

THE ROLE OF MACROSTRUCTURES IN COMPLEX INFORMATION REDUCTION

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Abstract

Complex information reduction refers to the recapitulation of the salient facts from a long text or discourse. It is akin to writing a summary. This paper therefore, examines the role of macrostructures in producing summaries. Macrostructures are said to be the global textual structures that form the global meaning of a text. They deal with the overall topic, the theme and the schematic organization of discourses or texts, they represent the gist of an entire text. Macrostructures are obtained by the application of transformational rules on the micro propositions of a text. These transformational rules are called macro-rules and they include: deletion, use of super-ordinate terms, selection and invention. These rules represent the cognitive operations that occur in complex information reduction. Developing the skills for writing summaries is very important. The skills are needed in school for general academic work and for research purposes. The skills are also needed in most professional fields in life after school. This paper submits that effective summary skills can be developed if the principles underlying macrostructures are followed. The paper is hinged on macrostructures of discourse, a model for summarization proposed by Kintsch and van Dijk in 1978, and later expanded by Brown and Day in 1983.

Keywords: Complex Information, Summary, Text, Macrostructures, Micro propositions

Introduction

Thorough comprehension is a pre-requisite for summary writing. People read for different purposes. The task or the assignment (purpose) for reading any given text can influence the reading activity. A student whose reading task is to summarize a particular text, has to understand the text thoroughly before he/she can respond intelligently to his/her given task.

A text can be simple or complex. Complexity or non-complexity of a text can be measured by its length, component parts, level and use of language, readability, comprehensibility and organizational structure. These can affect the comprehension and interpretation of a text.

As a text is read, a cognitive load is placed on the reader who decodes and interprets the text and incorporates the textual propositions into his/her knowledge base. The reader who successfully comprehends a text, builds a representation of it in his/her memory, which activates other related information already stored. To facilitate these retention and recall processes, macrostructures are required. This is because, a reader may not be able to store and retrieve all the single propositions in the text, but he/she can understand the text as a “whole” and give a summary of it by constructing macrostructures out of the sequences of propositions that make up the text. This in essence reduces the highly complex information to a manageable size.

Macrostructures are used to express the global meaning of a text. They are obtained by semantic mappings (transformations) applied to the local sentential meanings of the text/discourse. These mappings are called macro-rules and they include: deletion, use of super-ordinate terms, selection and invention. These macro-rules represent the cognitive processes that operate in (complex) information reduction.

Clarification of Concepts

Complex Information

The word “complex” denotes having many parts that is, being made up of various interconnected parts. It should not be confused with the word “complicated” which connotes being difficult. This means that something can be complex without being difficult (web.dictionary.co). Information on the

other hand is knowledge communicated either in verbal or written form, on a particular topic, idea or circumstance. Hence, complex information can be said to be a group of inter-related ideas that form a single whole.

Slamecka refers to information as “facts and opinions provided and received during the course of daily life” (web.np). According to him, one can obtain information from various sources: mass media, electronic data banks, books, letters, documents and even during discourse. Information organized according to some logical relationship is referred to as a body of knowledge, to be acquired by systematic exposure or study. The operations of summary are based on already existing document usually referred to as a text. Anderson and Hidi support this by stating that “summary is based on material that has already been written” (26). A text can be simple or complex based on certain parameters such as: text type, language use, readability, organizational structure and so on. Thus, one can understand the term “complex information”.

The Concept of a Text

Crystal defines a text as “a stretch of language spoken or written, collected for the purpose of analysis and description” (481). He further avers that “texts are language units which have definable communicative functions, characterized by such principles as cohesion, coherence and informativeness; which can be used to identify what constitutes their textuality or texture” (Crystal, 482). Halliday and Hassan also see a text as “a unit of language in use” which can be “any passage, spoken or written, of whatever length, that does form a unified whole” (12). Longe (126) reiterates the fact that the passage so to speak, must contain cohesive devices to qualify as a text.

Beaugrand and Dressler defined a text as a “communicative occurrence which meets seven standards of textuality” (3). These seven standards of textuality include: intentionality, acceptability, informativity, situationality, inter-textuality, cohesion and coherence. According to them, any natural text, whatever ‘type’ it belongs to, shares these same characteristics. Text is sometimes used interchangeably with discourse. However, some linguists make a distinction between text and discourse. Van Dijk for example, sees text as “a theoretical conception related to a language user’s competence, and discourse as a general term for examples of language use, i.e. language that has been produced as the result of an act of communication” (25). Similarly, Wang and Guo see discourse as “a coherent combination of sentences or sentence fragments that is a result of communication interacted between participants, whether speaker or listener, or writer and reader; while text only refers to written discourse” (460). From the above definitions, it is obvious that a text can be written or spoken. The focus of this paper is on the written text and how it can be summarized.

As said earlier, a text can be simple or complex. Learning A – Z, citing The Common Core State Standards, define “text complexity as a metric that determines how challenging a material is for a child at their specific grade level” (1). According to them, three factors are used to determine the complexity of a text. They are: qualitative measures, quantitative measures and considerations relating to the reader and the task, all of which have to be related on the basis of grade-level appropriateness.

Learning A – Z, citing CCSS further states that **qualitative** measures examine text attributes that can only be evaluated by the person who is reading the book or passage. The reader is required to consider such factors as:

1. Levels of meaning
2. Clarity and convention of language use
3. Knowledge demands
4. Structural organization of the text and
5. Visual complexity

Levels of Meaning: This is concerned with, if the purpose is explicitly stated or vague, and if the text has a single level meaning or multiple meanings. **Clarity and convention of language use** considers: If the language is clear or vague and purposefully misleading; if the language is contemporary and

familiar or unfamiliar and archaic; if the language of the text is conversational or academic; and if the text is cohesive or lacks cohesion.

Knowledge Demands consider if the text has a single theme or multiple themes; whether the text deals with common everyday experiences, or presents experiences that are likely vastly different from those of the intended readers; and whether the text is presented from a single or multiple perspectives. **Structural organization** considers how the text is organized: chronologically or in another logical pattern; if the text is arranged with complex and loosely connected content and whether the sections in the text are clearly labeled.

Visual complexity considers whether the graphical devices in the text are relatively simple and help the student to understand the material being read, or whether they are complex and for “show”.

Learning A – Z further avers that, **quantitative measures** are what teachers rely upon to determine the difficulty of a text. They consider the following: length of the text, sentence length and number of difficult or unfamiliar words. Finally, **considerations relating to the reader and the task** constitute the third vital component. In this case, each reader brings different skills, background, and motivation to the act of reading, for instance, a student who is interested in the topic being read is likely to bring more background knowledge to the reading task and want to learn more. The importance of the assignment itself can also influence reading activity. For example, a student who reads for leisure or skims an article for a piece of information, places less demand on the reading task, than a student who is reading to summarize.

Summary as a Concept

Summary has been given many definitions by various scholars. Eyisi defines summary as “a concise, clear, logical and readable presentation of a longer passage, giving only the major points” (65). According to her, when a story or an account of anything is shortened or abridged so that only the relevant issues are preserved, the story or account is said to have been summarized.

Norisma, Sapiyan and Rukaini define summary as “a condensed version of an existing text” (180). According to them, summary skills involve processes such as reading and understanding the content of a text, identifying the most important information in the text and producing a shorter version of it. Ikonta and Ugbede also aver that summary is an aspect of writing that represents “a short-to-the-point distillation of the main ideas in a text” (2). The key points are noted without examples and the vocabulary may change, but the main ideas remain. Cismako also sees summary as “getting rid of smaller details and leaving only the primary points” (1). Similarly, Azikiwe defines summary as “clearly and concisely writing out identified main points and ideas to give the gist of a passage” (162). Geatz and Pladke see summary as “presenting a shortened version of the original work in one’s own words” (259). According to them, when you summarize, you condense a text to its key ideas. Reducing a long work to its bare essentials requires that you fully understand the message of the text. It also helps you understand the message of the text. It also helps you understand how ideas are organized in a text.

From the above definitions, we can deduce that, a person involved in summary writing must read a passage, understand it thoroughly and replace it with a shorter version that contains the same information as the original but in a compressed form. Only the main points identified would be included in the summary. Summary is not a re-write of the original piece, rather the writer uses his/her own words to express briefly the main ideas and relevant points in the piece he/she has read. The purpose of writing a summary is to give the basic ideas of the original reading.

To qualify for a good summary, the summary has to be concise, clear, coherent and true to the original text. The idea of conciseness is to cut verbiage without sacrificing meaning. So, the writer has to briefly present the information required in a few words as possible. Clarity is a hallmark of effective summary. It involves choosing words deliberately, constructing sentences carefully, to convey exactly the meaning you want. Ambiguous and vague words are enemies of clarity.

Coherence requires that the different parts that make up the summary stick together. Being true to the original text means that personal opinion, information from external sources, no matter how related they may be to the content, must not be included in the summary. The summary must retain only the information contained in the original reading.

The Concept of Macrostructure

Macrostructure is a semantic construct, concerned with discourse production and comprehension. It is used to represent the overall or global meaning of discourse. According to Louwse and Graesser, the term macrostructure for global principles of text organization was first proposed by Bierwisch in 1965, for narrative structures in literary texts, as evidenced in her work “Poetic und Linguistik”. Later some scholars proposed similar narrative grammars as in Labov and Waletzky’s “Narrative Analysis: Oral Version of Personal Experiences” in 1967; and Trodov’s “Poetique de la Prose” in 1971. In fact, “the development of the concept of macrostructure should be seen against the background of the development of narrative structures” (Louwse and Graesser, 5).

Very much later, the term became established in “text linguistics”. It was introduced by Van Dijk in 1972 in his work “Some aspects of text grammars: A study of theoretical linguistics and poetics”. Van Dijk further explored the notion of macrostructures in 1977 in his book *Text and Content explorations in the semantics and pragmatics of discourse*. Later in 1978, the semantic construct was developed into psychological notions of discourse comprehension by Kintsch and Van Dijk in their work “Towards a model of text comprehension and production”.

According to them, macrostructures are global textual structures that form the global meaning of a text. They are created by the application of macro-rules to a sequence of propositions derived from a text; which results to a set of macro propositions that form the gist of the text. Louwse and Graesser posit that “Macrostructures are abstract semantic descriptions of the semantic content of a text, similar to a text’s global meaning and theme, thus providing global coherence” (4). They further aver that macrostructures being higher level properties of sequences of propositions cannot be identified at the surface level of the text. However, some indicators of macro propositions can be identified such as titles of texts, sub-titles, and topic sentences which occur either at the beginning or end of a paragraph and so on.

Similarly, Van Dijk states that, macrostructures refer to the essence of the text; that is, the topic or thesis being exposed in the text. Macrostructures specify what a discourse, as a whole, “is about”; not by enumerating the meaning of all the sentences that make up the text, but by applying certain rules that reduce complex information. For instance, from a long and complex sequence of propositions of a story such as:

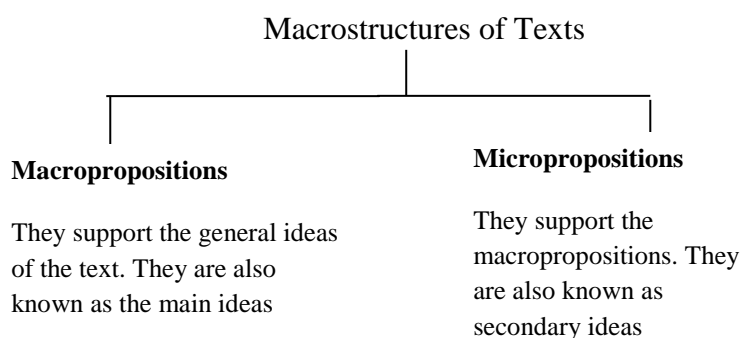
Mary took a taxi... She arrived at the airport ... She walked to the check-in counter of Air France... There was a long queue ... She saw an old friend and ... She ate a sandwich ... She was later checked-in ...

We may infer the “global” meaning or macroproposition as **Mary flew to Paris**.

TEXTOPEDIA also aver that macrostructures explain how and why language users produce a ‘gist’ of what they have heard or read; not only for complex information. Macrostructures are necessary to organize, reduce and manage such complex information.

The diagrammatic illustrations below differentiate macrostructures from microstructures.

1.



2.	<p>Macropropositions</p> <p>Usually a paragraph contains a specific macroproposition, followed by several supportive ideas.</p>	<p>Micropropositions</p> <p>In each paragraph of a text, there will be several micropropositions, some of them will be more relevant than others.</p>
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Theoretical Framework

This paper is hinged on semantic macrostructures of discourse, a model for generation of recall and summarization proposed by Kintsch and van Dijk in 1978. According to them, the operation of the macrostructure is to reduce the information in a text base to its gist. Macrostructures are obtained by the application of macro-rules on the sequences of the micro propositions of the text, to get at the ‘macro’ or global meaning. Kintsch and van Dijk proposed three Macro-rules namely: Deletion, generalization and construction.

The rule of **deletion** demands that propositions that are not relevant to the meaning of the text, should be deleted. Non-relevance here means that the particular act is not a condition for the other acts that follow in the sequence. Consider this example: *The clever students who won the competition are from the South East.* In this example, there are three propositions:

- i. The students are clever
- ii. They won the competition
- iii. They are from the South East

By the deletion rule, the summary writer can delete proposition (iii) leaving (i) and (ii). The macro proposition will then read – The clever students won the competition.

In this instance, being from the South East is not a condition for winning the competition. The rule of **generalization** permits the summary writer to map a sequence of actions unto their common “super-act”. In other words, a series of different propositions can be summarized into a more general proposition. Consider the example that was given earlier about the story of Mary going to Paris. *Mary flew to Paris* is the “super-act”, while other actions (micro proposition) that led to this are sub-component parts of the super-act.

The next rule is **construction**. The rule permits the summary writer to construct one proposition from a number of propositions. Consider the following example:

Janet decided to visit her uncle in the city. She went to the bus station and purchased a ticket. She went to a shop nearby to buy a gift for the uncle. By the time she came back, the bus had left. She looked at her watch and concluded that it was wrong and she was late.

From the text above, we can construct the following macroproposition: *Janet missed the bus.* The difference between generalization and construction is that generalizations are made from the input propositions; but in the text above the verb “missed” was not mentioned.

Later in 1983, Brown and Day expanded the macro-rules given by Kintsch and van Dijk. They came up with six rules. The expanded macro-rules are given below with the original ones in bracket:

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Delete unimportant or trivial information 2. Delete redundant information 3. Substitute a list of item with a super-ordinate term 4. Substitute a list of actions with a “super-act” 5. Select a topic sentence if any is given 6. Invent a topic sentence if none is provided - | <p>} Deletion</p> <p>} Generalization</p> <p>Construction</p> |
|--|---|

1 and 2 are the same with Kintsch and van Dijk’s rule of deletion which has been explained and exemplified above. For clearer explanation of the expanded version of the deletion rule, unimportant information refers to minor details, examples and illustrations; while redundant information includes

information that are repeated, restated or reworded, which is regardless of its importance, considered redundant. Since summaries are meant to be brief and concise, repetitive and trivial information should be deleted.

Rules 3 and 4 are the same with Kintsch and van Dijk's generalization rule. However, for a clearer explanation of Brown and Days rule 3, a summary writer is expected to use a super-ordinate term or an umbrella word to substitute a list of items. For example, if a text contains a list such as: cats, dogs, goldfish, gerbils and parrots, one can use the term "pets" to replace the list (Brown and Day: 4). Rule 4 has been well explained earlier.

Brown and Day's rule 5 says, select a topic sentence where it is given. Usually, a unit of the text called a paragraph discusses one main idea. This main idea is expressed in a "topic" sentence. The summary writer is expected to locate this topic sentence, select, rephrase and include it in his/her summary. Finally, rule 6 is the same as Kintsch and van Dijk's construction rule. Here, the summary writer is expected to construct or invent a topic sentence where none is given. He/she can do this by combining the meaning of the input text with his/her background knowledge to arrive at the message that is being conveyed; then he/she can construct the topic sentence for that unit.

The Role of Macrostructures in Producing Summaries

Macrostructures are used to represent the overall or global meaning of a text. They deal with the meaning of a text as a whole. In other words, macrostructures are used to summarize a long text and reduce it to its gist. To produce a summary, the student has to read a given passage first, for thorough understanding. He/she may not be able to recall or remember all the micro propositions (individual sentences) that make up the passage, but he/she will have a general idea of what the passage is all about and can summarize it. This is made possible by the cognitive processes that generate macrostructures used in summarizing texts. These cognitive processes are referred to as macro-rules. They are transformational rules applied on the input propositions of a text, to arrive at its global meaning. In other words, macrostructures for summarizing texts are generated by the application of macro-rules. These macro-rules include: deletion, selection, invention and the use of super-ordinate terms. They represent the cognitive operations that occur in the production of summaries.

According to Abushihab, students have to follow different steps in order to write an effective summary based on the macrostructure framework. For instance, redundant and trivial materials have to be deleted, main ideas have to be identified and selected, a list of items that belong together has to be replaced by a general term and a macro proposition has to be constructed to replace sequences of micro propositions in a text that is to be summarized.

This short passage taken from Asudo, Marsh and Oni, will exemplify how macrostructures function in the production of summaries:

Miss Odu was beautiful and poised, an obvious contrast to Mrs. Falolu and other teachers, with their outdated clothes. She looked something between twenty-five and thirty, but did not try to make herself look older as most of other young teachers in the school did. She wore a bright green, floral cotton dress and had her permed hair styled beautifully. And on her feet were glamorous, black high heeled shoes.

She is beautiful, abi? Whispered Bunmi, the naughtiest girl in the class, to her friend, Enitan. Enitan, eyes fixed on the new teacher nodded. There was something about this lady that attracted her.

Miss Odu began to speak. 'I'm pleased to meet you all. I want you to know that I'm always available if you need me for anything other than your studies.' This brought some giggling from the back row, but she ignored it and continued. 'I want you all to regard me not only as your class teacher, but as friend too. I'm here teach you all your subjects. I want to help you with any problems you may have or any questions you may want to ask. Perhaps you may want to discuss your choice of secondary schools for example.'

It was obvious to all the children as she talked, that this was a very frank and understanding person. All the other teachers never seemed to have enough time for the pupils outside classes. In spite of her young age and good looks, she seemed almost motherly, with a confident and sympathetic voice. (45-47)

This passage has four paragraphs, to summarize it, the student has to identify the main ideas lodged in each paragraph.

Paragraph 1 focused on the physical appearance of Miss Odu. A combination of macro-rules of selection and deletion were applied to summarize the paragraph: **Miss Odu was young and beautiful.** Paragraph 2 introduced two pupils in Miss Odu's class. The selection rule was applied to summarize the paragraph: **Enitan was attracted to the new teacher.** Paragraph 3 focused on Miss Odu's speech: **Miss Odu promised to teach and counsel the students** Paragraph 4 reflected on the general impression the children had on their new teacher. A combination of macro-rules was also applied to summarize the paragraph: **The children felt that Miss Odu was understanding and motherly.**

However, the **gist** of the passage is captured in this single sentence: **Miss Odu was more caring than the other teachers.** In the section that follows, practical examples of how macro-rules are applied to generate macrostructures that summarize a text are given.

Application of Macro-Rules in Generating Macrostructures used in Producing Summaries

The Macro-Rule of Deletion

There are two types of deletion: (i) delete unimportant or trivial information (ii) delete redundant information. Consider the following examples: Re-write the following sentences below and delete all unimportant and redundant materials.

1. *All said and done, and in the final analysis, the decree must be obeyed by these poor helpless villagers.*

Macrostructure: Finally, the decree must be obeyed by the villagers

Analysis: "all said and done" share the same meaning with "in the final analysis". It renders the information redundant. So, one is deleted and the other one reduced to a single word – "finally". The modifiers "poor" and "helpless" are unimportant, hence they are deleted.

2. *Our website has made available many of the things you can use for making a decision on the best dentist.*

Macrostructure: Our website presents the criteria for determining the best dentist.

Note the following points:

"presents" replaces "has made available"

"criteria" replaces "many of the things you can use"

"determining" replaces "for making a decision".

3. *Many have made a wise observation that when a stone is in motion, rolling down a hill or incline, that the moving stone is not likely to be covered all over with the kind of thick green moss that grows on stationary unmoving things. They become a nuisance giving the impression that they haven't moved in a long time and possibly would not move any time soon.*

Macrostructure: A rolling stone gathers no moss (6 words)

Analysis: This short passage is full of redundant materials:

- i. "in motion", "rolling down", "the moving stone" all share the same meaning (the notion of movement).
- ii. "hill" and "incline" also share the same meaning
- iii. "stationary", "unmoving", "have not moved", "would not move" are redundant ways of saying the same thing.
- iv. "In a long time" and "any time soon" also share the same meaning
- v. The phrase "to be covered all over" is replaced with a single word – "gathers"

Result: All the redundant and unimportant information were successfully deleted and the short passage which was made up of sixty six words, was reduced to only six words.

The use of Super-ordinate Terms

Two types of substitutions are required here:

1. Replace a list of items with a super-ordinate or general term
2. Substitute a list of actions with a “super-act” or “macro-act”.

Consider the following examples:

Re-write the following sentences replacing the list of items/actions with a general term:

i. *James went to the market and bought hoe, shovel, go-to-hell, machete, cutlass, pruning saw and spade.*

Macrostructure: James bought farm implements/tool. Farm implements or farm tools is the general term for the list given above.

ii. *Ken decorated the house with roses, lilies, hibiscus, marigold, and allamanda.*

Macrostructure: Ken decorated the house with flowers.

iii. *George did the arithmetic problems, then he did the five-page reading assignment on social studies. Finally, he studied the spelling list for tomorrow’s test.*

Macrostructure: George did his homework.

All the sentences are the sub-component acts of the “global” or “macro-act” of doing his homework.

The Macro-rule of selection

This rule applies where the topic sentences are explicitly stated. On identifying the topic sentence the student then re-states it in his/her own language, using as few words as possible. It is a punishable offence to lift the topic sentence verbatim from the original passage.

Consider the following example:

Identify the topic sentence in the following short passage and restate it in your own words:

1. *His choice of career has been criticized by his teacher. His father had also attempted to dissuade him from it. His friends as well had laughed at his ambition. But Sam Kolade did not give; he was determined as ever to become a champion wrestler.*

Macrostructure: Despite all oppositions, Sam Kolade was bent on becoming a wrestler.

Note: The underlined sentence is the topic sentence, but it was condensed to get at the answer. (No verbatim lifting!)

The Macro-rule of Invention

The rule of invention states that where there is no topic sentence, or where the topic sentence is not explicitly stated, the summary writer should invent or construct one. The summary writer has to infer from the sequences of sentences that make up that unit or paragraph, the meaning that the author wants to convey. He relates this with his world view or personal experience and finally arrives at a conclusion. Then he/she constructs a topic sentence for that unit, where the main idea is not explicitly stated.

Example: Provide topic sentences for the short passages below:

1. *A lot of children came and brought presents. They played games and blew bubbles at each other. A magician came and showed them some magic. Later, Jennifer opened her presents and blew out the candles on her cake.*

Macrostructure: Jennifer had a birthday party.

2. *Sarah was playing football. Fatima was jumping over a rope. Selma was drawing a house and Matilda was running round the field.*

Macrostructure: The children were playing.

According to Abushihab, the construction/invention rule does not eliminate irrelevant propositions. Rather, all the propositions are constructed into a single macro-proposition.

Recommendations

An adage says, “Make hay while the sun shines”. The overall importance of summary skills underscores the need to introduce the skills to our children early in school. It is pertinent to note here

that without the knowledge of macrostructures, and how they are derived through the application of macro-rules, developing effective summary writing skills will be a mirage. Based on this, the paper recommends the following:

- There is need for total over hauling of our school system to accommodate programmes that will enhance reading and writing skills in schools.
- More specifically, summary writing instruction should be taken seriously in our secondary school curriculum.
- Language teachers should be given refresher training on how to teach summary writing.
- They should acquaint themselves with the knowledge of macro-rules and macrostructures and how best they can use them to teach the students how to write summaries.
- Parents should join hands with schools to provide the students enough reading materials to enable them engage in extensive reading, which will in turn enhance their store of vocabulary.
- Students should be exposed to varieties of sentence structures which enable flexibility in sentence construction and restructuring that are required for paraphrasing and integration of ideas in summary writing tasks.

Conclusion

Summary writing is about eliminating wordiness and producing a clear and concise account of a material read. Often, writers use several small ambiguous words to express a concept; wasting energy expressing ideas that are better relayed through fewer specific words. Summaries take care of all these and help to reduce complex information to its gist.

The benefits of developing effective summary skills cannot be over-emphasized. Summary skills help students at all levels in their general academic work. Their reading skills improve and they have better understanding of the materials they read across all subjects. They develop critical thinking as they evaluate what to take up as important information and what to discard in any reading they engage in. At the tertiary level, students often write academic/research papers. In these papers, information is gathered from many sources and included in the work. This is usually done to make the work more forceful and convincing. A few direct quotations are allowed but generally, students are expected to summarize or paraphrase this information in their own words. Summary writing gives practice in this rather difficult task.

In the world of work, each profession has its own special needs for summary skills. The professional teacher needs it to gather the knowledge/information that he/she wants to pass across to his/her students. The executive manager who is busy with so many engagements prefers the summary of a report instead of having to wade through a very long report. The journalist needs the skill to select and present essential information from among a host of information available to him. Even the housewife, who makes a list before going to the market, unconsciously engages in summary skills. Suffice it then to say that acquiring effective summary skills is not an option; it is a must development for students at all levels. They are life-long skills needed, not only in school but also in the world of work and in life after school.

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