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The Effect of Some Mental Stimulants According to their Timing in Improving Reading Comprehension in English for Second-Year Middle School Students

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Abstract:

Educational institutions play a vital role in the advancement of individuals and societies. Structuring effective educational experiences requires teaching strategies that enhance learners' cognitive engagement and comprehension skills. One of the key elements in this process is the use of cognitive strategies that facilitate information storage and retrieval. This research investigates the impact of cognitive (mental) stimulants on reading comprehension among second-grade intermediate students studying English. It also examines the degree of progress in reading comprehension between an experimental group and a control group. A specially designed educational program incorporating mental stimulants was implemented with a sample of 20 students. Statistical analysis revealed that the curriculum designed with cognitive strategies significantly improved reading comprehension. Both groups showed post-test gains, but the experimental group demonstrated superior performance and higher developmental progress.

Keywords: cognitive stimulants, educational questioning, paraphrasing, review techniques, reading comprehension.

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Introduction

Reading consists of two primary processes: decoding and comprehension. Decoding involves recognizing letters, connecting them with speech sounds, and blending them into words. Students are explicitly taught phonemic awareness and sound-letter relationships, which serve as foundational skills for reading. Comprehension, on the other hand, refers to the ability to understand, interpret, and make sense of written texts, connecting new information with prior knowledge.

As readers become more proficient, decoding and comprehension operate interactively—each supporting and enhancing the other. Complex reading tasks engage the brain's frontal lobes to coordinate thought processes at a higher cognitive level.

Mental stimulants have significant educational value across various disciplines and age levels. Research has shown that such strategies can strengthen learners' abilities to store and retrieve educational content effectively (Abdel Majeed, 2000). According to Darwazah (2000), novice teachers are encouraged to utilize cognitive stimulants to make instruction more engaging and meaningful.

Improved comprehension not only enhances teacher effectiveness but also contributes to the overall learning process (Shehata, 2008).

Comprehension empowers students by enriching their language skills, fostering creativity, aiding in problem-solving, and enabling them to form insightful judgments Darwaza (, 2002). Achieving comprehension requires attention to cognitive processes during reading, such as perception and interpretation, which help readers grasp the deeper meaning behind the text (Salman, 2008).

Problem Statement

The evolution of educational strategies is essential for improving learning outcomes. Among such innovations is the use of cognitive stimulants, which serve as tools that activate and guide mental processes. These strategies allow learners to engage more actively in constructing understanding during reading, thereby improving overall comprehension. Given that reading is inherently a cognitive activity, identifying methods to enhance this skill is crucial.

Research Questions

1. Are there statistically significant differences in reading comprehension scores between the experimental group (using cognitive stimulants) and the control group (traditional instruction)?
2. Which types of reading comprehension (lexical, literal, interpretive, applied, affective) show the most improvement in the experimental group?
3. What is the overall impact of cognitive stimulants on reading comprehension among second-year intermediate female students?
4. What are students' attitudes and motivation levels toward the use of cognitive stimulants in reading comprehension?

Study Objectives

1. To develop a teaching program incorporating cognitive stimulants aimed at improving reading comprehension in English for second-grade intermediate students.
2. To examine the impact of these stimulants on the reading comprehension of the experimental and control groups.
3. To compare the developmental gains in reading comprehension between the two groups.
4. To explore student motivation toward the use of cognitive stimulants in learning.

Study Limitations

- The study was limited to female students in the second intermediate grade at Al-Istabraq School, Thi-Qar Governorate, during the 2022/2023 academic year.
- The focus was exclusively on the English language comprehension curriculum.

Operational Definitions

- **Cognitive Stimulants**: Instructional tools or strategies that activate mental processes, either by guiding the learner explicitly or giving them the freedom to choose methods that facilitate understanding (Darwazeh, 1995).
- **Reading Comprehension**: A cognitive skill that involves interpreting both explicit and implicit meanings within a text, organizing ideas, making connections, and critically analyzing the content (Qahf, 2016).

Theoretical Framework: Cognitive Strategies

Cognitive strategies, also known as psychotropic stimulants, are learning techniques that help students connect new information with previously known concepts, enabling better comprehension and retention. Researchers such as Adass (1998), Abdel Rahim (2004), and Darwazah (2000) describe these methods as structured mental tools that enhance students' ability to learn and adapt.

Types of Cognitive Stimulants

The study includes various strategies such as:

- Paraphrasing: Re-formulating the material studied to reflect the individual's understanding of what they have read. (Grabowski, 1989, p. 234)
- Educational Questions: Questions that prompt the learner to retrieve information from memory to answer or solve a problem.(Darwaza, 2004, p. 158)
- Educational Objectives: Behaviors or skills expected to be demonstrated after learning, either in the long or short term. (Darwaza, 2004, p. 158)
- Instructions: Directive sentences that guide the learner on how to work, solve problems, and continue learning. (Mealey, 1989, p. 493)
- Similes: Linking two academic topics to illustrate an unfamiliar topic through comparison. (Curtis, 1984, p. 117)
- Summaries: Extracting the essence and main ideas of a topic and expressing them concisely and clearly.(Fathi, 1999, p. 217)
- Spatial Learning Strategy: Organizing main ideas into relationships using maps or tables drawn with arrows.(Annis, L. F., 1985, p. 10)
- Structures: A concise system that shows the internal relationships between ideas in a text and with other ideas.(Darwaza Afnan, 2000, p. 223)
- Underlining Important Ideas: Identifying relationships and main ideas in a text by underlining. (Crouse, J. H., 1972, p. 313)
- Information Map: A structural representation of knowledge in the form of interconnected concepts organized hierarchically. (Novak, J. D., 1995, p. 86)
- Sentences and Titles: Brief words that express an idea, educational principle, or general procedure. (Wittrock, 1975, p. 489)
- Material Sensory Images: Illustrations that provide information about a specific situation or event. (Carrier, C. Joseph, 1983, p. 135)
- Educational Stories: An engaging method that engages the learner and increases their motivation to learn. (Ahmed Khairy & Saad Bass, 1973, p. 204)
- Class Notes: Brief sentences about the content of the material or the learner's experience that clarify, comment on, or add to the material. (Shrager, 1989, p. 263)
- Mental Images and Fantasies: Visualization or imagining of an idea or concept for clarity and deeper understanding. (Darwaza, 2004, p. 264)
- Advanced Information System: Brief presentation of general and then progressively less general information. (Ausubel, 1960, p. 272)
- Memory Consolidation Tools: Symbols, words, or pictures that represent related ideas or terms to enhance memory. (Lindsay, P. H., 1977, p. 77)

- Pen Tips and Lines: Organizing the relationships between concepts from general to specific to clarify abstract ideas. (Keny, R. F., 1994, p. 14)
- Introductions: A prelude to the ideas and concepts to be learned, providing a general overview. (Waxman, H. C., 1987, p. 88)
- Revisions: Reviewing the material learned to consolidate understanding and recall important points.(Darwazeh, 2004, p. 160)

These tools aim to support various stages of learning—before, during, and after the lesson.

Presentation Methods for Cognitive Stimuli

Two instructional approaches were used:

1. **Teacher-Directed Stimulation**: The teacher selects and presents cognitive strategies (e.g., questions or summaries), guiding students through the learning process.
2. **Student-Directed Stimulation (Limited Scope)**: Students are encouraged to generate their own strategies (e.g., formulating questions), with some guidance from the teacher.

This study primarily relied on teacher-directed and limited student-directed methods, suitable for the age group and the 45-minute lesson duration.

Timing and Application of Stimuli

According to Darwazah (2004), mental stimuli are most effective when timed appropriately during the learning process:

1. **Before Instruction**: Stimuli like previews and attention cues help students activate prior knowledge and focus.
2. **During Instruction**: Tools such as summaries, maps, and guided questions help with processing and encoding.
3. **After Instruction**: Review activities and concept integration aid long-term memory and future retrieval.

Table (1): Psychotropic Stimulants – Timing of Use in the Educational Process and the Cognitive Levels They Develop

(After the lesson)	(during the lesson)	(before the lesson)
Post-lesson questions Reformulation Summaries Visual information system reviews	educational questions Reformulation Comparisons main ideas Mental images Stories Classroom notes and means of reinforcement strategies	Educational goals Tribal educational questions Sentences and headings The heads of the pens Physical sensory images Diagrams and tables Mental images Stories Introductions Abstracts Prior knowledge systems and memory aids
Installation and calendar	application and analysis	Remember and understand

Research Methodology

To achieve the study's objectives, the experimental approach was adopted, specifically using the design of two equal groups (experimental and control). This design was selected due to its suitability for addressing the study's problem effectively.

Study Sample

The sample consisted of 40 second-grade intermediate students at Al-Istabraq Intermediate School for Girls during the academic year 2022/2023. Their ages ranged between 13 and 15 years. The students were divided equally into two groups:

- ✓ Experimental Group (20 students)
- ✓ Control Group (20 students)

Study Procedures

1. Selection of Psychotropic Stimulants

Through literature review and expert interviews, the researcher identified three core stimulants:

- ✓ Pre-lesson educational questions (targeting remembering and understanding)
- ✓ Reformulation during the lesson (targeting application and analysis)
- ✓ Post-lesson reviews (targeting evaluation)

2. Curriculum Content

Reading topics were selected from the second intermediate English textbook and activity book, covering a period of eight weeks.

Table (2): Comprehension Topics Covered During the Experiment

Week	Topic	Source	Page
1st	Meeting with a character	2nd Second grade curriculum	6
2nd	Jad and Johnny – A Tour of London	2nd Second grade curriculum	13
3rd	advice	2nd Second grade curriculum	17
4th	Jalal's Story	2nd Second grade curriculum	21
5th	Camping at Stonehenge	2nd Second grade curriculum	26
6th	Olympic Champions	2nd Second grade curriculum	33
7th	Football Match	2nd Second grade curriculum	37
8th	Try a New Sport	2nd Second grade curriculum	39

Pre- and Post-Testing

- ➢ **Pre-test Date:** Sunday, 16/10/2022
- ➢ **Post-test Date:** Thursday, 29/12/2022
- ➢ **Evaluation:** Based on a 10-point scale assessing reading comprehension

Educational Program Based on Cognitive Stimulants

Program Development Stages

1. **Analysis Phase**

- ➢ **Content:** Reading comprehension from the official curriculum
- ➢ **Target Group:** 2nd-grade intermediate students
- ➢ **Environment:** Equipped classroom with 45-minute sessions, two units per week for eight weeks

2. **Educational Needs Analysis**

- ➢ Open-ended questionnaires
- ➢ Visual aids (pictures, videos)

- Varied teaching strategies
- Literature review

Curriculum Structure (per lesson)

1. **Preparatory Phase (5 minutes):** Greeting, attendance, topic introduction
2. **Instructional Phase (10 minutes):** Use of pre-lesson questions and clear explanation
3. **Application Phase (20 minutes):** Use of reformulation; students retell content in their own words
4. **Concluding Phase (10 minutes):** Use of reviews; assessment and feedback

Implementation Steps

1. Group A (experimental): Used the program based on psychotropic stimulants
2. Group B (control): Taught using standard classroom methods
3. Each lesson followed the same stimulant-based sequence
4. The approach was applied consistently over eight weeks

Results and Discussion

Table (3): Pre- and Post-Test Scores for Experimental and Control Groups

Group	Pre-Test Mean	SD	Post-Test Mean	SD	T Value	Significance
Experimental	4.6	1.64	7.71	2.33	9.14	Significant
Control	4.8	2.23	6.56	1.23	10.17	Significant

The researcher attributes the significant improvement in the experimental group to the effectiveness of the curriculum designed based on mental stimulant strategies. These strategies aim to enhance reading comprehension performance by accelerating the learning process through scientifically grounded methods that align with learners' abilities and available resources. Mental stimulants help simplify the learning experience, remove unfamiliar content that may hinder beginners, and support the development of various cognitive levels. Presenting mental stimuli in different styles and at various times fosters the activation of diverse, often untapped, mental processes related to learning, comprehension, and recall. This aligns with the findings of Aqel Fakher (1976, p. 232), who noted that part of a student's failure to recall information stems from ineffective study methods and a lack of knowledge regarding mental stimuli, which serve as tools for memory enhancement—an essential component of the learning process.

Additionally, the control group also demonstrated an improvement in reading comprehension, which can be attributed to the effectiveness of the traditional school curriculum. When any educational program is developed with a scientific methodology and is suited to the student's level, it is expected to yield improvements in academic performance. Therefore, the proper implementation of curricula contributes positively to students' overall academic development.

Table (4): Post-Test Comparison Between Groups

Group	Mean	SD	T Calculated	T Tabular	df	Significance
Experimental	7.71	2.33	4.16	2.09	18	Significant
Control	6.56	1.23				

The researcher attributes this improvement to the effectiveness of the educational curriculum designed using mental stimulant strategies. These strategies enhance students' ability to store and retrieve information by engaging their cognitive processes during

learning. When students actively utilize mental operations, they achieve better outcomes compared to peers who do not engage in such cognitive strategies. This mental engagement contributes to superior performance by promoting deeper comprehension, improved organization of read material, and effective repetition of key content.

Furthermore, the experimental approach aided students in identifying main ideas within texts and retaining them more effectively. Although the control group also showed significant improvement, the superior performance of the experimental group validates the effectiveness of the mental stimulant-based curriculum. This finding is supported by the study conducted by Gadzella (1984), which confirmed a positive correlation between academic achievement and the use of cognitive strategies and mental stimulants.

Table (5): Development Rates Between Pre- and Post-Tests

Group	Pre-Test	Post-Test	Difference	Development Rate
Experimental	4.6	7.71	3.11	40.33%
Control	4.8	6.56	1.76	29.87%

This improvement can be attributed to the fact that students in the experimental group had not previously experienced such a scientific, structured, and engaging approach to learning. The use of educational questions, along with their analysis, rephrasing, and subsequent review, contributed to making the learning process more effective and enjoyable. This approach significantly enhanced the level and percentage of learning compared to the control group.

Conclusions

1. The curriculum based on cognitive stimulants significantly improved students' reading comprehension.
2. Both experimental and control groups benefited, but the experimental group outperformed the control group.
3. The stimulant-based strategy enhanced students' learning, recall, and understanding.
4. Students exposed to structured and engaging stimuli demonstrated higher cognitive growth.

Recommendations

1. Incorporate cognitive (psychotropic) stimulants in instructional design to enhance comprehension.
2. Conduct further research on other types of stimulants and their effects on various educational variables.
3. Develop a practical guide for teachers on how to apply stimulants in teaching.
4. Replicate the study across different grade levels and subjects to validate findings.

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