
**Thinking Their Way Through Text: A Think-Aloud Flowchart's
Impact on Reading Comprehension in Arabic and English for
EFL College Learners**

Mohamed Amin A. Mekheimer

Associate Professor of Curriculum & Instruction (TEFL)

Department of Curriculum & Instruction, FoE, Beni Suef University

Abstract

This study investigated whether a newly developed "think-aloud strategy flowchart" could improve reading comprehension in English and Arabic for bilingual college students (Arabic as their first language, English as their second). There was a total of 85 adults in the study: forty-seven students (average age = 19.4 years, SD= 6.4) in the experimental group and 38 students in the control group (average age = 19.3 years, SD = 0.8). Participants read passages with think-aloud prompts and answered comprehension questions. One group used the strategy flowchart, while the other didn't (control group). Scores on reading comprehension tests before and after the intervention showed significant gains for both languages in the flowchart group. Students in this group also reported changes in their reading habits across both Arabic and English. These results suggest that the flowchart helps EFL learners develop stronger reading skills and potentially even transfer that learning between Arabic and English. This research adds to existing knowledge by supporting the use of strategy-based reading instruction for EFL learners and highlighting its potential to enhance reading skills across languages.

Keywords: EFL learners; reading comprehension; think-aloud strategy; flowchart intervention; transfer of learning.

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

التفكير خلال النص: تأثير مخطط تدفق التفكير بصوت عالٍ على فهم القراءة باللغتين العربية والإنجليزية لطلبة الجامعة الناطقين بالإنجليزية كلغة أجنبية

د. محمد أمين عبد الجواد مخيمر

أستاذ طرق تدريس اللغة الإنجليزية المساعد - كلية التربية جامعة بني سويف

الملخص

هدفت هذه الدراسة إلى التحقق من فعالية "مخطط تدفق استراتيجيات التفكير بصوت عالٍ" الذي تم تطويره حديثاً في تحسين فهم القراءة باللغتين الإنجليزية والعربية لطلبة الجامعة ثنائيي اللغة (العربية هي لغتهم الأم والإنجليزية هي لغتهم الأجنبية). شملت عينة الدراسة ٨٥ بالغاً: ٤٧ طالباً (المتوسط العمري = ١٩.٤ سنة، الانحراف المعياري = ٦.٤) في المجموعة التجريبية و ٣٨ طالباً في المجموعة الضابطة (المتوسط العمري = ١٩.٣ سنة، الانحراف المعياري = ٥.٨). قرأ المشاركون مقاطع نصية مع التلقين والتفكير بصوت عالٍ وأجابوا على أسئلة الفهم. استخدمت إحدى المجموعتين مخطط تدفق استراتيجيات التفكير بصوت عالٍ، بينما لم تستخدمه المجموعة الأخرى (المجموعة الضابطة). أظهرت نتائج اختبارات فهم المقروء قبل وبعد التدخل مكاسب ملحوظة في كلتا اللغتين للمجموعة التي استخدمت مخطط تدفق استراتيجيات التفكير بصوت عالٍ. كما أفاد الطلاب في هذه المجموعة عن تغييرات في عادات قراءتهم في كل من العربية والإنجليزية. تشير هذه النتائج إلى أن مخطط تدفق استراتيجيات التفكير بصوت عالٍ يساعد متعلمي اللغة الإنجليزية كلغة أجنبية على تطوير مهارات قراءة على نحو أقوى، وربما انتقال أثر التعلم بين العربية والإنجليزية. تضيف هذه الدراسة إلى مكرهم المعرفة المتاحة من خلال دعم استخدام تعليم القراءة القائم على استراتيجيات التفكير بصوت عالٍ لدى متعلمي اللغة الإنجليزية كلغة أجنبية، وتبسيط الضوء على إمكاناتها في تعزيز مهارات القراءة عبر اللغات المختلفة.

الكلمات المفتاحية: متعلمو اللغة الإنجليزية كلغة أجنبية، فهم القراءة، استراتيجيات التفكير بصوت عالٍ، تدخل مخطط تدفق التفكير بصوت عالٍ، انتقال أثر التعلم

Introduction

Bilingualism, the ability to use two languages proficiently, is increasingly common globally. While bilingualism offers cognitive benefits, it can also present challenges in academic settings, particularly when reading in a second or foreign language. This study investigates the impact of reading strategies on reading comprehension skills among Arabic-speaking college students enrolled in English language programmes. Understanding how these students utilize reading strategies can inform the development of effective instructional approaches to enhance their reading comprehension abilities.

This research focuses on students in faculty of education programs, where courses are divided into language and linguistics, literature, and teacher education. While the first two categories are delivered in English, the latter is taught in Arabic. This unique context creates an ‘additive bilingual environment’ (Au-Yeung et al., 2014), where exposure to both languages fosters learning without hindering proficiency in either.

While previous studies have identified various reading strategies linked to comprehension (Friesen & Frid, 2021a; Pourhosein, Gilakjani & Sabouri, 2016), limited research explores how readers actively use these strategies to improve understanding (Frid & Friesen, 2020; Uhl-Chamot & El-Dinary, 1999). These strategies, as identified in the literature, include activating prior knowledge, making predictions, summarizing information, and posing questions throughout the reading process. Furthermore, research suggests that explicit instruction in these techniques can significantly enhance reading comprehension (Pourhosein Gilakjani & Sabouri, 2016). Gaining insight into how students utilize these strategies can advance our understanding of their effectiveness and inform interventions for diverse learner groups.

This study delves beyond individual strategies, examining the combined effect of employing multiple strategies during reading to address comprehension challenges. This approach ensures consistent language exposure across participants, facilitating a more meaningful reading experience. By investigating the interplay between reading

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

strategies and comprehension in this specific bilingual student population, the study aims to contribute valuable insights for educators seeking to optimize their instructional practices.

Literature review

Reading Comprehension: A Cornerstone for Bilingual Students

Reading comprehension, the ability to understand and interpret written text, is a cornerstone for academic success. It empowers students to critically analyse diverse texts, fostering deeper engagement and learning (Fontaine et al., 2021). Strong comprehension skills also enhance language proficiency and communication abilities in both native and target languages, especially when providing strategies and support to develop reading comprehension skills (Frid & Friesen, 2020). However, challenges arise when language proficiency or decoding skills are limited, hindering the complex process of comprehending written material.

Beyond decoding and basic language comprehension, successful reading comprehension hinges on the ability to make inferences and predictions. This higher-order thinking skill propels readers beyond the literal words on the page, allowing them to transcend surface-level understanding and delve deeper into the text's meaning. By drawing upon their existing knowledge and experiences, readers can connect the dots between explicitly stated information and implicit meanings, uncovering hidden connections and drawing conclusions that are not directly articulated. For example, a reader might infer a character's emotional state based on their actions and dialogue, or predict the outcome of a story based on established patterns and foreshadowing. This active engagement with the text transforms reading from a passive reception of information into a dynamic process of interpretation and discovery.

Recognizing the importance of fostering these skills, educators strive to equip students with effective strategies and support. Research suggests that participation in English immersion programs significantly improves comprehension (Cashion & Eagan, 1990; Frid & Friesen, 2020; Geva & Clifton, 1994; Uhl Chamot & El-Dinary, 1999). These programmes immerse students in a rich language environment, providing opportunities to practice comprehension skills

in real-world contexts. In addition, interactive activities and discussions encourage critical thinking and textual analysis, further solidifying reading comprehension. Therefore, both perceptual and interpretive vocabulary, alongside word-reading skills, contribute to the capacity to grasp written material.

Reading Comprehension: A Complex Process for Bilingual Learners

Reading comprehension is a multifaceted skill that involves more than just decoding words and understanding their meaning. This review explores different theoretical perspectives on reading comprehension, highlighting the interplay between language proficiency, decoding skills, and strategic reading behaviours for bilingual learners.

Minimalist Perspective:

Reading comprehension is a complex process that involves decoding and understanding the meaning behind written words. This perspective, aligned with a minimalist perspective on reading, suggests that students' limited language proficiency or decoding skills hinder their ability to understand written text (Erdos et al., 2014; Geva & Farnia, 2012). Gough and Tunmer (1986) propose a minimalist view, suggesting reading comprehension is the result of successful decoding and linguistic understanding. This emphasizes the importance of both language knowledge and decoding skills for comprehending written text (Erdos et al., 2014; Geva & Farnia, 2012).

Limited proficiency in either area can hinder comprehension (Hoover & Gough, 1990; Sadeghi et al., 2014). Poorer L2 proficiency is believed to be the primary cause of poorer scores on reading comprehension tests among bilinguals than their monolingual counterparts (Kolić-Vehovec & Bajanski, 2007; Bialystok et al. (2010). However, not all bilinguals exhibit worse L2 competence than L1 monolinguals, as vocabulary size in a second language may be less affected by factors such as later acquisition or fewer chances of reading in their second language (Cutting & Scarborough, 2006; 2013; Hsu, Chan & Ho, 2023; Cadime et al., 2017).

The Reading Rope Model (RRM):

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

Scarborough (2001) introduced the RRM, emphasizing the crucial role of reading fluency/decoding and vocabulary proficiency in reading comprehension. Research suggests interventions targeting both areas can significantly improve comprehension in bilingual students (Cutting & Scarborough, 2006; Hsu et al., 2023). The RRM also highlights that skilled readers employ language comprehension skills strategically (Cadime et al., 2017; Cutting & Scarborough, 2013).

The reading rope model (RRM) was introduced to support the minimalist view, highlighting the importance of reading fluency/decoding and vocabulary proficiency in improving reading comprehension. Fluency in a language is not the sole predictor of good reading comprehension but is an essential element in the simple view of reading (Silverman et al., 2013). Other factors, such as reading comprehension strategies and background knowledge, significantly help in understanding written texts (Friesen & Jared, 2007). In this vein, research has suggested that bilinguals may have cognitive advantages, such as enhanced executive functions and metalinguistic awareness, which can positively impact reading comprehension (Friesen & Jared, 2007; Iluz-Cohen & Armon-Lotem, 2013; Luk et al., 2011; Yow & Li, 2015).

Beyond Language Proficiency

While poorer L2 proficiency can indeed lead to lower reading comprehension scores compared to monolinguals (Kolić-Vehovec & Bajanski, 2007), it's crucial to recognize that **language proficiency is just one piece of the puzzle**. Several other factors come into play, painting a more nuanced picture of reading comprehension in bilingual learners.

Vocabulary size in the target language plays a significant role, but research suggests it can vary greatly depending on **acquisition age and exposure** (Iluz-Cohen & Armon-Lotem, 2013; Jimenez et al., 1996; Luk et al., 2011; Yow & Li, 2015). Bilingual children who begin acquiring the L2 at a younger age and have more frequent exposure to it are likely to develop a larger vocabulary, potentially mitigating the impact on comprehension.

Interestingly, research suggests that **bilingualism may offer cognitive advantages** that can positively impact reading

comprehension. Studies have shown that bilinguals may possess **enhanced executive functions** (mental processes involved in planning, problem-solving, and self-regulation) and **metalinguistic awareness** (the ability to reflect on and manipulate language) (Luk et al., 2011; Yow & Li, 2015). These cognitive advantages can equip bilingual learners with additional tools to navigate the complexities of reading comprehension, even if their L2 proficiency is still developing.

Therefore, it's important to **move beyond a simplistic view** that solely attributes lower reading comprehension scores to poorer L2 proficiency in bilingual learners. Recognizing the **interplay of various factors** such as vocabulary size, acquisition age, exposure, and potential cognitive advantages allows for a more comprehensive understanding of this complex process.

The Role of Reading Strategies

Successful reading comprehension hinges not only on linguistic skills but also on strategic behaviours like summarizing, inferring, predicting, and drawing on prior knowledge (Mayer, 1996; Blachowicz & Ogle, 2017). These strategies help readers retain information, form suggestions, and adjust their understanding as they read (Coiro & Dobler, 2007). Reading strategies aid students in constructing meaningful mental models of texts, including summarising, inferring, guessing, and drawing on prior experience. These strategies help readers retain information, make inferences, form hypotheses, and adjust their thinking if predictions do not align with the text (Blachowicz & Ogle, 2017; Coiro & Dobler, 2007; Mayer, 1996; Scarborough, 2001).

Strategy deployment is frequently used in scholarly investigations to examine its impact on reading comprehension proficiency. By actively engaging in strategies such as visualization, individuals can make meaningful connections between prior knowledge and new information, leading to a deeper understanding of the content being read ((Attaprechakul, 2013; Honig et al., 2000; Pourhosein Gilakjani & Sabouri, 2016; Wood et al., 1995).

Connecting Prior Knowledge

Schema theory emphasizes the role of existing knowledge structures (schemas) in understanding new information (Swargiary,

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

2024; Tracy & Morrow, 2017). Connecting refers to identifying and referencing previously encountered information relevant to the current text (Pourhosein et al., 2016). This strategy allows bilingual students to deepen their understanding by linking new information to their prior knowledge in both their native and target languages.

While language proficiency plays a critical role in reading comprehension, it's crucial to recognize the multifaceted nature of this process for bilingual learners. Schema theory, emphasizing the importance of existing knowledge structures (Anderson et al., 1977), highlights the "connecting" strategy as a key tool. This strategy, as described by Pourhosein et al. (2016), involves recognizing comprehension, making connections to prior knowledge in both languages, and asking relevant questions.

By actively engaging with the text through connecting, bilingual students can deepen their understanding and foster language development in both English and their native language (Pressley et al., 1995). Strategic behaviors like visualization and connecting significantly enhance comprehension by facilitating meaningful connections between prior knowledge and new information (Duke & Cartwright, 2021; Schoot, 2013; Liu (2014).

Skilled readers not only possess strong linguistic abilities but also utilize diverse reading strategies from L1 to extract key information, infer meaning, and critically analyze text in the L2 (Janzen & Stoller, 1998; Jiang & Farquharson, 2018; Talwar, Tighe, & Greenberg, 2018). Research by Hsu et al. (2023) highlights the effectiveness of explicit instruction in reading strategies for improving comprehension in both children and adults. By implementing effective instructional strategies that emphasize strategic reading, educators can empower bilingual learners to become successful readers in both their native and target languages.

Visualization and Active Engagement

Visualizing the content while reading can further enhance comprehension by connecting prior and current information (Pourhosein et al., 2016). Research suggests that **actively engaging in reading strategies** like visualization significantly enhances comprehension (Liu, 2014). Visualizing the content helps connect

prior knowledge to new information, leading to better retention (Pourhosein et al., 2016).

Overall, proficient reading requires a combination of **strategic behaviours, strong language skills, and effective reading strategies** (Jiang & Farquharson, 2018). Skilled readers not only employ these strategies but also utilize them to extract key information, infer meaning, and critically analyse the text (Talwar, Tighe, & Greenberg, 2018). Importantly, research shows that **explicit instruction in these strategies** can significantly improve reading comprehension for all ages (Hsu et al., 2023). Engaging in these strategies promotes active learning and fosters deeper understanding of the text.

The Importance of Explicit Instruction

Research highlights the effectiveness of explicit instruction in reading strategies for improving comprehension in both children and adults (Hsu et al., 2023). By equipping bilingual learners with these strategies, educators can empower them to become proficient readers in both their native and target languages. Explicit instruction in reading strategies has been shown to be particularly beneficial for bilingual learners, as it can help bridge the gap between languages and enhance overall comprehension skills. This approach can also boost confidence and motivation in students, leading to greater success in both academic and real-world settings.

Reading comprehension for bilingual learners is a complex process influenced by various factors beyond just language proficiency. Factors such as cultural background, prior knowledge, and socio-economic status can also play a significant role in a bilingual learner's ability to comprehend text. Therefore, educators suggest reading teachers should take a holistic approach when teaching reading strategies to support the diverse needs of bilingual students (Cummins, 2008; Genesee, Paradis, & Li, 2012; Moll, 1992).

By understanding the interplay between these factors and implementing effective instructional strategies, educators can support bilingual students in developing strong reading comprehension skills that are transferable across languages. This can ultimately lead to improved academic success and overall language development for bilingual learners as evidenced in some prior research (García, 2009;

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

Kleiman, 2008). Researchers and educators also sought to recognise and address these various factors in order to create a supportive and inclusive learning environment for all students, regardless of their linguistic background (Hornberger, 2003).

Models of reading comprehension strategies

Reading comprehension is a complex process that involves decoding and understanding written words, according to Gough and Tunmer's minimalist perspective. Students with limited language proficiency or decoding skills often struggle with reading comprehension. Reading strategies models such as the RRM refers to an interplay between reading fluency/decoding and vocabulary proficiency. Research shows that interventions targeting both components can significantly improve reading comprehension skills in bilingual students. Skilled readers use language comprehension skills more strategically, emphasizing the importance of addressing both components for effective reading comprehension (Cadime et al., 2017).

The Construction-Integration (CI) model by Kintsch (2005) emphasizes building and integrating textual representations. It highlights the importance of key concepts, filtering irrelevant information, and focusing on knowledge-based elements for effective comprehension. Graesser et al. (1994) build on this by proposing three readerly principles – critical thinking, coherence, and explanation – that guide readers in creating mental models of the text. This approach underscores the importance of strategies beyond mere linguistic ability.

Measuring Strategy Use: Think-Aloud Techniques and Beyond

Research on how readers utilize strategies is crucial for gauging their effectiveness. Think-aloud procedures, where readers verbalize their thoughts while reading, offer valuable insights into real-time thought processes (Lytle, 1982). Studies by Frid and Friesen (2020, 2021b) demonstrate how analysing these verbalizations can predict reading comprehension in both L1 and L2.

Individualized Approaches: Tailoring Strategies to Learner Needs

While research identifies effective strategies (Pashler, Bain, Durwin & Mayer, 2008; Kirschner & van Merriënboer, 2013), individual differences in learning styles necessitate personalized interventions (Coffield, Moseley, Spilsbury & Askew, 2004; Fleming & Mills, 1992). Some learners thrive by gleaning meaning from context clues, while others excel through analytical deconstruction of information (Coffield et al., 2004; Fleming & Mills, 1992). Understanding these variations allows educators to cater to each learner's unique needs and learning styles, ultimately optimizing their learning outcomes.

Patterns in Strategy Use: Collaborating and Connecting

McNamara (2007) and Muijselaar et al. (2017) identify emerging patterns in strategy use by both proficient and struggling readers. While past research has mostly focused on individual strategies, Huang (2018) highlights the importance of understanding how strategies work together. His study on Chinese students abroad reveals the effectiveness of combining visualizing with summarizing and making connections for enhanced comprehension.

Instructional Interventions: Scaffolding Strategy Use

Implementing strategic reading instruction demonstrably improves comprehension and retention (Ness, 2011). Duke & Cartwright (2021) outline a five-phase approach – explanation, modelling, collaborative use, supervised practice, and independent application – to effectively teach reading strategies. This scaffolded approach, akin to expert guidance in the classroom, fosters gradual development of independent strategy use.

Think-Alouds: A Powerful Tool for Visualization and Self-Awareness

Blackowicz & Ogle (2017) and Coiro & Dobler (2007) advocate for think-aloud protocols as powerful tools for teaching visualization while reading. By verbalizing their thoughts and images, readers actively engage with the text, connect it to prior knowledge, and gain valuable self-awareness of their reading processes. This not only enhances comprehension but also facilitates reflection and improvement.

The Role of Metacognition: Beyond Basic Strategies

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

Studies by Lin and Yu (2015) and Griva et al. (2009) highlight the crucial role of metacognitive strategies like questioning, monitoring, and prediction in proficient readers. Wang (2016) further emphasizes the ability of stronger readers to utilize numerous strategies and integrate textual information, demonstrating clear differences in strategy use compared to less proficient readers.

Finally, understanding reading strategies and their impact on comprehension empowers both educators and learners. By implementing research-based strategies, tailoring them to individual needs, and fostering metacognitive awareness, we can facilitate a deeper understanding of the reading process and empower individuals to become confident and successful readers in both their first and second languages. This journey of discovery, with its evolving strategies and continuous learning, holds the key to unlocking the full potential of reading comprehension.

Research questions

1. To what extent does the proposed strategy-based reading intervention improve reading comprehension in both English and Arabic for college students compared to a control group receiving traditional instruction?
2. Does the strategy-based intervention training predict learners' ability to transfer comprehension skills from English to their native Arabic and vice versa?
3. Do Arabic and English readers significantly differ in the strategies they utilize to predict their understanding of a text?
4. Are there specific reading strategies employed by proficient readers that differ from those used by non-proficient readers across both languages?

Method

Research Design

This study employed a semi-experimental method, utilizing a pretest-posttest control group design.

Participants

A total of 85 students participated in the study, forming two groups: an experimental group ($n = 47$, average age = 19.4 years, $SD = 6.4$) and a control group ($n = 38$, average age = 19.3 years, $SD = 0.8$).

All students were in their second year of a four-year undergraduate program and were enrolled in a course designed to prepare students to become teachers. All students identified Arabic as their primary language and English as their second language, having studied both languages since elementary school. Participants reported reading 18.9% (SD = 14.6) of the time in English and 80.5% (SD = 15.2) of the time in Arabic.

Design and instructions

To answer the research questions, participants were divided into two groups: one group received a strategy intervention (the experimental group), and the other did not (the control group). The experimental group was exposed to an explanation of the strategy flowchart, modelling of the flowchart, collaborative usage of the flowchart and individual practice with the flowchart. The pretest and the posttest were both reading comprehension tasks, and all participants performed them before and after the intervention.

However, the intervention group was given a flowchart to help them with the second reading comprehension assignment. This study's significance lies in the new insights it yields on the relationship between a single-session flowchart intervention and improved reading comprehension. Figure 1 shows the flowchart of strategy-based reading, while Figure 2 shows the research and intervention design.

Figure 1

Strategic Reading Flowchart Based on Think-ALouds

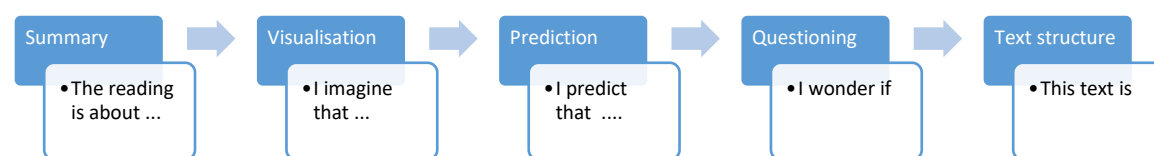
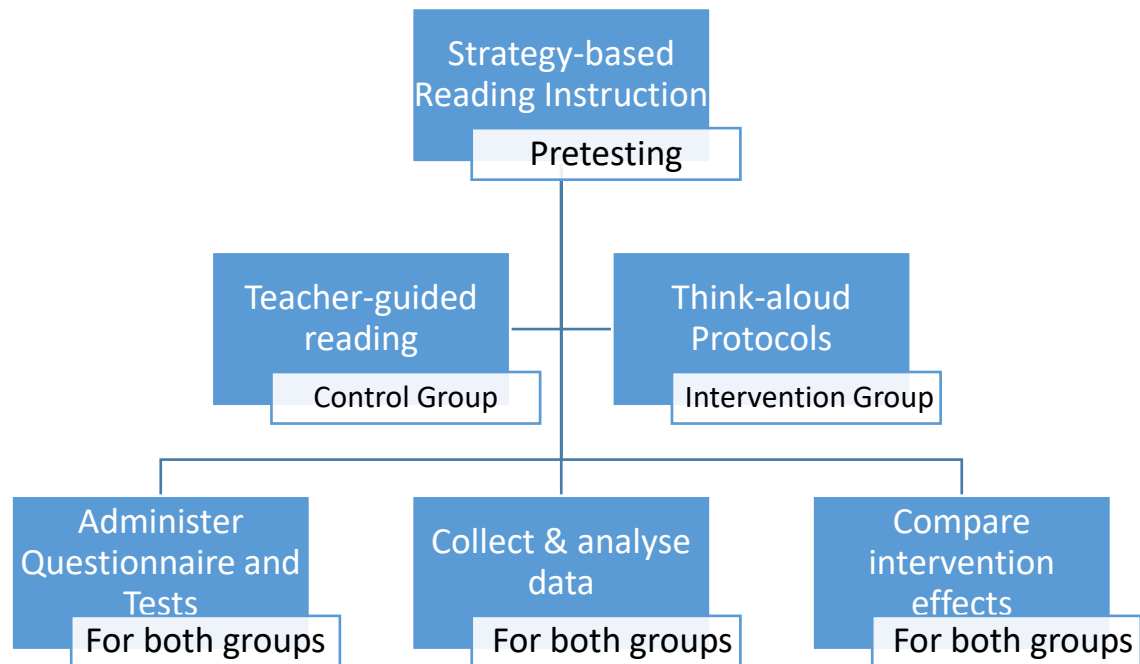


Figure 2

Research design for both groups

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....



Procedures

The study involved 25 reading passages of varying difficulty levels. Arabic translations were produced for the same set of reading passages. The participants engaged in a sequential pattern of alternating between sections written in English and Arabic, with the English part being presented first. The complexity of the passages escalated throughout the study, as participants were first presented with relatively straightforward English and Arabic reading materials and subsequently encountered increasingly challenging English and Arabic texts in both sessions. To ensure a fair comparison between the two groups and minimize any potential bias or confounding variables, both Arabic and English materials were included in the counterbalanced texts. The study included both Arabic and English materials to ensure a fair comparison and minimize potential bias. Participants were given efficient flowchart navigation instructions, ensuring a generalizable and accurate comparison.

The think-aloud strategy reading flowchart has the potential to improve the level of understanding of those who come across it on subsequent occasions with further graded readings. By familiarizing themselves with the flowchart and practicing its usage, participants can become more proficient in navigating through it, leading to more

efficient decision-making and problem-solving when using the flowchart in real-life scenarios. Additionally, the think-aloud strategy encourages participants to actively reflect on their thought processes, promoting deeper comprehension and critical thinking skills. This increased proficiency can lead to a quicker and more accurate decision-making process when using the flowchart in future training sessions.

Actively engaging with the flowchart can also enhance problem-solving skills and critical thinking abilities, as participants analyse different paths and outcomes within the chart. As a result, all the reading materials were thoroughly analysed in a balanced way during each training session. In addition, the participants were encouraged to provide their own insights and perspectives during the analysis process, fostering a collaborative and inclusive learning environment.

The participants were randomly assigned to either the strategy intervention group or the traditional instructor-guided reading teaching (control) group. In preparation for the pretest, both experimental groups were provided with a set of six tales, consisting of three stories in English and three readings in Arabic. The researcher asked the participants to think aloud in response to each segment after it was read, allowing the researcher to gain insight into the participants' thought processes and understand how they were connecting prior and current information.

Prior to commencing the exercise, the participants were provided with an exemplar English reading passage. The think-aloud responses were prerecorded by the researcher and then shown to the participant at certain intervals. Upon reaching the designated time for the participants to perform the assigned task, they were supplied with a strategy prompt sheet that included sentence starters to facilitate their think-aloud reactions.

As the study sought to assess the effectiveness of the strategy intervention for improving reading comprehension skills, participants were given a novel exemplar reading and an additional reading passage, along with a strategy prompt sheet. They were also presented with a think-aloud strategy flowchart, which required them to choose one of five strategies: summarisation, visualisation, prediction,

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

questioning, or text structuring. The flowchart facilitated navigation through diverse texts and identified approach patterns that led to compelling understanding.

Instruments

Reading Comprehension Strategies Questionnaire (Bogaert et al., 2023)

In this study, the researcher used the Reading Comprehension Strategies Questionnaire (RCSQ) developed by Bogaert, Merchie, Rosseel, and van Keer (2023) to assess the participants' reading experience. The 26-item survey used in this study was originally developed and validated by Bogaert et al. (2023) and comprises five subscales, namely, (1) overt cognitive reading strategies, (2) covert cognitive reading strategies, (3) monitoring, (4) evaluating native-speaker readers' reading strategies, and (5) the use of the home language to aid in text comprehension as a subscale for nonnative and bilingual students. The survey consisted of topics that inquired about participants' self-assessed proficiency and reading competence in both English and Arabic, as well as their preferences for reading materials.

The Reading Comprehension Tests

Students are tested for their ability to perform interpretations, make deductions, and infer the meaning of vocabulary words based on two reading passages in English, each of which consists of four multiple-choice questions and ten local and global questions. The two reading tests are equal in length, vocabulary range, and difficulty, requiring similar reading comprehension strategies. Two similar reading passages were prepared to test students' strategy-based reading comprehension in Arabic commensurate with the twin passages in English in terms of themes, complexity of words and structures and required strategies to respond to the questions.

Results

Equivalence and homogeneity of research groups:

The analysis began by establishing baseline equivalence between the control and experimental groups using independent-samples t-tests. These tests assessed statistically significant differences on reading strategy use and reading comprehension (Arabic and English) before the intervention (Table 1). The results (all p-values >

.05) indicated no significant differences between the groups at pretest, suggesting their equivalence in terms of initial reading strategies, reading skills, and potentially any other demographic characteristics that might influence the results.

Table 1

Pretest Homogeneity of Research Groups

Test	Group	N	M (SD)	t	p
Problem Solving	Control	38	19.13 (4.67)	1.097	.276
	Experimental	47	20.34 (5.49)		
Support Strategies	Control	38	19.76 (5.86)	1.114	.268
	Experimental	47	21.26 (6.47)		
Global	Control	38	29.24 (9.95)	1.234	.221
	Experimental	47	32.06 (11.15)		
Total Strategies	Control	38	68.13 (17.47)	1.351	.181
	Experimental	47	73.66 (20.24)		
Reading	Control	38	25.24	.385	.701

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

(Arabic)			(3.61)		
	Experimental	47	25.53 (3.39)		
Reading (English)	Control	38	25.21 (2.74)	.573	.568
	Experimental	47	25.53 (2.34)		

Note: M = mean, SD = standard deviation, t = t-statistic, p = significance level

Having established equivalent baseline points, the analysis proceeded to investigate the intervention's effects.

Effects of the Intervention

Independent-samples t-tests were conducted to assess the intervention's impact on strategy use and reading comprehension (post-intervention). The results (Table 2) revealed significant differences between the groups on all measures. The experimental group reported significantly higher strategy use compared to the control group ($t(83) = 11.29$, $p = .000$). Additionally, the experimental group demonstrated significantly better reading comprehension performance on both the English ($t(83) = 40.091$, $p = .000$) and Arabic ($t(83) = -31.786$, $p = .000$) reading tests compared to the control group.

Table 2

Post-Intervention Group Comparisons

Measure	Group	N	M (SD)	<i>t</i>	<i>p</i>
Strategy Use	Control	38	68.13 (17.47)	11.29	.000
	Experimental	47	73.66 (20.24)		

Reading (English)	Control	38	25.21 (2.74)	40.091	.000
	Experimental	47	25.53 (2.34)		
Reading (Arabic)	Control	38	25.24 (3.61)	- 31.786	.000
	Experimental	47	25.53 (3.39)		

To further quantify the intervention's effectiveness, Black's Modified Gain Ratio (BMGR) was calculated for both reading tests. BMGR is a statistic that considers both pre-test and post-test scores to assess the magnitude of improvement within a group. Scores typically range from 0 to 1, with values closer to 1 indicating minimal gain and values exceeding 1 suggesting a positive effect. A benchmark of 0.8 is often used, with values above this threshold considered indicative of a substantial gain.

Table 3

Black's Modified Gain Ratio

Test	Pretest Mean	Posttest Mean	BMGR	Significance
Reading English	25.50	46.00	1.25	Acceptable
Reading Arabic	25.00	46.40	1.27	Acceptable

Note: BMGR = Black's Modified Gain Ratio

As shown in Table 3, the BMGR values for both English (1.25) and Arabic (1.27) reading tests exceeded the benchmark of 0.8, indicating a substantial positive effect of the strategy-based training intervention on the experimental group's reading performance.

Relationship Between Strategy Use and Reading Performance

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

A multiple linear regression analysis was conducted to examine the relationship between strategy-based reading and reading performance in both English and Arabic (combined data from Tables 4 and 5). The analysis revealed significant positive correlations between all variables. Strategy-based reading was positively correlated with both English reading ($r = .890$, $p < .001$) and Arabic reading ($r = .946$, $p < .001$). Additionally, English and Arabic reading were also positively correlated ($r = .899$, $p < .001$).

Table 4

Correlation Matrix of Strategy-Based Reading and Reading Performance

Variable	Strategy-Based Reading	Reading (English)	Reading (Arabic)
Strategy-Based Reading	1.00	.890**	.946**
Reading (English)	.890**	1.00	.899**
Reading (Arabic)	.946**	.899**	1.00

Note: $p < .001$

These findings suggest that strategy-based reading is positively associated with improved reading performance in both English and Arabic. Moreover, the positive correlation between English and Arabic reading indicates potential transfer of learning between the languages.

This finding is further supported by the strong positive correlation observed between English and Arabic reading performance itself ($r = .899$, $p < .001$).

An interesting finding was the strong positive correlation observed between English and Arabic reading performance. This indicates that students who performed well on the English reading test also tended to perform well on the Arabic reading test, and vice versa. This could be attributed to several factors, such as shared reading skills required for comprehension in both languages (decoding, vocabulary knowledge, inference) and potential transfer of learning strategies between the languages, especially if the reading materials or tasks used in the tests had any similarities.

Discussion

This study investigated the effectiveness of strategy-based reading training in improving EFL college students' reading comprehension and facilitating transfer of learning between English and Arabic. The findings contribute to the existing body of research on reading comprehension and strategy-based instruction, aligning with several key points:

1. Importance of Reading Comprehension:

The study emphasizes the crucial role of reading comprehension in academic success and language proficiency, corroborating findings by Fontaine et al. (2021). Strong comprehension skills enable students to critically analyze diverse texts and improve their communication abilities in both languages.

2. Minimalist Perspective on Reading:

The findings support the minimalist perspective on reading, aligning with Gough and Tunmer (1986) and Erdos et al. (2014). The observed improvement in both English and Arabic reading performance suggests that the intervention effectively addressed both decoding and language comprehension skills, crucial for successful reading (Scarborough, 2001).

3. Reading Fluency and Vocabulary:

The study aligns with the Reading Rope Model (RRM) by Scarborough (2001), highlighting the importance of reading fluency and vocabulary proficiency for reading comprehension. The intervention likely addressed both aspects, contributing to the overall improvement observed in both languages.

4. Bilingual Reading Challenges:

While the study did not directly assess L2 proficiency, the findings acknowledge potential challenges faced by bilingual readers, as discussed by Kolić-Vehovec & Bajanski (2007). However, it also highlights the potential for bilingual individuals to develop cognitive advantages, as suggested by Luk et al. (2011) and Yow & Li (2015).

5. Importance of Reading Strategies:

The study aligns with extensive research emphasizing the significance of reading strategies for comprehension, including Blachowicz & Ogle (2017), Coiro & Dobler (2007), and Hsu et al.

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

(2023). The intervention likely equipped participants with valuable strategies like summarizing, inferencing, predicting, and connecting, which could explain the observed improvement.

6. Think-aloud Protocols:

The use of think-aloud protocols aligns with research by Lytle (1982), Frid & Friesen (2020, 2021a), and Uhl-Chamot and El-Dinary (1999) in examining strategy use during reading. This method likely provided valuable insights into participants' thought processes and strategy deployment.

7. Strategy-based Instruction:

The study aligns with research supporting the effectiveness of strategy-based instruction in improving reading comprehension, as demonstrated by Duke & Cartwright (2021), Ness (2011), Karimi (2015), Albeckay (2014), and Macaro & Erler (2008). The observed improvement suggests that the intervention successfully equipped participants with effective reading strategies.

8. Visualisation:

The potential benefits of visualization for reading comprehension and language learning, as discussed by Leeow & Morgan-Short (2004), are acknowledged. While the intervention may not have explicitly focused on visualization, it is possible that participants employed this strategy as part of their overall comprehension process.

9. Differences in Strategy Use:

The study aligns with findings by Lin & Yu (2015) and Griva et al. (2009) regarding differences in strategy use between proficient and less proficient readers. The observed improvement in both languages suggests that the intervention may have helped participants develop a wider range of strategies and improve their metacognitive skills.

10. Transfer of Learning:

While the study provides suggestive evidence of transfer of learning between languages, it acknowledges limitations in directly measuring this phenomenon. Further research is needed to conclusively determine the extent to which strategy-based instruction facilitates transfer across languages, as highlighted by the limitations discussed in the previous section.

Conclusion

Given these findings, the present study's findings suggest two key implications:

1. Integrating strategy-based reading instruction into language learning programmes appears beneficial for improving reading comprehension in both English and Arabic. This aligns with previous research highlighting the effectiveness of strategy instruction in enhancing reading skills across different languages (e.g., Oxford & Shearin, 1994).

2. The results also suggest that students with strong reading skills in one language may possess an advantage in developing similar skills in another. This potential for transfer of learning could be attributed to shared cognitive processes involved in reading across languages and the ability to transfer previously learned strategies to a new language (e.g., Lindell, 2019).

Furthermore, the specific strategies employed by participants were not directly measured. Future studies could investigate the specific strategies used and their impact on reading performance in both languages, using methodologies like qualitative interviews or direct observation. This would provide a more comprehensive understanding of the transfer of learning between languages.

Despite these limitations, the study offers valuable insights into the potential benefits of strategy-based reading instruction for multilingual learners. It suggests that incorporating such instruction into EFL programs can equip learners with valuable reading skills applicable across languages and that the intervention may have facilitated some degree of transfer of learning between English and Arabic reading.

Implications for Education:

By integrating strategy-based reading instruction into their curriculum, educators can equip EFL learners with valuable reading skills that transcend language barriers. Explicitly teaching and practicing these strategies in diverse contexts further promotes transfer of learning between languages. This means that learners equipped with a toolbox of effective reading strategies are more likely to apply them successfully across languages, enhancing their reading comprehension in both English and Arabic. This holistic approach fosters not only

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

language-specific skills but also transferable cognitive processes that empower learners to become successful readers in multilingual environments.

Future Research Directions:

While this study offers promising insights, future research is needed to solidify the understanding of strategy-based reading instruction's impact and refine its implementation for multilingual learners.

Establishing Causality: Employing experimental designs with pre- and post-tests would provide more robust evidence for a causal relationship between the intervention and improved reading performance. This would go beyond the current correlational findings and demonstrate whether the intervention directly leads to better reading comprehension.

Measuring Specific Strategies: Directly measuring the specific strategies used by participants in both languages before and after the intervention would offer concrete evidence of transfer. This could be achieved through methods like think-aloud protocols or strategy inventories. Examining the specific strategies employed and their impact on reading performance in both languages would provide a deeper understanding of how transfer occurs.

Gaining Deeper Understanding: Utilizing qualitative methods like interviews or focus groups would provide valuable insights into participants' experiences and the strategies they employ when reading in different languages. This would go beyond quantitative data and offer a richer understanding of learners' perspectives, challenges, and successes with the intervention, informing future instructional practices that better cater to their needs and learning styles.

By addressing these limitations and research gaps, future studies can provide definitive evidence of the effectiveness of strategy-based training in facilitating transfer of learning between languages. This knowledge can significantly inform educational practices, empowering educators to equip EFL learners with the necessary skills to navigate diverse reading contexts with confidence.

References

- Attaprechakul, D. (2013). Inference Strategies to Improve Reading Comprehension of Challenging Texts. *English Language Teaching*, 6(3), 82-91.
- Au-Yeung, K., Hipfner-Boucher, K., Chen, X., Pasquarella, A., D'Angelo, N., & Hélène Deacon, S. (2014). Development of English and French Language and Literacy Skills in EL1 and EL French Immersion Students in the Early Grades. *Reading Research Quarterly*, 50(2), 233–254. <https://doi.org/10.1002/rrq.95>
- Bialystok, E., Luk, G., Peets, K. F., & Yang, S. (2010). Receptive vocabulary differences in monolingual and bilingual children. *Bilingualism: Language and Cognition*, 13(4), 525-531.
- Blachowicz, C., & Ogle, D. (2017). *Reading comprehension: Strategies for independent learners*. Guilford Publications.
- Bogaert, R., Merchie, E., Rosseel, Y., & Van Keer, H. (2023). Development of the Reading Comprehension Strategies Questionnaire (RCSQ) for late elementary school students. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.1016761>
- Cadime, I., Rodrigues, B., Santos, S., Viana, F. L., Chaves-Sousa, S., do Céu Cosme, M., et al. (2017). The role of word recognition, oral reading fluency and listening comprehension in the simple view of reading: a study in an intermediate depth orthography. *Reading & Writing*, 30, 591–611. Doi:<https://doi.org/10.1007/s11145-016-9691-3>
- Cashion, M., & Eagan, R. (1990). Spontaneous reading and writing in English by students in total French immersion: Summary of final report. *English Quarterly*, 22, 30-44.
- Coffield, F., Moseley, D., Spilsbury, E., & Askew, S. (2004). *Learning styles and pedagogy*. What is the evidence? Policy Press.
- Coiro, J., & Dobler, E. (2007). Exploring the online reading comprehension strategies used by sixth-grade skilled readers to search for and locate information on the Internet. *Reading research quarterly*, 42(2), 214-257.
- Cutting, L. E., & Scarborough, H. S. (2006). Prediction of Reading Comprehension: Relative Contributions of Word Recognition, Language Proficiency, and Other Cognitive Skills Can Depend on How Comprehension Is Measured. *Scientific Studies of Reading*, 10(3), 277–299. https://doi.org/10.1207/s1532799xssr1003_5
- Duke, N. K., & Cartwright, K. B. (2021). The Science of Reading Progresses: Communicating Advances Beyond the Simple View of Reading. *Reading Research Quarterly*, 56(S1). <https://doi.org/10.1002/rrq.411>
- Erdos, C., Genesee, F., Savage, R., & Haigh, C. (2014). Predicting risk for oral and written language learning difficulties in students educated in a second language. *Applied Psycholinguistics*, 35(2), 371-398.
-

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

-
- Fleming, N. D., & Mills, C. M. (1992). *Learning styles and teaching: A practical guide*. ERIC Clearinghouse on Higher Education.
- Fontaine, G., Zagury-Orly, I., Maheu-Cadotte, M.-A., Lapierre, A., Thibodeau-Jarry, N., Denu, S. de, Lordkipanidzé, M., DuPont, P., & Lavoie, P. (2021). A Meta-Analysis of the Effect of Paper Versus Digital Reading on Reading Comprehension in Health Professional Education. *American Journal of Pharmaceutical Education*, 85(10). <https://doi.org/10.5688/ajpe8525>
- Frid, B., & Friesen, D. C. (2020). Reading comprehension and strategy use in fourth-and fifth-grade French immersion students. *Reading and Writing*, 33(5), 1213-1233.
- Frid, B., & Friesen, D. C. (2021). An Investigation of Reading Strategy Patterns Recruited by Bilingual Adults and Children. *The Canadian Modern Language Review*, 77(3), 212-233.
- Friesen, D. C., & Frid, B. (2021). Predictors of successful reading comprehension in bilingual adults: The role of reading strategies and language proficiency. *Languages*, 6(1), 18.
- Geva, E., & Clifton, S. (1994). The development of first and second language reading skills in early French immersion. *The Canadian Modern Language Review*, 50, 646-667.
- Geva, E., & Farnia, F. (2012). Developmental changes in the nature of language proficiency and reading fluency paint a more complex view of reading comprehension in ELL and EL1. *Reading and Writing*, 25(8), 1819-1845.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *RASE*, 7, 6-10.
- Graesser, A. C., Singer, M., & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological Review*, 101, 371-395.
- Honig, W., Diamond, L., & Gutlohn, L. (Eds.). (2000). Teaching reading sourcebook for kindergarten through eighth grade. Novato, CA: Arena Press: National Reading Panel.
- Hoover, W. A., and Gough, P. B. (1990). The simple view of reading. *Reading and Writing*, 2, 127-160. doi: <https://doi.org/10.1007/BF00401799>
- Iluz-Cohen, P., and Armon-Lotem, S. (2013). Language proficiency and executive control in bilingual children. *Bilingual Language Cognition*, 16, 884-899.
- Janzen, J., & Stoller, F. (1998). Integrating strategic reading in L2 instruction. *Reading in a Foreign Language*, 12(2), 251-269.
- Jiang, H., & Farquharson, K. (2018). Are working memory and behavioral attention equally important for both reading and listening comprehension? A developmental comparison. *Reading and Writing*, 31(7), 1449-1477. <https://doi.org/10.1007/s11145-018-9840-y>
- Jimenez, R. T., Garcia, G. E., & Pearson, P. D. (1996). The reading strategies of bilingual Latina/o students who are successful English readers: Opportunities and obstacles. *Reading Research Quarterly*, 31(1), 90-112.
-

-
- Karimi, M. N. (2015). EFL Learners' Multiple Documents Literacy: Effects of a Strategy-Directed Intervention Program. *The Modern Language Journal*, 99(1), 40-56.
- Kirschner, P. A., & van Merriënboer, J. G. (2013). *The new science of learning: Strategies for teaching and learning*. Routledge.
- Kintsch, W. (2005). An overview of top-down and bottom-up effects in comprehension: The CI perspective. *Discourse Processes*, 39(2-3), 125-128.
- Kolić-Vehovec, S., & Bajšanski, I. (2007). Comprehension monitoring and reading comprehension in bilingual students. *Journal of Research in Reading*, 30(2), 198-211.
- Liu, D. (2014). "Visual-spatial attention and its relationship with reading," in *Understanding Developmental Disorders of Auditory Processing, Language and Literacy Across Languages: International Perspectives*, eds Chung, K. K. H., Yuen, K. C. P., McInerney, D. M. (Charlotte, NC: Information Age Publishing), 169–188.
- Luk, G., de Sa, E., and Bialystok, E. (2011). Is there a relation between onset age of bilingualism and enhancement of cognitive control? *Bilingual Language Cognition*, 14, 588–595.
- Mayer, R. E. (1996). Learning strategies for making sense out of expository text: The SOI model for guiding three cognitive processes in knowledge construction. *Educational Psychology Review*, 8(4), 357-371.
- McNamara, D. S. (Ed.). (2007). *Reading comprehension strategies: Theories, interventions, and technologies*. Psychology Press.
- Muijselaar, M. M. L., Swart, N. M., Steenbeek-Planting, E. G., Droop, M., Verhoeven, L., & de Jong, P. F. (2017). Developmental relations between reading comprehension and reading strategies. *Scientific Studies of Reading*, 21(3), 194-209.
- Ness, M. (2011). Explicit reading comprehension instruction in elementary classrooms: Teacher use of reading comprehension strategies. *Journal of Research in Childhood Education*, 25(1), 98-117.
- Pashler, H., Bain, P., Durwin, T., & Mayer, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105-119.
- Pourhosein Gilakjani, A., & Sabouri, N. B. (2016). How can students improve their reading comprehension skills? *Journal of Studies in Education*, 6(2), 229-240.
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale NJ: Erlbaum.
- Sadeghi, A., Everatt, J., McNeill, B., & Rezaei, A. (2014). Text processing in English-Persian bilingual children: A bilingual view on the Simple Model of Reading. *Educational and Child Psychology*, 31(2), 45–56. <https://doi.org/10.53841/bpsecp.2014.31.2.45>
-

Thinking Their Way Through Text: A Think-Aloud Flowchart's Impact on Reading Comprehension....

-
- Scarborough, H. (2001). Connecting early language and literacy to later reading (dis)abilities: evidence, theory and practice. In S. B. Neuman, & D. K. Dickinson (Eds.) *Handbook of Early Literacy Research* (Vol. 1, pp. 97 - 110). New York, NY: Guilford Press.
- Silverman, R. D., Speece, D. L., Harring, J. R., & Ritchey, K. D. (2013). Fluency Has a Role in the Simple View of Reading. *Scientific Studies of Reading*, 17(2), 108–133. <https://doi.org/10.1080/10888438.2011.618153>
- Swargiary, K. (2024). *Learning Made Easy: The Power of Teaching in Regional Languages*. LAP.
- Talwar, A., L. Tighe, E., & Greenberg, D. (2018). Augmenting the Simple View of Reading for Struggling Adult Readers: A Unique Role for Background Knowledge. *Scientific Studies of Reading*, 22(5), 351–366. <https://doi.org/10.1080/10888438.2018.1450410>
- Tracey, D. H., & Morrow, L. M. (2017). *Lenses on reading: an introduction to theories and models* (3rd ed.). The Guilford Press.
- Uhl-Chamot, A., & El-Dinary, P. B. (1999). Children's learning strategies in language immersion classrooms. *The Modern Language Journal*, 83(3), 319-338.
- Wood, E., Woloshyn, V. E., & Willoughby, T. (1995). *Cognitive strategy instruction for middle and high schools*. Cambridge, MA: Brookline Books.
- Yow, W. Q., & Li, X. (2015). Balanced bilingualism and early age of second language acquisition as the underlying mechanisms of a bilingual executive control advantage: why variations in bilingual experiences matter. *Frontiers in Psychology*, 6(12). <https://doi.org/10.3389/fpsyg.2015.00164>
-