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Effect of Landa's Model on the Development of Creative Thinking of Primary School Students in the Group of Family and Technical and Vocational Education

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Abstract - **Teaching creativity skills to learners is one of the most important goals of those involved in education. This research aims to evaluate the effect of Landa's model on the development of creative thinking of primary school students in the family and technical and vocational education groups. The research uses the method of quasi-experimental designs "pre-test-post-test with control group and matched". The population of 1050 male students of elementary schools in Baghdad city – Iraq is considered. The sample size of two classes with 30- students was selected by random cluster sampling from among 21 boys' classrooms in Baghdad and they were assigned into two groups: Landa and simple method. Multivariate covariance analysis is performed using SPSS statistical software to explain the research hypotheses. The results of the study indicate the existence of a significant difference in each of the dimensions of creative thinking, including innovation, expansion, flexibility and fluidity, between the two experimental groups (using the Landa method) and the control group (using the traditional method). In other words, the use of Landa's method has ascertained a significant effect on students' ability to think creatively compared to the use of the traditional method. The results of the first hypothesis show that the students who were taught by the Landa method, compared to their peers who did not experience this method, have a significant difference in the ability to think creatively in social studies. In particular, teaching social studies using the Landa method has been significantly more effective than the traditional method in strengthening students' creative thinking.**

Keywords: **Landa Model**, **Development of Creative Thinking**, **Elementary School, Vocational Education**

I. INTRODUCTION

Among the activities that are carried out in the process of educating students and learning different skills, the most attention is paid to the teacher's teaching activity in the classroom (Safavi, 2014). The fact is that the level of learning and understanding of different skills of students is directly dependent on the learning patterns and teaching methods of the teachers. Learning patterns include a set of activities, motivations, and beliefs about learning that include emotional, cognitive, and self-regulation aspects of learning. Based on their knowledge of the learning environment, educational principles, and students' characteristics, the researchers tried to choose a model of teaching that first responds to the learning needs of students and then ensures that this learning process also takes place in a non-educational environment.

According to the issues raised, it is argued that the classroom of the 21st century needs students to face the problems of the real world. Educational institutions often emphasize parrot conservation. This is even though in today's world, learning is not appropriate in the way of memorization; Therefore, it is very important to create a classroom that encourages collaboration, discussion and acceptance of others' beliefs and perspectives. A philosophy that has been a source of conflict among students is the freedom of speech, where students have differing opinions about the allowance of free speech in their institutions. Freedom of expression is one of the foundational principles in the education system and comes alongside the idea of creative thinking, which is important in the development of talented individuals and seduced citizens. Creative thinking, in this sense, means the capacity to apply knowledge and skills to devise new solutions by introducing something new (Zhu & Sheng, 2024). This process includes a set of cognitive activities in which people implement new ideas in the face of various conditions and behaviours (Neto et al., 2018). Some research studies do suggest that creativity and the ability to think out of the box enhance people's performance and the ability to learn at their inner depth level (Lucas, 2019).

In recent years, Western and Asian countries have seen a resurgence of interest in the development of creative thinking. Creativity can be described as the ability to innovate and make a difference in a common and ongoing process (Steiner, 2009; Fan et al., 2023). Creative thinking can be helpful when solving problems. Problem solving is more objective than creativity and has an objective, external and specific goal. However, creative thinking is fresh thinking, independent and socially friendly, and it has a personal aspect and is dependent on intuition and analysis (Basadur et al., 2014). Sternberg, (1988) briefly considered creativity as composed of four main factors: 1) fluidity, which means the

ability to generate many ideas; 2) Innovation means the ability to produce novel, unusual and new ideas; 3) flexibility means the ability to produce many different ideas and methods and 4) expansion means the ability to pay attention to details.

Various studies show that creative thinking, how to develop creativity and values in schools, teaching creative development, and teaching families to develop students' creativity are important in having a creative society (Lee & Park, 2019; O'Flaherty et al., 2018; Liang et al., 2024). The results of Lim & Chapman, (2022) showed that creative thinking is a very common topic in today's education systems and how such education should be conducted is highly controversial. In Singapore, for example, when the students complete formal education, they should also be recognized for their creativity, and they would be given a badge of creativity because graduates are self-confident and judgmental people. Therefore, in the curriculum headings, character and citizenship education are recognized as the main subjects to deliver a creative and informed citizen to the society. In the same aspect, several efforts were made to evaluate the development of creativity in education (ex. primary, secondary and post-secondary education) (Jacques & Anderson, 2017; Choi et al., 2020; Coleman & Wilkins, 2020; Goldsmith et al., 2020; Kashanian et al., 2014).

Landa's teaching model is one of the elements of the information processing model family (Safavi, 2014). The Landa-based teaching method, as one of the educational approaches that is currently receiving a lot of attention around the world, has been able to overcome many of the shortcomings associated with traditional models. This model essentially focuses on strengthening students' critical thinking and mental abilities and helps to improve their understanding. The Landa-based educational approach was initially presented to teach basic ideas that provide students with the foundations of higher thinking and enable them to reach mutual understanding and establish effective communication (Erickson, 2011). Theoretically, Landa's method is one of the learning strategies in the field of education and is not limited to a specific subject. This method claims to empower students to use their knowledge in a way that approaches that of an expert by teaching them how an expert works in problem-solving.

Teaching creativity skills to learners is one of the most important goals of those involved in education. In this regard, Felder & Brent, (2004) confirmed that it is necessary to emphasize intellectual development among students as it enables them to prepare themselves to live in future societies and achieve success. Creative thinking is among the thinking skills that play an important role in solving problems and problems like high-level thinking skills. Creative thinking is a combination of decision-making and problem-solving skills. By using this type of thinking, different solutions to the problem and the consequences of each of them are examined, and in this way, a person can understand the problems beyond his experienced solutions. Teachers are educational leaders in schools and through planning, forecasting, targeting and organizing classroom activities, they create a collaborative atmosphere where everyone participates in decision-making and accepts responsibility for their work outcomes along with a common concept of goals. Considering the school as a learning community that encourages both the participation and empowerment of teachers and the creation of a culture of cooperation among students and their creativity and ideas makes teachers try different teaching methods and use different models (Sarjivani & Starrett, 2013; Zahedifard et al., 2015).

Hasnor et al., (2013) examined the effect of two types of superficial and deep approaches to learning on the academic progress of learners. The researchers concluded that the superficial pattern, with the characteristics of lack of goals, fear of failure and ambiguity in concepts, in contrast to the deep pattern, has a weaker development level. Therefore, the model of deep learning with the organization of concepts and conceptual understanding has a significant relationship with academic achievement (Hasnor et al., 2013).

Behrangi & Nasiri, (2015) investigated two teaching models on students in a research. The results showed that there is a significant difference in the level of self-management of the students of the two experimental and experimental groups in learning experimental sciences. Due to the creation of an attractive, interactive and collaborative learning environment, the use of the education management model can achieve better results in achieving the important goal of students' self-directed learning.

Ersoy, (2014) conducted a research entitled The Effect of Problem-based Learning Methods in Higher Education on Creative Thinking. The main purpose of this research was to reveal the effect of problem-based learning methods on creative thinking skills. For this purpose, it was tried to determine the change in creative thinking skills scores in a university where problem-based learning was implemented. This study is descriptive, and the sample includes first-year students (73 people) in the Department of Statistics at Duquez Illul University. As a result of the study, an increase in students' scores for creative thinking skills was observed at the end of the problem-based learning process. It was also found that fluency, flexibility and originality, which are sub-dimensions of creative thinking skills, have a significant difference. It can also be said that as a result of the training provided with the scenario, the students dealt with the events in a multi-dimensional way, were able to adapt to changing conditions and succeeded in improving their perspective.

Sokol et al., (2015) explained in their research that teacher leadership plays an important role in the formation of creative attitudes in students. In this research, it was shown that the emotional support of the professors to the students, providing them with appropriate feedback and understanding the students' problems in their creative process are effective in the development of students' creativity.

In a qualitative study, Stiffler, (2018) examined the approach of teacher leadership, efficacy beliefs and student progress and led to the development of a model that showed that teacher leaders who have been successful in the progress of their students have high self-efficacy and promote equality and improvement in the teaching and learning process. They emphasized the learning of all students positive dialogue and building constructive and supportive relationships with them. They created a sense of creativity, cooperation and sharing of ideas, in a way that leads to mutual learning and flexible training and stepping into new paths and experiences leading to success.

Safai et al., (2021) investigated the students' creative thinking process in an educational game creation course for middle school students in the United States for the design and development of digital games. This enables us to understand the perceptions of digital design and programming involved in the game creation learning approach. Interviews were conducted with 12 students with three different levels of game design experience, 6th, 7th, and 8th grade students with 1, 2, and 3 years of game design experience, respectively. The findings showed that students enjoy the learning approach as satisfying and attractive. Technologically challenging students experienced positive opportunities to engage the creative thinking process in combining information on social issues to build their understanding through the creation of interactive educational digital games. The researchers suggested that the creative thinking process in the student-centred game creation learning approach may provide learners with a rich and enjoyable learning experience using authentic technology and also provide deep and insightful learning (Golafshani, 2003).

Yusufjon & Shahzoda, (2022) conducted research under the title of developing creative thinking in students in physics class. In this research, new educational technologies and new advanced methods of extracurricular activities were presented to the science teacher in the development of the exploratory thoughts of elementary students, while predicting the effectiveness and efficiency of education. It was concluded that the effectiveness of organizing individual-oriented education and training is based on a creative approach to education and training.

Referring to the above literature, using the observational learning method by Bandura's observational learning theory and creating situations for a deep understanding of complex issues and skills by constructivism theory is one of the characteristics of Landa's model. Among the previous research, no research investigated the effect of Landa's model on the development of creative thinking in students, and therefore this study aims to answer the question of whether Landa's model affects the development of creative thinking in the group of family and technical and vocational education in school students of Baghdad city in 2023. Accordingly, the purpose of this study is to introduce a method that leads to effective learning. In this regard, it should be noted that this educational method has not been implemented in Iraq and has not received enough attention from curriculum planners and educational teachers who play an important role in determining educational processes and practices. It should be noted that the curriculum in the initial stages is designed more conceptually than the actual axis. By encouraging children to participate, be creative and solve problems, they can be encouraged to take advantage of their talents. This would strengthen the significance of conducting this study.

II. RESEARCH HYPOTHESES

The Landa model has a significant effect on the development of creative thinking in the group of family and technical and vocational education in primary school students in Baghdad. The sub-hypotheses of the current research are as follows;

- The Landa model has a significant effect on the development of fluid creativity in the group of family and technical and vocational education in primary school students in Baghdad. City
- The Landa model has a significant effect on the growth of creativity in the group of family and technical and vocational education in primary school students of Baghdad city.
- The Landa model has a significant effect on the growth of creativity and innovation in the group of family and technical and vocational education in primary school students in Baghdad city.
- The Landa model has a significant effect on the growth of creativity and flexibility in the group of family and technical and vocational education in primary school students of Baghdad city.

III. LANDA'S THEORY

In the field of teaching, during the last twenty years, significant theories have been proposed and implanted. According to all these theories, it can be said that until now theorists have not succeeded in presenting a unified teaching theory. Among these theories are Tennyson's theory (1980) about the concept of teaching, Scandora's theory (1977) about the theory of teaching construction Landa's theory (1972) and some other people about how to teach and Case's theory (1978), which is used for teaching preschool and kindergarten children.

Landa's theory was published in 1974 by Lou Landa, and its purpose was to provide detailed guidelines for the development of educational activities. The main idea of this theory was to analyze the method of an expert when solving a problem, which occurs by breaking the work execution steps into smaller units. It showed the practical application of educational design steps. This strategy can be of interest in two ways: first, it is objective and second, it naturally improves the cognitive structure in the field of strategies and methods. To teach problem-solving with the help of this method, one may take a model of observing an expert solving the problem and gradually turn to using algorithms and

heuristic strategies. Landa, (2013) ascertained that it is common among students that most of them have the necessary knowledge, but they cannot solve the problems correctly. Teachers and psychologists solve this problem by stating that students can think correctly, or that they are not able to use their knowledge (Harris & Muijs, 2004). The critical point in the process of using knowledge in problem-solving by an expert is that this process usually occurs unconsciously and naturally. For educators who want their students to have the skills of an expert to deliver, this process should be investigated and the first step in this investigation is to analyze the behaviour of the expert and analyze the process steps into simpler components. Then each step is taught to the students in order and they practice it until that step internally becomes embedded in the students and becomes automatic in its implementation. Finally, students review all the steps simultaneously. While reviewing, they can critically review the work steps, and this step provides a deepening of learning and expansion of the plan.

The graphic representation of this theory is represented in the diagram below:

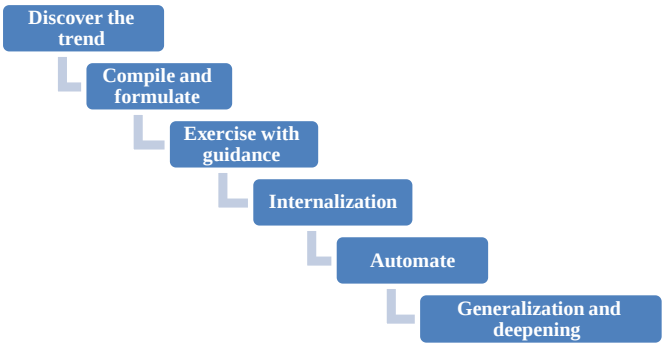

Fig. 1 Landa's Theory Representation

According to Landa's theory, two types of problems can be solved by stages or cognitive strategies:

1) Algorithmic problems: they are problems that are solved by using fixed and specific steps. In such issues, the main and secondary steps and methods can be explained in advance so that the learner can learn and apply them. Like teaching how to install software, which is a category of algorithmic problems.

2) Exploratory problems: problems in which steps must be designed taking into account specific conditions each time so that it can have its effect on reaching the correct answer.

The special conditions of the problem itself explain the sub-steps and how to achieve them. Design education is of this class. In any case, the basis of the components of this approach is a hypothesis that is expected to lead to effective learning as an educational method. This theory is not only related to the levels of educational design and teaching-learning methods but also provides a precise method for using any kind of knowledge.

IV. Research Methodology

Research Method

The current research method was of an experimental type with a quasi-experimental research design of "pre-test - post-test with control group and matched".

The Statistical Community of the Research

The statistical population considered in this research consists of all the male students of elementary schools in Baghdad city, in the number of 1050 people of 41 classes.

Sample Volume and Sampling Method

The sample size of two classes of 30 -people was selected by cluster random sampling from among 21 -school classes of boys' primary school students. That is, primary schools were considered as clusters, and two boys' schools were selected from among the clusters by simple random method. In addition, the two subsets of the sample size were similar in terms of number, selection conditions, educational progress, etc.

Research Measurement Tools (Specifications of Questionnaires)

The most common and common means of collecting information in the field of humanities is a questionnaire. Therefore, questionnaires are very important in humanities research, including the use of questionnaires, measuring people's attitudes, perceptions, opinions and interests using certain methods and events also known as "attitude measurement". In this case, the questionnaire acted as a "measuring tool". Conducting scientific research, in addition to collecting the theoretical foundations of the subject, requires having more accurate information, which is obtained through the implementation of valid tests such as questionnaires, etc., and tests research hypotheses. In this research, Torrance's creative thinking test, which is described below, has been used.

Torrance's Multiple-choice Paper-pencil Contextualization Test (MPPT) for Measuring Creativity

This questionnaire is famous in the psychological literature as Torrance's creativity test. The principle of Torrance's creativity assessment test is very detailed and long. Its execution requires hours of time. Among the tools for measuring creativity, Torrance's creative thinking test in educational researches and measurements, the test actually measures four factors of creativity, i.e. fluidity, innovation, flexibility and expansion, which includes 12, 22, 11 and 11 options, respectively. That is, questions 1 to 22 measure the fluidity factor, 23 to 33 the expansion factor, 34 to 4 the initiative factor, and 50 to 40 the flexibility factor. Of course, each of these questions actually form a sub-test. There are three different answers A, B and C (qualitative) with the value of conversion to numerical quantity 0. 1 and 2. It is assumed that in each question, the person who chooses option

A has the least creativity and the person who chooses C has the most creativity. Subject performance in each area is shown by adding up their scores on the corresponding subtests, and subject performance in creativity as a whole is shown by adding up their scores across all four subtests. The results that are acquired by assessing each of the four elements individually and the total scores can be used for analysis and interpretation. Each subject's total originality score can be anything from zero to one hundred and twenty. The following is the creative scoring system that will be built on Torrance's software:

- Very high creativity: 120 to 100 points
- High creativity: 100 to 85 points
- Medium creativity: 85 to 75 points
- Low creativity: 75-50 points
- Very little creativity: score 50 and below

Validity of Research Measurement Tools

The meaning of test validity is whether a tool is suitable for measuring what was intended or not, and answers the question of how much the measurement tool measures the desired characteristic. Without knowing the validity of the measurement, one cannot be sure of the accuracy of the data obtained from it. The measurement tool may be valid for measuring a special characteristic, but it does not have any validity for measuring the same characteristic in another society. Therefore, to measure the validity of the questionnaire, the content method was used in such a way that the opinions of expert professors in the field of creativity, and the concepts of creativity in fluid dimensions; Flexibility, expansion and innovation were questioned and confirmed.

Methods of Collecting Information and Research Data

Having sufficient and valuable information is required in all stages of research, more precisely, any type of scientific research is only worth the amount of useful information collected related to the subject. Therefore, the information that has the following three characteristics will be needed and our attention in this research.

- Information related to the subject.
- The information should be accurate
- The information is up to date.

Therefore, to save costs, time and energy, it is necessary to avoid collecting irrelevant, vague and outdated information (except in necessary cases such as historical review, opinions, etc.) and the act of selecting the required information from the collection has been done in this research, the collected information has both quantitative and qualitative aspects and will be obtained mainly by using (quantitative) questionnaires. Therefore, in terms of the descriptive and survey nature of the present research, it will be appropriate to use a questionnaire (as the most common means of collecting information in the human sciences), although it seems that in some cases, the use of interview and observation techniques is also required. And the more details mentioned, the more desirable it is.

The questionnaires used in this research (Appendix) are closed-ended (multiple-choice), which includes measuring and evaluating the type of interaction, and evaluation of students, parents, and teachers regarding the variable "creative thinking". It will be used for elementary school students (important ages in terms of the emergence and development of creativity). In fact, with this work, we use the questionnaire as a "measuring tool" that turns qualities into quantities. The intended tests measure the atmosphere of the family and school environment in terms of how much they support children's creativity.

Library information, review of similar available research examples, use of magazines and articles included in publications, and study of Persian and English language internet sites were among other methods of collecting theoretical information in the present study. To collect the necessary practical information and data from the target schools, first visit the mentioned schools in person and discuss with the respected managers, the necessary explanations about the nature of the research objective, questionnaires and the way of distributing and collecting them, and providing the necessary preparation for cooperation. Became. To carry out the main test, which included the assessment of students' creativity before and after the Landa method of learning, based on the importance of class time, teachers' dissatisfaction, etc., the method of completion at home was used. Finally, due to the necessity of having the same conditions for the test, the method of explanation in the class and completion of the questionnaire at home was chosen for boys' and girls' schools, so that the results would not be affected by factors such as the opinion of parents and elders. The questionnaire distribution phase took place in the presence of the moderator and vice president of the school in the class. After providing general explanations about the purpose of the research and the method of completing the questionnaires, the students were asked to determine and return the answers as truthfully as possible without the interference of others. The questionnaire related to the parents was also sent home along with the questionnaire for the students. A questionnaire related to teachers was distributed and collected by the assistant principals of schools.

Considering the generality of the subject of creativity in various fields of human sciences (psychology, sociology, management, social science, etc.) and the abundance of written works and research, it is obvious that in addition to the above questionnaires, many other similar questionnaires can also be used. It is necessary to explain that the normative tests of creative talents were mainly prepared during comprehensive research projects in the field of the nature of creativity. The two main related test sets are the Southern

California Creative Tests prepared by Gilford and his colleagues and Torrance's Creative Thinking Tests. As mentioned earlier, Guilford's role in this discussion is very important and unique, to the extent that no book, article, or scientific research should feel that he does not need his ideas and tests of creativity. Of course, currently, these tests are only used in research problems because they are still in their experimental and youthful period and for this reason, they are not very scientific. Research has shown that these tests cannot be considered complete tests that can provide us with all the useful information related to the subject. To cover.

Research Variables

A variable is a feature or quality such as intelligence, desire and talent that differs from case to case and has a different numerical value. The following variables have been evaluated in this research:

The amount of performance, response, thinking and feelings, imaginations and creative ideas of students is considered as "dependent variable" "output" or "response."

Demographic information (including the socio-economic class of families, parent's education and occupation, gender, etc.) is considered as control factors and moderating variables. Learning by Landa's method is considered an independent variable.

Selection bias factor, test factor, etc. are considered as unwanted variables.

Research Implementation Method

The researcher started the process of preparing the content for creative thinking training. First planning was done to produce the required content, and then the researcher prepared and edited the appropriate content related to creative thinking, using library reviews and articles. The contents of the training included familiarity with creativity, creative thinking, factors that strengthen the creative mind, the benefits and obstacles of creative thinking, and performing yoga mind-strengthening methods, which were collected through books and reliable scientific educational resources. The educational content is studied and re-read by knowledgeable professors in this field and the necessary corrections were made.

Afterwards, the researcher personally went to the elementary schools and attended the classes to provide a complete explanation of the objectives of the research. The students were randomly selected based on the inclusion criteria and a written consent form was given to them and asked to sign it. Then they were asked to complete questionnaires related to demographic information and creative thinking. In the following, students were randomly grouped into two groups. It should be noted that the completion of the questionnaires was done in the presence of the researcher and when the necessary explanations were given on how to fill them. Then, it was provided to the students in a group of booklets about creative thinking.

In the second group (control group), students were given a booklet about creative thinking with the same educational content as on the educational board. After one month of the intervention, the researcher presented in the schools again and asked the students in both sample groups to complete the questionnaires again.

Statistical Methods of Research Data Analysis

In this research, descriptive statistics methods such as classification criteria (calculation of frequency tables, relevant graphs), concentration criteria (calculation of mean) and dispersion criteria (variance and standard deviation) have been used to analyze the data according to the type of research variables. Also, to explain the research hypotheses, inferential statistics including (the Chi-square test, Fisher test, univariate covariance analysis regression, Levine's test, and multivariate covariance analysis results) were used based on SPSS statistical software version 25. Significance was considered at the 0.05 level.

V. RESULTS

In this chapter, the research findings were presented in the form of four tables. First, general statistics of the demographic information of the participants are presented in Table I. Then, the creative thinking test was examined in both groups in two stages before and after the intervention. To achieve the goals of the research, the data was analyzed by Spss software version 25, and the significance level in this study is p=0.05. The total number of samples in the two classes was 30 -people. 30- people participated in the Landa method learning group and 30- people participated in the simple method group.

TABLE I COMPARISON OF QUANTITATIVE DEMOGRAPHIC CHARACTERISTICS OF RESEARCH UNITS (THE LANDA METHOD LEARNING GROUP)

Variable		Landa Education Group		The traditional method of training group		P
		Percent	Number	Percent	Number	
Father's education	Elementary and illiterate	5	14/47	4	00/200	
	High school	4	20/00	5	27/12	
	diploma	8	24/47	7	23/33	
	Bachelor	7	23/33	8	24/47	
	Master and higher	4	13/33	4	13/33	
	Total	30	100	30	100	
Mother's education	Elementary and illiterate	4	20/0	4	20/00	0/27
	High school	5	14/47	5	14/47	

	diploma	8	24/47	8	24/47	
	Bachelor	7	23/33	7	23/33	
	Master and higher	4	13/33	4	13/33	
	Total	30	100	30	100	
Father's job	freelancer	10	32/33	9	30/0	0/39
	Employee	11	34/47	10	33/32	
	Farmer	9	30/0	11	34/47	
	Total	30	100	30	100	
mother's job	housewife	21	70/0	22	73/33	0/41
	Employee	9	30/0	8	24/47	
	Total	30	100	30	100	

TABLE II COMPARISON OF QUANTITATIVE DEMOGRAPHIC CHARACTERISTICS OF RESEARCH UNITS (THE SIMPLE METHOD GROUP)

group	**Landa group**		**Traditional method group**		p-value
Statistics Variable	**Average**	**Deviation**	**Average**	**Deviation**	
Number of siblings	2/24	1/19	2/44	1/77	0/39

Tables I and II examine the demographic information of the participants. In the comparison of the two experimental and control groups by Chi-square test, and Fisher test, there was no statistically significant difference in terms of qualitative demographic characteristics ($p>0.05$). Thus, the two groups were similar in terms of qualitative demographic characteristics.

The statistical T-test did not show a significant difference in terms of the number of siblings between the two groups ($p>0.05$). As a result, the two groups were similar in terms of quantitative demographic characteristics.

Referring to the first hypothesis of the research, univariate analysis of covariance. The data associated with this hypothesis was statistically analyzed using (ANCOVA). Here, we evaluated the experimental team's final test average to the control group's post-test average, with the scores before the test serving as variables. Table 3 displays the findings of this analysis, which relies on the assumption of regression slope uniformity.

TABLE III. ONE-WAY COVARIANCE ANALYSIS RESULTS TO CHECK THE HOMOGENEITY OF THE REGRESSION SLOPES IN THE POST-TEST OF CREATIVE THINKING IN THE TWO EXPERIMENTAL AND CONTROL GROUPS

Source	**Sum of squares**	**Degrees of freedom**	**Mean square**	**F**	**Significance**
pre-exam Creative Thinking	7424/932	1	7424/932	27/832	0.00
Pre-test group	200/351	1	200/351	0.731	0.397
error	11235/378	57	197/111		
Total	707140/000	59			

According to Table III, There is no statistically significant relationship between the group and the pre-test for creative thinking. With p-values of 0.731 and 0.397, respectively, the findings lend credence to the idea that the regression slopes are homogeneous. Thus, multivariate covariance analysis was used to analyze the data pertaining to the four dimensions of the creative thinking scale (initiative, development, flexibility, and fluency), and the results are presented in Table IV. It shows the report on whether or not the research variables comply with the default assumption of equal variances (Levin's test) before the data about the creative thinking scale's components are shown. Also, the changes in the average score of total creative thinking before and immediately after the intervention, separated into two groups, Landa and Simple, are also shown in Figure 2, and as can be seen, the total score of creative thinking in the Landa group compared to the Simple group, after the intervention has increased more than before the intervention.

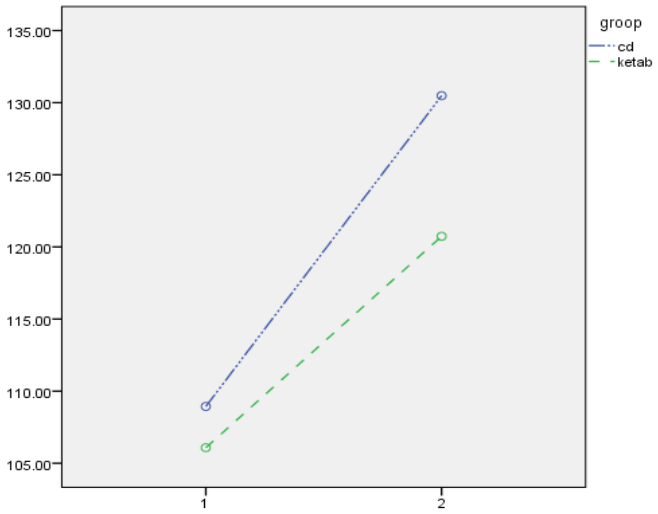

Fig. 2 Changes in the Average Score of Students' Creative Thinking Before the Intervention and After the Intervention Between the Landa and Traditional Groups

Based on the score of Figure 2, the trend of changes in the average score of the Landa group's total creative thinking over time has been more than simple.

TABLE IV LEVIN'S TEST RESULTS REGARDING THE ASSUMPTION OF EQUAL VARIANCE OF THE SCORES OF THE RESEARCH VARIABLES OF THE GROUPS

Variable	Abundance F	Degrees of freedom 1 Df 1	Degrees of freedom 2 Df2	Sig
innovation	1/829	1	58	0.183
expansion	0.144	1	58	0.705
flexibility	0.241	1	58	0.424
psychological	0/30	1	58	0.844

Table IV shows that this study's results support the null hypothesis that the groups' variances in the research variables are identical. That is, the required conditions for performing statistical tests were met, and the premise of equal variances of scores in the experimental and control groups was confirmed.

TABLE V A SUMMARY OF THE RESULTS OF MULTIVARIATE COVARIANCE ANALYSIS TO INVESTIGATE THE POST-TEST DIFFERENCE OF CREATIVE THINKING COMPONENTS IN TWO GROUPS

Source	Variable	SS	DF	MS	Abundance F	Sig	Effect size
Group	Innovation	1705/289	1	1705/289	29/980	.000	.411
	Expansion	2741/425	1	2741/425	48/944	.000	.414
	Flexibility	248/129	1	248/129	19/504	.000	.312
	Fluidity	240/192	1	240/192	5/111	.29	.104

According to the associated results of Table 5, when the adjustment of the pre-test scores for each level of creative thinking, there was a significant difference between the two experimental groups (Landa) in the following areas: innovation ($p=0.000$ and $F(1.43) =29.980$), expansion ($p=0.000$ and $F(1.43) =68.964$), flexibility ($p = 0.00$ and $F(1.43) = 19.506$), and the fluidity dimension ($p = 0.029$ and $F(1.43) = 5.111$). Additionally, the control group (using the conventional approach) differs significantly. In other words, Landa's method outperformed the traditional one on all levels of creative thinking (effect size=0.842; Landay-Wilks=0.158; $p<0.0001$ and $F=53.386$). Also, the changes in the average score of total creative thinking before and immediately after the intervention, separated into two groups, Landa and Simple, are also shown in Figure1. Figure 1 introduces the total score of creative thinking in the Landa group compared to the Simple group. The intervention has increased more than before the intervention.

VI. Discussion of the Results

The main hypothesis of the Landa model is effective in the growth of creative thinking in the group of family and technical and vocational education in primary school students in Baghdad. The results of the research of the first hypothesis showed that students' capacity for original thought in the social studies class differs significantly depending on whether they received formal instruction with Landa's teaching method compared to their peers who did not receive this training.

In explaining the associated results of the current study, it can be said that elementary school students have a creative mind that seeks to understand subjects, but in the meantime, this ability of students requires a type of conceptual education. According to most experts, students benefit from the power of creativity, because they can think to solve problems and find solutions for them. The results also have shown that most philosophical schools emphasize the activeness and understanding of students in the matter of education and believe that education, especially in the early years of school and at a young age, should be tangible and practical. As much as a subject can be made into an objective and conceptual form, deep learning can be expected as opposed to superficial learning. It is obvious that until a person does not understand a subject, that concept will be vague for him, so conceptual training such as Landa can help to strengthen the understanding of concepts, especially in courses such as experimental sciences. Furthermore, it can be said that analyzing the subject to identify the thought processes leads to a conceptual and key understanding of the material. As opposed to rote memorization, one of the primary aims of education is to foster critical thinking and understanding of subject matter for pupils. For the most part, students' conceptual knowledge improves when their teachers delve deeply into a topic and offer engaging examples to illustrate key points. Thoughts are constructed from fundamental ideas. Because they are not based on a database with a solid conceptual framework, traditional curricular design patterns lead to shallow learning and put students' initiative into doubt. Even more crucially, there is an intrinsic conceptual framework to every field of study. The significance of these conceptual frameworks in representing, classifying, and processing novel data is being more and more exposed as the body of knowledge in the field grows. A higher degree of abstraction is required for the organization and processing of information as the quantity of factual detail grows. Thus,

under the guidance of active learning strategies like Landa's concept-based model, students in a field like practical sciences can develop and attain high levels of thinking, including metacognitive skills and problem-solving ability. Find Concept-based education and curriculum design patterns that are more suited to a Landa-based classroom. Unlike the conventional patterns, these focus on developing one's intellect in tandem with one's educational pursuits. The capacity to analyze factual information, make connections to prior knowledge, comprehend patterns and relationships, have a meaningful understanding at the conceptual level, make rational judgments based on evidence, transfer understanding appropriately to the present moment, and creatively solve problems or create new ideas are all components of Landa-style conceptual thinking.

Referring to the first sub-hypothesis, Landa's model on the development of fluid creativity in the experimental group (M=35/58) was more than the control group (M=30/95) and this difference is statistically significant. This finding shows that creativity training can greatly increase the level of mind production. Fluidity is a metacognitive component that increases the power of the mind and the speed of action to generate ideas in normal to special situations.

Referring to the second sub-hypothesis, the Landa model on the development of creativity in the experimental group (M=48) was more than the control group (M=27/38) and this difference is statistically significant. The second hypothesis of the research was based on the claim that expansion increases under the influence of Landa's model. This claim was confirmed at an acceptable level of statistical certainty. This finding is also consistent with the theoretical discussions of creativity, which claim that with the rise of the expansion component, we are witnessing the emergence and eruption of another metacognitive component, namely expansion. Expanding the ability of a person to pay attention to details. In this case, the creative person has the ability to complete an idea and add more details, as well as to complete related pictorial ideas.

Referring to the third sub-hypothesis, Landa's model on the growth of creativity in the experimental group (M=35/94) was more than the control group (M=23/43) and this difference is statistically significant. The third hypothesis of the research was based on the claim that innovation increases under the influence of Landa's model. This claim was confirmed at an acceptable level of statistical certainty. This finding is also in line with the theoretical discussions of creativity, which claim that with the rise of the metacognitive components of fluidity and flexibility, we are witnessing the emergence and eruption of another metacognitive component, i.e., innovation. The metacognitive component of innovation has a privileged position among other components of creativity. Therefore, a mind that can think innovatively will be able to find pure and effective solutions for the most complex situations in life, work and education. Another practical result of the research was that brainstorming techniques and creative problem-solving are suitable methods for stimulating the metacognitive components of creativity. More interestingly, in line with this research, it was found that provided motivational and creative conditions are observed in training and using appropriate exercises, the above techniques can create a noticeable rise in the elements of fluidity, flexibility and initiative. Create in the mind and personality of the person.

Referring to the fourth sub-hypothesis, Landa's model on the growth of flexibility creativity in the experimental group (M=22/08) was more than the control group (M=1) and this difference is statistically significant. The fourth hypothesis, which is about increasing the metacognitive component of flexibility, was confirmed at an acceptable level of statistical confidence. This finding also shows that creativity training can help to increase the diversity and maneuverability of the mind while increasing the power of thought generation. The metacognitive component of flexibility is one of the most important indicators of success in life, work and education. Because it makes people able to take advantage of the diverse capacities of their minds depending on the situation. In any case, the results of the first and second hypotheses are consistent with the research of (Torrance, 1974), who claims that the metacognitive components of fluidity and flexibility are related. This group of experts believe that with the increase in the ability to generate ideas, the characteristics of diversity and change also increase naturally. Every new idea is accompanied by a change compared to the old idea. In this research, the metacognitive components of fluidity and flexibility had the same increased degree, which is a confirmation of the validity of the theoretical topics.

VII. CONCLUSIONS

In general, according to the results of the present study, it can be said that training with the Landa model on creative thinking increases the scores of this skill. Landa's model allows the students to be more aware of the connection between concepts and their existing thought processes and to depict the mental organization of the student more in the form of concrete examples and models of concepts. Due to the significance of Landa training in the education system, the managers can improve these programs by evaluating the programs and common activities in the field of teaching students and with more planning. To implement these programs as best as possible, it is necessary to train teachers to provide training in the Landa style, correctly and based on scientific principles.

Education managers, especially managers and educational professionals, can evaluate the programs and common activities in the field of teaching students and plan appropriately to improve the level of education, from the existing new and practical methods (such as the use of Landa).

REFERENCES

[1] Basadur, M., Gelade, G., & Basadur, T. (2014). Creative problem-solving process styles, cognitive work demands, and organizational adaptability. *The Journal of Applied Behavioral Science, 50*(1), 80–115.

[2] Behrangi, M. R., & Nasiri, R. A. (2015). The effect of teaching experimental sciences with the education management model on the self-directed learning of third-year middle school students. *A New Scientific-Research Quarterly in Educational Management, 7*(28), 109–130.

[3] Choi, Y., Han, H., Bankhead, M., & Thoma, S. J. (2020). Validity study using factor analyses on the Defining Issues Test-2 in undergraduate populations. *PLoS ONE, 15*(8), 1–18. https://doi.org/10.1371/journal.pone.0238110

[4] Coleman, R., & Wilkins, L. (2020). Moral Development: A Psychological Approach to Understanding Moral Decision Making. *The Routledge handbook of mass media ethics*, 43-58.

[5] Erickson, H. L. (2011). Curriculum and concept-based education: An approach to *fostering thinking* (A. Nouri & A. Abdi, Trans.). Tehran: Education Research Institute.

[6] Ersoy, E. (2014). The effects of problem-based learning method in higher education on creative thinking. *Procedia-Social and Behavioral Sciences, 116*, 3494–3498.

[7] Fan, Y., Heydari, M., Saeidi, M., Lai, K. K., Yang, J., Cai, X., & Chen, Y. (2023). Corruption and Infrastructure Development Based on Stochastic Analysis. *Archives for Technical Sciences, 1*(28), 11–28. https://doi.org/10.59456/afts.2023.1528.011Y

[8] Felder, R. M., & Brent, R. (2004). The intellectual development of science and engineering students. Part 1: Models and challenges. *Journal of Engineering Education, 93*(4), 269–277.

[9] Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report, 8*(4), 597–607.

[10] Goldsmith, J., Burton, E., Dueber, D. M., Goldstein, B., Sampson, S., & Toland, M. D. (2020). Assessing ethical thinking about AI. *Proceedings of the AAAI Conference on Artificial Intelligence, 34*(9), 13525–13528.

[11] Harris, A., & Muijs, D. (2004). *Improving schools through teacher leadership*. McGraw-Hill Education (UK).

[12] Hasnor, H. N., Ahmad, Z., & Nordin, N. (2013). The relationship between learning approaches and academic achievement among Intec students, UiTM Shah Alam. *Procedia-Social and Behavioral Sciences, 90*, 178–186.

[13] Jacques, K., & Anderson, S. (2017). Impact of a residence hall staff training class on the moral judgment development of college students. *Open Access Library Journal, 4*, 1–14. https://doi.org/10.4236/oalib.1104232

[14] Kashanian, H., Peashdad, M. H., & Kondori, M. A. (2014). Development of umbrella activities in agile methodologies. *International Academic Journal of Innovative Research, 1*(1), 1–5.

[31] Zahedifard, M., Attarzadeh, I., Pazhokhzadeh, H., & Malekzadeh, J. (2015). Prediction of students' performance in high school by data mining classification techniques. *International Academic Journal of Science and Engineering, 2*(1), 139–147.

[32] Zhu, L., & Sheng, Z. (2024). Artificial Intelligence, Virtual Computer Systems, and Interactive Systems: a Holistic Approach to Enhancing Creative Talent in Art Design. *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 15*(3), 395-411. https://doi.org/10.58346/JOWUA.2024.I3.026

[15] Landa, L. N. (2013). Landamatics instructional design theory and methodology for teaching general methods of thinking. In *Instructional-design theories and models* (pp. 341–369). Routledge.

[16] Lee, I. T., & Park, G. Y. (2019). A study on the way to verify the effectiveness of character education in moral education of South Korean schools. *Journal of Moral & Ethics Education, 63*, 81–110. https://doi.org/10.18338/kojmee.2019..63.81

[17] Liang, H., Ahmad, A., & Khan, A. (2024). A Systematic Review of Effective Models in School-Enterprise Cooperation in China in the English and Chinese Literature. *Indian Journal of Information Sources and Services, 14*(3), 138–144. https://doi.org/10.51983/ijiss-2024.14.3.19

[18] Lim, L., & Chapman, E. (2022). Development and preliminary validation of the Moral Reasoning Questionnaire for secondary school students. *Sage Open, 12*(1), 21582440221085271. https://doi.org/10.1177/21582440221085271

[19] Lucas, B. (2019). *The impact of critical and creative thinking on achievement in literacy and numeracy.*

[20] Neto, R. D. C. A., Rodrigues, V. P., & Melendez, A. (2018). Creative thinking and entrepreneurial behaviour among k-12 teachers: A predictive study. *Psico, 49*(4), 395–401.

[21] O'Flaherty, J., Liddy, M., & McCormack, O. (2018). 'The teachers put effort into teaching us about life, and what's right and what's wrong': values and moral education in publicly-managed schools in Ireland. *Journal of Beliefs & Values, 39*(1), 45-56.

[22] Safai, N., Zarei, I., & Samavi, A. (2021). Designing and validating a curriculum model based on creative thinking skills for primary school students. *Education Technology, 15*(3), 579–590.

[23] Safavi, A. (2014). *General teaching methods and techniques (short text).* Tehran: Contemporary.

[24] Sarjivani, T., & Starrett, R. (2013). *Redefining educational supervision (R. Hoyda, A. Siadat, & H. Rahimi, Trans.).* University of Esfahan.

[25] Sokol, A., Gozdek, A., & Figurska, I. (2015). The importance of teacher leadership in shaping the creative attitudes of students. *Procedia-Social and Behavioral Sciences, 197*, 1976–1982.

[26] Steiner, G. (2009). The concept of open creativity: Collaborative creative problem solving for innovation generation-a systems approach. *Journal of Business and Management, 15*(1), 5-33.

[27] Sternberg, R. J. (Ed.). (1988). *The nature of creativity: Contemporary psychological perspectives*. CUP Archive.

[28] Stiffler, K. (2018). *Exploring teacher leadership practice, efficacy beliefs, and student achievement.* University of La Verne.

[29] Torrance, E. P. (1974). *Torrance Tests of Creative Thinking: Directions Manual and Scoring Guide; Figural Test Booklet B*. Personnel Press.

[30] Yusufjon, A., & Shahzoda, U. (2022). Development of creative thinking in students in physics class. *Journal of Academic Research and Trends in Educational Sciences, 1*(11), 271–275.