

---

# The Impact of the Suchman's Model in Developing Creative Thinking for Students of Industrial Management Department in the College of Administration And Economics At Baghdad University

**Assistant Professor. Dr. Taghreed Fadhil Abbass**

University Of Baghdad /College Of Management And Economics

Taghreed.F@Coadec.Uobaghdad.Edu.Iq

---

## ABSTRACT

The Present Paper Targets Identifying The Effect Of The Suchman's Model In Developing Students' Creative Thinking At The Department Of Industrial Management In The College Of Administration And Economics. Therefore, The Researcher Suggests The Subsequent Hypotheses:

1. No Statistically Significant Differences Are Noticed Between Students' The Mean Scores In The Experimental Group Who Were Exposed To The Suchman Model And The Average Scores Of The Control Group Students In The Post Test At A Significance Level (0.05).
2. There Is No Statistically Significant Difference Between The Mean Scores Of The Experimental Group Students In The Pre-Test Application Of The Creative Thinking Test And Their Average Scores In The Post-Test Application At A Significance Level (0.05).

The Current Research Is Limited To A Sample Of Freshmen Students In The Department Of Industrial Management At The College Of Administration And Economics At The University Of Baghdad For The Academic Year 2019-2020. The Researcher Used The Torrance Test For Creative Thinking, Image (A), And It Was Applied In The Post-Test On Students Of The Control And Experimental Group Of Each Group (39). (Male And Female Students). After Using The T-Test For Two Independent Samples And Two Interconnected Samples, The Results Were Revealed.

1. Between The Mean Scores Of The Two Study Subjects, There Is A Statistically Important Difference In Favour Of The Experimental Community. Thus, It Rejects The Null Hypothesis And Accepts The Alternative Hypothesis That There Is A Statistically Significant Difference Between The Mean Scores Of The Experimental Group Students And The Average Scores Of The Control Group Students In The Post Test Of Creative Thinking.
2. The Average Scores Of The Experimental Group Students In The Pretest Application Of The Creative Thinking Test And Their Average Scores In The Post Application Of The Test Are Statistically Significant, Suggesting That There Is A Growth In Creative Thinking Among The Experimental Group Students. The Researcher Included Various Conclusions, Recommendations And Suggestions.

*Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020*

---

## Section one

### Defining The Research

#### Research Problem

Developing Students' Mental Capabilities And The Reinforcement Of Their Positive Behaviors Is A Social And Educational Necessity Imposed By The Demands Of Society In Progress Of Building The Human Being According To Solid Scientific Foundations To Keep Pace With The Modernity Of The Time And The Tremendous Scientific And Technical Developments That Are Characterized By. Therefore, It Has Become Imperative For Education To Be Able To Play Its Role In Searching For Means, Developing Methods, And Activating Theoretical And Applied Programs To Develop These Capabilities, Where Thinking Is The Foremost (Ghani, 1991: 21).

Luria Believes That Creativity Is The Highest Stage Of Thinking And It Is Ability Aailed In All Individuals And What Is Important Is To Create Conditions Helping To Develop And Get It It To Highest Levels (Abd Al-Rahim, 1983: 29). Research Has Shown The Possibility Of Developing Creative Thinking Through Training Programs By Giving Everyone In The Community Has The Right Opportunity To Develop His Creative Abilities And Skills And Take Care Of Him Enough To Bring Him To The Level That Suits Him.

The Need For Education Has Increased To Inject New Ideas And Methods To Develop Creative Thinking To Raise Their Mental Abilities To The Desired Level (De Bono, 2001: 13). It Is An Interactive Process Based On Positive Cooperation Between The Individual And The Group, So It Does Not Grow In Nothing, But Rather Is Affected By The Individuals' Interactions And Their Relationship With Each Other. Gerard Concluded That Our Creative Perceptions Are Not The Product Of An Isolated Human Brain, But Rather The Result Of Interaction With Others (Rochka, 1989: 94). Bayer 1988 Believes That It Is Necessary For Us To

Teach Students How To Think And Raise The Level Of Those Who Have The Ability To Think. There Is A Place To Teach Thinking Because It Is Possible To Influence The Thinking Process At Various Levels. It Becomes Very Limited (Bayer, 1987: 47--48).

Therefore, Students Need Effective Models And Methods To Develop Creative Thinking In Addition To Their Need For Knowledge In Order To Be Able To Think Well And Deal In A Correct Way With Situations. Many Of Them Are Not Good At Creative Thinking Despite The Availability Of Knowledge And The Reason For This Is Their Inability To Use Their Store Of Knowledge In Suitably.

Numerous Studies, Research And Conferences Have Indicated That There Is A Major Imbalance In The Teacher Preparation Process (Al-Hayali, 1999: 753), Which Requires The Development Of Models To Replace The Traditional Methods And Methods Of Developing Creative Thinking With Methods, Methods, Strategies And Teaching Models That Contribute Effectively To Developing Creative Thinking. Among Those Strategies And Models, The Researcher Chose The Suchman Model To Test Its Effectiveness In Developing Creative Thinking. Accordingly, The Study Problem Can Be Formulated With The Following Question: What Is The Effectiveness Of The Suchman Model In Developing Creative Thinking Among Students Of The Department Of Industrial Management In The College Of Administration And Economics, University Of Baghdad?

#### Research Importance

The World Has Witnessed A Tremendous Knowledge Explosion, As The Knowledge Of Mankind Has Grown At A Large And Rapid Rate, And The Volume Of Knowledge Has Doubled Again In Recent Years, Where Man Can Use Internet To Obtain Information From Various Parts Of The World And From Various Sources.

Preparing Generations Capable Of Innovation, Discovery And Production Of New Things Has Become A Basic Goal Of Modern Education That Focuses On The Individuality Of The Learner And His Group, Through The Interaction Between Him And His Environment And Helping Him To Contain Everything That Occurs In Development In Various Fields And Develop A Development That Ensures His Survival As An Effective And Influential Element In The Process Of Evolution (Michel, 2002: 5). Traditional Education, With Its Methods And Content, Has Been Able To Meet The Basic Needs Of The Individual And Society, But It Is No Longer Sufficient. New Types Of Education Must Be Introduced To Meet The Needs Of The Individual And Society, And We Need Education That Is Able To Adapt To And Control Future Changes.

Studies Have Proven The Probability Of Enhancing Creative Thinking By Employing Various Training Programs And Models As A Capacity That Each Person Possesses And Is Enhanced If The Proper Circumstances Are Provided For Him. In Houser's 1989 Study, That Made Use Of Training Programs In Creative Thinking, Group Evaluation And Problem-Solving Skills For Gifted Students In Grades Ten And Eleven, Differences Were Verified That Statistically Significant In The Group Showing To The Program (Houser 1989: 369)

In The Edward's And His Assistants Study On The Impact Of Training Students And Teachers On Thinking Skills, They Showed Differences In Academic Readiness And Creative Thinking (Debono, 1980: 30). The Garfield's And Et Al, Study 1971 Also Showed An Impact Of Counseling Programs In Developing Creative Thinking Among University Students Of Ages ( 17-21) Years Old. Neal's Study 1990 Found An Effect Of The Program Concerning Problem Solving In Creative Thinking, Motivation And Self-Esteem Of Sixth Grade Pupils (Neal, 1990: 3529). Teaching Thinking Has A Positive Effect And Is Of Great Importance In Developing The Self-Concept Of Individuals And Strengthening Feelings Of Belonging And A Sense

Of Responsibility (Al-Khatib, 1995: 10). Experts Of Psychology Agree That Thinking Does Not Occur In Nothing, That Is, In Isolation From A Specific Content Or Content, And Teaching Thinking Does Not Happen In A Vacuum Either, But That The Learning And Teaching Process Is Governed By Many Factors. One Of The Most Important Of These Factors Is The Teacher, Which Is The Most Important Factor In The Success Of Thinking Programs, Because The Results Achieved Out Of The Application Of Any Program To Teach Thinking Depend To A Large Degree On The Quality Of Education Practiced By The Teacher In The Classroom (Al-Helah, A, 2001: 447).

Sternberg 1987 Suggests That If The Teacher Wants To Develop Thinking Among Students, It Should Be An Example And A Role Model In Thinking, Encouraging Students Not To Be Afraid Of Making Mistakes, Instilling A Spirit Of Adventure, Providing Sufficient Time For Thinking, Encouraging Them To Endure Ambiguity And Providing An Environment That Stimulates Thinking (Sternberg, 1987: 255) ) Teaching Thinking And Training The Teacher To Master Students' Thinking Skills, Abandoning Students' Status In One Form, Moving To Teaching What Requires Multiple Goals, Branching Out Mental Processes And Enhancing Students' Uniqueness And Excellence. All This Achieves Students' Mastery Of Thinking Skills And Processes And Methods Of Obtaining Knowledge And Experience On Their Own (Qatami (2001: 66). As A Result, Teaching Models Appeared Aimed At Helping Students To Better Learning.

Suchman Model Is Among Those Models, Which Adopts The Investigative Approach In Teaching, Which Is The Entrance In Which The Student Is The Focus Of The Educational Process By Placing The Student In An Educational Position Requiring Him To Think, Organize Ideas And Present Them In A Sound Logical Manner To Get To Knowledge (Ghabawi And Abu Shaira, 2010: 27). Suchman Model (Investigative Learning Style)

Also Aims To Train Students In Systematic Research By Proposing A Set Of Hypotheses About An Unexpected Event Or Phenomenon That Raises Their Astonishment Because Of The Varying Experiences It Contains Raising Doubts For Them. Subsequently, Work To Re-Learn These Experiences In An Advanced Manner, The Student Becomes Active (Qatami And Nayfa, 1998: 56). It Is Also Worth Noting The Possibility Of Using Suchman's Investigative Model At Different Age Stages, Because The Investigation Process Is A Mental Process That Can Grow And Develop Through The Different Stages Of Growth, In Addition To The Possibility Of Using It In Various Academic Subjects, Whether Literary Or Scientific (Qatami And Naifa 1998: 215). So, The Importance Of Research Comes Out Of:

1- The Importance Of The Current Research Community, Which Consists Of Students Of The Department Of Industrial Management In The College Of Administration And Economics, University Of Baghdad

2- The Suchman Model For Developing Creative Thinking Can Achieve The Principle Of Continuous Learning And Help Students To Increase The Effectiveness Of Information Processing In The Ever-Expanding Field Of Knowledge.

3- The Importance Of Studying Creative Thinking And Searching For The Best And Most Effective Ways To Develop It And The Importance Of Measuring It Among Students Because Of Its Contribution To The Development Of The Educational Process In General.

#### **Research Aims:-**

The Current Research Aims To Identify The Impact Of The Suchman Model In Developing Creative Thinking At The Request Of The Department Of Industrial Management In The College Of Management And Economics. Therefore, The Researcher Puts The Following Hypotheses:

1. The Mean Scores Of The Experimental Community Students, Who Were Exposed To The Suchman Model, Do Not Vary Statistically Significantly With The Average Scores Of The Control Group Students In The Post-Test At A Significance Level (0.05).

2. At A Significance Level Of 0.05, No Statistically Significant Difference Amongst The Experimental Class Students' Average Score On The Pretest Application Of The Innovative Thought Test And Their Average Scores In The Post Application Of The Test.

#### **Research Limitations:**

The Present Study Is Confined To A Sample Of Students From The Department Of Industrial Management In The College Of Administration And Economics, The First Class At Baghdad University For The Academic Year 2019-2020 Of The First Semester.

#### **Defining Terms:**

**First: The Model Is Defined By Al-Haila (2003) As** “Essential Steps That Are Intertwined, Interconnected, Intermingled And Interacting With Each Other Leading To Developing Educational Materials To Achieve Specific Goals And Are Directed To A Specific Type Of Learners In Light Of Theoretical Concepts And Principles” (Al-Helah, 2003: 101). (Abu Jadu, 2007): “The Set Of Procedures Practiced By The Teacher In The Educational Situation, Which Includes The Material And Methods Of Presenting It And Treating It” (Abu Jadu, 2007: 317).

#### **Second: Suchman's Model**

Suchman's Model Is Defined By The Researcher Theoretically As A Method That Is Based On Sequential And Interconnected Procedural Steps Leading To An Increase In The Scientific Knowledge Level Of Students Because It Is Important For Students To Be Encouraged And

Trained In Reasoning, Investigative Skills, Knowledge Collecting, And Decision-Making, And Because Teaching In This Manner Shifts Action From The Teacher To The Students. As For The

Procedural Definition, It Is A Set Of Elaborate Sequential Steps Designed For The Purpose Of Developing Creative Thinking Among Students.

### **Third: Creative Thinking**

Defined By (Edibi 2001) As “The Ability To Produce That Is Characterized By The Greatest Possible Degree Of Intellectual Fluency, Automatic Flexibility And Originality, In Response To A Problem Or An Exciting Situation” (Adibi, 2001: 85). (Al-Haila 2001) "As A Process That Has Successive Phases And Aims To Produce A Product Represented By The Issuance Of Multiple Solutions Characterized By Diversity And Novelty In A General Climate Prevailing Consistency And Corruption Between Its Components." (Al-Haila, 2001: 164). The Researcher Adopted Torrance's Definition Of Creative Thinking. As For The Procedural Definition: It Is The Overall Score That Students Obtain Through Their Response To The Torrance Test Of Creative Thinking, The Formal Test, Image A.

## **Section Two**

### **A Theoretical Framework And Previous Studies**

#### **Suchman's Model**

Contemporary Social Theory, Which Appeared In The Field Of Education Through The Ideas Of Dewey, Harold And Boud, Paid Great Attention To The Investigative Trend, As These Educators Considered That The Basic Work Of Education Is To Confront The Problems Of Society And Rebuild Social Systems On Human Foundations. On This Basis, The Role Of The School Must Not Be Limited To Transferring Information Only, But By Giving The Learners The Opportunity To Question And Inquire In Preparation For Accepting This Information And Then Restructuring It And Building It On A New Basis (Al-Haila, 2002: 144). In The Early Seventies Of The Last Century, The Scientist Suchman Built A Model Of Investigative Learning For Middle School Students, And He Applied It To Natural Sciences Subjects Such As Physics And Chemistry According To Dewey's Steps After Developing It Into A Method Of Teaching That Directs The Student To A High Sufficiency Of Investigation And Problem-Solving. In This Way, It Is Considered One Of The Models Of Classroom Teaching That Was Developed To

Suit The Age Of Technology, Techniques, And The Knowledge Explosion In Which We Live, In Which The Traditional Methods Of Teaching Have Become Insufficient On Their Own To Transfer The Ideas Of The Era And Its Technology In The Minds Of Scientists, Thinkers And Inventors To The Minds Of Learners. Therefore, It Was Necessary To Search For More Advanced Methods And Methods To Suit The New Learner We Want, Transforming Him From Just A Recipient Person, Who Is Practicing The Act Of Education, To A Positive Person With An Active Participation In The Educational Process (Al-Bakri And Al-Kasawi, 2002: 43)

Suchman Model Developed By Richard Suchman In 1962 Is Based On The Presence Of Conflicting Events In Front Of The Learner, So That He Sees A Result Or Event That Causes Him A State Of Cognitive Inconsistency And A Balance Between What He Saw And What Is In His Cognitive Structure. Thus, He Seeks To Develop Several Hypotheses That Explain What Is Happening. In Order To Reach The Correct Theory, And Here His Role Is Active, Positive, Interacting With The Learning Process, And Moving To Meaningful Learning That Helps Him Refine His Skills And Develop Himself With The Help Of The Teacher Whose Role Is To Plan, Guide, And Direct

(Martin, R, Et Al, 2001: 126) The Suchman Model Is One Of The Models Affiliated With The Investigative Strategy, Which Aimed To Empower Learners And Give Them A Greater Role In The Educational Process, Making Them The Main Focus Of It. This Is What Was Not Present In Traditional Teaching Strategies, And That Learners Will Not Be Interacting With The Curriculum And The Teaching Process Unless It Is Designed For Them. Investigative Models Help To Search And Investigate As (Myers & Dyer 2006) Believes That Teaching Should Emphasize The Learners' Acquisition Of Basic Science Skills, Which Help Them To Observe And Discover; To Overcome The Problems Of Life, And To Try To Explain And Analyze The Phenomena Surrounding Them (Myers & Dyer 2006: 52).

(Mohan, 2007) Indicates That The Importance Of Suchman's Investigative Model Lies In Developing A Set Of Skills Among Learners That Make Process Information And Knowledge Productively And Meaningfully. So That, It Increases The Motivation Of Learners Towards Insight Into Situations And Events, And The Use Of The Mind And Investigation Behind Every New Knowledge (Mohan, 2007: 78). The Investigation Method Is Still Receiving The Attention Of Many Educators And Educational Scientists Because It Is Important For Students To Be Encouraged And Trained In Reasoning, Investigative Skills, Knowledge Collecting, And Decision-Making. The Investigative Method Is Among The Teaching Methods That Involve The Learner In Activities That Lead To His Obtaining Knowledge And Make Him Active And Effective As Well, As The Learner Uses His Mental Abilities And A Lot Of Scientific And Practical Methods And Processes. That Is, The Investigation Is Based On Discovery And Does Not Happen Without The Mental Processes That Are Used In Discovery, But Added To Practical And Experimental Practices (Al-Dabsi, 2003: 233).

#### **Steps Of The Investigative Method:**

Although There Are Several Models Of Inquiry, All Of These Models Address The Learner As A Person Whose Goal Is To Seek Access To Information And Facts Through Thinking And Using Investigation And Scientific Research. As Suchman's Model Based On Teaching Investigation, It Is Centered On Five Stages:

1- Presenting The Problem To Be Studied: There Must Be A Problem, Question Or Issue That The Teacher Submits To His Students, Indicating To Them The Procedures To Be Followed In The Search For A Solution Or An Explanation Of This Problem. It Is Preferable That The Problem Presented Is Of The Type That Raises The Curiosity Of The Students. There Are Several Forms Of Presenting The Problem, Including:

- \* Presenting Conflicting Information To Students, And Asking Them To Choose A Specific Position On This Information.

- \* Presenting Or Showing Things That Contradict Students' Ideas

- \* Presenting Or Presenting Positions Or Issues Without Specifying Their Endings To Allow Students To Search For Acceptable Ends.

2 - Information Gathering: This Information Is Usually Obtained By Using The Question-And-Answer Method, Whether With The Teacher Or Among Students Under The Supervision Of The Teacher. Students May Be Asked To Search For Information From Other Sources Such As The Library, Use Experimentation, Or Ask The Competent Authorities.

3 - Verifying The Validity Of The Information: This Step Takes Several Forms, Including Examining The Information, Such As For Comparing This Information To Ensure That There Is No Contradiction In, Especially If The Student Collects Information About The Problem From Multiple Sources, Or For The Student To Check This Information With His Colleagues, As If He Read It

To Them And Then There Is A Discussion About This Information.

4 - The Stage Of Assembling And Analysing Information: After Verifying The Accuracy Of The Data, Students Begin To Organise And Order It To Arrive At A Plausible Scientific Interpretation Of The Problem Under Investigation, In Which The Data Is Provided In The Form Of Explanatory Sentences For The Problem, Its Sources, And Its Aspects. At The End, A Sensible And Satisfactory Solution To The Problem Must Be Carried Out Where The Teacher's Role Here Is To Help And Guide His Students.

5 - Analyzing And Evaluating The Investigation Process: This Is The Step In Which A Review And Analysis Of All The Steps They Followed In Dealing With The Problem, Starting From Identifying It And Ending With The Process Of Passing Judgments About The Problem And Its Interpretation (Al-Anbaki, 1999: 38)

Assumptions On Which Suchman Relied In His Model:

- 1- Learners Can Learn By Self, Under The Supervision And Guidance Of The Teacher.
- 2- The Students' Tendency, By Nature, To Engage In Investigative Research Activities Out Of Curiosity And The Desire To Discover The Unknown.
- 3- The Possibility Of Developing The Curiosity And Questioning Motive Among The Learners In A Direct Way Through Training Them On Research Procedures And The Foundations Of The Scientific Method.
- 4- Empirical Knowledge Is Not Fixed, But Is Subject To Modification And Change, Which Stimulates Learners To Constantly Think About The Natural And Social Phenomena That Surround Them (Ibrahim, 2004: 482).

### **Conditions For The Suchman's Investigative Model:**

Suchman Identified A Number Of Conditions That Must Be Observed In Investigative Learning, Or Research Training, And He Described Them As Follows:

- 1- Choosing An Event Or Phenomenon That Raises The Interests Of The Learners And Urge Them To Question And Search For An Explanation. That Mysterious, Unexpected Or Unknown Accidents And Phenomena Are Best Suited To The Topics Of Investigative Education. It Is Necessary To Distinguish Between The Familiar Phenomenon And The Known One, Since Many Of The Phenomena Available In The Environment Of The Learners Is Of The Familiar Type, Such As The Expansion Of Minerals With Heat, The Transformation Of Water Into Steam, And Rain Falling. A Great Deal Of These Phenomena Are Unknown To The Learners In The Sense That They Do Not Know Their Causes, Variables, Or Explanations, Because They Have Not Developed Ideas Or Theories About Their Nature And Methods Of Control.
- 2- The Need For The Phenomenon Targeted By Education Or Training To Be Of A Degree Of Importance And Ambiguity, So As To Arouse The Astonishment And Surprise Of The Learners In A Way That Prevents The Emergence Of Their Indifference.
- 3- The Learners' Questions Must Be Of The Type That The Teacher Can Answer With The Word "Yes" First, I.E. The Question About The Interpretation Or Explanation Of The Phenomenon Subject Of Interest Should Be Avoided And Try To Perform With Interrogative Expressions That Determine A Certain Fact Or Fact In Their View, And

The Teacher Should Explain To Them Whether Their Statements Correct Or Not.

- 4- Focusing On The Necessity For The Educational Dialogue To Take Place In A Way That Enables The Learned People To Determine The Facts Of The Phenomenon, The Subject Of Study And The Conditions For Its Occurrence Or Change. Organizing

These Facts In A Logical Manner Facilitates The Processes Of Interpretation, Tuning, And Prediction. In Other Words, Educational Dialogue Should Take A Form That Qualifies Students To Acquire Concepts, Understand Relationships, Extract Principles And Form Theories (Mari And Al-Haila, 2005: 156-157).

### **The Dynamic Theory In The Interpretation Of Creative Thinking**

Torrance Is One Of The Most Scholars Who Studied Creative Thinking, As He Came Up With A Set Of Concepts That Develop Creative Thinking. In The First Concept, Torrance Stresses The Need To Recognize Individual Differences, As Individuals Learn The Best They Can When They Have Opportunities To Learn In The Most Appropriate Way To Their Abilities. As For The Second Concept, It Emphasizes That Learning Is Better With Work And Attention To What Is Done By It. Individuals Do Not Learn Automatically Or Without Interest In Work, So, Work Requires Leadership And Direction. In The Third Concept, Education Is A Continuous Rebuilding Of Life Experience That Is Not Limited To What Is In The Classroom Only. This Requires The Teacher And The Student To Teach To Think About The Potential Consequences Of Rebuilding Life Experience Outside The Classroom Walls. In The Fourth And Fifth Concepts, The Emphasis Is Placed On Spreading Democracy In The Classroom To Allow Acceptance Of The Ideas And Concepts Presented And Increase Courage. Torrance Found That Students Who Constructively Criticize Information Presented To Them Are More Capable Of Generating Creative Ideas (Fakher, 1975: 59-66).

Torrance And Kieford Agree On The Components Of Creative Thinking, Namely Fluency, Flexibility, Originality And Details (Al-Zyoud, 1999: 122). As For Fluency, It Is The Ability To Produce Many Good And Valuable Ideas In A Specific Unit Of

Time For A Specific Issue Or Problem, I.E. The Multiplicity Of Ideas That Can Be Called And The Speed With Which These Ideas Are Summoned, Their Fluidity, Flow, And Ease Of Generating Them, And Fluency Is Measured By The Number Of Responses In A Fixed Unit Of Time Compared To The Performance Of Others ( Qattami, 2001: 198) Torrance Defines It As The Ability Of The Individual To Give The Largest Possible Number Of Appropriate Responses To A Specific Stimulus In A Given Period Of Time (Torrance, 1971, 57).

Flexibility Means The Ability To Change The Mental Orientation Or Diversity In Ideas Or Is The Degree Of Ease In Changing Thinking, Which Is The Opposite Of Mental Stiffness. Torrance 1971 Defines It As The Ability To Think In Several Directions That Include Different Categories Of Responses So That His Production Includes Multiple Types Of Ideas, As Well As The Possibility Of Shifting His Thinking From One Input To Another (Torrance, 1971, 57). Authenticity Means Novelty Or Uniqueness Of Ideas, That Is, The Ability Of The Individual To Produce Original Responses, That Is, Of Little Repetition In The Statistical Sense Within The Group To Which He Belongs, And For This Reason The Less Common The Idea, The Greater The Degree Of Originality (Mua'ayda, 2001: 185). Torrance And Guilford Define It As The Production Of Unfamiliar Ideas (Torrance, 1971, 59). Details Mean The Ability To Add Details To The Basic Idea, That Is, The Individual's Ability To Make A New Addition To A Particular Idea That May Lead To More Details (Torrance, 1971, 59). Torrance



Believes That There Are A Set Of Principles That Can Be Taken Into Account When Teaching Creative Thinking, Namely:

Attention To All Questions Raised By Learners.

Encouraging The Learner To Brainstorm Ideas And Emphasize That They Are Valuable.

Respect For The Teacher's Imaginative Ideas. (Al-Zyoud, 1999: 182)

Creative Thinking Is A Concept That Should Be Subject To Empirical And Analogical Research. It Is Teachable And Is Not Restricted To A Small Group Of People (Jarwan, 2002: 86).

## Previous Studies

### Studies On The Suchman Model

Al-Shammari's 2012 Study

The Study Aimed To Know The Effectiveness Of Teaching By Using The Suchman Model In Acquiring Geographical Concepts For Fourth-Grade Literary Students, A Comparative Study Between Urban And Rural Female Students. In Order To Achieve The Goal Of The Research And Verify The Research Hypotheses, The Researcher Chose Al-Baqer High School For Girls In The Rural, And Zarqa Secondary School For Girls In Urban To Be A Field For Her Experiment. The Research Sample For Both Schools Reached 53 Students Distributed Over The Two Groups Of Research In Urban And Rural Areas. The First 27 Experimental Studies Study The Subject Of Geography Foundations And Its Techniques By The Method Of Directed Investigation. And The Other 26 Female Officers Are Studying The Same Subject In The Traditional Way.

The Researcher Rewarded The Students Of The Two Groups Statistically With The Following Variables: 1) Chronological Ages Calculated In Months. 2) Parents' Academic Achievement. 3) Geographical Subject Grades In The Semester. After The Researcher Determined The Scientific Material, She Formulated The Behavioral Goals, Prepared The Teaching Plans And Presented Samples Of Them To A Group Of Experts And Specialists, Then Prepared A Test To Acquire Geographical Concepts Consisting Of 50 Test Items Of The Type Of

Multiple Test Characterized By Validity, Stability And Objectivity. The Researcher Personally Studied The Students Of The Groups In The Research Sample That Lasted An Entire Semester. At The End Of The Experiment, The Test Of The Acquisition Of Geographical Conceptions Was Pragmatic To The Students Of The Research Sample Groups. The Researcher Used The Following Statistical Methods In Her Research Procedures And Analysis Of Its Results, The T-Test For Two Independent Samples, The Chi-Square Test, The Paragraph Difficulty Equation, The Discriminatory Force Equation, The Effectiveness Equation Of Invalid Alternatives, The Consistency Factor Of Pearson And The Spearman Equation. The Researcher Reached A Conclusion That The Students Of The Experimental Group Who Studied The Subject Of Geography And Its Techniques By The Method Of Directed Inquiry Over The Control Group Students Studying An Identical Subject In The Traditional Method, And There Are No Differences Between Urban Areas. (Author's Abstract Is Under Disposal Of Al-Shammari, 2012)

### Studies Dealing With Creative Thinking

Abu Al Khail's Study 2020

The Study Aimed To Investigate The Impact Of An Educational Program Based On The Web Quest For Developing Creative Thinking Skills (Fluency, Flexibility, And Originality) Among First-Grade Students Of High School In Computer Research In Jordan. In This Study, The Two Researchers Followed The Quasi-Experimental Approach, As The Study Sample Consisted Of (50)

Students Of The First Grade Of Secondary School In The Madaba First Secondary School For Boys Of The Directorate Of Education Of Madaba, In The Academic Year 2017/2018. The School Was Chosen For Its Suitability To The Conditions Of Study. Because Of Its Proximity To Researchers, The Control And Experimental Groups Were Randomly Assigned To That School, So That The Members Of The Experimental Division Were Taught In The Proposed Program, While The Members Of The Control Division Were Taught In The Usual Way. To Achieve The Goal Of The Study, The Two Researchers Used The Torrance Test For Creative Thinking (Verbal Picture A), Where The Scale Was Applied To The Control And Experimental Groups, And The Results Of The Study Revealed Statistically Significant Differences At The Level Of  $\alpha = 0.05$  In The Level Of Creative Thinking In General And Sub-Skills (Fluency, Flexibility, Originality) And In Favor Of The Experimental Group. (Abu Al Khail, 2020: 159-186)

**Section Three**

**Methodology And Procedures Of The Research**

The Current Section Discusses Testing Methods And Procedures For Selecting A Suitable Experimental Design, Deciding Research Variables, Identifying The Research Population, Its Sample, And The Process Of Sample Collection,

Determining The Pre And Post Examination, Determining The Instrument Used In This Analysis, And Finally Applying The Results, As Well As Determining The Statistical Procedure Required To Fully Fulfill The Research Goals And Evaluate Its Hypotheses. The Researcher Followed The Experimental Approach By Which He Could Achieve The Goals Of The Research By Following The Following Steps:

First: The Design Used In The Research:

The Research Design Denotes The Action Strategy That The Researcher Adopts In Answering The Questions Regarding Research. The Goal Behind Selecting The Research Project Is To Decrease Errors As Much As Possible By Increasing The Percentage Of Data Confidence And Validity. The Choice Of Experimental Strategy For The Research Is Of Great Importance, Because It Designs For The Researcher The Suitable Structure Of The Research, And It Arrives At Results That Can Be Mentioned In Answering The Questions Presented By The Research Problem And Verifying The Hypotheses. Despite The Fact That There Are Several Different Laboratory Designs, The Researcher Chose One That Uses The Equivalent Testing And Control Groups For The Pre And Post Tests. The Experimental Structure Of The Experiment Is Outlined In Table 1.

Table (1)

Experimental Design Of Post And Pretest Research For The Two Equivalent Groups

Post Test	Independent Variable	Pretest	Group
Creative Thinking	Suchman's Model	Creative Thinking	Experimental
Creative Thinking	-	Creative Thinking	Controlling

Second: - For The Academic Year, The Study Class Is Made Up Of Students From The University Of Baghdad's College Of Administration And Economics. (2019-2020) For The First Semester,

And Their Number (4134) Students Are Disseminated Among The Scientific Dept. Of The College.

Third: The Research Sample: It Was Selected Out Of The Department Of Industrial Management (The Second Phase). The Pre-Test (Creative Thinking) Was Applied To All Students Of The Second Phase In The Department, Which Numbered (78) Students In The Department Of Industrial Management, Then They Were Fall Into Two Groups: The First One Is The Experimental Whose Members Are (39) Individuals, And The Second Was A Control Officer With A Number Of (39) Individuals.

**Equivalence Of The Research Groups:** The Safety Factor Of The Experimental Design Is One Of The Most Important Factors That Must Be Verified, And This Is Done By Conducting Parity Between The Experimental Group And The Control Group In The Variables That Affect The Dependent Variable. These Variables Can Be Identified By Analyzing The Research Problem And By Examining The Previous Experimental Studies Closely Related To The Phenomenon In Question, Parity Was Made Between The Two Groups (Experimental And Control) In The Variables (Chronological Age, Intelligence, Creative Thinking).

1: - Student’s Chronological Age Calculated In Months:

The Chronological Age Of The Students Was Calculated By The Number Of Months. The Date Of Birth Of Each Student Was Obtained Directly From The Students Themselves, And The Ages Were Verified Through The Information Documented Upon Registration. The Arithmetic Average Of The Ages Of The Experimental Group Students Was Calculated As (239.3) Months And The Arithmetic Average Of The Ages Of The Control Group Students (239.6) Months For The Purpose Of Identifying The Significance Of The Differences Between The Two Groups. The T-Test Was Used For Two Independent Samples, So The Calculated T Value Was (-322) When Compared To The Tabular Value. At The Level Of Significance (0.05), It Was Found To Be Equal To (2.009) (Al-Bayati, 1985, 275) It Is Not Statistically Significant, And This Means That There Are No Statistically Significant Differences Between The Two Groups In Age, As Shown In Table (2).

Table (2): T-Test Results For The Average Chronological Age Amongst The Experimental And Control Groups

Significance 0,05 Level	The T-Value		The Standard Deviation	The Arithmetic Mean	No	Group
	Tabular	Calculated				
No Differences	2.009	-3.222	0.349 0.409	239.3 239.6	39 39	Experimental Controlling

It Is Prominent Out Of Table (2) That The Calculated T Value (-2222) Is Less Than Its Tabular Value (2.009), Which Indicates That The Differences Are Not Significant In The Chronological Time Life Among The Two Groups.

2- Creative Thinking Test Scores

The Researcher Applied The Torrance Formal Test (Image A) Prepared By The Scientist Torrance In The Year 1966 Before Applying The Experiment To The Two Groups On 11/24/2019 As The Arithmetic Averages Of The Experimental And Control Groups

Were Extracted. The Value Of The Average Scores Of The Experimental Group Reached (60,696) And The Average Scores Of The Control Group (60.650). For The Purpose Of Identifying The Significance Of The Differences Between The Two Groups, The T-Test Was Used For Two Independent Samples, So The Calculated T Value Was (0.525), Which Is Smaller Than The Tabular Value Of (2.009) At A Level Of Significance (0.05), Meaning That It Is Not Statistically Significant. This Means That There Are No Differences Statistical Significance Between The

Two Groups In Creative Thinking, As Shown In Table (3).

Table (3): The Results Of The T-Test For The Average Scores Of Creative Thinking In The Pretest Between The

Experimental And Control Groups

Level Of Significance 0,05	The T-Value		The Standard Deviation	The Arithmetic Mean	No	Group
	Tabular	Calculated				
No Differences	2.009	0.525	0.227	60.696	39	Experimental
			0.452	60.650	39	Controlling

3- Intelligence Test

The Researcher Counted On The Raven Test For Intelligence, Since It Was Standardized On The Iraqi Environment To Verify The Equivalence Of The Two Research Groups. The Arithmetic Mean Of The Experimental Group Reached (27,550) Degrees, Whereas The Arithmetic Mean Of The Control Group Reached (27,489) Degrees, And By Using The T-Test For Two Independent Samples To Find Out The Significance Of The Difference Among The

Two Groups Appeared That There Was No Statistically Significant Difference (0.05) For The Value. The Calculated T (0.376) Is Smaller Than The Tabular Value (2.009) And With A Degree Of Freedom (76). This Indicates That The Two Search Groups Are Equivalent In This Variable, And Table (4) Illustrates This.

Table (4) The Results Of The T-Test For The Average Scores Of The IQ Test In The Pretest Between The Experimental And Control Groups

Level Of Significance 0,05	T-Value		Standard Deviation	Arithmetic Mean	No	Group
	Tabular	Calculated				
No Differences	2.009	0.376	0.668	27.550	39	Experimental
			0.690	27.489	39	Controlling

Rules For Conducting Suchman Investigative Model

A Group Of Researchers Indicated That The Scientist Suchman Set Six Rules And Their Steps When Starting A Survey Session According To This Model With The Aim Of Creating All The Appropriate Conditions For Learning, And Controlling The Elements Of The Educational Process. These Rules As Khtaybeh, 2005 Indicates Are:

The First Rule: Asking Questions By Students.

The Second Rule: Freedom To Ask Questions And Not Restrict Students.

The Third Rule: The Teacher's Response To The Theories Put Forward By The Learners.

Fourth Rule: Testing Hypotheses.

Fifth Rule: Cooperation And Work In The Spirit Of One Team.

Sixth Rule: Experimentation.

The Researcher Believes That By Using These Rules, The Investigation Process In The Suchman Model Will Be Completed With Effectiveness And Success, And To Increase The Scientific And Intellectual Level, And To Develop The Creative Thinking Of Students.

### **Third: - Research Tool:**

#### **Creative Thinking Test**

#### **Test Validity**

Validity Is One Of The Characteristics Necessary For Preparing Research Tools, Noting That A Valid Test Measures The Behavior That It Is Really Trying To Measure And Does Not Measure Anything Else. The Valid Test Represents One Of The Important Means In Judging Its Validity, And The Concept Of Validity Refers To The Quality Of The Test As A Tool To Measure What Was Originally Designed To Measure, And Validity Is The Most Characteristic Of Any Test. The Researcher Has Relied On Apparent Validity To Identify The Validity Of The Test. A Group Of Specialists In Educational And Psychological Sciences And Asked Them To Express Their Opinion On The Clarity And Sufficiency Of The Phrases In Every Field And To Suggest Any Amendments To Them. The Researcher Adopted 80% Of The Arbitrators'

#### **Test Correction Method**

The Torrance Test For Creative Thinking (Formalistic Model), Image (A), And For The Three Parts Of The Test Called The "Three Activities", Were Corrected According To The Dimensions Of Creative Thinking (Fluency, Flexibility, Originality, And Details) That Can Be Measured In Each Activity In This Test. The Researcher Reviewed The Correction Model Prepared By Fuad Abu Hatab And

The Arabic Image Was Used For The Tests Of Creative Thinking For Torrance, Which Were Prepared In The Year 1966, And It Was Translated Into Arabic And Prepared In The Year 1971 By Abdullah Suleiman And Fuad Abu Hatab, Noting That These Tests Consist Of Four Batteries In Two Parts (Verbal And Formal) And Each Part Consists Of Several Subtests (Torrance, BT, 2). The Researcher Used Image (A) In The Formal Test, Which Consists Of Three Sub-Tests: 1- Building The Image, 2- Completing Pictures, 3- Parallel Lines.

Agreement On The Validity Of Each Paragraph Of The Test, And In This Way, The Test Was Accepted As It Is.

#### **Stability Test**

The Researcher Extracted The Test Stability Factor By Applying It To A Sample Of (20) Students From The First Stage, Then The Test Was Re-Applied To The Same Sample After A Period Of Two Weeks Had Passed From The First Application, Which Is The Best Period Between Two Applications, And By Using The Pearson Correlation Coefficient, It Was Calculated The Test Reliability Coefficient, So The Coefficients Were (0.76) For The Dimension Of Fluency, (0.71) For The Dimension Of Originality, (0.70) For The Dimension Of Flexibility, And (0.68) For The Dimension Of Detail, Meaning That The Test Has A High Degree Of Stability.

Mahmoud Suleiman In 1978, And The Correction Model Prepared By Saeb Ahmed Al-Alousi 1980. They Are Printed Pamphlets Containing Information On The Tests And Instructions On How To Apply Them, As Well As Instructions For Correction (Al-Alousi, 1980, 20) As Follows:

#### **Activity 1: Creating An Image**

1- Authenticity: A Scale Was Developed Ranging From Zero To Five: Zero For Responses That Obtained (5% Or More), One Score For Responses That Obtained Repeat (4% - 4.99%), Two Degrees For Responses That Obtained Repeated (3% - 3.99%) And Three Degrees. As For Responses That Obtained Repeat (2% - 2.99%), Four Scores For Responses That Obtained Frequency (1% - 1.99%), And Five Scores For Responses That Obtained Frequency (Less Than 1%), Which Are Responses That Show Imagination And The Power Of Innovation.

2- Details: A Score Is Given For Every Meaningful Detail (Or Idea) Added To The Original Stimulus, Or To The Surrounding Place, And One Score Is Given For Each Of The Following:

- Every Major Detail In The Original Response Is Given A Score, But The Additional Repetition Of The Idea Does Not Count For The Same Response.

- Misleading Intended, Not Just Drawing On The Lines With A Pen Again.

- Every Major Change In Design That Is Meaningful To The Overall Response.

- Divide The Image Into Two Parts And Counting The Two Parts.

### **Activity Two: Complementing The Picture**

1- Fluency: Fluency Is Calculated In This Activity By Calculating The Figures Completed By The Respondent, And The Highest Score Obtained By The Respondent Is 10 Marks.

2- Flexibility: The Degree Of Flexibility Is Calculated By Adding The Number Of Categories Into Which The Responses Fall For Each Test Question. One Score Is Given For Each Of The Categories.

3- Authenticity: Setting A Scale Ranging From Zero To Two And For Each Of The Forms: Zero For Responses That Obtained (5% Or More), One Score

For Responses That Obtained Repeat (4% - 4.99%), And Two Degrees For Responses That Obtained Repeated Responses (Less Than 2%).

4- Details: The Degree Of Detail Is Calculated For Each Response Using The Same Method Used In The First Activity.

### **Activity Three: Lines**

1- Fluency: The Fluency Score Is Calculated By Summing The Responses Minus The Repeated Or Unrelated Responses To The Stimulus. The Highest Score A Respondent Gets Is 22.

2- Flexibility: The Degree Of Flexibility Is Calculated By Adding The Number Of Categories Into Which The Responses Fall Within.

3- Authenticity: A Scale Ranging From Zero To Five Has Been Developed To Measure The Degree Of Originality In This Activity, And As Follows: Zero For Responses Obtained (5% Or More) And One Score For Responses That Get Repeated (4% - 4.99%) And Two Degrees For Repetitive Responses. (3% - 3.99%), Three Scores For Repeat Responses (2% - 2.99%), Four Scores For Repeat Responses (1% - 1.99%), And Five Scores For Repeat Responses (Less Than 1%)

4- Details: They Are Corrected According To The Principles Mentioned In The First And Second Activities. What Is Required Is To Determine The Number Of Ideas Expressed By Each Drawing In Addition To The Basic Idea, And To What Extent The Drawing Tells A Meaningful Story, And No Degree Is Given For The Details Of The Titles.

### **Fourth: Statistical Means**

- Pearson Correlation Coefficient: - Such Method Was Employed In Order To Detect The Stability Of The Test By The Re-Testing Method.

- The T-Test For Two Independent And Correlated Trials: - To Calculate The Equivalence Between The Two Groups, Search For Variables, As Well As Use

It To Test Hypotheses. (Al-Bayati And Anthasios, 1977: 260)

**Section Four**

**Presentation And Interpretation Of Results**

**The First Hypothesis:**

By Comparing The Post-Test For The Two Groups, It Was Revealed That The Average Scores Of The

Experimental Group Students Was (82,470) With A Standard Deviation (0.341), Whereas The Average Scores Of The Controlling Group Were (60,667) And With A Standard Deviation (0.562) By Employing The T-Test For Two Independent Samples To Find Out Its Significance. Such Differences Within Those Two Averages Show The Existence Of Statistically Significant Differences Between The Two Groups. Table (5) Illustrates That: -

Table (5)

Results Of The T-Test Of Two Independent Samples For The Creative Thinking Posttest

Level Of Significance	T-Value		Degree Of Freedom	Standard Deviation	Arithmetic Mean	Group No	Group
	Tabular	Calculate					
0.05	2.009	191.254	76	0.341	82.470	39	Experimental
				0.562	60.667	39	Controlling

It Can Be Seen From Table (5) That With A Degree Of Freedom (76) And A Level Of Importance (0.05), The Measured T Value (191.254) Is Higher Than The Tabular T Value (2.009), Suggesting That There Is A Statistically Important Discrepancy Between The Average Scores Of The Two Test Groups, Supporting The Experimental Community. As A Consequence, The Null Hypothesis Is Denied And The Alternative Hypothesis Is Accepted That There Is A Statistically Significant Difference Between The Mean Scores Of The Experimental Group Students And The Average Scores Of The Control Group Students In The Post Test Of Creative Thinking.

**The Second Hypothesis: -**

To Verify This Hypothesis, The T-Test Was Employed For Two Correlated Models To Find Out Whether The Suchman Model Was Effective In Developing Creative Thinking Among Students Of The Experimental Group, Where The Average Differences Between The Scores Of The Group's Students In The Creative Thinking Test Was (82.470) With A Standard Deviation Of (0.341) In The Post Test, The Average Differences Amongst The Group Students' Marks In The Creative Pretest Test Reached (60,696) With A Standard Deviation Of (0.227) Table (6) Shows That: -

Table (6)

The Outcomes Of The T-Test For Two Correlated Samples Of Pre And Post Application To Test The Creative Thinking Of The Experimental Group

Level Of Significance	T-Value		Degree Of Freedom	Standard Deviation	Arithmetic Mean	Sample No	Test
	Tabular	Calculated					

ance			m				
0.05	2.009	311.057	76	0.341	82.470	39	Post
				0.227	60.696	39	Pre

Table (6) Illustrates That The Calculated T Value (311.057) Is Larger Than The Tabular T Value (2.009) With A Degree Of Freedom (76) And At A Level Of Significance (0.05), Meaning That The Result Is Significant Statistically In Favor Of The Posttest. A Statistically Significant Difference Is Between The Mean Scores Of The Experimental Group Students In The Pre-Application Of The Creative Thinking Test And Their Average Score In The Post Application Of The Test. This Means That There Is A Development In Creative Thinking Among The Students Of The Experimental Group.

### Conclusions

Based On The Results Of The Current Study, The Researcher Concluded The Following: -

- 1- The Ability Of The Suchman Model Used In Developing Students' Creative Thinking.
- 2- The Suchman Model Used In The Development Of Creative Thinking Focused On Repetition And Clarity Of Ideas, And Is Characterized By The Blending Of Its Components, Their Coherence And Their Interconnectedness With Each Other By A Network That Clarifies The Relationships That Are Linked To Each Other.
- 3- The Used Suchman Model Is A Model That Fits The Students' Abilities, Meets Their Needs And Desires, And Develops Their Abilities In Various Fields.
- 4- The Suchman Model Increases Learners' Self-Confidence, Broadens Their Perceptions, Enhances Their Thinking Abilities, And Establishes The Concept Of Lifelong Learning For Them.

### Recommendations

The Researcher Suggests The Following In Light Of The Findings Of The Present Study:

1. Take Advantage Of The Suchman Model Used For The Current Study In Developing Creative Thinking By Applying It To Students Who Are Characterized By Their Low Creative Thinking Through The Heuristic Unit In The Scientific Departments Of The University.
2. Adopting The Suchman Model And The Techniques Used In It By The Teachers And Students, And Employing Them In Class Interaction And Teaching Materials.

### The Suggestions

The Researcher Suggests The Following In Light Of The Suggestions Of The Present Study:

1. Conducting Studies Similar To The Current Study On Study Subjects And Other Stages And On Both Genders.
2. Conducting Other Studies To Figure Out The Influence Of Making Use Of The Suchman Model On Other Variables, Thinking Styles And Cognitive Styles.

### References

1. Ibrahim, Magdy Aziz (2004). Higher Education Strategies And Learning Methods. The Anglo-Egyptian Office.
2. Abu Al-Khail, Yusef Mufleh (2020). The Impact Of A Quest-Based Educational Program On Developing Creative Thinking Skills For First-Grade Secondary Students In Computer Research In Jordan, An-Najah University Journal For Research: Humanities. Mg. 34, P. 1 ., 159-186



3. Abu Jadu, Salih Muhammad Ali (2007). *Educational Psychology*, 4th Edition, Dar Al Masirah For Publishing, Distribution And Printing, Amman, Jordan.
4. Adibi, Abbas Abd Ali (2001) Innovative Thinking Capabilities In Relation To Study Habits And Test Anxiety Among Secondary Education Students,” *Journal Of Educational And Psychological Sciences*, Bahrain, Vol. 12, No. 3.
5. Al-Alusi, Saeb Ahmed Ibrahim (1980) *Torrance Tests Of Creative Thinking*, Photo A, Brochure.
6. Al-Bakri, Amal And Afaf Al-Kasawi (2002) *Methods Of Teaching Science And Mathematics*. 2nd Edition, Dar Al-Fikr For Printing, Publishing And Distribution, Jordan.
7. Al-Bayati, Abdul-Jabbar (1985). *Statistical Analysis In Educational Research, Psychological And Social Research. Nonparametric Methods*, Kuwait, 1st Edition, Kuwait Foundation For The Advancement Of Sciences.
8. Torrance, A. Paul (B. T) *Torrance Tests For Innovative Thinking*. Translated By Abdullah Mahmoud Soliman, Abu Hatab, Fouad (1988), Cairo, The Anglo Library.
9. Jarwan, Fathy (2002) *Creativity*. Amman, 1st Edition, Dar Al-Fikr.
10. Johnson, David Et Al. (1995). *Cooperative Learning*. (Translation Of Dhahran Schools, 2004), Ed. 2, Al-Turki Foundation For Publishing And Distribution, Damman.
11. Al-Harthi, Ibrahim Ahmad Muslim (1999) *Teaching Thinking*, Riyadh, King Fahd National Library.
12. Hassan, Mansi (1997). *Characteristics And Problems Of Academically Outstanding Students In The Basic Stage In Jordan*. Omdurman University, Sudan, Phd Thesis (Unpublished).
13. Al-Hayali, Saadoun Rashid Abdul-Latif (1999). *A Future Vision In The Preparation, Training, And Scientific And Professional Growth Of The Arab Teacher*. Al-Ustad Magazine, College Of Education - Bin Rushd, University Of Baghdad, Issue 14.
14. Al-Heilah, Muhammad Mahmoud (2003) *Teaching Design, Theory And Practice*. 2nd Edition, Dar Al Masirah For Publishing, Distribution And Printing, Amman, Jordan.
15. Al-Heilah, Muhammad Mahmoud, (2001). *The Impact Of Artistic Activities On The Innovative Thinking Of Basic Stage Students*. *Journal Of The Qatar Research Center*, Qatar University, Issue 19.
16. Al-Heilah, Muhammad Mahmoud, (2001) *Teaching Methods And Strategies*. Emirates, 1st Edition, University Book House.
17. Khateeb, Abdullah Muhammad (2005) *Science Education For All*. College Of Education Yarmouk University, Irbid, Jordan.
18. Al-Dabsi, Ahmad Issam And Saleh Saeed Al-Shehabi (2003). *Methods Of Teaching Natural Sciences*. University Of Damascus.
19. De Bono, Edward, A. (2001) *Teaching Thinking*, Translated By: Adel Abdel Karim And Et Al. Amman, Dar Al-Reda For Publishing And Distribution.
20. Roshka, Alexandru (1989) *Public And Private Creativity*; Translated By: Ghassan Abdel-Hay Abu Fakhr, Kuwait, The World Of Knowledge.
21. Al-Zyoud, Nader Fahmy And Others (1999) *Classroom Learning And Teaching*, Amman, 4th Edition, Dar Al-Fikr For Printing.
22. Suleiman, Arbi` Ibrahim (2020) *Teaching Mathematics Based On The Components Of Rich In Conceptual Teaching In The Development Of Creative Thinking Skills In Decimal Fractions For Basic Stage Students*, The Journal Of The Islamic

University For Educational And Psychological Studies. Mg. 28, P. 2, P. P. 602-627

23. Al-Shammari, Lamia Jabbar Jabbar (2012) *Teaching Highness Using The Suchman Model In Acquiring Geographical Concepts For Fourth-Grade Literary Students, College Of Basic Education, University Of Babylon, Master Thesis (Unpublished).*

24. Muhammad (2013) *The Effect Of Suchman's Model On The Acquisition Of Historical Concepts Among Fifth Grade Literary Students, College Of Education - Ibn Rushd, University Of Baghdad, Master Thesis (Unpublished).*

25. Al-Anbaki, Sundus Abdullah Jadou '(1999). *The Effect Of Using The Method Of Targeted Inquiry With Current Events On The Development Of Critical Thinking Among Female Students In The Subject Of History, University Of Baghdad, Ibn Rushd College Of Education, (Unpublished MA Thesis).*

26. Ghabawi, Thaer Ahmad And Khaled Muhammad Abu Shairah (2010), *Educational Research Methods. 1st Edition, Arab Society Library.*

27. Ghani, Taghreed Khalil (1991) *The Impact Of Educational Guidance On The Development Of Innovative Thinking Among Middle School Students. College Of Education - Bin Rushd, University Of Baghdad, MA Thesis (Unpublished).*

28. Fakhier Aqil (1979) *Creativity And Its Education, Beirut, 2nd Edition, Dar Al-Alam For Millions.*

29. Al-Qurbati, Abdul-Muttalib (1989) *The Mentally Excellent: Their Problems In The Family And School Environment And The Role Of Psychological Services In Their Care. Letter Of The Arabian Gulf, No. (8).*

30. Qatami, Nayfeh (2001) *Teaching Thinking For The Elementary Stage, Amman, Dar Al-Fikr For Printing.*

31. Mari, Tawfiq Ahmed And Muhammad Mahmoud Al-Haila (2005), *General Teaching Methods, 2nd Edition, Dar Al-Masirah For Publishing, Distribution And Printing, With No Place To Print.*

32. Al-Muaytah, Khalil Abdul-Rahman, And Al-Balais, Muhammad Abdul-Salam, (2001) *Talent And Excellence, Amman, Dar Al-Fikr.*

33. Michel Kamel Atallah (2002). *Methods And Methods Of Teaching Science, 2nd Edition, Dar Al Masirah For Publishing And Distribution, Amman, Jordan.*

34. Bayer, K. B. (1987) *Practical Strategies For The Teaching Of Hinking. New York.*

35. De Bono, E. (1980) *The Cort Thinking Programme 1 St. Chicago: North Wacker Drive.*

36. Houser, Cherry I. Ann (1989) "Effects Of Group Counseling On The Self Esteem, Creative Thinking And Problem Solving Skills Of Gifted Tenth And Eleventh Grades Students", *DAI. Vol. 49, No. 11.*

37. Martin, R., & Colleen, S., & Wagner, K. (2001). *Teaching Science For Children. Ed(2), New York: Aligned And Bacon.*

38. Mohan, R. (2007). *Innovative Science Teaching – For Physical Science Teachers. Ed(4). New Delhi: Prentic- Hall Of India.*

39. Myers, B., & Dyer, J. (2006). *Effects Of Investigative Laboratory Instruction On Content Knowledge And Science Process Skill Achievement Across Lernerig Styles Education, Journal Of Agriculturaleducation, 47(4), 52-63*

40. Neal, V. B. (1990) *The Effect Of A Systematic Programme Teaching Discipline Management Problem Solving And Creative Thinking Of Achievement Motivation And Self Esteem Of Sixth Grade Students", DAI. Vol. 50, No. 11.*

41. Ross, Allen & Parker, Marolyn (1998) Academic And Social Self-Concept Of The Academically Gifted. Vol. 47.

42. Sternberg, R. (1987) “Questions And Answers About The Nature And Teaching Of Thinking Skills”, Edited By Baron & Sternberg, New York: W. H Freeman.

43. Torrance, E. (1971) The Creative Person, Encyclopedia Of Education. Vol. 2, No. 552.