



# READING AND KNOWLEDGE ACQUISITION IN CONTENT-BASED INSTRUCTION (CBI)

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## ABSTRACT

*This article discusses key elements of fostering reading fluency and competency in the framework of content-based instruction (CBI). The interactive reading models, including the top-down and bottom-up methods, methods for improving reading proficiency, and crucial language-learning procedures for reading in the CBI domain, will all be covered in this paper. Reading is viewed as a link between content and language acquisition. The importance of reading is manifested in accordance with the current theory and models of psycholinguistic approaches. Content words are viewed as contextual clues. The author offers to arrange integrated strategies of reading in the higher-level and lower-level reading process.*

**KEY WORDS:** *reading fluency; CBI; STEM; reading strategy; reading aloud; silent reading; top-down strategy; bottom-up strategy; prior knowledge.*

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## INTRODUCTION

Reading is a language skill. In any language, for this matter, it is basically seen as a “Receptive Skill” aimed at gathering information and acquiring content knowledge. However, reading must be seen as a skill that is more than just being receptive and that only carries information to a reader. Certain information that one receives through reading may be disputable due to various reasons that, perhaps, only the reader may know. The information could be challenged through the cultural practices of certain people, could be indifferent or, may even be against the practice of certain people divided by geography and topography of nature. As such, the particular information may be challenged by a seemingly identical group of people according to their local, cultural context. Hence, the so-called, receptive skill could escalate into becoming a productive skill where new points and arguments would be delivered in the light of argument for others to “receive”, and it moves on to transform into a cycle between being receptive and productive skills.

Reading can basically be divided into categories, silent reading and reading aloud. Seen from the norms of reading, silent reading is focused on understanding the text, interpreting the text, and identifying the main points and the minor details for the purpose of mastering the content. On the other hand, reading aloud is more on practicing and checking the ability to utilize and pronounce the words, apply correct intonation and rhythm, and discourse markers based on the deliverance of the message as well as putting into practice the other technical aspects of reading. This article deals with the important aspects of developing reading fluency and competence in the content-

based instruction (CBI) context. This paper will discuss the interactive models of reading, including the top-down-bottom-up approach, techniques of mastering reading competence, and essential language learning strategies in reading in the CBI domain.

## A LITERATURE REVIEW

Teaching reading too could take two forms of relevance. In the initial stages of learning, the focus is usually on reading aloud. This is to put the learners at the proper stage of pronouncing the words and appropriately applying other technical elements of reading. According to the Student Engagement in Higher Education Journal in Amsterdam, science educators undertook a research-through-design approach to study the new role of the public library in offering citizen science projects as an addition to other science institutes [36]. They concluded that the public library of the future should contextualize information and offer opportunities for citizen scientists to co-create and explore new vistas. Tangential benefits would include the development of a scientific worldview and a scientific paradigm [21] as the citizens’ work together to seek alternative theories and practices. This is also applicable to the teaching and learning of “reading” as a subject that can be taught in isolation or in integration.

No matter if an educator is a novice or experienced one, those teaching science, mathematics, engineering, or technology need to expose students to meaningful STEM experience. For the transition of students from learning science to practicing science, faculty can spearhead innovative pedagogies that produce reflective, active learners and engage



them in problem-solving for self-directed and team applications, and they can tailor activities for students' benefit with mentors, communities of practitioners, and real research. To accomplish these goals, students should first master the comprehensive approach to reading and then apply what they have learned. By involving the learner in meaningful reading tasks as a part of the complex and iterative process of "doing science," educators teach not only the content but also the practices, values, and ethics of their field, honing the students to be professionals ready to solve pressing community, national, or global issues. Acquired knowledge and learned knowledge, as well as accumulated experience, help in enhancing this knowledge and these experiences and taking charge of them.

To generate discoveries and solutions successfully, students have to glean prior and new knowledge and practices, as Aristotle posited, from their faculty members, communities of scholars, and research participation, thereby becoming partners and collaborators in innovations that advance science for their generation.

Reading fluency, which is enhanced through the practice of repetition, helps develop a number of important aspects of reading, including word recognition, vocabulary, sentence processing, and motivation. In order to become a fluent reader, readers must have the following: fast and accurate word and phrase recognition; a large recognition vocabulary; a lot of practice in comprehension skills; a reasonable level of grammatical knowledge; and a lot of reading practice. This creates an undivided connection between reading fluency and reading comprehension. To obtain meaning from a reading text, students must read fluently. Fluency is related to reading comprehension development; a lack of fluency is one cause of comprehension problems. Grabe and Stoller [20] explain the idea that fluency is a defining characteristic of reading comprehension abilities, especially in academic contexts. Skilled readers are fluent readers. Fluent readers are so automatic with the component skills of fluency (phonological awareness, decoding, and vocabulary) that they focus their attention on constructing meaning from the print. These component skills need to be well developed and automatic to support understanding.

There are numerous fluency-training activities that teachers can do to develop fluent readers. The activities should be done regularly in class and valued as part of reading instruction. There has been an ongoing debate in the reading research literature for the last two decades as to the relative importance of each of these processing levels in fluent reading comprehension. Some researchers have argued for the primacy of higher-level syntactic, semantic and text integration skills, minimizing the role of basic lower-level word recognition processes in fluent reading [13, 17, 18, and 30]. Other researchers have argued for the importance of lower-level textual and word recognition processes in addition to that of higher-level processes even in advanced readers [2, 7, 12, 14, 31,].

However, in our opinion, the approach of bottom-up, top-down suggested by Goodman [17] is the most applicable in the CBI context for non-native speakers of English. Bottom-up decoding emphasizes the smallest units—phonemes and syllables—to lead us to meaning. The top-down model emphasizes the use of background knowledge to predict content. In its turn, the bottom-up model contributes to word recognition in the reading process.

Word recognition is defined as the ability to read and identify words quickly and accurately.[1] This ability is fundamental to fluent reading in both L1 and L2 [6,10,2,31,33]. In our study, word recognition was measured by the word reading section of the Wide Range Achievement Test (WRAT-3) [36]. The test has two equivalent forms, each with 42 English words ranging from highly frequent and orthographically simple English words (e.g., see, red) to highly infrequent and orthographically more complex words (e.g., internecine, regicidal). Both forms were used in the study (including all 84 words), and the scores were combined and averaged. The equivalent-forms estimated reliability (Pearson's) of the test was 86 words. Standard administration procedures were used, following the manual guidelines. In this process, each participant was asked to read the words aloud at a normal pace. A word was scored as incorrect if it was read incorrectly, or if it was read segment by segment or through grapheme-phoneme conversion rules (e.g., an Uzbek student pronounces the word 'international' as "in-ter-nationel", while correct pronunciation is [ ,ɪntəˈnæʃənəl ɪ]. Differences in accent did not count as inaccurate response.

## CURRENT THEORY AND MODELS OF READING

The psycholinguistic model of reading is highly influenced by second-language reading research and is among the most advanced reading models of the past two decades [17, 18]. Traditionally, it was believed that readers first read the words by decoding them, combining their meanings to form phrases, then sentences, and finally constructing the meaning of the whole text in a very linear manner [19]. In this view, the major role was attributed to lower-level textual components, with little importance given to higher-level comprehension processes during the reading process.

On the other hand, the psycholinguistic model emphasizes higher-level contextual and background knowledge sources while downplaying the contribution to reading of basic lower-level visual word recognition processes. Goodman [17, 18] argued that "readers are able to use syntactic and semantic cues to such a considerable extent that they need only minimal graphic cues in many cases." Another very important clue that exists and helps as well as influences the readers very much is the "contextual clues" [11; 26]. Mastering this skill scaffolds self-agency so learners can identify the meaning of unfamiliar words independently. Contextual clues provide hints in all kinds of ways to help readers figure out what words mean, so they are aware of these strategies. There are a number of strategies that can contribute to the development of reading skills. For instance,



breaking the word into parts (root, prefix, suffix-*inter-disciplinary*), looking for a definition or explanation within the existing context, trying to find out the meaning of the unknown word with the help of the closest word meaning, providing examples of the unknown word, considering the opposite information in the context, guessing the meaning of the unknown word by comparing it with the general idea of analogy shaped in mind, guessing the meaning of the unknown word with the assistance of the grammatical structure of the context, etc.

In general, if a reader does not understand a word (lexical), all the reader has to do is to retract or move forward a line or two to see if the storyline in the context of the flow enables him/her to predict the meaning of the word. Similarly, the problem with syntax is retracted in this way. A large number of first-language (L1)-based studies using miscue analysis provided support for psycho-linguistic views. [9]

The next interactive model of reading is the most current in second language acquisition. Reading comprehension models are interactive in second language acquisition, and reading comprehension is considered a process involving the combination and integration of various sources of knowledge, including both lower-level and higher-level knowledge sources. [3, 8, 20, 12, 23, 35] The interactive model of reading was initially developed by Rumelhart [29], who proposed that the information handling system in reading consists of different levels of processing that work independently of one another and operate in a parallel manner. While the data-driven processing level is doing visual analysis, the syntactic and semantic processing [27; 261-276] systems are operating to generate hypotheses about the interpretation of the visual information coming from visual analyses. The output of each of these processing levels is then transferred to a central organizer in the form of hypotheses that can be confirmed or rejected in light of the total information accumulated from all other sources in this message center. Moreover, the comprehension process results from the combination and integration of all these different knowledge sources contained in the message center.

Stanovich [31,32] proposed a similar model to the above mentioned integrated model. But he believes that, in order for the model to be able to account for individual differences in reading, it had to be enhanced with a compensatory mechanism, in which information at one level provided compensation for deficiencies at other levels of processing. In his view, lower-level word recognition and graphed-phonetic information, as well as semantic and syntactic information, both play a significant role in reading comprehension, but the reading process is mainly oriented to lower levels of processing. Stanovich [31] argued that a deficiency in the word recognition processes can be compensated for by higher-level knowledge sources, but this operation will be carried out at the expense of cognitive capacity and will constitute an extra burden on the reader's attentional resources, which, in turn, results in fewer resources being left for the comprehension processes. Another way of looking at this interactive model in reading is when the reader himself interacts

with the writer. This happens, particularly when what is written by the author is disputed by the reader. Hence, an argument goes on within the mind of the reader against what has been written by the author. This is an excellent act of interactive reading or assertive reading. It can also be called creative reading.

## DISCUSSION

Reading strategies are traditionally divided into two categories: silent reading and reading aloud. Seen from the norms of reading, **silent reading** is focused on understanding the text, interpreting the text, and identifying the main points and minor details for the purpose of mastering the content. On the other hand, **reading aloud** is more about practicing and checking the ability to utilize and pronounce the words; applying correct intonation and rhythm; discourse markers based on the delivery of the message; and putting into practice the other technical aspects of reading. At various stages of classroom procedure, reading aloud can become competitive. Reading aloud is an art form in and of itself.

Reading is central to exploration and reference, seen from a purely academic angle. Silent reading takes a different form in doing literature reviews. Reading includes the skills of browsing, scanning, skimming, picking and plucking, and highlighting, as well as the ability to identify facts and figures. However, in this academic angle, more care and deep concern are required to achieve the targeted goal. Reading carries some universal purposes, among them are:

- To update one's knowledge from time to time;
- To find a viable solution to problems;
- To provide an opportunity to "test/assess" what is being delivered for reading;
- To know the protocol, process, and procedure of something;
- To understand some fundamental aspects of reading;
- To think about ideas for further exploration;
- To act as a catalyst for a thorough discussion of a text;
- To investigate discussion and argument options regarding textual knowledge.

Phonological processing skills, in our case, refer to a systematic and rapid translation of spelling patterns into phonologically appropriate codes [24; 139–153]. This skill is more complex than the ability to detect simple relationships between single graphemes and phonemes and involves a complex relationship between spelling units consisting of letter sequences and the ways they are phonemically encoded within a word-specific context [33; 111–129]. Previous first-language-based research has typically used pseudo-word pronunciation tasks to measure phonological processing skills. However, these tasks were inappropriate for the present study with ESL readers because they were confounded with an articulation variable. If a learner is unable to pronounce the pseudo word, it may not be due to a lack of proficiency in processing grapheme phoneme correspondences but rather to difficulties articulating specific English phonemes that do not exist in the L1.



## METHODOLOGY

In order to minimize this problem, a pseudo-word-matching task was developed and used in which the participants, instead of being asked to articulate pseudo words, were asked to judge whether the pronunciation of members of pseudo-word pairs matched or not. The task was modeled after one used by Manis et al. (1990) and consisted of a list of 30 pairs of pseudo-words that either sound the same or different in English (e.g., *pague-paig*, *zign-zine*, *fype-fip*). The items were derived from Venezky's [35] analysis of English grapheme-phoneme relationships. Participants were to read and judge as quickly as possible whether the pronunciation of the members of the pseudo word pairs was matched or not. The accuracy and the speed of reading the text at which the task was performed were measured. As a top-down strategy, the learners were asked to read aloud the pseudo words by giving definitions to each of them.

## DISCUSSION

As noted by Brown [5], success in mastering a foreign language depends to a large degree on "learners' autonomous ability both to take initiative in the classroom and to continue their journey to success beyond the classroom and the teacher" [5; 70]. Learner autonomy is one of the most important principles of language teaching and learning. There are many claimed benefits of learner autonomy in language acquisition. Some of these benefits can be explained as follows: (a) improving the quality of language learning, (b) promoting democratic societies, (c) preparing individuals for lifelong learning, and (d) enabling learners to make the most of learning opportunities both inside and outside of the classroom [4;216]. Analyzing the reading and understanding competence of learners is another relevant approach in assisting students to master the second language. The term "reading comprehension" is rather supportive of this factor.

Language learning strategies are specific actions or steps on the part of learners that facilitate the acquisition of a second or foreign language [5, 12]. They can be effectively employed to enhance performance on a variety of language tasks in the domains of listening, speaking, reading, and writing. As noted by Lessard-Clouston [37], some strategies are visible (i.e., observable behaviors, steps, or techniques), whereas others are unseen (i.e., mental processes or thoughts). For example, strategies such as using flash cards to memorize vocabulary or asking clarifying questions in a purposeful way involve observable actions/behaviors on the part of the learner. On the other hand, strategies such as visualizing information while reading or guessing the meaning of unknown words or phrases are unseen. Whether, visible or unseen, however, language learning strategies must be consciously deployed and carefully orchestrated in order to be effective tools [5, 12, 13, and 23].

Several systems for classifying language learning strategies have been developed over the years, with Rebecca [12] being the most widely recognized and utilized. Oxford's taxonomy contains six major categories of strategies: (a)

memory strategies, (b) cognitive strategies, (c) compensation strategies, (d) metacognitive strategies, (e) affective strategies, and (f) social strategies. Numerous studies have examined the relationship between language learning strategies and English proficiency. Using Oxford's Strategy Inventory for Language Learning (SILL), and its results have consistently demonstrated a significant correlation in a variety of settings worldwide [13].

## CONCLUSION

To conclude, we can emphasize that developmental procedures of reading and knowledge acquisition highlight psycholinguistic and interactive models of reading competence, including bottom-up and top-down reading approaches. Reading is of utmost importance to any learner at any level of content-based instruction. The more one reads, the more one is exposed to the knowledge of the world. Reading fluency helps develop a number of other aspects of reading, including word recognition, vocabulary, sentence processing, and motivation as well. To obtain meaning from a context, learners must read fluently. Reading fluency is related to reading comprehension development; a lack of fluency is one cause of comprehension problems. Skilled readers are fluent readers who eventually foster learner autonomy. Reading strategy and learner autonomy are two issues that cannot be separated. These findings point to a need for further future research on the relationship between learner autonomy and the use of reading strategies. Theoretically, language learning strategies, including reading strategies, are essential for cultivating learner autonomy. Autonomous learners should be able to apply appropriate strategies in completing reading tasks. The specific relationships identified between learner autonomy and reading strategy use will help us understand the nature of the relationships in order to help all students become better language learners. Reading will contribute greatly to the learner's development.

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