

## Impact of a Proposed Strategy According to Luria’s Model in Realistic Thinking and Achievement in Mathematics

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Ban Hassan Majeed<sup>(✉)</sup>

College of Education for Pure Science/Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq  
ban.h.m@ihcoedu.uobaghdad.edu.iq

**Abstract**—The research aims to find the impact of a proposed strategy according to the Luria model on realistic thinking among fifth-class scientific students and their achievement in mathematics. To achieve it, the experimental research method and the quasi-experimental design were used for two equal groups, one of them is a control group taught in traditional way and the other is an experimental one taught according to strategy based on Luria model. The research community represents the students of the fifth scientific class from the General Directorate of Education of Karkh First. The research sample (40) students were deliberately chosen and distributed equally between the two groups after making sure that they were equals in their previous achievement in mathematics, their level of intelligence, and their chronological age. For the purpose of collecting data for the experiment, 2 test were built both of them were objective, i.e., multiple choice; a realistic thinking test consisted of (15) items, in addition to the achievement test, which in its final form consisted of (20). The results indicated that the students of the experimental group who studied according to the proposed strategy outperformed the students of the control group who studied by usual method. In light of the results, the researcher recommended a number of recommendations.

**Keywords**—proposed strategy, Luria Model (LM), realistic thinking (RT), mathematics

### 1 Introduction

A good teaching strategy is one that works to achieve interaction between the parties to the educational situation, in addition to determining the performance of both the teacher and the learner and directing the lesson towards achieving the predetermined outcomes. Learners, and teacher are a guide, facilitator, and leader. Efficient education is achieved through modern teaching strategies that stimulate the learner’s thinking, as the use of exemplary and appropriate learning and teaching strategies ensures the achievement of quality in education. Despite the constant emphasis on making the learner’s role effective and active, and avoiding memorization and indoctrination, in fact, the focus was not placed on the learner’s possession of lifelong learning skills.

Realistic thinking is one of the modern models that has been introduced to education recently and has proven its efficiency in making the student think with a more realistic scientific mentality that helps him to meet the challenges of his daily life [1–3].

Teaching methods and strategies are still the preoccupation of specialists in fields of education and learning, every time and time they sift their ideas, perhaps guiding them to a method or a model to carry out the reality of new education. After a series of experiments, research and studies, the scholars found what they wanted in modern strategies, including the LM as a model, which will be the field of our research. Since the teaching methods used in educational institutions still depend on the method of lecture and other traditional methods, and reluctance of teachers to adopt modern teaching learning strategies in the learning and teaching process leads to poor academic achievement among students, in addition to low of performance in thinking skills [4, 5]. Also when students does not allow actively participate in the lesson, which leads to stifling their talents and reducing their creativity. Since the teaching of mathematics faces difficulties related to the nature of the subject and the methods of teaching and evaluating it [6, 7]. As a result of this weakness, many conferences and studies emphasized the need to rely on modern methods of teaching [8, 9]. Theoretical and applied importance of research is summarized by the from experimenting with modern methods to verify their effectiveness, including Luria model is one of the most recent models that have been used in education in general and mathematics in particular. This model stimulates the students’ brain for thinking. Students’ possession of realistic thinking helps establish a generation that can solve the problems facing the learner in his real life. Finding out if there is an effect of the proposed strategy according to the Luria model and the achievement of students in fifth-class scientific. Providing a realistic thinking test for high school students that can be used in the educational field or by other researchers. Directing the attention of mathematics teachers to adopting modern and unique models in teaching that allow for more realistic thinking. Draw attention to the importance of students’ realistic thinking and its role in determining their goals better. The research is limited to the students of the fifth scientific class (applied branch) in the General Directorate of Education of the 1st Karkh in the province of Baghdad. The second chapter (Sequences) from the content of the mathematics textbook for students of the fifth scientific for the year 2021, which was written by a committee in the Ministry of Education. The 1st semester/year (2021–2022).

## **2 Review of the literature**

### **2.1 Luria’s Model (LM)**

Attempting to understand human processing of information requires understanding what is going on inside the brain rather than focusing on trying to understand it as an abstract cognitive process. If we want to understand how a student solves a math problem, it is necessary to study the brain and follow the changes that occur to his brain during solving the mathematical problem. This approach requires accurate knowledge of brain processes and functions, and this is not an easy task with all the cognitive development in the study of the brain [10]. Many cognitive psychologists confirm that

the brain is the base of the human mind. To study the biological bases of knowledge, it requires identifying the areas of perception, attention, senses, language, memory, learning, etc., and how these areas are structured and their role in controlling cognitive processes, and knowing the mechanism of information transmission in these parts until the cognitive response occurs [11–13]. The four lobes of the brain consisting of the two hemispheres and the important centers they contain related to mental cognitive processes are the frontal lobe, which is the center for deriving plans and processing memories, the parietal lobe, where the frontal part of it is concerned with processing and processing information and is concerned with attention, and the temporal lobe is specialized in understanding, hearing and producing verbal language [14, 15]. The human brain is the site of various mental abilities, including the capabilities of processing and processing information, and the brain is the center of the learning process. It also controls the patterns of learning and thinking. Therefore, knowledge of brain functions is necessary for educators and those in charge of the educational process. The brain can be divided into four main sections called lobes, which are not distinct units but rather anatomical regions, each with specific functions, but they are interactive and integrated [16, 17].

**Table 1.** Functions of the hemispheres according to different processing modes information for learn

<b>Functions of Hemisphere</b>	
<b>The Right</b>	<b>The Left</b>
The way of thinking is holistic and comprehensive, Be creative and idea-generating while reading.	Analytical and detailed way of thinking, Be scrutiny, analyzer and critic while reading.
Processes information in parallel, synchronously, with some intuition.	Processes information sequentially, sequential, in a stereotyped manner.
It handles formal and imaginary information.	Handles numerical and mathematical information
my conclusion.	inductive
It deals with imagination and invention.	Dealing with facts
It deals with imagination and invention, He remembers shapes and pictures more, It deals with three-dimensional space.	Dealing with facts, Names and words are more frequent, Dealing with time

So there are many models that deal with thinking and the interpretation of mental abilities and mental organization, the most prominent of which are the models that explain mental activity, the models that explain the methods of thinking [18, 19]. The explanatory models of mental activity are the Gubins Model, the Aurther Costa Model, the Presseisen Model, the Luria Model, and finally the Brain Organized a Long Three Plans Model [20–22]. The Luria’s model consists of three main units of cognitive mental activity of the brain. It consists of a unit of activation level and excitation of the cerebral cortex; a unit of receiving, analyzing and storing information in the back areas of the brain (visual center), temporal regions (auditory centers), and parietal regions (general sensory); information and programming unit (in the frontal parts of the brain) [23, 24]. Brain does not remain idle when it is not fully engaged in learning certain

information. When the teacher presents educational and teaching tasks and duties that are incompletely organized, unrealistic or not significant enough to operate the brain’s processes and intellectual processes, the brain searches for other ways to excite through random thoughts, feelings, physical sensations, imagination, problem solving, suggestion, innovation, and automatic memories. Hence, the brain continues to find the direction the teacher wants or intends [25, 26]. The teacher must have a very fundamental role in order to build an educational atmosphere that creates spaces for the improvement and development of thinking skills. For students to love mathematics, the teacher must always innovate in learning mathematics. Therefore, the proposed strategy is one of the alternative solutions that can be made so that students are motivated to learn mathematics [27, 28]. Cognitive processes in Luria’s theory; the three functional units identified by Luria about cognitive activities, and these cognitive processes are complex functional systems placed in wide functional areas of the human brain and they occur through the interaction of brain structure (cells) that work in integration and harmony [29, 30]. A good teaching strategy is one that works to achieve interaction between the parties to the educational situation, as well as to determine the performance of both the teacher and the learner and to direct the lesson towards achieving predetermined outcomes. Efficient education is achieved through modern teaching strategies that stimulate the learner’s thinking [31, 32]. So researcher suggested an educational strategy based on the Luria model consisting of four stages, activating the previous information of the students by the teacher, whereby questions are asked to the students to elicit their previous information. Explanation of the scientific material, as the teacher explains the topic in detail and gives students opportunities to link the new information with the previous one. Then the teacher presents a set of activities and examples in order to help the students relate and store the information. Finally, the teacher gives a summary of the strategy so that the students organize their information and store it [33].

## **2.2 Realistic thinking (RT)**

Thinking is a mental process by which the learner can do something meaningful through the experience he is going through. It is a series of mental activities that the brain performs when exposed to a stimulus that is received by one or more of the five senses (touch, sight, hearing, smell, taste) [34, 35]. Realistic thinking is one of the necessary thinking skills for the learner, it means the learner’s ability to rely on observation and experiment through the facts he perceives and enjoy discussions [36]. Everyone needs to master the ability to think realistically in the face of the demands of the twenty-first century. Given the rapid global development over time, the high level of complexity of life’s problems. Only individuals who have “RT” can succeed. Even the world of work requires individuals with high (RT) skills [37]. Realistic things are what the learner feels in his personal life, touches, or sees, a thinking that includes listening to discussions and preferring realistic scientific aspects. And that the learner cannot automatically improve his realistic thinking while learning in the usual way, but that this depends on the amount of time he spends in thinking, as well as acquiring new knowledge that allows cognitive developments that allow more realistic thinking and he still needs support from the teacher to enhance his realistic thinking that would help to Addressing the challenges of his daily life [38, 39]. Realistic thinking

is very important, as it leads learners to better define their goals by developing a clear and accurate plan. It is a thinking that requires learners to face the truth, deal with its consequences, collect facts related to the idea to examine what others have done in similar cases, as well as think about the pros and cons associated with the idea as it acquires a more realistic viewpoint [40, 41]. “RT” means the individual’s ability to observe and experiment, and that real and realistic things are what we go through in our personal lives, such as what we feel, touch, see and smell. So what we see is what we get and the motto of realistic thinking is facts. It includes enjoying direct and real discussions of current matters, preferring scientific aspects related to the real aspects, shortening everything in sentences and things [42, 43]. The pragmatic thinkers are similar in terms of trying to make a good understanding of things, while they disagree of the assumptions and strategy used. The person with the realistic style depends in his thinking on observation, experimentation and direct sensory interaction. The real person is characterized by features and characteristics such as, that his mental process is the corrective quality, he always goes towards achieving the right results, he wants to complete the work of things steadily and accurately, cares about the results of his work, stays away from subjectivity and irrationality Likes to do things by gathering information, tends to be inductive and experimental. Realistic thinking style with strong fact-oriented and functional and formal thinking [44–46]. Characteristics of realistic thinking, past experiences and facts available in memory are resorted to in order to start solving problems treated by thinking, the process of mental research is used and employed in order to stimulate and evoke all experiences and experiences stored in the human mind in order to evoke and remember the necessary and targeted facts in order to apply them to reach to a solution to the problem at hand. Bringing the necessary facts related to the problem is transformed through the mind to become a set of proposals to overcome that problem [47]. Realistic thinking skills are gathering and rearranging the necessary information. Use of appropriate representation of information. Working on studying and collecting information to explore the relationships between them. And put the relations in a specific order and successively [48].

### **2.3 Previous studies**

According to what researcher have found, there are no studies (to her knowledge) that dealt with both of “LM” and “RT” especially in Mathematics.

## **3 Methodology and procedures**

The experimental research method was chosen, including the experimental design of two experimental and control groups with a post-test, which is one of the “Real Designs”. As it represents the proposed strategy, realistic thinking and achievement as in table one. The research community consisted of all students (applied branch) in the General Directorate of Education for the 1st Karkh in “Province of Baghdad”. Researcher chose the distinguished high school – Al-Khdra for boys from the first Karkh Education Directorate to conduct the experiment, class (A) was randomly chosen as the experimental group and class (B) as the control one. Each groups consisted of (20) students.

**Table 2.** “Experimental design”

Group	Independent Variable	Dependent Variable	Test Type
Experimental	Proposed Strategy LM	R. T.; Achie.	RT test; Achie. test
Control	Teaching by traditional way		

To ensure internal safety, external of design, the two research groups were equalized in previous achievement in mathematics, chronological age, intelligence. The researcher trained the teacher of math. to teach the proposed strategy. The second chapter was taught for both groups. The time period was equal, which (45) days, within the first semester of the academic year (2021–2022). The number of lessons scheduled for fifth-class students of mathematics was (5 lessons) per week. Research tools “a realistic thinking test”, “achievement test” were applied to both two groups.

Experimental extinction is the effect that results from leaving a number of students within the research sample or interruption during the experiment, in this research no student left the study or was interrupted from work except for the absences that the two research groups were exposed to approximately equal proportions.

### 3.1 Search tools

**RT test.** Researcher reviewed from the theoretical background of research the features of the theoretical concept of realistic thinking, so the test consisted (15) paragraphs of the objective type that require thinking, making realistic and rational decisions. Instructions were set for answering. Test paragraphs were presented to professors from methods of teaching Mathematics and Psychologies In light of their observations, the amendments were made and approved 80%. Finding out the clarity of the test paragraphs, their understanding by the exploratory application sample, the clarity of the instructions for answering it, and the time taken for answering, it was applied on (100) students from the fifth-class (Al-Mutamayzeen High School – Al-Harithiya for boys). They were asked to read the instructions, pay attention to paragraphs and inquire about any ambiguity. The time taken to answer was calculated by calculating the weighted mean between the first and last three students who took the test, and (45) minutes was sufficient. Statistical analysis of test paragraphs, difficulty coefficients were extracted between (0.27–0.74), it is considered one of acceptable ratios. As for the discrimination index, percentages also were acceptable and ranged between (0.24–0.69). The psychometric properties (of test); “Validity” was checked by verifying the apparentable Validity, as the test was presented to a few of specialists in Mathematics and teaching methods of it, psychologists who supported that its paragraphs are suitable for the purpose for which they were set, and thus the test is outwardly honest. Reliability Coefficient; using “Kuder–Richardson Formula 20” its value was (0.79) which is considered an acceptable. Thus “RT Test” is ready in its approved format for application to the research.

**Achievement test in mathematics.** After the educational content was determined, the special behavioral objectives were formulated and their number was (45), according to Bloom’s six levels of behavioral objectives for behavioral purposes. A test map

was developed to determine the questions for each of Bloom’s scale, based on opinion of arbitrators, the total number of questions (20) items of objective type was determined. In order to know the clarity, understanding, clarity instructions of answering time taken to answer, the test was applied to a sample of (100) students from research community/outside the experiment sample “Al-Mutamayizin High School for Boys – Al-Harithiya”. Paragraphs were clear and (60) a minute is sufficient. Statistical analysis of the paragraphs; the discrimination coefficient was calculated for each of test items, it was found that its value ranges between (0.30–0.80), which are a good indicator. The difficulty factor was calculated for the paragraph, and the results ranged between (0.37–0.72) and these results are considered acceptable. Extracting the psychometric properties of the achievement test; two types of honesty were extracted, the apparent honesty validity and valid in content. Test was presented to a number of arbitrators in specializations of mathematics and its teaching methods. Opinions of them were taken into account in reformulating and amending some paragraphs, and none of them was deleted, their final form reached agreement (80%) and thus all test items were considered valid to measure the students’ achievement from the sample. Test map was drawn up which objectives were explained at their levels with the number of hours needed to study each topic. Was presented again to academic specialists and was approved by agreement (80%). He proceeded to extract the stability using the K – R 20 and the stability value was (0.83), which is an acceptable. Thus, the achievement test has acceptable validity and reliability, and its paragraphs are acceptable in terms of difficulty and discrimination. Thus, the achievement test is ready to be applied to the research sample in its final form.

## 4 Results and discussion

### 4.1 Realistic thinking test

To verify that there is no statistically significant difference at significance level (0.05) in Realistic thinking test.

**Table 3.** “RT test”

Groups	No.	SMA	Var.	St. Div.	T-test		Significance
					Cal.	Tab.	
Exp.	20	9.75	0.826	0.909	5.181	2.021	statistically significant at (0.05)
Con.	20	8.75	0.512	0.716			

Obviously (5.181) is higher than (2.021). Therefore the null hypothesis is rejected. It is possible that adopting the proposed strategy according to Luria’s model affected students’ thinking because it allowed them to start thinking realistically, more freely and make them realize their weaknesses and strengths and work on them; thus increase their skills. Mathematics is an interesting field to deal with rationally solving life’s problems. RT helps bridge mathematical concepts with real-life situations in an accurate result.

#### 4.2 Achievement test in math

Researcher verified the validity of the hypothesis; “there is no difference between the mean scores of fifth-class students who learned the mathematics subject according to proposed strategy (the experimental group), with students who learned the same material by usual way (control group) in achievement test”.

**Table 4.** “Achievement test”

Group	No.	Mean	Variance	Standard Deviation	T Value		Indication Level
					Calculated	Tabular	
Experimental	20	12	1.366	1.169	2.666	2.021	Significant
Control	20	11	0.630	0.794			

It is noted that the (2.666) is greater than the tabular value therefore the null hypothesis is rejected, alternative hypothesis is accepted. Researcher believes the reason may be the adoption of a proposed strategy according to the Luria model, which made it an incentive to provoke realistic thinking among students to search and investigate information and facts in the academic content and make them open-minded, provide innovative solutions.

### 5 Conclusions and recommendation

Using a proposed strategy according to “Luria’s Model” in teaching has an impact on developing students’ realistic thinking skills, raising their achievement in mathematics. The proposed strategy contributed to creating a diverse and rich learning environment with the activities presented, which made it easier for students to deal with the educational material and reduce aversion to mathematics. The use of modern strategies in teaching has an impact on improving thinking processes and developing thinking skills, which in turn contributes to the development of realistic thinking. Teaching according to the proposed strategy contributed to improving student achievement. Teachers must use newer strategies encourage students thinking, including the strategies of explanatory models of mental activity. Holding training courses for teachers on the Luria model and possibility of proposing multiple strategies in the classroom. Emphasizing on teachers the importance of using realistic thinking and developing their skills, as it is a thinking that helps them face life situations. Doing comparative studies between teaching models to identify the best ones for teaching all mathematics subjects.

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## 7 Author

**Ban Hassan Majeed**, She is an Assistant Professor and one of the faculty member in the Department of Computer Science, College of Education for Pure Sciences/ Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq. Her current research interests include Mathematics Education, Educational Technology, Digital Education, Smart Learning, Multiple Intelligence in Teaching and Learning, and Thinking with its skills. She holds an international assessor certified Publons and Academy peer reviewer. She is also an active researcher in the field of ICT in education. She is currently a member of editorial board in the peer review process for several international journal. The number of articles in national databases – 7. The number of articles in international databases – 19. E-mail: [ban.h.m@ihcoedu.uobaghdad.edu.iq](mailto:ban.h.m@ihcoedu.uobaghdad.edu.iq)

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