developing more effective, cognitively informed approaches to translation pedagogy.

The paper has five main sections. The first section is the introduction. The second Section reviews the relevant literature and provides a description of what theory involves. The third section outlines the methodology, including research design and sample population/test methods, data collection instruments, and analytical procedures for analyzing cognitive load effects on translation performance. Then, the fourth section outlines and discusses the findings. The final section is conclusion.

THEORETICAL FRAMEWORK

Overview of Cognitive Load Theory

Cognitive Load Theory is the foundation for this research, as it explains how the human cognitive system processes information during learning. Learning efficiency and performance are negatively impacted when learners complete tasks that exceed the capacity of their working memory (Sweller, 1988; Sweller, Ayres, &

Kalyuga, 2011). During translation tasks, learners must simultaneously comprehend the source text, interpret meaning, and produce an equivalent target text (Gile, 2009; Shreve & Angelone, 2010). Learning in a trilingual setting, such as Hausa (L1), Arabic (L2), and English (L3), is made more challenging by the need to switch between linguistic systems while maintaining accuracy and coherence, which intensifies cognitive load and processing difficulty. This poses challenges for both language acquisition and comprehension.

Types of Cognitive Load

Cognitive Load Theory divides cognitive load into three categories: intrinsic, extraneous, and germane. Intrinsic cognitive burden is linked to the inherent complexity of the task, such as structural and morphological differences between Arabic and English (Sweller, 1994; Sweller, Ayres, & Kawaii, 2011). Extraneous cognitive burden can result from the presentation of information or poor teaching techniques, such as grammar-translation techniques and memorization, which can place unnecessary stress on learners. The productive mental effort put into learning, such as the creation of translation strategies, comprehension enhancements, and the establishment of mental schemas for efficient processing, is known as germane cognitive load (Paas, Renkl, Sweller et al. Managing intrinsic load, minimising extraneous load and optimizing germane load is the key to effective learning (Sweller et al, 2011; Paas & al.)

Cognitive Processing in Translation

Translation is a cognitively demanding activity that involves multiple processes at once. It involves reading, comprehension, interpretation, and production. Effective utilization of working memory and attentional resources is necessary for these processes (Gile, 2009; Shreve & Angelone, 2010). The presence of complex sentence structures or unfamiliar linguistic patterns can lead to cognitive load and processing issues, as observed in Swinger, Ayres, and Kalyuga (and Dragsted, 2010).

Application to Arabic–English Translation

Among translators, the structural differences and interaction with Hausa as the first language have a significant impact on cognitive load in Arabic-English translation. Self-contained and syntactically complex Arabic sentences lead to an increase in intrinsic cognitive load, whereas negative transfer from Hausa and Arabic into English increases processing difficulty. Moreover, instructional techniques that do not promote active thinking can result in excessive workload and hinder learners' performance. In this perspective, translation problems are not purely linguistic but rather arise from cognitive overload.

METHODOLOGY

Research design

The study used a pre-experimental, one-group pretest and post-test design to assess whether students experience significant changes in their translation performance following cognitive load theory-based instructional intervention. According to Kothari (2004, p. 41), the treatment would have an equivalent effect on the phenomenon after the procedure but less on its pre-treatment impact. Furthermore, after administering the pre-test, the researchers introduced Arabic–English translation tasks to improve students' ability to produce accurate and culturally appropriate Arabic–English translations by managing cognitive processing demands effectively and applying meaning-based translation strategies rather than literal transfer. To be effective, the treatment should incorporate Cognitive Load Theory (Sweller) as a practical and theoretical framework that can be used in classrooms and for instructional purposes.

Once the intervention was completed, a post-test was conducted to evaluate the impact of the experiment and make a final decision.

Participants & sampling

In the academic year 2024/2025, a study was carried out on third-year undergraduate students of Arabic from Ahmadu Bello University, Bayero University, and Umaru Musa Yar'adua University in Northwest Nigeria. Through a purposive sampling method, the participating universities were chosen and then randomly assigned twenty (20) students from each university to make up sixty (60) participants. Of the total number of participants, 36 were males and 24 weren't, aged between 18 and 40 years; all were native Hausa speakers.

Therefore, the selection of participants was done based on many reasons. At first, participants were all third-year students, they had already gained basic knowledge of translation in level one and two. Hence, this provides the necessary background information for the translation task during training. In addition, the Arabic translation task presented some obstacles for participants. Additionally, the study used a translation exercise to gather data for purposes of assessing the level of proficiency in translating the participants' texts. Interestingly, the translation program is only available in the courses for which this sample was used. The researchers considered the participants' prior experience in translation learning during their first three years of study, as translation is a complex language learning and requires broader knowledge.

The absence of randomization in the sampling methodology and the lack of a control group are notable limitations of this design. Taking into account ethical considerations, the researchers were granted permission and sent a letter of approval by the heads of the departments where the data was collected. Participants were given an information sheet that contained details about the training programme.

Furthermore, participants were given the option to withdraw from the study at their discretion as they see fit. Following that, the participants were prompted to complete a consent form if they desired to participate. Finally, every individual received pseudonyms to guarantee their anonymity.

Instruments & materials

The primary means of collecting data before and after training was the use of translation tasks in this research. The objective of this task was to enable the researchers to assess the participants' translation abilities both before and after the teaching intervention. Studies have consistently utilized translation tasks as valid means of assessing learners' translation

performance because they simulate genuine translational challenges and obtain measurable outcomes (Keller, 2008; Mossop, 2014). To maintain relevance and curricular validity, the task content was chosen in accordance with the course materials listed in the participants' syllabus. Hyland and Nunan (2004) suggest that the selection of topics for productive writing tasks should consider learners' personal experiences and communicative requirements to maximize engagement and meaningful production. As a result, the translation task's subject was chosen to reflect themes that are relevant to students' everyday experiences and their experiential knowledge, in line with pedagogical advice.

To prepare participants for the post-test, the researchers devised and executed a six-week training program that involved two sessions per week. The Cognitive Load Theory was used to develop this programme, with a focus on structured instruction and scaffolding. This is to enhance learners' working memory and reduce unnecessary cognitive burden during complex tasks as suggested by Sweller, Ayres, & Kalyuga, (2011).

The researchers conducted a pilot study to determine the instrument's suitability for data collection after receiving authorization from the universities where the training was held.

Inter-rater Reliability

A pilot study was conducted with fifteen students who were similar in characteristics to the participants in the main studies. As the training program was based on the Cognitive Load Theory, the translation task was supposed to be easy for the brain to manage but still needed to require precise meaning and good language

decisions. According to Sweller, Ayres and Kalyuga (2011), well-structured tasks with clear scoring rules can reduce the extraneous mental effort and help to get more reliable results in the assessment of performance. The students' translations were checked by two experienced Arabic as a foreign language teachers to ensure the reliability of the scores and reduce the bias. The two raters were teachers in the Department of Arabic Language at Umaru Musa Yar'adua University with more than ten years experience. The two raters had been teaching language skills for more than ten years. The raters received standard training on the analytic rubric for evaluating accuracy, clarity of meaning transfer, and appropriateness of expression, consistent with cognitive load theory until they scored. The provision of clarified scoring criteria and rater training is in line with cognitive approaches to instructional design that underline the importance of providing structured guidance to ensure reliable evaluation of performance.

Following the scoring process, an inter-rater reliability analysis was conducted to determine the consistency of the raters' judgments. The results indicated a high level of agreement between the two raters ($F = 21.040$, $p < .001$, 95% CI [.752, .969]). The average intraclass correlation coefficient ($ICC = .909$) demonstrates excellent reliability, indicating that the scoring rubric produced stable and consistent evaluations of translation performance. After confirming the reliability of the instrument within this combined cognitive and functional framework, the researchers proceeded to implement the instrument in the main study.

Training sessions

During the first meeting, all the participants were informed about their participation and the training's objective. Participants were provided with an information sheet that detailed the project, data storage, rights, and participation. Afterward, all participants were given pseudonyms to maintain their anonymity.

Cognitive Load Theory (Sweller, 1988) was the focus of the six-week training that aimed to improve Arabic-English translation abilities. The sessions were arranged in stages to decrease cognitive burden while devising efficient translation methods.

In **Session One**, participants were introduced to the concept of cognitive load and trained on how to manage cognitive processing during translation. They practiced segmenting long and complex Arabic sentences into smaller meaningful units. For example, the sentence *شهدت المجتمعات الإنسانية عبر التاريخ تطوراً ملحوظاً في أنماط التفكير ووسائل التواصل* (Throughout history, human societies have experienced remarkable development in patterns of thinking and means of communication) was used to demonstrate how to identify key components such as subject, time reference, and main ideas before translation. The instructor emphasized reducing intrinsic cognitive load by simplifying sentence structure.

Session Two focused on minimizing extraneous cognitive load by discouraging word-for-word translation and encouraging students to use step-by-step translation strategies. Participants practiced translating sentences such as *حيث لم يعد الاكتفاء بالحفظ والتلقين كافياً لتحقيق الفهم العميق أو الإنتاج الفكري الفاعل* (As a result, reliance on memorization and rote learning is no longer sufficient to achieve deep understanding or effective intellectual production), with emphasis on analyzing meaning before producing the target text. Pair activities were used to reinforce these strategies and reduce unnecessary mental effort.

Session Three introduced techniques for working with complex sentence structures and enhancing working memory efficiency. The participants underwent guided translation exercises that involved recognizing primary and secondary clauses, organizing concepts according to their rationality, and reconstructing sentences with clear and coherent English.

Session Four was dedicated to increasing the cognitive load of germane information by both reformulating and phrasing. Students engaged in translation practices while maintaining their meaning rather than their form, which strengthened their translation schemas and facilitated deeper cognitive processing. This was done through practiced translation activities.

The fifth session was spent concentrating on practicing translation texts under guided conditions. Individuals translated passages and then underwent peer review activities to evaluate their accuracy, fluency, or structural clarity. Instructor feedback was used to reinforce effective cognitive strategies, including the correction of common cognitive errors like segmentation and incorrect restructuring.

In **Session Six**, participants engaged in independent translation tasks under timed conditions without the use of dictionaries, simulating real assessment environments. This session integrated all previously learned strategies and aimed to assess participants' ability to manage cognitive load effectively while producing accurate translations. Sample sentences such as *وقد أدى هذا التحول إلى ظهور تحديات جديدة تتطلب من الإنسان القدرة على التكيف مع* and *المغريات المتسارعة* ("This transformation led to new challenges requiring humans to adapt to rapidly changing circumstances") (It cannot be correctly understood if translated literally without considering cultural context) were used to evaluate performance.

In the end, the post-test was conducted after the sixth-session training to evaluate the effectiveness of the training program. To test the hypothesis of the study, the pre- and post-test results were also compared to determine whether there was statistically significant improvement in the participants' translation performance.

Data analysis

At the end of the training programme, the collected data was analyzed using the statistical package for social science (SPSS) 26 version, which was subjected to both descriptive and inferential analysis. The paired sample t-test was run to compare the means and standard deviations obtained before and after the training session to detect the changes between the pre-test and post-test mean scores and draw a conclusion based on the outcomes.

RESULTS

This research was conducted at ABU, BUK and UMYU with classes of 300-level undergraduate students of Arabic. The participants, consisting of both males and females, were in their third year of study and ranged in age from 18–40 during the academic year 2024–2025. A purposive technique was employed in selecting the universities while a random sample was used to assign the participants, which comprised 36 males and 24 females, all of whom belonged to the Hausa ethnic group in Nigeria. The following table shows the demographic data of the participants.

Table 1. Demographic Data of the participants

University	No. of Participants	Gender (M/F)	Age range	Native Language
Umaru Musa Yar'adua University	20	12/8	18-40	Hausa
Bayero University Kano	20	15/5	18-40	Hausa
Ahmadu Bello University	20	16/4	18-40	Hausa

After the completion of the data collection session, the researchers proceeded to check the reliability and normality of the data before conducting the inferential analysis. The outcome of the reliability and normality tests confirmed the data was reliable and normally distributed. Subsequently, the researchers ran a statistical analysis using a paired t-test, which allowed them to compare the mean sores and standard deviations to arrive at a conclusion.

The translation task One aims to develop students' ability to translate linguistically complex Arabic texts by effectively managing cognitive load. It focuses on training students to break down long and structurally dense sentences into meaningful units, identify key ideas, and reconstruct them into clear, accurate, and fluent English. Through this process, students learn to reduce mental overload, avoid literal word-for-word translation, and produce coherent translations that preserve the intended meaning of the source text.

The following table 2 presents the results of the pretest and post-test by the participants in the task 1:

Table 2 task 1: Paired Samples t-test results for the participants' pre- and post-test scores of Task 1.

	Mean	N	Std. Deviation	Std. Error Mean
Pre Test	11.08	60	1.71	.22
Post Test	15.00	60	1.13	.17

The descriptive statistics in table 2 reveal a substantial increase in student performance following pedagogical intervention. The mean total score rose from 11.08 (SD = 1.71) in the pretest to 15.00 (SD = 1.13) in the post test. This average increase of 3.92 points suggests a significant shift in the participants' translation competence following the pedagogical intervention.

Table 3: Task 1- paired sample t-test result shows the mean scores, for each component of task 1:

Components	Mean	N	STD. Dev.	Std. Error Mean
Pre: Text Segmentation & Comprehension	4.20	60	.78	.100
Post: Text Segmentation & Comprehension	5.19	60	.48	.06
Pre: Clarity and Fluency of Expression	3.75	60	0.60	0.08
Post: Clarity and Fluency of Expression	4.86	60	0.42	0.05
Pre: Handling of Complex Structures	3.13	60	0.54	0.07
Post: Handling of Complex Structures	4.95	60	0.53	0.07
Pre Total Score	11.08	60	1.71	0.22
Post Total Score	15.00	60	1.13	0.17

The comparison of component means in table 3 reveals a significant upward trajectory across all components, with the most striking progress observed in the students' technical translation difficulties. Initially, the component (Handling of complex Structures) was the participants' most significant weakness, recording the lowest pre-test means of 3.13. However, it achieved the most substantial growth of any category, rising by 1.82 to a post-test mean 4.95 overtaking clarity and fluency scores. In contrast, the component (text segmentation and comprehension) began with the highest baseline score of 4.20 and maintained its position as the top scoring component after intervention, doubling exactly to a post-test mean of 5.19. While the component (Clarity and Fluency of Expression) demonstrated a robust improvement with an increase of 1.11 points (moving from 3.75 to 4.86). Collectively, these results indicate that while students remain strongest in foundational segmentation, the pedagogical intervention was most transformative in addressing their initial deficiencies in managing complex linguistic structures.

Table 4: Task 1- Paired Samples Test presents the results determining if the training was effective

	Components	Mean Diff.	Std. Error Mean	95% confidence interval of the difference		t-value	Sig. (2-tailed)
				Lower	upper		
Pair 1	Pre - Post Segmentation	-0.99	0.06	-1.11	-0.87	-16.50	.001
Pair 2	Pre - Post Clarity/Fluency	-1.11	0.05	-1.21	-1.01	-22.20	.001
Pair 3	Pre - Post Complex Struct	-1.82	0.07	-1.96	-1.68	-26.00	.001
	Pre Total - Post Total	-3.92	0.09	-4.10	-3.74	-43.56	.001

The paired samples t-test results presented in table 4 confirm that the improvements across all translation components were statistically significant at the $p < .001$ level. The robust t-statistics most notably for the overall

performance gains $t(59) = -43.56$, $p < .001$ -alongside the tightly bound 95% confidence intervals, indicate that the pedagogical intervention exerted a highly powerful and consistent effect on the participants' translation competence. Specifically, the inferential data demonstrate that the training was most effective in enhancing the students' ability to manage complex linguistic structures. This specific domain yielded the highest absolute mean difference ($=1.82$) confirming that the intervention successfully targeted and mitigated the students' primary initial translation baseline deficiency

DISCUSSION

The research investigates the linguistic, cognitive, and cultural obstacles faced by Hausa-speaking undergraduates in North-West Nigerian universities when translating Arabic–English. The focus is on identifying factors like linguistic interference, structural differences, and cognitive overload, while also examining cultural factors such as religious expressions and idioms that may cause misinterpretation. Sixty 300 level Arabic students from ABU, BUK, and UMYU in the North-West of Nigeria were used in the study. To achieve the intended outcome of the study, a pre-experimental design was employed with one group utilized as both the pre and post-test measures. Following their selection, the participants underwent a comprehensive six-week training program. They were instructed to identify importance of cognitive overload.

The primary outcomes were obtained by comparing the mean scores of the pre-test and post-tested translation task, which indicated a significant surge in the average score of both tasks after the data analysis. Based on the cognitive theory, the participants' translation skills were enhanced by their ability to comprehend complex structures and segmentation techniques. This suggests that they improved their abilities in translation. Based on cognitive theory-based learning, the study's findings suggest that participants can achieve a good translation from the Arabic to the English language. Also, the pre-test results showed that the participants' translations' scores were low, but after the test, they significantly increased their mean score. The effectiveness of cognitive load processing in reducing translation time has been confirmed, and the post-test growth can be linked to the importance of cognition process in translating tasks.

According to the results, undergraduates in Northwest Nigeria who spoke Hausa had a significant improvement in Arabic-English translation performance with the help of Cognitive Load theory (CLT) based instruction. The significant improvement in performance between the pre-test and post-test cores indicates that the instructional intervention facilitated students' better management of the cognitive demands related to translation. According to the cognitive Load Theory, translation is a highly cognitive activity that necessitates learners to comprehend the source text, process meaning, suppress interference from other linguistic systems, and produce an accurate target text at the same time (Sweller, 1988). This puts significant strain on working memory, particularly in multilingual environments such as Hausa, Arabic, or English.

The observed improvement can be attributed to the instructional intervention that decreased intrinsic cognitive load by teaching students to divide complex sentences into simpler, more manageable units. According to Sweller, et al. (1998), learning is more effective when complex information is broken down into meaningful components that can be processed in a sequential manner. Through the reduction of information entry in working memory over time, learners were able to allocate more cognitive resources towards meaning transfer and translation production.

The improvement in clarity and fluency of speech can be attributed to a decrease in extraneous cognitive burden. Before intervention, many of the students relied heavily on literal word for. Which commonly caused awkward expressions. In the training, learners were taught to prioritize meaning over form as part of the translation process. Through the use of instructional scaffolding, mental effort that would otherwise be wasted on translation practices was reduced and students were able to focus more on producing coherent and fluent target texts. The results, therefore, support the argument that instructional design is crucial for efficient cognitive processing in complex language tasks.

Furthermore, the intervention yielded the most significant improvement in managing intricate structures and enhanced the development of translation schemas. According to Sweller, et al. (1998), learning occurs when learners create and automate mental schemas that aid in the efficient processing of information. Repetitive practices, guided exercises, and feedback help students develop cognitive frameworks for recognizing complex Arabic syntactic patterns and translating them into appropriate English structures (Paas, et al., 2003). The more rigid these schemas became, the less pressure was placed on working memory, allowing learners to process intricate linguistic information with greater precision and confidence.

The discoveries highlight the importance of German cognitive load in translating learning. In this regard, Paas, et al., (2003) argues that refining knowledge structures requires a significant amount of productive cognitive effort, which is known as Germane load. So, the training sessions prompted students to engage in meaningful activities such as paraphrasing, restructuring, and meaning formation, which enabled greater mental processing abilities. Rather than memorizing isolated linguistic forms.

Previous studies have demonstrated a correlation between cognitive load and translation performance, which is consistent with this study. According to Chen (2025), the participants' early struggles with intricate structures are a result of the cognitive burden that is increased by complex texts and reduced accuracy in translations. The improvement in clarity and fluency expressions was supported by Qassem's (2024) observation that translation fluencies are highly correlated with cognitive processing efficiency. Liu et al. (2025) argued in his work that the cognitively demanding translation task necessitates more sophisticated processing and strategic use of cognitive resources, an observation that is consistent with the significant gains observed after the intervention.

These results provide strong empirical evidence for cognitive load theory. The improvement observed after the intervention supports the hypothesis that learning is enhanced by reducing extraneous cognitive burden through instructional methods, managing linguistic load, and promoting germane cognitive load processing (Sweller, et al. 1998). Certainly, the structured and scaffolded nature of the training appears to have allowed learners to use their limited working memory resources more efficiently, leading to improved performance and learning. The results also align with Mayer's (2005) principle of segmentation, which suggests that learners learn more effectively by understanding complex information in simpler units. Consequently, Arabic-English translation performance can be significantly improved in multilingual educational settings through cognitively informed instructional strategies.

Nonetheless, the current study has some limitations that would not allow the researchers to generalize its findings. For instance, the study lacks control group; where 60 students who registered the translation course were used for pre and post test. The existing of control group could have helped the researchers avoid bias and ensure that the significant differences between pre-test and post test was due to the effect of the treatment rather than other possible factors. Nevertheless, to minimize the impact of absence of control group, the researcher's pre-test as a measure prior to the training sessions. In addition, the sample size is enough, this serves as an additional control measure to get reliable results. Another limitation of the study was that it was carried out only with under graduate students from the northern part of Nigeria. Thus, it should be noted that the results can not be generalized to cover the entire population students from the other part of the country. Another limitation was that of time constraints. The study was only conducted in the period of six weeks. A study with a more extensive treatment duration may have revealed different results.

Despite the limitations, the findings of the study will serve as a step for further research aimed at improving the learning of Arabic-English in Nigeria through the use of cognitive load during the instruction. To minimize these limitations in future studies, the use of randomization and a control group should be considered along with a larger sample size for the generalization of the findings.

CONCLUSION

The study showed that Hausa-speaking undergraduate students of North-West Nigeria performed significantly better in Arabic-English translation when taught using Cognitive Load Theory (CLT)-based instruction. Results

indicated notable enhancement in students' translation accuracy, comprehension, fluency, and especially their ability to handle complex Arabic sentence structures after a six-week instructional intervention. The results imply that the reduction of cognitive overload through text segmentation, guided translation practice and meaning-based translation enables learners to process information more efficiently and produce better translations. The study suggests that cognitive factors are important to translation performance and recommends the use of Cognitive Load Theory in translation teaching for better learning outcomes, translation accuracy and fluency.

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