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Computer-assisted interpreting tool and simultaneous interpreters' perceived cognitive load and adoption intent

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ABSTRACT

The rapid integration of Computer-Assisted Interpreting (CAI) tools into professional interpreting practice raises critical questions about their cognitive impact, particularly in Global South contexts where infrastructure and training constraints compound the challenge. This mixed-methods study investigated how the use of InterpretBank, a CAI tool, affects the perceived cognitive load of 18 Indonesian professional simultaneous interpreters during simulated diplomatic interpreting tasks, and what factors drive their intent to adopt the tool. Using a 2×2 within-subjects design (CAI tool use × text difficulty), perceived cognitive load was measured through an 18-item Likert-scale self-rating questionnaire assessing mental effort, stress, frustration, and difficulty of listening, comprehension, and memory, and through retrospective semi-structured verbal protocols probing attention management. Results show that all participants rated their cognitive load as significantly higher in CAI-supported conditions than in non-CAI conditions, with the highest ratings for listening, comprehension, and memory. Qualitative analysis of verbal protocols identified five themes, i.e., attention disruption, memory and listening interference, tool management challenges, strategic coping, and conditional utility. Despite these costs, most participants expressed moderate to high adoption intent, driven by the tool's value for specialist terminology preparation, pre-task glossary building, and post-production accuracy verification. Training was unanimously identified as the primary adoption enabler. These findings suggest the need for locally adapted CAI tools to ensure maximum benefit to the specific demands of a CAI-assisted Simultaneous Interpreting context. Furthermore, the study provides participant-reported evidence establishing a conditional adoption model tailored to professional interpreting in the Global South. Recommendations include tiered CAI training curricula, attention-switching skill development, and the design of offline-capable, locally adaptable tools.

Keywords: Adoption intent; cognitive load; computer-assisted interpreting; Global South; Indonesian interpreters; simultaneous interpreting

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INTRODUCTION

The language industry's rapid integration of technology has transformed interpreter-mediated communication from an essentially manual, face-to-face practice into an increasingly technology-dependent one. Yet this shift has not always been matched with adequate support for interpreters' cognitive (Chen et al., 2016; Costa et al., 2014) and practical needs (Baume, 2022; Nielsen, 2022). The central tension this study investigates is whether a Computer-Assisted Interpreting (CAI) tool, designed to help interpreters manage terminology and reduce memory demands, intensifies the cognitive load already inherent in simultaneous

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interpreting (SI) rather than alleviating it. This question is particularly urgent in professional contexts in the Global South, where limited training infrastructure and technological constraints compound the challenge.

Simultaneous interpreting is widely regarded as one of the most cognitively demanding language tasks (Seeber, 2011). Interpreters must listen to and analyze the source language (SL), retain segments in working memory, and simultaneously produce target language (TL) output, all in real time. Cognitive load, defined in this study as the cognitive effort required to complete SI tasks (Gile, 2009; Sweller, 1994), is a crucial factor in assessing quality. When cognitive load exceeds available attentional capacity, interpreters are prone to errors and omissions, which are recognized as primary indicators of cognitive load (Gile, 1999; 2011). CAI tools, which provide terminology databases, glossary lookups, and, in some cases, Automatic Speech Recognition (ASR) support, are intended to reduce these demands. However, preliminary evidence suggests that their operation during live interpreting may itself impose an additional cognitive layer (see Yuan & Wang, 2023), raising the question of whether tools designed to support interpreters may, paradoxically, hinder them.

Despite growing scholarly attention to CAI tools, most research has focused on European language pairs and student or novice interpreters (Prandi, 2018, 2023; Defrancq & Fantinuoli, 2021; Wang & Wang, 2019). Professional interpreters in linguistically diverse, resource-constrained settings, such as Indonesia, remain largely understudied. Indonesia presents a compelling case, as Bahasa Indonesia's recent designation as one of UNESCO's official languages (UNESCO, 2023) highlights the urgency of equipping Indonesian interpreters with current professional tools. At the same time, infrastructural constraints (variable internet connectivity, limited dedicated CAI training) and the country's rich linguistic diversity create a distinctive adoption context that existing CAI frameworks, developed largely in Global North settings, do not adequately address (Djafri & Wahidati, 2022; Rakhmawati, 2023).

This mixed-methods study addresses these gaps. Specifically, it investigates the influence of the CAI tool on Indonesian professional simultaneous interpreters' perceptions of their cognitive load and the factors driving their adoption intent for the CAI tool. By focusing on professional interpreters and centering a Global South context, the study offers three contributions. Firstly, it provides evidence on CAI-related perceived cognitive load among a previously unstudied professional population. Also, it extends Gile's Effort Model to a CAI-assisted interpreting context and provides participant-reported evidence that appears consistent with the attentional predictions of Barrouillet's (2015) Time-Based Resource Sharing model. Lastly, it produces context-specific recommendations for CAI design, training, and policy relevant to the Global South.

Cognitive Load in Simultaneous Interpreting: Definitions and Components

Cognitive load is defined in this study as the cognitive effort required to complete simultaneous interpreting tasks, specifically language comprehension and production (Gile, 2009; Gile & Lei, 2020; see also Rakhmawati, 2023). The construct derives from Cognitive Load Theory (CLT), originally proposed in cognitive psychology by Sweller (1988, 1994), which posits that the human brain has limited processing capacity and cannot process multiple complex tasks simultaneously without cost. Applied to interpreting, CLT explains why errors and omissions occur even among skilled interpreters. The inherent cognitive demand of SI almost always operates close to the interpreter's available attentional limit (Gile, 1999).

Cognitive load is a measurable construct, indexed in this study by self-rating responses that capture participants' subjective experience of effort, stress, and difficulty across specific process components. Within SI specifically, cognitive load is constituted by several distinct but interacting process components. This study's primary theoretical framework is Gile's (2009) Effort Model, which comprises: (a) **Listening and Analysis (L)**, the cognitive operations involved in hearing, decoding, and understanding the SL speech; (b) **Memory (M)**, the short-term storage and retrieval of SL segments during the interpreting process; (c) **Production (P)**, the cognitive and linguistic activities required to produce the TL output, including self-monitoring; and (d) **Coordination (C)**, the management of attentional resources across the three efforts. Gile's formula for SI is $R(SI) = R(L) + R(M) + R(P) + R(C) \leq$ Total Available Resources. When the sum of required resources exceeds what is available, cognitive saturation occurs, resulting in errors, omissions, and infelicities (Gile, 1999; 2011). This study applies Gile's extended formula of SI: R + M + P + HMI + C (Human-Machine Interaction) (Gile, 2020) and extends it to CAI-assisted SI as: $R(CASI) = R(L) + R(M) + R(CAI) + R(P) + R(C)$, where $R(CAI)$ represents the additional attentional resource required for tool management during interpretation.

Cognitive load in SI is commonly measured through four types of indicators. Subjective measures include self-rating questionnaires such as the NASA Task Load Index (Chen, 2017; Zhu & Aryadoust, 2022) and cognitive load self-rating instruments (Ayres, 2006; Joseph, 2013; Rakhmawati, 2023). Performance measures examine interpreting output quality through indicators such as errors, omissions, and disfluencies (Gile, 2011; Plevoets & Defrancq, 2018; Adler, 2024).

Physiological measures include eye-tracking (Robert et al., 2025), heart rate, and EEG data (Li & Chmiel, 2024). Behavioral measures track physical actions such as keystroke logging or gaze (Prandi, 2023; Chen et al., 2016). This study employs subjective (self-rating) measures, the 18-item cognitive load questionnaire, and retrospective verbal protocols, which are well-established for experimental SI research (Paas et al., 2003) and appropriate for the study's mixed-methods design targeting perceived cognitive load. Self-rating scales remain a promising but underused instrument for interpreting research, with Chen (2017) applying them in consecutive rather than simultaneous interpreting; pairing self-ratings with retrospective verbal protocols in a single design offers a further opportunity.

Several empirical findings inform this study's design. Interpreting experience may significantly influence cognitive load. Experienced interpreters exhibit lower overall CL because they automate component skills more (Adler, 2024). Language directionality matters, as interpreting into a second language may impose a higher CL than interpreting into a first language (Rakhmawati & Emilia, 2025). Task complexity, speech rate, and terminology density are additional load-inducing factors (Chmiel et al., 2024; Christoffels & De Groot, 2009; Gile, 2009). These variables were therefore controlled in this study's experimental design, as detailed in the Methods section.

Evolution and Functionality of CAI Tools

Computer-Assisted Interpreting (CAI) refers to the practice of real-time oral translation supported by computer technology. CAI tools have evolved from simple digital glossary databases into integrated platforms that combine terminology management, Automatic Speech Recognition (ASR), and, in more recent iterations, AI-driven real-time term suggestion (Fantinuoli, 2018, 2023). Current tools span a spectrum from human-centric tools that preserve interpreter control through manual glossary curation to AI-driven tools that automate terminology retrieval and provide ASR-generated transcriptions of SL speech.

The tool used in this study, *InterpretBank*, is a human-centric glossary management platform. Based on the time of the study, *Interpretbank*'s primary functions appear: (a) pre-task glossary building, enabling interpreters to compile and upload domain-specific terminology before an assignment; (b) real-time glossary querying during interpretation, through a one-click or keyboard-search interface that retrieves pre-loaded term equivalents; and (c) optional ASR integration for live captioning (not used in this study due to technical constraints in the online multi-device setup). *InterpretBank* was specifically designed for interpreting and has been empirically validated in prior CAI research (Fantinuoli, 2017; 2018; Prandi, 2018). Table 1 situates *InterpretBank* within the broader CAI tool landscape.

Table 1.
Key CAI Tools by Primary Function (adapted from Ortiz & Cavallo, 2018; Martin, 2020; Fantinuoli, 2018)

Tool	Primary Function	SI-specific	Type
InterpretBank	Glossary management, real-time lookup, and optional ASR	Yes	Human-centric
Boothmate	Live terminology support, ASR	Yes	Human-centric
ILA (KUDO)	Automated glossary creation, real-time term suggestion, ASR-MT	Yes	AI-driven
Interprefy	Remote SI platform with interpreter support features	Yes	Platform + CAI
DeepL / Google Translate	Automatic text translation	No	MT (not CAI)

Despite the expanding tool landscape, adoption among professional interpreters remains limited. Many continue to rely on manual glossaries, Excel lists, or printed term sheets (Costa, Corpas Pastor, & Durán Muñoz, 2014; Martin, 2020; Paster & Fern, 2016; Prandi, 2018). Resistance to adoption is attributed to interface complexity, time constraints during live interpretation, insufficient CAI-specific training, and skepticism about the benefits of the tool relative to its costs (Ortiz & Cavallo, 2018). The pre-selection survey in this study confirmed this pattern, that only 10% of Indonesian interpreter respondents had used a dedicated CAI tool such as *InterpretBank*, and 61.8% still relied on manual/printed glossaries.

Theoretical Frameworks: Cognitive Load and CAI Tool Impact

The theoretical foundations of this study draw from two complementary models that together explain how CAI tool use interacts with SI cognitive processes. Gile's (2009) Effort Model is the primary framework. As described previously, the model posits that SI outcomes depend on the balance between total required and total available attentional resources. When CAI tool management (R(CAI)) is added to the standard SI effort formula, the risk of attentional overload, the 'tightrope' condition in which any additional demand causes the interpreter to exceed available capacity, increases. Prandi's (2018) empirical study using *InterpretBank* with student interpreters found that while the tool improved terminology accuracy, it simultaneously increased omissions. These results appear consistent with the Effort Model’s prediction. The present study extends this line of inquiry by investigating how professional interpreters perceive and report this cognitive load through self-ratings and verbal protocols in an English-to-Indonesian diplomatic context.

Barrouillet's (2004; 2007; 2015) Time-Based Resource Sharing (TBRS) Model provides a complementary theoretical lens for understanding the temporal dimension of cognitive load in CAI-assisted SI. The TBRS model holds that: (1) any cognitive task requiring attention can occupy the focus of attention only one at a time; (2) unattended memory items decay over time if not refreshed; and (3) maintenance of memory items requires directed attentional refreshing. Applied to SI with a CAI tool, the model predicts that when an interpreter shifts attention to a term query, the SL segment held in working memory begins to decay; if the query occupies attention for long enough, the memory trace of that segment may be lost before production can resume. This paper presented part of the study that measures participants' retrospective accounts of memory and listening disruption during tool queries to provide experiential evidence that appears consistent with this attentional decay prediction. Thus, the TBRS model is used as an interpretive framework for understanding the pattern of perceived cognitive load reported by participants. The TBRS model is not treated as a model whose temporal parameters are independently tested, since we did not report measurements of query durations or response latencies in this paper.

A further consideration, noted by Moser-Mercer (2000), is that efficient simultaneous interpreting depends on a high degree of automation in component tasks, freeing controlled attention for less routine demands. CAI tool use, by introducing a novel and not-yet-automated task into an established interpreting routine, necessarily draws on controlled attentional resources, which is why even experienced professional interpreters in this study reported cognitive load despite their overall interpreting proficiency.

Together, these frameworks predict that: (a) interpreters will perceive their cognitive load as significantly higher in CAI-supported conditions than in non-CAI conditions, particularly on the listening, comprehension, and memory components corresponding to Gile's L and M efforts; (b) this effect will be present across both easy and difficult texts, given that tool management introduces a constant attentional cost regardless of text complexity; and (c) interpreters will report subjective experiences of memory and listening disruption during tool queries, echoing the attentional decay logic of TBRS. Predictions (a) through (c) are directly addressed through the self-rating questionnaire and retrospective verbal protocols reported in this article as part of a larger study.

CAI Research: Evidence, Gaps, and Mixed Findings

Empirical CAI research presents a mixed picture. A first stream of research documents performance benefits. Fantinuoli (2018, 2023) and Defrancq et al. (2024) report that CAI tools can enhance accuracy, particularly for numbers and technical terminology. Prandi (2018) found that InterpretBank was superior to Word and Excel glossaries for terminology quality among student interpreters. Li and Chmiel (2024) demonstrated that ASR-generated subtitles improved interpreting accuracy while reducing cognitive load. Abdelaal (2024) found similar benefits for novice interpreters using InterpretBank in an Arabic-English context.

A second stream, however, documents cognitive costs. Wang and Wang (2019) found that ASR tools, while improving accuracy for high-proficiency interpreters, increased cognitive load for those with lower proficiency. Prandi (2023), in a more controlled cognitive-experimental study, documented complex interactions between tool use, terminology retrieval, and interpreter performance, with tool management consuming attentional resources that compete with core SI tasks. Defrancq et al. (2024) similarly found increased disfluencies associated with CAI tool use, consistent with the attention-residue effects documented by Yuan and Wang (2023). The pattern across these studies suggests that CAI tools offer benefits primarily under specific conditions: sufficient interpreter experience, a favorable speech rate, and high familiarity with the tool's interface.

Global South Context: Indonesia and CAI Adoption Challenges

The Technology Acceptance Model (TAM; Davis, 1989; Dianati et al., 2022) identifies perceived usefulness and ease of use as the primary predictors of technology adoption. However, TAM was developed in Global North contexts and does not fully capture the structural barriers to CAI adoption in settings like Indonesia. Three contextual factors are particularly relevant: infrastructure, linguistic diversity, and the training ecosystem.

In terms of infrastructure, internet penetration in Indonesia has grown significantly. However, connectivity remains variable outside major metropolitan areas, limiting the usability of cloud-dependent CAI features. InterpretBank's offline functionality was a key selection criterion in this study, directly addressing this constraint.

For context on linguistic diversity, Indonesia has over 700 languages, and the complex relationship between Bahasa Indonesia and regional languages (Eberhard et al., 2023) creates challenges in terminology management. Bearing in mind that existing CAI tools designed primarily for European language pairs have not addressed such diverse languages. Locally curated resources (e.g., the Kateglo dictionary) exist but lack interoperability with CAI glossary features.

Regarding the training ecosystem, structured CAI training is not yet embedded in Indonesian interpreter education programs (Rakhmawati, 2023), whereas in the European Union, interpreter education actively incorporates CAI tool training (Fantinuoli & Montecchio, 2022; Gieshoff, 2024). The pre-selection survey in this study found that 90% of Indonesian interpreter respondents had no prior experience with InterpretBank, though most had used digitally adjacent tools (electronic dictionaries, glossary applications), suggesting foundational readiness if appropriate training is provided.

Research Gaps and Study Positioning

Four gaps position this study. First, CAI research has centered on student and novice interpreters, leaving professional interpreters, for whom tool integration means reorganizing established routines, understudied. Second, most work is situated in European or Chinese contexts, with Indonesia and comparable settings absent from the literature. Third, self-rating scales combined with retrospective verbal protocols remain underutilized for capturing perceived cognitive load in a single design. Fourth, what drives professional interpreters' adoption intent in resource-constrained settings, beyond standard TAM variables, is not yet well understood.

This study addresses all four gaps through a mixed-methods 2×2 design with 18 Indonesian professional simultaneous interpreters, using self-rating questionnaires and retrospective verbal protocols as converging instruments to measure perceived cognitive load and adoption intent. The following section details the methodology.

METHODS

This article reports on a part of a larger study that employed a mixed-methods design to investigate two research questions: (RQ1) How does the CAI tool influence interpreters' perceived cognitive load during simultaneous interpreting (SI)? (RQ2) What factors drive adoption intent for the CAI tool in this Global South setting? Quantitative and qualitative data were integrated through triangulation to enhance validity and applicability (Creswell & Clark, 2017).

The study protocol received ethics approval from the IRB Board (protocol no. 21-395). Participants provided written informed consent prior to participation, were explicitly informed of their right to withdraw at any stage without consequence, and were assured of data confidentiality. All recordings and transcripts were anonymized (P1–P18) and stored on password-protected drives.

Participants and Recruitment

Participants were recruited via purposive sampling through an online pre-selection survey distributed by the Indonesian Translators' Association (HPI), the Indonesian Association for Conference Interpreters (AICI), the American Translators Association (ATA), and Indonesian interpreters' professional online forums. The survey was designed using Qualtrics. A total of 114 survey responses were recorded, of which approximately 68 were completed in full. From the completed responses, 32 participants agreed to participate in the experiment and signed written consent forms.

A target of 30 participants was set, consistent with recommended sample sizes for experimental interpreting studies (Perret & Kandel, 2014). Of the 32 who consented, 23 could complete the simulated interpreting tasks. Upon data screening, five were excluded. Three for incomplete task submissions and two (pilot) due to technical audio synchronization errors during online recording. This yielded a final analytical sample of 18 participants.

For this study, "professional interpreter" refers to individuals with paid interpreting experience who may or may not hold formal training credentials or professional association membership, but who use technology as part of their interpreting practice. All 18 participants were native speakers of Indonesian and disclosed their TOEFL or IELTS scores as evidence of English proficiency. Six participants completed tasks onsite in the United States (Washington D.C., Maryland, Virginia, and California); 12 participated online from Indonesia and Canada via Zoom or Skype. The cohort represented diverse experience levels, reflecting the pre-selection survey sample (n = 68), which were 1–5 years (26.5%), 5–10 years (22.1%), 10–20 years (17.6%), and over 20 years (11.8%).

Task Design and CAI Tool Selection

Each participant completed four simulated diplomatic speech interpretation tasks (approximately 3 minutes each) in a 2×2 within-subjects design: two easy texts (E1, E2) and two difficult texts (D1, D2), each interpreted under both CAI-supported and non-CAI conditions. All 18 participants completed all four conditions, serving as their own controls. Table 2 illustrates the factorial structure.

Table 2

2×2 Within-Subjects Factorial Design

Text Difficulty	With the CAI Tool	Without the CAI Tool
Easy (E1, E2)	Perceived CL measured	Perceived CL measured
Difficult (D1, D2)	Perceived CL measured	Perceived CL measured

Text order and CAI condition assignments were counterbalanced across participants to control for order effects (Gile, 1998). A pilot study was conducted in January–February 2022 with two participants (one onsite, one online) to validate procedures and speech materials before the main data collection phase (March–August 2022).

Source Speech
The source speech was an authentic audio-video address delivered by U.S. Secretary of State Michael Pompeo during his official visit to Jakarta, Indonesia, on 29 October, 2020 (Pompeo, 2020a & 2020b; total length 10:14). This speech was selected for the following reasons: (a) *ecological validity*, an authentic diplomatic address at a professional speech rate reflects real conference interpreting demands; (b) *contextual familiarity*, delivered in Indonesia and addressing Indonesian organizations, history, and values, providing participants with relevant background; and (c) *difficulty manipulability*, the speech contains passages of varying terminology density and lexical complexity suitable for the easy/difficult distinction.

Four experimental texts and one practice text were extracted from the first ten minutes of the speech (200–300 words each). Easy texts (E1, E2) covered general bilateral relations and universal values. Difficult texts (D1, D2) contained culturally embedded and politically sensitive terms, including "Pancasila," "Bhineka Tunggal Ika," "Nahdlatul Ulama (N.U.)," "unalienable rights," "blasphemy accusation," and proper names ("Gus Dur," "Bachtiar Effendy," "Mary Anne Glendon"), terms familiar to Indonesian interpreters but rendered challenging by the speaker's American English accent and pronunciation.

Speech Difficulty Operationalization
Text difficulty was operationalized through three criteria.

- *Lexical Complexity and Terminology Frequency:* Easy texts contained a lower proportion of technical and domain-specific terminology. Difficult texts included higher frequencies of low-frequency jargon, culturally embedded proper nouns, and specialist political-legal vocabulary (e.g., "unalienable rights," "blasphemy accusation," "foundational principles"). Terminology classification was assessed by the researcher and validated by two external expert reviewers.
- *Speech Rate:* The overall speech rate averaged 130–150 words per minute (wpm), within the professional range defined by Seleskovitch (1965) and Christoffels and De Groot (2009). The natural speech rate was preserved to maintain ecological validity.
- *Syntactic Complexity and Readability:* Texts were assessed using seven automatic readability formula indices (readabilityformulas.com). Easy texts were rated 'standard or average'; difficult texts were rated 'difficult to read.' Difficult texts additionally featured longer noun phrases and embedded clause structures, posing English-to-Indonesian transfer challenges.

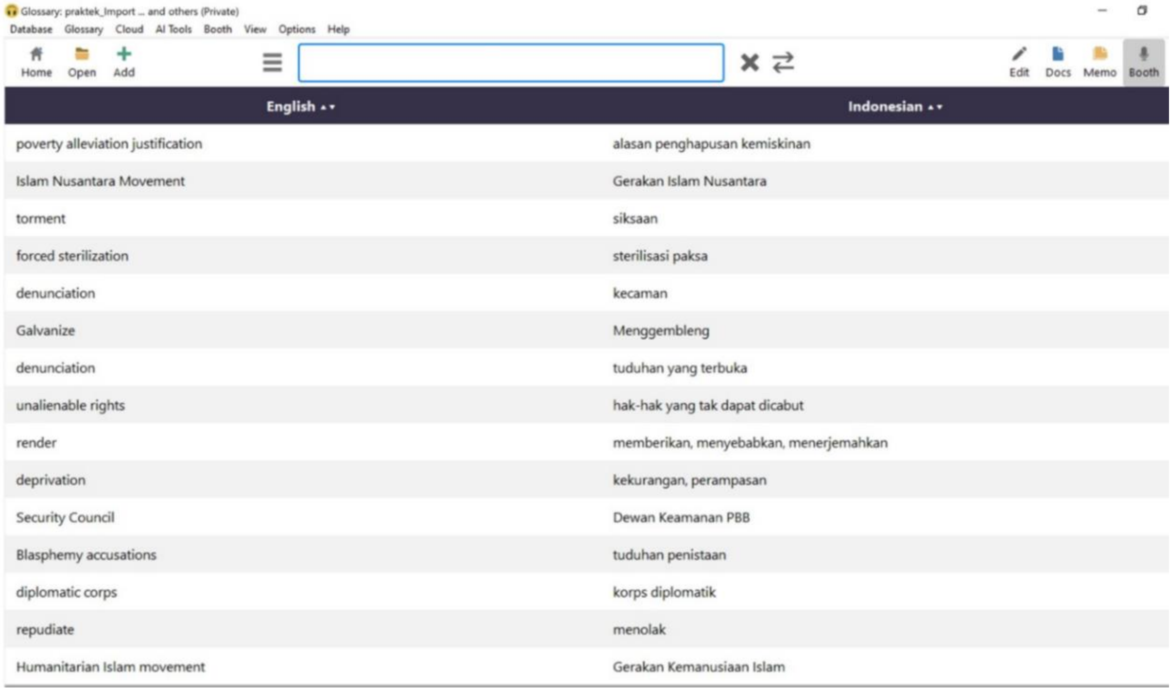
CAI Tool Selection, Features, and Training
InterpretBank was selected as the CAI tool based on pre-selection survey results. It was selected for its offline functionality, addressing Indonesia's variable internet connectivity; its glossary management features, aligning with existing practice (61.8% of Indonesian interpreters use manual/printed glossaries); and its prior validation in SI research (Fantinuoli, 2018). The example of the CAI tool display can be seen in Figure 1. It is the illustration of the tool, with a preloaded glossary from the text used in the experiment.

Participants installed the trial version of InterpretBank one to two weeks before their experiment session. The researcher conducted two individual online preparatory meetings per participant, covering tool training, glossary preparation, and procedural orientation. Tool training includes instruction in *InterpretBank*'s interface, term-entry, query functions, and screen navigation. Glossary preparation covers the distribution of a preloaded speech-specific terminology bank compiled from the source texts and adaptation or adjustment of the glossary entries based on each interpreter's preference. Procedural orientation involves briefing on the speaker's name, speech topic, and general context, without disclosure of specific speech content. As seen in Figure 1, the glossary entries were adjusted so that each participant displayed different entries. On the day of the experiment, an additional 30 minutes were allocated for procedural review and a 2–3-minute warm-up practice text. In CAI conditions, participants accessed *InterpretBank* on a secondary screen or device alongside the speech video. The experiment proceeded using the glossary management and manual query functions. In non-CAI conditions, participants used paper notepads and printed glossaries.

Data Collection Instruments
Cognitive Load Assessment (RQ1)
Perceived cognitive load was measured through two instruments, as described below.

Instrument 1. 18-Item Self-Rated Cognitive Load Questionnaire.
Upon completing all four tasks, participants completed an 18-item Likert-scale questionnaire (1 = strongly disagree, 5 = strongly agree) adapted from Rakhmawati (2023), Ayres (2006), and Joseph (2013). The questionnaire assessed perceived cognitive load across three domains: (a) *mental effort and overall difficulty*; (b) *process components*: self-rated difficulty of listening, comprehension, and remembering (Gile, 2009); and (c) *affective-cognitive state*: stress, frustration, relaxation, confidence, and interest in future CAI use. Instrument reliability was high (Cronbach's α = 0.85).

Figure 1
Interpretbank Glossary View (Rakhmawati, 2023, p. 76)


Glossary: praktek_Import ... and others (Private)
Database Glossary Cloud AI Tools Booth View Options Help
Home Open Add Edit Docs Memo Booth

English	Indonesian
poverty alleviation justification	alasan penghapusan kemiskinan
Islam Nusantara Movement	Gerakan Islam Nusantara
torment	siksaan
forced sterilization	sterilisasi paksa
denunciation	kecaman
Galvanize	Menggembleng
denunciation	tuduhan yang terbuka
unalienable rights	hak-hak yang tak dapat dicabut
render	memberikan, menyebabkan, menerjemahkan
deprivation	kekurangan, perampasan
Security Council	Dewan Keamanan PBB
Blasphemy accusations	tuduhan penistaan
diplomatic corps	korps diplomatik
repudiate	menolak
Humanitarian Islam movement	Gerakan Kemanusiaan Islam

Instrument 2. Retrospective Verbal Protocols.
Semi-structured verbal protocol sessions (≤15 minutes per session) were conducted immediately after each of the four interpreting tasks, yielding 72 sessions total across 18 participants. Sessions were audio-video recorded and later fully transcribed. The verbal protocols probed attention management specifically, using structured prompts including *"What is your impression about the interpreting that you just did?"; "At what points did the tool disrupt your focus?"; "Is there any difference now that you used the CAI tool compared to when you did not use it?"; "How did you manage your attention between the speech and the tool?"*

Adoption Intent Assessment (RQ2)
RQ2 was addressed through adoption-related items in the 18-item questionnaire (interest in future CAI tool use, M = 4.06/5.00; confidence; certainty) and through adoption intent probes in the verbal protocol sessions administered at the end of the final task session.

Data Analysis
The data were analyzed using a mixed-methods approach. For the 18-item self-rating questionnaire (Instrument 1), descriptive statistics, including means, standard deviations, and frequency distributions, were calculated to identify trends in participants' perceived cognitive load, stress, and frustration.

For qualitative analysis (RQ1 Instrument 2 and RQ2), verbal protocol transcripts were analyzed using inductive thematic analysis (Braun & Clarke, 2006) in NVivo R1. Initial codes were generated from participants' retrospective descriptions of their attention management, tool experience, and adoption intent, then grouped into higher-order themes. Inter-coder reliability for thematic coding reached κ = 0.82 after two rounds of consensus discussion.

Quantitative self-rating scores and qualitative verbal protocol findings were triangulated methodologically (Denzin, 1978) to produce a converging account of perceived cognitive load (RQ1) and adoption intent (RQ2).

Participant Demographics
The following demographic data are drawn from the pre-selection survey (n = 68 complete responses). The majority of survey respondents had used tools with features similar to Interpretbank's (electronic dictionaries, glossary apps, Interprefy). As seen in Figures 2 and 3, the survey data present respondents' interpreting experiences and the types of tools used.

Figure 2 presents survey respondents' experience, with the majority having 1-5 years and the fewest having over 20 years. Of the 68 respondents, only 55 answered the questions about the use of technology during their interpreting work, as shown in Figure 2.

Figure 2
Survey Respondents' Interpreting Experience

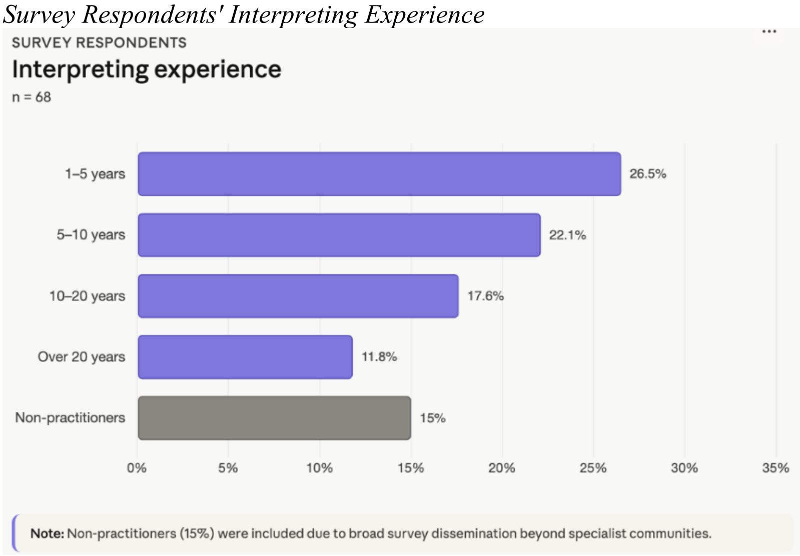


Figure 3
Technological Tool Usage during Interpreting.

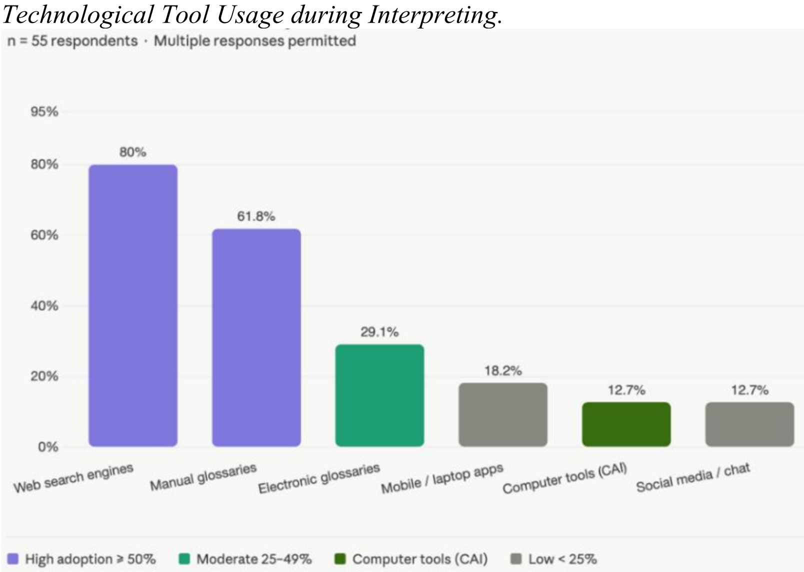


Figure 3 presents 55 responses on different types of technology used during interpreters' live jobs. 80% use web search engines; the majority of interpreters use this, and the CAI tool ranks last with 12.7% usage among respondents.

Although the majority of survey respondents had no prior experience with InterpretBank specifically, they had strong technical experience with similar tools. This foundational technological literacy, combined with the researcher-led training provided before the experiment, ensured that *InterpretBank* could be introduced within a familiar technological framework for all participants.

FINDINGS AND DISCUSSION

This section presents findings from the two data collection instruments used in this study to address the two objectives of the study on the influence of the CAI tool on the interpreters' perceived cognitive load and factors driving the tool adoption intent, which were addressed through the self-rated cognitive load questionnaire and the retrospective verbal protocols upon participants completed four interpreting conditions.

The CAI Tool's Influence on Interpreters' Perceived Cognitive Load

Self-Rated Cognitive Load

The 18-item Likert-scale self-rating questionnaire (Cronbach's α = 0.85), administered after all four tasks, assessed participants' perceived cognitive load across specific process components, mental effort, stress, frustration, relaxation, and difficulty of listening, comprehension, and memory, in both CAI and non-CAI conditions. Table 3 presents the full distribution of means and standard deviations for all 18 participants.

Table 3.
Distribution of Means and Standard Deviations, Self-Rated Cognitive Load (N = 18). Source: Rakhmawati (2023), Table 7

Self-Rating Item	Mean	Std. Dev.	N	Condition
Text difficulty	4.83	2.36	18	No CAI tool
Text difficulty	5.50	2.04	18	With CAI tool
Difficulty listening to speech	7.00	2.03	18	With CAI tool
Difficulty comprehending speech	7.06	1.86	18	With CAI tool
Difficulty remembering speech	6.89	1.68	18	With CAI tool
Easy listening with tool*	6.72	1.71	18	With CAI tool (easy)
Easy comprehending with tool*	6.28	2.11	18	With CAI tool (easy)
Easy remembering with tool*	6.83	2.01	18	With CAI tool (easy)
Stress level — with CAI tool	5.78	1.59	18	With CAI tool
Stress level — without CAI tool	3.39	1.58	18	No CAI tool
Relaxed — with CAI tool*	5.22	2.18	18	With CAI tool
Relaxed — without CAI tool*	3.44	1.85	18	No CAI tool
Frustrated — with CAI tool	4.89	2.27	18	With CAI tool
Frustrated — without CAI tool	3.22	2.02	18	No CAI tool
Confident performing SI with tool*	5.22	2.26	18	With CAI tool
Interested in tool use for SI*	4.06	2.41	18	Post-task
Certainty of performing SI with tool*	4.39	2.30	18	With CAI tool

Note. * = reverse-coded item.

The questionnaire findings confirm that all 18 participants perceived their cognitive load as significantly higher in CAI-supported conditions than in non-CAI conditions across every measured dimension.

*Overall text difficulty***.** Participants rated interpreting with the CAI tool as more difficult (M = 5.50) than without it (M = 4.83). This overall perception of greater difficulty in CAI conditions held across both easy and difficult text types.

Cognitive process components. The items with the greatest self-rated difficulty were those corresponding directly to the cognitive process components in Gile's (2009) Effort Model. Difficulty of comprehension while using the tool (M = 7.06) was rated highest, followed by difficulty of listening (M = 7.00) and difficulty of remembering (M = 6.89). Even for *easy* texts, these same process components remained substantially challenged: easy listening with the tool (M = 6.72), easy comprehending (M = 6.28), and easy remembering (M = 6.83). This pattern confirms that CAI tool use imposed perceived cognitive costs on the L and M efforts, the core input processes of SI, even when the text content was not inherently difficult.

Affect and mental state. Participants rated SI with the CAI tool as substantially more stressful (M = 5.78 vs. 3.39 without the tool), less relaxing (M = 5.22 vs. 3.44), and more frustrating (M = 4.89 vs. 3.22). These differences reflect the sustained attentional management demands of real-time tool use.

Confidence and certainty. Participants rated their confidence in performing SI with the tool (M = 5.22) and their certainty (M = 4.39) as moderate, reflecting the division in the sample between those who found the tool beneficial (4/18) and those who found it disruptive (14/18).

All in all, the self-rating questionnaire findings establish that all 18 participants experienced higher perceived cognitive load when using the CAI tool, with the specific burden falling most heavily on the listening, comprehension, and memory components of the interpreting process.

Retrospective Verbal Protocols — Attention Management

Semi-structured retrospective verbal protocols were conducted immediately after each of the four interpreting tasks (72 sessions total). Thematic analysis (Braun & Clarke, 2006) identified five themes: (a) attention disruption, (b) memory and listening interference, (c) tool management challenges, (d) strategic coping, and (e) conditional utility. Table 4 presents the thematic summary.

Attention disruption and reported memory decay. The most prevalent theme, reported by 14 of 18 participants, was that tool use directly disrupted attention to the SL speech. P10's comment, *"my brain got stuck... my ears were like they were on hold",* articulates simultaneous failures of Memory (M) and Listening/Analysis (L) efforts. This experiential account aligns with TBRS's prediction that redirecting attention to a secondary task causes unattended memory items to decay (Barrouillet, 2015); however, since the verbal protocols are retrospective and approximate, they document participants' subjective perception of this process rather than the temporal mechanism itself.

Time pressure as the binding constraint. Twelve of 18 participants described time pressure as the specific mechanism through which tool use became disruptive. P16's observation, "there is very little space for us to think and also speak", reflects the

Table 4.
Thematic Summary of Retrospective Verbal Protocol Analysis (N = 18; all participants; 72 sessions)

Theme	Frequency	Representative Quote	Theoretical interpretation
(a) Attention disruption	14/18	"When I had to move my head to the tool and tried to seek out the words, I kind of lost concentration on what I heard." (P4)	Suggestive disruption of Coordination effort (C) and Listening/Analysis effort (L) in Gile's (2009) model.
(b) Memory and listening interference	14/18	"My brain got stuck, busy looking at the Interpretbank, and then my ears were like they were on hold." (P10)	The experiential statement aligns with TBRS prediction that unattended memory items decay when attention is redirected (Barrouillet, 2015). Memory (M) and Listening (L) efforts appear to have been jointly strained, as reported retrospectively.
(c) Tool management challenges	14/18	"I was busy typing, turning my head back and forth... what if there's a typo? It can even confuse me." (P10)	Manual typing adds executive function demand to an already saturated cognitive system (Moser-Mercer, 2000).
(c) Time pressure during queries	12/18	"There is very little space for us to think and also speak. Sometimes if we miss a fraction of a second, he has already changed to another sentence." (P16)	Participants' reported experience of time pressure echoes TBRS's temporal constraint logic, though the precise decay interval cannot be quantified from verbal reports alone.
(c) Freezing during term lookup	6/18	"When I looked at 'forced sterilization', I froze for a moment there, looking at what the translation was." (P1)	Attentional capture by tool query halts production and memory maintenance which appears consistent with Gile's Tightrope Hypothesis (1999).
(d) Strategic coping: attention-switching	9/18	"I tried to split my focus into the speeches and into the screen... one word I fully took benefit from was '1945 constitution'." (P9)	Active attention-switching strategy consistent with Gile's (2009) coordination tactics.
(d) Strategic coping: post-task verification	3/18	"I used the glossary only to check if my interpretation was accurate... for faster delivery I'd just go right ahead and interpret based on context." (P2)	Restricts CAI use to post-production windows, a strategy that may help preserve L, M, P balance during interpretation proper.

real constraint of a 130–150 wpm speech rate. This reported experience appears interpretively consistent with TBRS's formalization of cognitive load as a function of processing time relative to total available time (Barrouillet et al., 2007). The precise query durations and decay intervals predicted by the TBRS model are not directly measurable from verbal reports alone; future studies using real-time measures (eye-tracking, keystroke logging) would be needed to test the temporal parameters specifically.

Executive function cost of typing under pressure. Six participants specifically mentioned the cognitive cost of typing during SI. P10's account of worrying about typos while simultaneously listening and producing illustrates his/her controlled attention demand (Moser-Mercer, 2000), which is an executive function layer requiring accuracy monitoring on top of the core SI task.

Strategic coping. Nine of 18 participants described explicit attention-switching strategies they developed during the experiment, selectively querying only the highest-priority terms, using glossary preview at task start to reduce live queries, and abandoning queries mid-task when time pressure became acute. These strategies closely parallel the coordination tactics described by Gile (2009).

Conditional utility. Four participants (P5, P6, P9, P12) reported CAI tool benefits, in every case, conditional on specialist vocabulary at slower speech rates or for post-task accuracy verification. No participant reported the tool as unconditionally beneficial during live interpretation at the natural speech rate.

Training demand. All participants identified CAI-specific training as a prerequisite for effective tool use during live interpretation. P9's observation that the tool "demands familiarity" suggests that the coordination cost of tool use (R(CAI)) can be reduced through practice-induced automation. P11 framed this as a systemic issue: *"There is a learning curve that practitioners must go through to be able to use this tool effectively, and it should be intentional."*

Factors Drive Adoption Intent in Global South Settings

Despite the cognitive challenges documented, participants demonstrated moderate to high adoption intent (M = 4.06/5.00 across all participants) in terms of its use for specialist terminology, preparatory use before live interpreting, and the need for training, while taking into consideration the resources and infrastructure constraints in Indonesia.

The majority of participants (83%) valued the CAI tool specifically for specialist terminology in technical or diplomatic texts, and hesitants towards its utility for general-language passages at a natural speech rate. P5's comment captures this niche framing: *"The Interpretbank helped me to find specific vocabularies that were uncommon in Indonesia... I made more omissions when I didn't use the bank."* Furthermore, a substantial majority of participants (72%) praised the CAI tool's glossary-building and pre-task preparation functions while expressing reservations about real-time querying during live interpretation. P2's account of using the glossary for post-translation verification rather than real-time lookup represents a cognitively efficient deployment pattern. This translates into restricting tool use to post-production windows to avoid real-time attentional disruption entirely while still accessing terminology support. The unanimous demand for CAI-specific training (100%) is the study's strongest finding regarding adoption intent. Participants articulated training needs at two levels, i.e., technical (keyboard shortcuts, navigation speed) and strategic (when to query vs. when to prioritize SL listening). P11 captured both aspects as in his remarks, *"I don't know what functions and practical shortcuts it can do... there is a learning curve that practitioners must go through, and it should be intentional."*

Participants identified contextual factors specific to the Indonesian setting that shaped their adoption intent. Variable internet connectivity was cited by six of the 12 online participants as a concern for cloud-dependent CAI features. The absence of localized terminology databases indicates that adoption intent is currently directed toward familiar, low-friction digital solutions rather than specialist platforms. These findings collectively suggest that adoption intent among Indonesian professional interpreters is real but conditional. They are conditional on tool training, context-appropriate deployment, and infrastructure that supports offline or low-bandwidth operation.

All in all, the findings from both instruments converge on a consistent picture that CAI tool use significantly increases Indonesian professional interpreters' perceived cognitive load, with the heaviest burden falling on the listening, comprehension, and memory components of the SI process. The self-rating questionnaire data support Gile's (2009) Effort Model prediction that adding tool management to the SI task increases total cognitive effort demand beyond available capacity. The specific pattern of findings, listening, and comprehension rated as most affected, followed by memory, maps onto the model's effort hierarchy. The verbal protocol data provide qualitative depth to these perceived load trends, where participants' descriptions of their "brain getting stuck" and their "ears going on hold" are experiential accounts of the L and M effort failures suggested by the higher mean scores in the written self-ratings. This experiential evidence echoes Barrouillet's (2015) TBRS prediction that redirecting attention to a secondary task causes unattended memory items to decay. Participants' descriptions of the speech "already changing to another sentence" while they were mid-query reflect the kind of temporal competition that TBRS formalizes.

Two findings offer a more nuanced perspective on common assumptions in the prior CAI literature. First, the fact that the non-CAI difficult condition resulted in higher self-rated ease and lower perceived cognitive load than the CAI easy condition suggests that the technical effort of tool management may be a more significant driver of perceived load than the inherent complexity of speech content. These results suggest a qualification to the view that CAI tools perceived benefit in cognitively demanding tasks (Fantinuoli, 2018, 2023; Abdelaal, 2024) and lend support to Prandi's (2023) observation that the advantages offered by such tools are fundamentally task- and context-dependent. Second, while Fantinuoli (2017) emphasizes the role of intuitive interfaces in optimizing interpreter workflows, the unanimous demand for training among this study's professional participants suggests that many factors need consideration to sufficiently bridge the gap in the effective deployment of the tool. These findings extend Fantinuoli's (2017) proposal for socio-constructivist training by highlighting that for professionals, an intentional and dedicated learning curve is viewed as the primary enabler for CAI tool integration.

Extending findings to a Global South context, this study's most distinctive contribution is its documentation of these patterns among professional interpreters in a Global South setting. The strategies participants developed, preparatory glossary use, selective real-time querying, post-production verification, and attention-switching calibration reflect professional adaptations to a tool designed primarily for Global North conference environments. This study's conditional adoption model, where intent is real but calibrated to preparatory and specialist use, represents a context-specific adaptation of TAM for professional interpreters in resource-constrained settings.

Further studies are warranted since this study has several acknowledged limitations. First, simulated tasks differ from live conference settings in speaker interaction, booth conditions, and performance stakes. Second, while 18 participants are consistent with within-subjects' experimental norms (Perret & Kandel, 2014) and provided sufficient statistical power (post-hoc $1-\beta = .99$), the sample limits generalizability. Third, participants received two preparatory sessions; the perceived cognitive load of tool use may decrease substantially with extended practice. Fourth, the instruments used, the self-rating questionnaire and retrospective verbal protocols, capture participants' subjective perception of cognitive load and cannot independently verify the temporal parameters of the TBRS model. Future studies integrating real-time measures such as eye-tracking or keystroke logging alongside self-report instruments would allow more direct testing of the temporal mechanism TBRS specifies.

CONCLUSIONS

This study set out to address two research questions about Indonesian professional simultaneous interpreters' experience of using the CAI tool *InterpretBank* in simulated diplomatic interpreting tasks. Triangulation of the written self-ratings and retrospective protocols indicates that CAI tool use was the primary driver of perceived cognitive load, with participants consistently reporting higher levels of stress and technical effort regardless of the inherent difficulty of the speech content. The process components most affected were listening, followed by comprehension and memory, corresponding to Gile's (2009) L and M efforts. Verbal protocols corroborated this pattern. 14 of 18 participants described direct attention disruption, with accounts that echo the TBRS (Barrouillet, 2015) memory trace decay prediction. Interpreters also rated CAI-supported interpreting as significantly more stressful, less relaxing, and more frustrating than non-CAI interpreting.

For the factors driving adoption intent, despite the perceived cognitive load documented above, most participants expressed moderate to high adoption intent. Three factors drove this intent: niche utility for specialist terminology, preparatory use preference, and training as the primary adoption enabler. Indonesia-specific infrastructural constraints shaped the framing of adoption intent toward offline-capable, low-bandwidth tool features.

This study offers three specific theoretical contributions. First, it provides support for Gile's (2009) Effort Model in a CAI-assisted SI context with professional interpreters, confirming that tool management constitutes an additional cognitive effort (R(CAI)) that competes with the standard SI efforts. The self-rating data align precisely with the model's prediction that tool management disrupts the L and M efforts. Second, the verbal protocol data provide participant-reported, experiential evidence that aligns with the attentional decay prediction of the TBRS model (Barrouillet, 2015). Participants described memory and listening processes being suspended during tool queries in ways that align with TBRS's account of how unattended items decay when attention is redirected. This study's self-rating and verbal protocol instruments cannot test the model's temporal parameters directly; future studies employing real-time measures would be needed for that purpose. The contribution is therefore one of phenomenological corroboration from a professional population not previously studied in this context. Third, the study introduces a conditional adoption model for CAI tools in Global South professional interpreting contexts, one that distinguishes preparatory from real-time use and frames adoption intent as context-calibrated rather than technology-driven.

The unanimous training demand establishes a clear imperative for CAI tools to be integrated into interpreter education through intentional, structured curricula. Based on the attention management challenges documented in the verbal protocols, effective CAI training should include (1) technical proficiency, such as keyboard shortcut training and interface navigation speed; (2) strategic deployment, such as guidance on when to query vs. when to prioritize SL listening; and (3) attention-switching practice, such as graduated dual-task exercises that develop the capacity to shift attention between speech and tool interface. Tiered curricula would align with the adoption model documented among this study's participants.

The study's findings point to specific interface design requirements for the Indonesian professional context. Offline functionality is non-negotiable given variable internet connectivity. Query response speed is a critical usability factor, as participants consistently reported that any tool query requiring sustained attention competed directly with SL listening and memory maintenance. This reinforces the importance of minimizing the number of screen interactions required per query. Interface minimalism directly addresses the typing-under-pressure executive function cost that 14 of 18 participants cited as a source of their perceived cognitive load. Localization of terminology databases, including Indonesian and regional language support, would reduce accent-recognition failure-triggered queries (e.g., the Pancasila and Gus Dur cases).

Extensive pre-task glossary preparation remains the highest-return CAI activity. Selective querying, targeting only the highest-priority unknown terms during the slowest speech segments, reduces the attentional competition between tool use and SL listening that participants consistently reported. Post-production verification (P2's documented strategy) represents a cognitively efficient deployment pattern that avoids real-time attention disruption entirely. Interpreters should also monitor their own tool query timing. If a query is still incomplete when the speaker has moved to a new proposition, abandoning the query and maintaining SL listening is consistently the lower-risk choice.

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