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## Using Electronic Mind Maps in developing students' Reading Comprehension

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### Abstract

Reading comprehension is an important skill that significantly impacts academic achievement and emotional well-being. It demands students to connect studying with personal experience, or what they are already aware of in order to make a meaning when reading. In order to improve reading comprehension, novel techniques such as electronic mind map have been investigated. Mind maps especially digital ones, are a pictorial representation of the way the brain organizes, stores, and retrieves information. Mind maps help learners interconnect concepts and digest data to enhance memory and understanding. The current study focuses on the use of electronic mind maps for reading comprehension. Through the use of images, blue, and hierarchical structure, mind maps ensure that both right and left sides of our brains are activated and enhanced, thus stimulating creative and logical thinking. Studies show that students are more engaged in their learning process when they use visual thinking methods, such as mind maps, to map out the relationships between ideas. This study also highlights Buzan's seven steps to creating an effective mind map such as employing a central image, adding colors, curved branches to maximize engagement and increase memory. The resulting evidence suggests that electronic mind maps are an effective method to enhance reading comprehension, afford a flexible, responsive and motivating way of learning. This approach is adaptable to a variety of learning styles, promotes deeper cognitive involvement, and is a useful instructional tool.



**Keywords:** electronic maps, mind mapping tools, reading comprehension, critical thinking, better understanding

## Introduction

Of the four essential skills, reading is regarded as a critical component. Reading proficiency is crucial for academic success and significantly influences emotional and social development throughout an individual's life. Goodman (1970) posits that comprehension represents the primary objective of reading proficiency. Reading comprehension is a complex process that is associated with brain function. To derive meaning from a text, students must establish connections among learning activities, personal experiences, and prior knowledge. It additionally advocates for the formation of mental imagery and the capacity to visualise written words and symbols. Zeki (1993), Moore and Lo (2008), and Lipson and Wixton (2009) examined the visual images produced within the brain. The brain generates a visual context, with perception and understanding occurring concurrently. Creating a graphic that illustrates key concepts and sub-ideas, such as a mind map, serves as a contemporary strategy to enhance learning efficiency and facilitate information access for students. The mind map is notable for its ability to efficiently organise concepts, enhance learning, and bolster memory retention (Buzan & Buzan, 1996).

## Definition of Mind Map

Mind maps serve as a visual organisational tool. This exemplifies the brain's information storage process (Buzan & Buzan, 1996). This tool serves as an important learning resource, facilitating note-taking, organisation, and convenient access for students (Tucker, Armstrong, & Massad, 2010). Holzman (2004) asserts that the mind map serves as an effective tool for aiding low-achieving students in improving their performance levels. Furthermore, it improves the long-term retention of information and cognitive functions.

A mind map engages the right hemisphere's spatial thinking, drawing, and creativity, while also activating the left hemisphere's reading, reasoning, and conceptualisation skills. Buzan asserts that individuals acquire and retain information through visual aids when learning a language. He posits that when the term "apple" is uttered, the listener's brain engages in the active processing of the image of an actual apple, rather than the phonetic representation "A-P-P-L-E." The brain utilises images and associations for information processing. The author identifies five fundamental functions of the human brain: receiving, holding, analysing, producing, and controlling (Buzan & Buzan, 1994, p. 36).

The brain serves as the central organ in the learning process, interpreting various inputs such as memories, music, sensations, images, and thoughts. Mind mapping employs a comprehensive range of cognitive skills, including verbal, visual, numerical, logical, rhythmic, chromatic, and spatial abilities. Buzan posits that the creative right hemisphere and the rational left hemisphere of the brain can be utilised in mind mapping, resulting in a significant synergistic effect on cognitive capacity. He posits that all individuals possess inherent creative potential and that mind maps, as an educational tool, facilitate more effective learning by optimising cognitive engagement. Anthony Seldon (2009) posits that mind mapping serves as an active learning strategy that promotes student engagement in the processes of learning and knowledge construction, enhancing both engagement and enjoyment.



A mind map's attributes include associations, hierarchies, pictures, important terms in the branches, colours, and a purposeful arrangement of content. In a mind map, information is arranged in a meaningful and logical sequence, with hierarchies and associations flowing freely from a core image. A supporting concept or category related to the main theme is captured by the branches that flow from the main image. According to Buzan (1993), the mind map's primary focus must always be an image. Additionally, he suggested that whenever feasible, visuals be used throughout the mind map. Each branch is labelled with a key word or image. Within each category, there are fewer things that come from the relevant disciplines. Words of varying sizes are utilised to emphasise the concepts and strengthen links. He makes an important point that using a variety of colours in mind mapping could inspire students because the whole thing in single colour suggests monotony and our brain gets bored.

The brain uses associations and essential ideas, according to Buzan, to help people remember and comprehend what they read. He claims that the lack of correlations and connections between information makes traditional note-taking ineffective. The associations between concepts are thought to be very important for comprehending textual material. The goal of mind mapping is to generate new information by actively and purposefully connecting and associating concepts. Novak (1984) restates Ausubel's meaningful theory, which holds that through the processes of reception and discovery, new information is connected to preexisting notions and mental structures to produce meaning. By connecting new knowledge to advanced organisers that lead to cognitive accommodation, active meaningful learning can be promoted and rote memorisation of information must be avoided in order to ensure meaningful learning. Mind mapping is based on constructivism, which holds that students integrate new knowledge into what they already know by organising, predicting, and assessing it.

### **The Seven Steps in Mind Mapping Creation**

Buzan (2014) outlines seven steps for making a mind map that uses a representational image to convey the key thought in the centre. Animated lines that represent additional concepts and connections between concepts branch out from this main idea. There is more flexibility to branch out and multiply with related information when there is only one word per branch. Using a wide range of colours stimulates and renews the brain cells that are responsible for differentiating between colours. According to Buzan (2005), mind maps offer a hybrid textual and visual method of recording our thoughts. This hybrid approach combines words and images, engaging various cognitive processes to enhance understanding and retention of information.

The textual component of a mind map is illustrated by the keywords or concepts written on branches extending from the central idea. These terms function as succinct representations of core concepts, aiding individuals in capturing essential information in a clear and structured way. Utilising single words or short phrases, mind maps eliminate the clutter of lengthy sentences, facilitating rapid scanning and enhancing recall. This component facilitates efficient information processing in the brain, organising it to emphasise the connections and relationships among concepts.

The visual component of mind maps incorporates colours, images, and shapes to improve the presentation and comprehension of information. The central image, commonly employed to signify the primary concept or theme, serves to visually anchor the content, thereby establishing a strong mental association. Visual elements such as colour-coded branches and images serve as mnemonic devices,



enhancing the interaction among the learners and stimulation of the mind map. Colours can differentiate categories or emphasise significant information, while images provide additional meaning and reinforce concepts. The integration of these two modes of representation engages various brain regions, notably the right hemisphere linked to spatial thinking, creativity, and visual processing, alongside the left hemisphere, which governs language and logical reasoning. The integration of text and visuals enhances cognitive processing, thereby improving comprehension and recall. The visual representation allows students to quickly observe the relationships between concepts, facilitating their understanding of the interconnections among various pieces of information.

Mind maps serve as adaptable instruments that can be readily modified or elaborated upon. The capacity to rearrange, add, or remove elements without compromising the overall structure of the map increases its flexibility. This adaptability enables learners to engage with the material actively, establish connections, refine ideas, and continuously enhance their knowledge. The hybrid nature of mind maps, which integrates text and visuals, renders them an effective tool for organising and documenting thoughts. This method enhances comprehension and retention of information while fostering creativity, critical thinking, and problem-solving skills, thus serving as an effective learning strategy.

The seven steps for making mind maps are as follows:

1. Begin in the middle of a blank page. Because beginning in the middle allows the brain to expand in all directions and express itself more spontaneously and freely.
2. Use an image to convey the main concept. Because a picture speaks a thousand words and encourages students to use their imaginations. Students find a focal image more engaging, which helps them focus and pay closer attention.
3. Make use of colours in the mind map. Because colouring excite the brain just as much as images do. It gives the mind map more life and vibrancy and gives active and creative thinking.
4. Attach the primary branches to the main image, and the branches at the second and third levels to the first and second levels, respectively. because the brain needs associations to function. It connects two (or three, or four) things by nature. It would be simpler to comprehend and remember if the branches were connected.
5. Curve the branches instead of making them straight. Because curving lines give each branch a distinct style whereas straight lines are uninteresting.
6. Each line should have one important word. Because mind maps are more adaptable when they contain only one important word.
7. Incorporate pictures into the mind map. Because every image is worth a thousand words, just like the main image.

Images have the power to quickly connect and build associations with knowledge obtained from prior experiences. (Busan, 2005) These are what Buzan refers to as mind mapping norms that must be adhered to in order to develop a clear mind map.

## Electronic Mind Map

Mind maps are traditionally created by hand, but as specialised software became available, electronic mind maps began to develop (Dara, 2010). The e-mind map may now be prepared more



quickly and visually. A number of studies comparing electronic mind maps to hand-drawn ones were conducted, and all of them concluded that electronic mind maps have advantages that make them more effective and interesting because they contain learner-attracting images, colours, and drawings (Dara, 2010; Nong, Pham, & Tran, 2009).

Sabbah (2015) investigated how students' reading comprehension was affected by self-generated computerised mind maps and found that the experimental group fared better. Although both had the same impact on students' reading comprehension, Hariri's (2013) investigation of EFL learners' views towards the use of mind maps in reading comprehension revealed that students found software-supported digital mind maps more engaging than handmade ones.

A computer and the necessary software are needed to create electronic mind maps. Although students can make mind maps using a variety of tools, including word processing or drawing software, mind mapping systems like Xmind, Nova Mind, and iMindmap have many advantages over other programs in the field. These programs are designed to produce mind maps that serve as concept management tools and facilitate the addition of images and the modification of colours, topics, and forms. Additional capabilities of mind mapping software include the ability to drag and drop images to any branch, reorganise the mind maps, and recolour the branches. It is simple to add, remove, and rearrange ideas without affecting the map's clarity.

The extent of a digital mind map is almost infinite. They can be added to papers and other files, exported, and safely kept on a computer's hard drive. As a result, digital mind maps are distinct and easier to understand than those made with paper and pencil. As was previously said, electronic mind mapping is a sophisticated note-taking method for creating and sharing knowledge. It is also a useful tool for brainstorming and organising ideas. Numerous mind mapping software programs, including freemind, imindmap, xmind, openmind, novamind, biggerplate, coogle, mindmeister, Bloomfire, bubbl.us, spiderscribe, Cmaptool, mindjet, text2mindmap, visual understanding environment (VUE), and mindmanager, are used to accomplish these objectives.

Electronic mind maps provide several practical advantages for both students and educators, particularly in enhancing cognitive functions like memory, comprehension, and problem-solving. By enabling learners to visualize complex ideas, these tools facilitate deeper engagement with the material, which is essential for understanding and retaining information. Studies have consistently shown that the use of visual aids, such as mind maps, leads to better retention of information, as it allows learners to establish connections between concepts and retain them more effectively (Buzan, 2006).

One of the main benefits of electronic mind mapping is its versatility and adaptability to various learning styles. For example, visual learners benefit greatly from the graphical representation of information, while kinaesthetic learners are able to engage with the mind map through the act of rearranging and reorganizing ideas. Additionally, auditory learners can benefit from the ability to incorporate audio notes or attachments into their maps, making these digital tools inclusive for a wider range of students. Moreover, the interactive nature of e-maps allows students to actively engage with the content, making learning more dynamic and participatory. The flexibility of electronic mind maps is further demonstrated by their ability to integrate multimedia elements such as links to external resources, videos, and images. This multimedia integration offers a comprehensive approach to



learning, where students are not limited to text-based content but are encouraged to explore a variety of sources and materials that enrich their understanding. The use of images and colours in mind maps also enhances the appeal and engagement level of students, providing a more stimulating learning environment.

Electronic mind maps are an effective tool for collaborative learning. Many mind mapping software programs support real-time collaboration, allowing multiple users to work on the same map simultaneously. This feature encourages teamwork and fosters a sense of community among students, as they can share ideas, offer feedback, and contribute to the map's development. Collaborative mind mapping can be especially beneficial in group projects, where students can collectively organize their thoughts and ideas before presenting them to the class. By promoting teamwork and communication, electronic mind maps support the development of essential skills such as collaboration and peer interaction.

Another significant advantage of electronic mind maps is the ease with which they can be updated and modified. Unlike paper-based maps, which may require starting over when changes are made, electronic mind maps allow for easy adjustments, such as adding or removing branches, changing the layout, or reorganizing the structure. This flexibility helps students refine their understanding of the subject matter as they progress through their studies. It also makes it easier for educators to track students' thought processes and provide timely feedback, which can be especially useful in formative assessments.

The adaptability of electronic mind mapping tools also extends to their application across various educational settings. Whether it is used in elementary schools to organize reading comprehension, in secondary schools for analysing complex texts, or in higher education for research and thesis planning, the principles of mind mapping remain the same. These tools can be tailored to suit the needs of different academic subjects, from the sciences to the humanities, offering a versatile solution for students at all levels of education. Moreover, the integration of mind mapping into online and blended learning environments has gained traction. As education moves increasingly toward digital platforms, electronic mind mapping software provides an easy-to-use and effective tool for structuring online lessons, assignments, and discussions. Teachers can create mind maps to outline course content, design activities, or even plan lesson sequences. Students can then use these digital tools to summarize lessons, organize research, or prepare for exams. The accessibility of electronic mind maps through cloud-based platforms also ensures that students can access and work on their maps from any location, promoting greater flexibility in their studies.

The use of electronic mind maps encourages critical thinking by enabling students to make connections between disparate ideas and concepts. By visualizing how different pieces of information fit together, students can identify patterns, explore relationships, and develop a more nuanced understanding of the material. This ability to synthesize and analyse information is critical for academic success and lifelong learning, making electronic mind mapping a powerful tool for developing higher-order cognitive skills. The electronic mind maps are an invaluable educational tool that offers numerous benefits for enhancing students' reading comprehension and overall learning. From their ability to support different learning styles to their capacity for fostering collaboration and critical thinking, these



digital tools empower students to engage actively with the content. By integrating multimedia and facilitating real-time collaboration, electronic mind maps create a more interactive and inclusive learning environment, helping students better organize, retain, and apply knowledge. As educational practices continue to evolve, the use of electronic mind maps is likely to become an even more integral part of the teaching and learning process.

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