Stimulants of Cognitive Strategies: The Most Prominent Types & Importance of Using in the Teaching and Learning Process

(A Survey Study of the Relevant Literature)

Nidal F. Abdel Ghafoor[1] & Saed M. Rabaia[1]

[1] Al-Quds Open University, Palestine

Correspondence: Nidal F. Abdel Ghafoor, Al-Quds Open University, Palestine.

Received: July 11, 2021 Accepted: September 2, 2021 Online Published: September 8, 2021

doi:10.5430/ijhe.v11n2p30 URL: https://doi.org/10.5430/ijhe.v11n2p30

Abstract

The study aimed to identify the importance of using stimulants of cognition strategies in the teaching-learning process and to identify the most prominent types of these stimulants, based on a survey of the relevant literature. To achieve these two objectives, the researcher followed the steps of the descriptive approach and the analytical procedures. Results indicated the importance of employing stimulants of cognition strategies in teaching different subjects/materials, as well as and its contribution to the learning of students at different school stages, Furthermore, the study came out with a list of stimulants consisted of (22) types of stimulants on which the previous studies and literature agreed. Finally, the researcher presented a set of recommendations that emphasizes the importance of using these Stimulants in the teaching and learning process.

Keywords: stimulants, cognition, strategies

1. Introduction

Education in many countries of the world is facing a learning crisis, and still low and suffers from weakness, according to some reports, there is a shortcoming in the efficiency of educational systems in achieving the major goals, (The World Bank 2019; The Arab League Educational, Cultural and Scientific Organization, 2020). One of indicators, that these countries usually score much lower than the average in international standardized tests in education, such as {TMSS} and {PISA} (United Nations Development Program Regional Office for Arab States, 2016).

Regardless of the reasons that may stand behind this decline in the educational process, The researcher, based on what a lot of literature (Meiers, 2007; Jalbani, 2014; Al-Khouly, 2002; The World Bank 2019) Assumes that most important reasons that lead to the stagnation and decline of the educational process may related with teachers, especially many education systems pay little attention to what teachers know and do in the classroom, on other hand there is afailure to keep pace with modern methods and strategies of teaching, As well as, resistance these modern methods and strategies by teachers .

However, many teachers still prefer traditional methods of teaching; which leads to weakening and regression of the teaching process and led the students being unable to benefit from the education provided to them, and they neglect the cognitive methods and means; that would attract the attention of the students, increase the effectiveness of educational and learning situations, and developing mental skills for them. Although, teachers can easily develop and employ these practices to rid the educational and learning process of many negatives and obstacles.

2. Study Problem

The changes that occurred in the modern era have had a major impact on all mankind's life, and left a clear impact on the progress and development of all fields, including the field of education and related objectives, means, teaching methods, and curricula. Accordingly, the need became urgent to new strategies that direct the course of education in the modern era to keep pace with scientific and technological progress (Al-Heresh et al, 2010). And it became required of teachers to develop their educational practices and to focus on cognitive methods and means that ensure the development of students' mental skills, and teach them how to obtain and process information, and develop their ways of thinking.

Therefore, the use of cognitive stimuli is one of the methods and means that every teacher must pay attention to, and use them to expand and enrich the curricula, and to make changes in the learning environment (Obeidat & Abu Al-Sameed, 2013).

The Subject of stimulants of cognition strategies has attracted the attention of many researchers -as literature of the current study indicates- who have tried to shed light on it from more than one aspect, such as types of stimulants of cognition strategies, and identify the importance and feasibility of using these stimulants in the educational and learning process. However, it is taken on these research attempts that they were scattered, dealt with the subject in a fragmented manner, and it was predominantly experimental or semi-experimental.

Therefore, this study provides a survey of the relevant literature, will attempt, on one hand, to identify the importance of using stimulants of cognition strategies in the teaching and learning process. On the other hand, the study will identify the most prominent types of these stimulants strategies that can be used in the teaching-learning process.

3. Goals and Questions of the Study

- Identifying the importance of using stimulants of cognition strategies in the teaching and learning process, according to relevant previous studies, by answering the question: What is the importance of using stimulants of cognition strategies in the teaching and learning process, according to relevant literature and previous studies?
- Specifying the most prominent types of stimulants of cognition strategies that can be used in the teaching-learning process, by answering the question: What are the most prominent types of stimulants of cognition strategies that can be used in the teaching-learning process, according to relevant literature and previous studies?

4. The Importance of the Study

A- The present study derives its theoretical importance from:

A:1-The lack of theoretical studies on the subject (to the extent of the researcher's knowledge).

A:2- Shedding light on the issue of stimulants of cognition strategies and the importance of using them in education according to relevant literature and previous studies.

B- As for its practical (applied) importance, it derives from:

B:1-Extracting a list of the most prominent stimuli of cognition strategies that the literature agreed upon and put it in the hands of teachers to rely on inactivating educational situations.

B:2- Researchers can benefit from this list and the study as a whole in conducting relevant studies.

5. Methodology of the Study

Since the current study is theoretical, the researcher followed the steps of the descriptive approach and analytical procedures, as he relied on many relevant Arab and foreign references and studies, in clarifying the background of the subject, and answering the two questions of the study.

6. Theoretical Background and Literature Review

6.1 Theoretical Background

Psychologists and educators in our current era, get focused on the cognitive methods and means that teachers use to develop students' mental skills, teaching them how to obtain information, how to process it, and how to develop their methods of thinking (Sakhi & Hameed, 2010)

Cognitive methods are an important focus for the study of individual differences in the field of mental processes, such as (perception, thinking, attention, memory, learning, and problem-solving), It is also regulating the environment of the individual and his perceptions, and it is one of the preferred methods of receiving and processing information, and solving problems that impede his balance. With the importance of distinguishing between cognitive methods and cognitive strategies: The first one expresses the distinct and conscious self-consistency of the individual in his handling information, and it deals with situations and tasks in their general form that does not change, while cognitive strategies are general methods used by individuals in dealing with information, and they deal with the characteristics of situations and tasks, and It can be changed through training (Al-Arabi, 2009).

Cognitive strategies can be defined as an internal process that can be utilized for various activities requiring cognitive involvement, including; cognitive strategies in reading comprehension, cognitive strategies in learning,

cognitive strategies in recalling, and cognitive strategies in thinking or solving problems. Shortly, it deals with how to learn, how to remember, and how to convey ideas reflexively and analytically. If the learner masters the internal process well, they will be able to self-learn (self-instruction) and can learn independently (Suyitno, 2017). It can be also defined as sets of mental processes that are consciously implemented to regulate thought processes and content to achieve goals or solve problems. Because it directs the behavior towards the goal through direct attention focus, cognitive reframing or reinterpretation of distressing experiences, imagery techniques, and mental rehearsal of positive statements (Cameron & Jago, 2013).

Perception can be defined as a psychological process that contributes to accessing the meanings and connotations of things, people, and situations that the individual deals with, by organizing related sensory stimuli or interpreting and formulating them into meaningful faculties and capabilities (Nabeel, 2000). It must be pointed out that attention is closely related wit perception, and It precedes perception and paves the way for it, and it works to direct the feeling towards a specific influential thing, As for perception, it analyzes that influencer and clarifies it for understanding, Due to a large number of influences (internal and external), the individual cannot pay attention to them and realize them all, so he chooses from them what his work requires, his needs, motives, tendencies, and his psychological and physiological state, In other words, attention directs the individual's feeling towards the behavioral situation as a whole if this situation is new to him, or directs his feeling towards some parts of the perceptual field if the situation is familiar (Sharafia, 2010).

Perception is very important because it includes many internal mental processes such as (assembly, repetition, organization, interpretation, meaning creation, analysis, imagination, linking, retrieval, and other processes) that require stimuli that enable students to employ them during the learning process. So psychologists searched the means that urge students think about what they learn, help them to effectively activate their mental processes to reach a high degree of understanding and comprehension (Al-Fatlawi & Harrat, 2014).

Thus, it can be said that strategies of stimuli cognitive, is one of the important things that teachers must use to expand the curricula and making changes in the learning environment, especially teaching methods and educational procedures that achieve the goals.

The term "cognitive strategies" in its simplest form means using the mind (cognition) to solve a problem or complete a task, or as prompts and facilitators procedural which can increase the efficiency with which the learner approaches a learning task (Jordan, 2009).

Whereas stimulus cognitive can be defined as the processes (interpretation, analysis, summarization, imagination, conclusion, linkage, grouping, repetition, evaluation, and others) that learner's memory performs to lead him to understand, insight, vision, and then retrieval and remembering. These mental stimulants come from two sources the teacher and the learner (Abu Haleel, 2016). It can also be defined as the mental processes that a learner employs to understand and learn or those cognitive means that urge the learner to employ the appropriate mental process during his learning (Al-Affoon & Jaleel, 2013). As for Darwaza (2004) she sees that they are means urging students to employ the appropriate mental process during their learning or leave them the freedom to employ whatever mental processes they want to lead them to assimilation and then to learn.

Therefore, it can be said that cognition stimulants are specific practices, activities, and means of cognition that can be done by the student, the teacher, or both, to urge the learner to employ the appropriate mental process during his learning, and activating his memory to enter information in it and coordinate and program it functions and objectives of cognitive stimulants differ in terms of the time of use in the lesson or educational situation (Al-Affoon & Jaleel, 2013):

Stimulants appear before starting the learning process (aimed at attracting the learner's attention, to the topic and the important ideas in the lesson) .

Stimulants appear during the learning process (concerned with helping the learner to coordinate and program information into memory by interpreting, analyzing, organizing, linking to previous information, classifying, compiling, arranging, transforming, and simplifying it)

Stimulants appear after the learning process (focusing on assembling and summarizing the material, helping the learner to review all the learned material in a relatively short time, and also helping him to store information in long-term memory and developing learning at higher levels).

These stimulants must have specifications such as:

- Clear and unambiguous.

- Instructions and strategies for employment and use are clear.
- Diverse in its style questions, introductions, summaries, notes. etc.....
- Used at different times in the lesson (In light of the goals.
- Can be presented in different forms (verbal, audio, and visual) to suit the students' tastes.
- Fit the studied educational material.

Commensurate with the characteristics of the learners, level of intelligence, abilities, and their educational stage.

Regarding the benefits of employing cognitive strategies stimulants in teaching, the literature has been emphasized that good cognitive strategy improves the learner's ability to deal with academic information, and enable him to obtain information by teaching him how to learn and how to think scientifically, which makes him the center of the educational process and providing him with the means for acquiring knowledge. And she emphasizes that the use of these strategies helps learners to employ and develop a greater number of mental skills, and may lead them to achieve higher levels of cognitive goals, and raising their levels (Abdel Ameer & Jassim, 2009). In addition to that, the use of cognitive strategy stimuli provides a structure for learning when a task cannot be completed through a series of steps and supports the learner as it develops the internal procedures that enable it to perform complex tasks (Jordan, 2009).

Looking at the above benefits, it is noted that the use of these stimulants intersects with the concept of active learning, which is one of the methods of learning and teaching that is based on providing an educational environment rich in stimuli, allowing students to participate effectively through reading, writing, thinking, reflection, discussion, constructive dialogue, conscious thinking, and deep contemplation of what it includes the educational situation, which helps them to reach knowledge under the supervision of the teacher (Sa'ada et al, 2006). So using these stimuli is very important in activating learning, because active learning leads to effective teaching, and encourages and develops knowledge, skills, and attitudes, and activate students' learning and push them to use their skills and higher mental abilities in reaching knowledge (Diković & Gergorić, 2020). Instead of limiting their role in the process of receiving information; Singh (2017) emphasizes that active learning strategies in a hybrid form, help students understand classroom concepts in the context of real-world situations, and help them understand that faculty expect them to search and find relevant information to answer questions or solve problems. Finally, it should be noted that the use of these stimulants does not limit to face-to-face education or traditional classroom educational situations only, but it can be used to activate e-learning, or virtual classrooms, which it defines (Al-Astal, 2013) As an online technology based on creating an interactive learning environment similar to a regular classroom environment.

6.2 Literature Review

6.2.1 Previous Studies That Dealt with the Use of Cognitive Stimulants Strategy in Teaching

The studies that dealt with the use of the strategy or method of cognitive stimulants in teaching are many and varied; the researcher presents some of them in the following:

Sakhi & Hameed's study (2010) aimed to determine the effect of using cognitive stimulants in teaching child psychology to female students of the Teachers Preparation Institute in developing their scientific thinking; The results found that there is an effect of employing the strategy of cognitive stimulants in developing the student's scientific thinking.

Abdel-Ameer & Jassim's study (2009) aimed at finding out the effect of cognitive strategies activators on the achievement& the development of the mental skills of the research sample students. The results revealed the superiority of the performance of the experimental group in the achievement posttest over that of the control group, it also revealed a statistically significant difference in the mean scores of the mental skills post-test favor of the experimental group.

Al-Fatlawi & Harrat's (2014) study aimed at finding the effect of cognitive stimulants on the reading comprehension of second-grade intermediate students in the reading subject. The results showed the superiority of the performance of the experimental group in the reading post-test.

Allawi's study (2015) aimed to identify the effect of using conscious activators to develop critical thinking on female students of teachers institute in geography material, The results showed the superiority of the experimental group over that of the control group and concluded that the use of cognitive stimulants in teaching geography to the female students led to the development of critical thinking for them.

AL Kalbi's study (2012) aimed to identify the effect of cognitive stimulants on the achievement of fourth-grade literary students in the history of Arab-Islamic civilization, and in developing their inclination towards it. The results showed the superiority of the students in the experimental group over the students in the experimental group in the post-achievement test, and in the measure of a tendency toward the subject.

Abu Haleel's study (2016) aimed to identify the range of the impact of the mental stimulants strategic in the attainments of the History department students of the education college in the curriculum. The results showed the excellence of the experimentalism group on the immutable group.

Abdul Ridha & Tiki's study (2015) aimed at building an educational design model based on cognitive stimulants, and identifying its effectiveness in developing scientific thinking skills in geography for first-grade intermediate students. The results revealed the superiority of the experimental group to a control group on the skills of scientific thinking test, it also revealed a statistically significant difference in the mean scores of the mental skills post-test favor of the experimental group, in addition to constructing a model of instructional design according to the doping strategies perception.

Jaber's study (2010) aimed to know the influence of the Cognitive strategies and their activators on the quality and goodness of what has been achieved by the 1st year students of the female intermediate schools in Al-Qadisiya province. And know the influence of the Cognition strategies and their activators on growing up the mental abilities of the female students. The results showed the performance excellence of the experimental group that has studied by using cognitive strategies activators in the achievement test, it also revealed a statistically significant difference between scores of the mental abilities test (before/after) and was favored of the experimental group.

Jubran's study (2012) aimed to investigate the effect of using a Multi-Sensory Approach for teaching English language skills on the tenth-grade students' achievement in English at Jordanian public schools. The results indicated a statistically significant in the post-test in favor of the experimental group, and no statistically significant difference in the students' achievement due to gender, or to the interaction between gender and group.

Scott's study (2005) aimed to examine the effect of multi-sensory stimulation on the descriptive writing of fourth-grade students' descriptive writing of the fourth - grade stud. The results indicated that the experimental group had significantly higher scores for "amount learned" than the control group from the first writing prompt, whereas scores for both groups were not significantly different from the other writing prompt.

Baranova & Nikolaev's study (2017) aimed to analyze the dynamics of the question-asking behavior throughout a school year revealed a tendency towards some positive changes. The results showed that Primary school children need psychological and pedagogical scaffolding aimed at developing a question-asking behavior as a form of cognitive activity.

Barghash's study (2020) aimed to shed light on Spaced Learning Or the so-called spaced repetition. The results indicated the importance of focusing on employing this strategy in the educational process, especially with students with Learning Disabilities, given what this category suffers from problems in memory, and showed that this strategy can support students' information with all kinds of memory and with long-term memory.

6.2.2 Literature That Dealt with the Types of Cognitive Stimulants

By speaking about the types of cognitive stimulants that the teacher can use and employ in the teaching-learning process, the researcher researcher reviewed and checked the studies and literature that dealt with these stimulants and found that they are many: Al-Shammari (2014); Darwaza (2004); Atiya (2010); Al-Afoon & Qahtan (2010); Sandaqli (2009); Abdel Bari (2010); (Al-Fatlawi & Harat (2014); Al-Saadawi (2016); Al-Azzawi (2017); Barghash (2020); Attia (2006); Fahmy (2003)); QED Foundation (2021); Jaber (2010); British Council (2005); Jordan (2009); Blocki et al (2020); Kang (2016); Ace & Casem (2017) The researcher also found that this literature dealt with many cognitive stimulants, by compiling them the researcher came up with a set of stimulants. In the following is a presentation of them coupled with a brief explanation and definition of each one:

Retrieval strategy: The ability to remember information and retrieve it from memory. Retrieval may be at the level of comprehension, application, analysis, composition, assessment, discovery.

Educational questions: They are interrogative sentences that urge the learner to search his memory for the information he learned, and then retrieve it to answer a question posed, or solving a presented problem.

Teaching objectives: They represent notice behaviors that are expected to be shown by the learner after the learning process. It may be general and comprehensive, are achieved in a long period, such as a semester or an academic year, or a special behavioral event that can be achieved in a short period.

Paraphrasing: reflects how far the individual has comprehended what he has read and learned through repeating the studying subject in the individual`s language.

Analogies/similes and comparisons: connecting two studying subjects at the same level of generality; one of them is popular with him and the other is not, and the comparison here is held for the outside shape, or function, or composition.

Instructions: indicative sentences that direct learners on how to work, solve the problem, and proceed in the learning process. They are often presented in the form of points or steps.

Introductions (advanced organizers): Introductory material and background information provided to the learner at the beginning of teaching a particular subject or an entire unit of study, He can rely on it to form concepts as well as help him remember previous information and use it to receive new learning.

Sentences and Titles: Concise words representing an idea, concept, principle, or a taught general act and give an essential idea about it. Summaries: a brief presentation of the most important information contained in the studied text, by taking out its essence from details and long explanations.

Structures (Formulations): A brief system of information that shows the internal relations between the ideas of the studied text, or external relations with other outside ideas, and it shows firstly the main public relations, then the less general than the less. It differs from the information system strategy in that it is concerned with clarifying the external relations between the text and related ideas.

Underlining (lines under important ideas): Used to shed light on the main ideas the studied theme implied on the ground that these ideas assist the learning person to learn, through underlining the main and important ideas.

Class Note Taking: Brief sentences or phrases that are extracted from the content of the material in addition to the knowledge of the learner himself.

Educational Stories: Stories designed to guide, control, and provide learners with specific behaviors and concepts in the subject of learning.

Means of memory consolidation: Words, letters, or images, each of which represents an important word, idea, or term to be learned.

Spatial learning strategy: Deals with the main ideas and information that are contained in the text and knows how to link the relationships between these ideas using arrows after they are organized in tables and maps starting with the general or higher idea to the lower than it.

Outlines: a skill that concerns by defining the relations among concepts and organized them in a way that reflects the main ideas included in the studying subject, then shifting to the less significant ideas.

Mental Images and Imaginations: a perception of a concept, a fact, or an imaginary idea, a principle, or a procedure to see this information in a clearer and richer way.

Sensory Images: The visible illustrative shapes that provide the learning with details and facts on a certain happening or a situation. These pictures are colored or uncolored, and It differs from the mental images formed by the learner's memory to understand a particular idea.

Revisions: Reconsidering the learned material, to ensure that the learning process has taken place, by emphasizing the important points that were mentioned in the studied text, whether they are partial or general information.

Information System: Includes general, comprehensive, and abstract information for the thing to be learned, and It is designed hierarchically so that it includes information from the highest to the less general and then the least gradually.

Diagrams and information, maps: The visual forms that show and depict the main ideas that were mentioned in the study material in an organized way per which information is arranged in order from the general idea to that of less generality.

Self-questioning strategy: Allowing students to generate questions about the presented information and ask themselves and the teacher, by searching in the scientific material or in the text to collect information while generating the questions; which leads to their understanding of what they have read .

Spaced Learning/spaced repetition: This strategy is summarized in the repetition of information in different ways three iterations during the school hour, separated by time intervals as dispersals For deliberate attention, and these intervals are within ten minutes, and in these intervals, activities far from the subject of the lesson are used, and

physical activities can be used as dispersions, and the divergent learning strategy results in encoding the information in the long-term memory, which is reflected in the educational results of students.

7. Results

7.1 The Results of the First Question

What is the importance of using cognitive strategy stimulants in the teaching-learning process according to the literature and previous relevant studies? By referring to the above studies that dealt with the use of cognition strategies stimulants, notes that most of these studies were experimental or semi-experimental. By referring to the above studies that dealt with the use of cognition strategies stimulants, notes that most of these studies were experimental or semi-experimental. The results showed:

Importance of employing these strategies in teaching different subjects.

Importance of employing these strategies in different educational stages.

The effect of using these strategies in many variables, table 1 illustrates this.

Table 1. Displays aspects that show the importance of using stimuli of cognition strategies in the educational process, according to previous studies and literature

The study	Targeted variable	Targeted material/subject	Targeted institution/ stage	Classification of Targeted stage	The result
Sakhi & Hameed (2010)	Scientific thinking of female students	Psychology	Female Teachers preparation institute	Higher education	There is an effect of using the cognitive stimulants strategy in developing the scientific thinking of female students.
Abdel-Ameer & Jassim (2009)	Achievement of students & their mental skills	Biology	Fifth grade/ scientific branch	Basic stage	There is an effect of using the cognitive stimulants strategy in achievement of students, and in developing their mental skills.
Al-Fatlawi & Harrat (2014)	Reading comprehension	Reading subject	Intermediate second grade	Second-grade intermediate	There is an effect of using the cognitive stimulants strategy in reading comprehension.
Allawi (2015)	Critical thinking of female students.	Geography	Female Teachers preparation institute	Higher education	There is an effect of using the cognitive stimulants strategy in developing critical thinking.
AL Kalabi (2012)	Achievement of students & their tendency towards the subject	The history of the Arab-Islamic civilization	Fourth grade / Literary branch	Basic stage	There is an effect of using the cognitive stimulants strategy in achievement of students.and on students' tendency towards students the subject.
Abu Haleel (2016)	Achievement of students	Curriculum subject	History Department/College of Education for Human	Higher education	There is an effect of using the cognitive stimulants strategy in achievement of students.

			Sciences, Al-Muthanna University		
Darwaza (2003)	Academic achievement of students	General / Unspecified	An-Najah National University	Higher education	There is an effect of employing classroom notes and lines under ideas on university academic achievement.
Abdel Ridha & Tiki (2015)	Students' scientific thinking skills&Their independence and self-confidence	Geography	First middle grade	Intermediate stage	effectiveness of instructional design using cognitive strategies activators in developing students' scientific thinking skills, their independence and self-confidence.
Jaber (2010)	Achievement of students and their mental competencies	Biology	Middle Schools for Girls	Intermediate stage	There is an effect of employing cognitive stimulants strategy In the achievement of students, and in the development of their mental competencies
Jubran (2012)	Achievement of students	English language	10th grade / Public schools	Intermediate stage	There is an effect of using Multi Sensory Approach for teaching English language skills in the achievement of students
Baranova & Nikolaev (2017)	Motivating students towards learning , research and explore	General / Unspecified	Elementary schools	Basic stage	There is an effect of using questioning strategy In motivating students towards learning and enabling them to research and explore.
Barghash (2020)	Reducing memory problems of that they suffer &Strengthening their information with long-term memory	General / Unspecified	Unspecified	Students with Learning Disabilities	There is a positive effect of employing the divergent learning strategy (spaced repetition strategy) in teaching students with learning difficulties, and in reducing memory problems of that they suffer, and in strengthening their information with long-term memory.

Source: the researchers

The table 1 showed that the studies that related to the subject of the use of stimulants of cognitive strategies are many and varied. The results showed the importance of using these stimulants in teaching different subjects and materials such as (psychology, biology, reading, geography, curricula, physical education, English language, and mathematics).

As well as, its contribution to learning at different educational stages such as (the basic stage, the intermediate stage, higher education, and students with learning difficulties). It also showed the impact of using these stimulants on the achievement variable mainly, and several other variables such as (enhancing critical thinking in student achievement, motivating students towards learning, research, and exploration, Developing the skills of scientific thinking, independence, and self-confidence, developing students' mental skills and reading comprehension, their tendency towards the subject, learning some offensive skills in handball, and overcoming the memory problems that students with learning difficulties suffer from.

In other words, all of these studies confirm the importance of these stimulants, the viability of employing them in the teaching-learning process, and emphasize the necessity of using them.

7.2 The Results of the Second Study Question

What are the most prominent types of stimulants of cognition strategies that can be used in the teaching-learning process according to the literature and previous relevant studies? After listing the above types of stimulants, the researcher monitored the frequency of each one in the literature; the table 2 shows the results.

Table 2. Displays the most prominent types of stimulants of cognition strategies that can be used in the educational process, according to the literature

NO.	Name/ type stimulant	The Reference
1	Educational questions	Darwaza (2004); al-Shammari (2014); Allawib (2015); al-Azzawi (2017); al-Fatlawi & Harrat (2014); Al-Saadawi (2016).
2	Teaching objectives	al-Fatlawi & Harrat (2014); (Jaber (2010); Darwaza (2004); Al-Shammari (2014); Allawi (2015); Al-Azzawi (2017); Al-Saadawi (2016).
3	Paraphrasing:	British Council (2005); Darwaza (2004); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
4	Analogies/similes and comparisons	Jordan (2009); Darwaza (2004); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
5	Instructions	Jordan (2009); Darwaza (2004); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
6	introductions or advanced organizers	Attia (2010); Al-Azzawi (2017); Darwaza (2004); Al-Shammari (2014); Al-Saadawi (2016).
7	Summaries	Q.E.D Foundation (2021); British Council (2005); Darwaza (2004); Shammari (2014); Al-Azzawi (2017).
8	Structures (Formulations)	Darwaza (2004); Al-Shammari (2014); Al-Azzawi (2017); Allawi (2015); Al-Saadawi (2016).
9	Underlining (lines under important ideas)	Jaber (1999); Darwaza (2004); Al-Azzawi (2017); Al-Saadawi (2016).
10	Titles and sentences	Al-Afoon & Qahtan (2010); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
11	Class Note taking	Q.E.D Foundation (2021); Darwaza (2004); Al-Shammari (2014); Sandaqly (2009); Al-Azzawi (2017).
12	Revisions	Q.E.D Foundation (2021); Al Shammari (2014); Al-Saadawi (2016).
13	educational stories	Darwaza (2004); Al Shammari (2014); Al Azzawi (2017); Al Saadawi (2016).
14	Memory consolidation means	Darwaza (2004); Al Shammari (2014); Al Azzawi (2017).
15	Spatial learning strategy	Darwaza (2004); Al-Afwoon & Qahtan (2010); Al-Azzawi (2017).

16	Outlines	Q.E.D Foundation (2021); Darwaza (2004); Al-Azzawi (2017)
17	mental images and imaginations	Abdel Bari (2010); Al Shammari (2014); Al Azzawi (2017); Al-Saadawi (2016).
18	sensory images	British Council (2005); Al-Afoon & Qahtan (2010); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
19	Information system	Q.E.D Foundation (2021); Jordan (2009); Al-Shammari (2014); Al-Azzawi (2017); Al-Saadawi (2016).
20	Diagrams and information maps	Q.E.D Foundation (2021); Darwaza (2004); Al Afoon & Qahtan (2010); Al-Azzawi (2017); Al-Saadawi (2016).
21	Self-questioning strategy	Q.E.D Foundation (2021); Attia (2006); Fahmy (2003).
22	Spaced Learning /spaced repetition	British Council (2005); Blocki et al (2020); Ace & Casem (2017); Kahn (2016); Burghash (2020).

Source: the researchers

The table 2 shows the most prominent types of cognitive stimulants (the main stimulants) as shown by the relevant literature contained in this study, here it must be noted that teacher can derive other stimulants from these stimulants and use in the teaching-learning process. It should also be noted the possibility of employing one or more stimulants in one lesson or educational situation.

And it is important to pay attention to the location and the timing of the strategy in the lesson, the timing of using the stimulant is very important, as there are stimulants that appear and are preferred to be used - as we mentioned:

Before starting the process learning such as: educational objectives, educational questions, instructions, sentences and addresses, sensory images, mental images and imaginations, stories, introductions or advanced organizations.

During the learning process, such as: educational objectives, educational questions, Paraphrasing, Analogies/similes and comparisons, lines under important ideas, mental images and imaginations, stories, class notes, memory consolidation means.

After the learning process such as: post-educational questions, paraphrasing, summaries, revisions.

Therefore, the teacher can use one stimulant in more than one place in the lesson or the teaching mode .

8. Results

- The importance of employing stimulants of cognition strategies in teaching different subjects/materials.
- The possibility of using cognitive strategies stimulants to contribute to students' learning at different school stages.
- The effect of using stimulants of cognition strategies on students' achievement, and on many other variables
- The study came out with a list of (22) types of stimulants on which the previous studies and literature agreed.
- Finally, the researcher presented a set of recommendations that emphasizes the importance of using these Stimulants in the teaching and learning process.

9. Recommendations

- Inviting the ministries of education, universities and teacher training colleges to give special attention to cognitive stimulants.
- The necessity of providing all the necessary requirements (material and moral) to employ cognitive stimulants in the educational process.
- Urging teachers to use cognitive stimulants in different educational disciplines and stages.
- The necessity of teachers' interest in using cognitive stimulants to motivate their students to learn, research, and explore, raise their levels of achievement**,** develop their skills, and thinking.
- Implementing a study measures the degree to which teachers employ cognitive stimulants in teaching.

References

Abdel-Ameer, F., & Jassim, B. (2009). The effect of stimulants of cognition strategies on the achievement of fifth-grade students in science and the development of their mental skills in biology. *Al-Qadisiyah Journal of Arts and Educational Sciences, 1*(8), 297-320.

Abdel-Bari, M. (2010). *Strategies for Learning Vocabulary*. Dar Al Masirah for Publishing, Amman, Jordan.

Abdel-Ridha, N., & Taki, I. (2015). The effectiveness of a suggestion to design an example of activating skills of intellectual thinking in geography. *Ahl al-Bayt Journal*, 17, 495-538.

Abu Haleel, K. (2016). The Effectiveness of the Mental Stimulants Strategy in the Achievement of Students of the History Department at the College of Education for Human Sciences: Al- Muthanna University in Curriculum Subject. *Arok Journal, 3*(19), 351-390.

Ace, T., & Casem, R. (2017). Spaced Learning Strategy in Teaching Mathematics. *International Journal of Scientific & Engineering Research, 8*(4), 851-856. DOI- 10.13140/RG.2.2.27715.43043.

Al- Heresh, A., Muflih, M., & AL-Dhoon, M. (2010), Obstacles to using the e-learning system from the point of view of secondary school teachers in Koura District. *The Jordanian Journal of Educational Sciences, 6*(1), 27-40.

Al-Affoon, N., & Jaleel, W. (2013). Cognitive Learning and Information Processing Strategies. *Dar Al-Mahraj for Publishing and Distribution*, Amman, Jordan.

Al-Affoon, N., & Qahtan, F. (2010). *The Effectiveness of Instructional Design and its Relationship to Practical Thinking and Environmental Awareness*. Dar Safaa for Publishing and Distribution, Amman, Jordan.

Al-Arabi, G. (2009). The homogeneity of the cognitive style of both the teacher and the student and its impact on the academic achievement of the students of the Higher School of Technical Education Teachers in Oran in the light of the variable of gender and specialization: correlative study, comparative. *(Unpublished Doctoral Dissertation)*, Oran University, Oran-Algerie.

Al-Astal, O. (2013). The actuality of usage of virtual classes in teaching, educational courses at Al- Quds Open University and the means to develop them. *(Unpublished Master Thesis)*, Al-Azhar University, Gaza, Palestine.

Al-Azzawi, A. (2017). The effect of mental stimulants in developing the reading comprehension skills of second-grade students in the middle school in the subject of the Noble Qur'an and Islamic Education. *Journal of Adab Al-Farahidi, 9*(31), 476-510.

Al-Fatlawi, J., & Harrat, I. (2014). The Impact of Realization Activators in Reading Comprehension for the Second Intermediate Students in the Reading Lesson. *Journal of the College of Basic Education*, 17, 251-274.

Al-Kalabi, A. (2012). The effect of cognitive activators in achievement and development the interest for the students of the literary fourth class in the history material. *(Unpublished Master Thesis)*, Babylon University, Iraq.

Al-Khouly, H. (2002). *Cognitive Methods and their Controls in Psychology*. Dar Al-Kitab Al-Hadith, Cairo, Egypt.

Allawi, F. (2015). The effect of using cognitive stimulants in developing critical thinking among female students of the Teachers Preparation Institute of Geography. *Journal of the College of Basic Education for Educational and Human Sciences, 1*(23), 613-635.

Al-Shammari, S. (2014). *The effect of an educational program using mental stimulants on the performance of some ring skills in rhythmic gymnastics for female students*. (Unpublished Master's Thesis), University of Dhi Qar, Iraq.

Attia, M. (2010). *Metacognitive Strategies in Reading Comprehension*. Dar Al-Manhaj, Amman, Jordan.

Attia, S. (2006). The effectiveness of metacognitive strategies in developing reading comprehension skills for students with learning difficulties in the preparatory stage. *Journal of the College of Education, 67*(17), 142-176.

Baranova, E. (2017). Question-asking behavior as a form of cognitive activity in primary school children. *Psychology in Russia, 10*(1), 269. https://doi.org/10.11621/pir.2017.0101

Barghash, R. (2020). The strategy of divergent learning and its importance in teaching students with learning difficulties. *The Open Academic Journal for Applied Sciences and* Humanities*, 1*(1), 1-13. DOI: 10.13140/RG.2.2.27715.43043

Blocki, J., Komanduri, S., Cranor, L., & Datta, A. (2014). Spaced repetition and mnemonics enable recall of multiple strong passwords. arXiv preprint arXiv:1410.1490. https://doi.org/10.14722/ndss.2015.23094

British Council. (2005). *Cognitive strategies Teaching English*. British Council. https://www.teachingenglish.org.uk/article/cognitive-strategies

Cameron, L., & Jago, L. (2013). Cognitive Strategies. In: Gellman M. D., Turner J. R. (eds) Encyclopedia of Behavioral Medicine. https://doi.org/10.1007/978-1-4419-1005-9_1120

Darwaza, A. (2003). The Impact of Employing Class Notes and Lines Under Important Ideas for Study Skills on University Academic Achievement. A-Najah National University publications, Nablus, West Bank.

Darwaza, A. (2004). Fundamentals of Educational Psychology: Perception Strategies and their Stimulants as a Basis for Designing Education; Studies, Research and Applications. *Dar Al-Shorouk for Publishing and Distribution*, Aman, Jordan.

Fahmy, I. (2003). The effectiveness of the meta-knowledge strategy in developing critical reading skills for first-year secondary school students. *Journal* of *Reading and Knowledge Magazine, Egypt*, 3, 119-151.

Gergorić, T. (2020). Teachers' assessment of active learning in teaching Nature and Society. *Economic research-Ekonomska istraživanja, 33*(1), 1265-1279. https://doi.org/10.1080/1331677X.2020.1728563

Jaber, H. (2010). The Effect of Using the Cognitive Strategies and Their Activators on What the 1st Year Students of the Female Intermediate Schools Achieve Out of the Biology Subject and the Development of Their Mental Efficiencies in Al-Qadisiya Province. *(Unpublished Doctoral Dissertation)*, University of St Clements.

Jalbani, L. N. (2014). The Impact of Effective Teaching Strategies on the Students' Academic Performance and Learning Outcome. *Munich: GRIN Verlag.*

Jordan, LuAnn (2009). An introduction to Cognitive Strategies. 2002-2005 University of North Carolina. Charlotte Instruction/Cognitive Strategies Special Connections (ku.edu).https://rdw.rowan.edu/cgi/viewcontent.cgi?article=2078&context=etd

Jubran, S. (2012). Using Multi Sensory Approach For Teaching English Skills And Its Effect On Students' Achievement At Jordanian Schools. *European Scientific Journal, 8*(22), 50-61. DOI: https://doi.org/10.19044/esj.2012.v8n22p%25p.

Kang, S. (2016). Spaced repetition promotes efficient and effective learning: Policy implications for instruction. *Policy Insights from the Behavioral and Brain Sciences, 3*(1), 12-19. https://doi.org/10.1177/2372732215624708

Meiers, M. (2007). Teacher professional learning, teaching practice and student learning outcomes: Important issues. In *Handbook of teacher education* (pp. 409-414). Springer, Dordrecht. https://doi.org/10.1007/1-4020-4773-8_27

Nabeel, A. (2000). *Social Psychology*. Zahraa Al Sharq Library, Cairo.

Obeidat, T., & Abu Al-Sameed, S. (2013). Teaching Strategies in the Twenty-first Century Teacher and Educational Supervisor Guide, 3rd Edition, *Debno Center for Teaching Thinking*, Amman, Jordan.

Q. E. D Foundation. (2021). Developing Cognitive Activation. All Kinds of Minds (AKOM). https://www.allkindsofminds.org/attending-to-important-information-developing-cognitive-activation

Sakhi, M., & Hameed, H. (2010). The use of cognitive stimulants in teaching child psychology to female students of the Institute for Teacher Preparation in developing their scientific thinking. *Journal of the College of Education, 1*(8), 278-325.

Sandaqli, H. (2009). *Learning Disabilities, Movement Disorder and Attention Deficit*. Dar Al-Nahda Al-Arabiya, Beirut, Lebanon.

Scott, K. (2005). A study examining the effect of multi-sensory stimulation on the descriptive writing of fourth grade students. *(Unpublished Master's Thesis)*, Owen University. https://rdw.rowan.edu/cgi/viewcontent.cgi?article=2078&context=etd

Sharafia, M. (2010). The effect of perceptual burden on visual selective attention: an empirical study on the maritime observers of the port of Skikda. *(Unpublished Master Thesis)*, Mentouri Frères University, Algeria.

Singh, J. (2017). Enhancing Student Success in Health Care Programs: Active Learning in a Hybrid Format. *Journal of Instructional Pedagogies*, 18, *1-14.*

Suyitno, I. (2017). Cognitive Strategies Use in Reading Comprehension and Its Contributions to Students' Achievement. *IAFOR journal of education, 5*(3), 107-121.

The Arab League for Education, Culture and Science. (2020). The reality of public education in the Arab world and ways to develop. The Arab League for Education, Culture and Science.

The World Bank. (2019). The Education Crisis: Being in School Is Not the Same as Learning. https://www.worldbank.org/en/news/immersive-story/2019/01/22/pass-or-fail-how-can-the-world-do-its-homework

United Nations Development Program Regional Office for Arab States. (2016). Youth in the Arab Region: Prospects for Human Development in a Changing World.