Available online at www.jlls.org

JOURNAL OF LANGUAGE AND LINGUISTIC STUDIES

ISSN: 1305-578X

Journal of Language and Linguistic Studies, 18(2), 1-21 ; 2022

THE EFFECTIVENESS OF EDUCATIONAL - LEARNING DESIGN ACCORDING TO THE PROGRESSIVE INQUIRY MODEL IN MATHEMATICAL EXCELLENCE SKILLS OF SECOND –GRADE INTERMEDIATE STUDENTS

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APA Citation:

Noor Mohammed Jasim, Assist. Prof. Dr. Areej Khuder Hassan (2022). THE EFFECTIVENESS OF EDUCATIONAL - LEARNING DESIGN ACCORDING TO THE PROGRESSIVE INQUIRY MODEL IN MATHEMATICAL EXCELLENCE SKILLS OF SECOND –GRADE INTERMEDIATE STUDENTS, *Journal of Language and Linguistic Studies, 18*(2), 1-21

Submission Date:22/12/2021

Acceptance Date:.28/2/2022

Abstract

The Aim Of The Research Is To Build An Educational-Learning Design According To The Progressive Inquiry Model And To Know Its Effectiveness In The Mathematical Excellence Skills Of Second-Grade Intermediate Students. To Achieve The Research Objectives, The Two Researchers Followed The Experimental Research Method, And They Adopted A Quasi-Experimental Design With Two Equal Groups With A Pre-Post Test To Measure The Mathematical Excellence Skills. To Achieve The Goal, The Following Null Hypothesis Was Formulated:

There Is No Statistically Significant Difference At The Significance Level (0.05) Between The Mean Scores Of The Experimental Group Students Who Studied The Material According To The Educational-

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Learning Design And The Students Of The Control Group Who Studied The Same Material According To The Usual Method In The Pre-Post Test Of Mathematical Excellence Skills.

The Research Community Was Identified, Which Represents All The Students Of The Second Intermediate Grade In The Governmental Middle And Secondary Day Schools Of The General Directorate Of Education In Baghdad / Rusafa I. The Sample Consisted Of (63) Students From The Second Intermediate Grade Students ,(32) Students For The Experimental Group And (31) For The Control Group From Al-Harith Intermediate School For Boys.

As The Test In Its Final Form Consisted Of (30) Paragraphs Of The Essay And Objective Type, And The Appropriate Statistical Analyzes Were Conducted, And By Adopting The Appropriate Statistical Tools To Analyze The Results, The Results Indicated The Existence Of A Statistically Significant Difference In Favor Of The Students Of The Experimental Group.

Those Who Studied The Prescribed Subject According To The Educational-Learning Design And Among The Students Of The Control Group Who Studied The Subject According To The Usual Method, And That Teaching According To The Educational-Learning Design According To The Progressive Inquiry Model Is Effective In The Skills Of Mathematical Excellence.

Keywords: Effectiveness, Educational Design, Progressive Inquiry Model, Mathematical Excellence

First: The Research Problem

Mathematics Is An Important Field Of Knowledge As It Grows Very Quickly And Cannot Be Pursued Either In Its Concepts Or Life Applications. Thus, The School With Its Curricula Is Facing Great Pressures To Understand It And Communicate It To Students To See The Beauty Of Mathematics And Its Importance And The Need To Employ It In The Face Of Daily Life And Study Problems, And This Depends On The Mathematics Teacher As He Became A Mentor And Guide For His Students To Learn How To Develop In Their Thinking And Excel In Their Performance ,By Preparing Situations And Activities That Allow Them To Discover And Understand Relationships, Solve Problems And Applications Associated With Them, With The Correct Use Of Modern Technological Techniques So That They Can Develop Their Skills That Help To Reach Outstanding Performance, All These Opportunities Teach Them To Rely On Themselves, Given The Importance Of Mathematical Excellence Skills And Their Connection To Solving Daily Problems, Deepening Understanding, And Linking Mathematics With Other Curricula To Provide Opportunities For Developing And Demonstrating Students' Understanding Of Mathematics And Applying Mathematical Concepts And Skills In Solving Problems, And The Absence Of Empirical Studies In Iraq That Dealt With Mathematical Excellence Skills, All Of This Prompted The Two Researchers To Think About Finding The Best Teaching Methods And Approaches To Achieve Mathematical Excellence Among Students Of The General Education Stages

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And To Search For Models That Contribute To Organizing The Knowledge, Which Is Addressed By The Educational Situation, So Post-Constructivist Models And Progressive Inquiry Are One Of The New And Innovative Methods That Can Face Changes And Complexities In The Educational Process, And Based On The Foregoing, The Research Problem Can Be Determined By Answering The Following Question: **(What Is The Effectiveness Of Educational-Learning Design According To The Model Of The Progressive Inquiry In The Skills Of Mathematical Excellence Among)**

Second: The Importance Of Research:

The Current Research Acquires Its Importance Through Two Aspects, One Is Theoretical And The Other Is Practical As Followes :

Theoretical Significance:

1. The Progressive Inquiry Model Is A Post-Constructivist Model, And It Is One Of The New Trends That Have Emerged To Provide New And Innovative Learning Methods In The Educational Process. Its Philosophy Is Based On The Fact That Knowledge Is Built In The Student's Mind Through Activating A Set Of Mental Processes, Organized In A Sequential And Interconnected Manner To Achieve Integration Of Knowledge, Understanding, Interpretation And Evaluation.
2. It Is A Response To Modern Trends In Teaching And Learning Mathematics That Seek To Move From Interest In Memorization And Indoctrination To Interest In Mathematical Excellence Skills.
3. It Helps Direct The Attention Of Those In Charge Of Education To The Need To Enrich The Teaching Of Mathematics With Modern Models.

Practical Importance:

1. Providing An Educational Design According To The Progressive Inquiry Model In Mathematics For The Second Intermediate Grade, And This Research Is The First To The Knowledge Of The Two Researchers.
2. Providing The Mathematical Educational Field With Models For The Teaching Plans That Have Been Prepared According To The Model And From Which Teachers Can Benefit.
3. Providing A Test Of Mathematical Excellence Skills That Has Psychometric Characteristics For Students Of The Second Intermediate School.

Third: The Purpose Of The Research

The Current Research Aims To:

1. Building The Educational-Learning Design According To The Progressive Inquiry Model.
2. Recognizing The Effectiveness Of Educational-Learning Design According To The Progressive Inquiry Model In The Sports Excellence Skills Of Second-Intermediate Students.

Fourth: The Research Hypothesis

To Achieve The Research Objective, The Following Null Hypothesis Was Developed:

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(There Is No Statistically Significant Difference At The Significance Level (0.05) Between The Mean Scores Of The Experimental Group Students Who Studied The Material According To The Educational-Learning Design And The Control Group Students Who Studied The Same Material According To The Usual Method In The Mathematical Excellence Skills Test).

Fifth: Research Limits

The Current Search Was Limited To The Following:

1. Students Of The Second Intermediate Grade In Baghdad Governorate (Daytime) Schools Affiliated To The General Directorate Of Education In Baghdad, Rusafa First.

2. Mathematics Book For The Second Intermediate Grade, Part One (Relative Numbers, Real Numbers, Limits, Equations And Inequalities) Scheduled By The Ministry Of Education, 3rd Edition, 2019.

3. The First Semester Of The Academic Year 2021/2022.

3. Mathematical Excellence Skills (Understanding, Mathematical Sense, Mathematical Reasoning, Mathematical Communication, Mathematical Coherence, Life Skills, Algebraic Thinking).

Sixth: Term Definition

First, The Efficacy:

- Defined By (Sayyid, 2017) As: "The Statistically Significant Percentage Of The Change Caused By The Independent Variable In The Level Of The Dependent Variable Through Repeated Measurements, Before And After" (Sayed, 2017: 153).

The Two Researchers Defined It Procedurally As The Positive Change Caused By The Educational-Learning Design Prepared According To The Progressive Inquiry Model And The Mathematical Excellence Skills Of Second-Intermediate Students Through The Pre- And Post-Test.

Second: Educational Design: It Was Defined By - (Al-Zind, 2018): “The Totality Of Activities And Procedures That Ensure Planning The Educational Situation Within Specific Goals Linked To A Time-Limit And Calculated And Measurable Steps That Are Drawn And Implemented Individually Or Collectively With A Small Educational Situation, Or A Comprehensive Long-Term That Achieves Specific Calculated Results Or Results Of Broad Objective Dimensions.” (Al-Zind, 2018: (39).

The Two Researchers Defined It Procedurally As A Planned And Organized Process That Works To Organize The Teaching And Learning Of Mathematics Content For The Second Intermediate Grade According To The Progressive Inquiry Model Through Interrelated Stages Starting With The Analysis Stage And Ending With Evaluation With Continuous Feedback That Provides The Researcher With Information About The Progress And Success Of This Process.

Third: Progressive Inquiry Model:

(Mahdi, 2019) Defined It As: An Educational-Learning Framework To Help Learners Solve Mathematical Problems Cooperatively Within Clear Steps, Including: Creating Context, Asking And Preparing

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Questions, Building Work Theories, Critical Evaluation, Deep Knowledge Search, Generation Of Sub-Questions, Developing New Theories , Distributed Experience (Mahdi, 2019: 8).

The Two Researchers Define It Procedurally As: An Educational-Learning Framework To Help Second-Grade Students, The Sample Of The Research, To Solve Problems Cooperatively In The Light Of Clear Steps For Designing The Content Of The Study Material Represented By Chapters (Relative Numbers, Real Numbers, Limits, Equations And Inequalities) And Including Educational Activities That Focus On Mathematics Excellence Skills And Acquiring Mathematical Knowledge For The Experimental Group Students.

Fourth: Mathematical Excellence:

Defined By Math Excellence Group (2011): As The Ability Of Learners To Use Mathematical Concepts And Skills Appropriate To The Requirements Of The Twenty-First Century, And To Be Confident In Their Understanding And Qualified In Their Application In Real Situations That Lead To The Emergence Of Mathematics Applications In Other Fields, And The Use Of Appropriate Mathematical Language And Technological Treatments, And Their Ability To Recognize Mathematical Patterns And Relationships And Work With Them, And To Carry Out Mathematical Inferences To Solve Problems, And To Have A Sense Of Mathematics, And To Have Positive Attitudes To Learn And Passion To Study And Have The Curiosity To Search And Investigate New Information So As To Enable Them To Learn For Life. (Math Excellence Group,2011:3)

The Two Researchers Defined It Procedurally As The Ability Of The Second Intermediate Grade Students In The Research Sample To Use The Mathematical Excellence Skills (Understanding, Mathematical Sense, Communication, Mathematical Interdependence, Life Skills, Inference And Algebraic Thinking) In Solving Mathematical Problems And Providing Appropriate Explanations And Justifications For Them. This Is Measured By The Degree That Students Obtain In The Excellence Skills Test Prepared By The Researcher.

Theoretical Background And Previous Studies

First, Educational Design

Educational Design Is A Link Between Educational Theory And Educational Application. By Following The Systems Approach, The Specifications Of Teaching Behavior Are Determined To Achieve The Desired Results, As The Design Of The Teaching Process Is In The Form Of A System Consisting Of Inputs That Interact To Achieve Specific Goals It Is A Science Related To The Method Of Planning, Analyzing, Organizing And Developing The Elements Of The Educational Process In Terms Of Forms And Plans Before Implementing Them, Whether They Are Descriptive Or Procedural (Zayer And Khudair, 21: 2020).

Educational Design Is Rooted In:

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1- Studies And Research Conducted In The Field Of Education And Psychology Related To The Psychology Of Individual Differences And The Process Of Self-Learning And Programmed Education.

2- Studies Related To Learning Theories And Behavioral Sciences That Examined The Importance Of Controlling Stimuli And Responses In The Educational Situation.

3- Engineering Technology That Helped The Learner To Progress In The Learning Process At His Own Pace, And Which Examined The Importance Of Self-Learning When Using The Machine.

4- Studies That Examined The Importance Of Audio-Visual Aids In The Learning Process And The Learner's Use Of More Than One Sense At A Time. (Alhela, 1999: 28-27).

Second: Progressive Inquiry Model

The Model Represents An Educational Framework To Facilitate The Learning Process For Learners Not Only To Find Answers To Pre-Existing Questions But To Create New Questions, Generate Explanations, And Seek Knowledge For Themselves And Their Teachers That May Be New (Muukkonen & Other, 2004:38).

The Progressive Inquiry Model Is Concerned With Studying The Cognitive Content That Is Presented To Learners In A Careful Study That Goes Beyond Memorizing And Understanding It Directly, To The Extent That They Acquire Various Thinking Skills To Solve Problems And Build Knowledge.

It Works On Analyzing The Content, Interpreting It, Working The Mind In It And All The Information It Contains, Expressing An Opinion On It And Evaluating It, Which Leads To Encouraging Learners To Cooperate With Each Other, Actively Participate In Activities, Share Knowledge And Self-Criticism Of Learning Practices (Kozma, R., 2003:7).

This Model Was Proposed In 2003 By Kai Hakkarainen And His Research Team At Helsinki University, The Largest University In Finland. This Model Assists Teachers And Learners In Organizing Knowledge And Its Activities In Order To Acquire And Master It. This Model Is Based Mainly On Building Knowledge, The Interrogative Model Of Scientific Inquiry And The Idea Of Distributing Experience, And This Model Has Been Tested In Various Educational Environments In Finland. Kai Hakrenen And His Research Team Analyzed The Previous Requirements, So He Developed The Model As An Educational And Cognitive Framework To Support Teachers And Learners In Organizing And Facilitating Knowledge-Building Activities (Muukkonen & Other, 2004:38).

Post-Structural Models Are Based In Their Philosophy And The Inquiry Model One Of Them Is That Knowledge Is Built In The Mind Of The Learner By Activating A Set Of Mental Processes That Are Organized In A Sequential And Interconnected Manner To Achieve Integration In Knowledge In Terms Of Understanding, Interpretation And Evaluation. It Is One Of The New Trends That Have Emerged To Offer New And Innovative Learning Methods In The Educational Process, And One Of Its Principles On Which It Is Based Is That The Information Is Available In All Sources, And It Is Simple And Ordinary

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Materials And Can Only Be Benefited From After Processing, Classifying, Linking Them Together, Checking And Categorizing Them In The Learner's Memory And Memorizing The Learner So That It Allows From Consumer To Producer And Employee Of Information (Deleuze, 2004: 170).

Phases Of The Progressive Inquiry Model

1) Create Context:

In The Beginning, The Teacher Participates With The Learners By Creating A Context To Understand The Problem Under Study, And Works To Link It To The Main Concepts Related To Science Or Life Applications. The Learning Group Is Formed, Then Joint Planning And Setting Common Goals, Taking Into Account The Creation Of A Social Culture That Supports The Exchange And Cooperative Sharing Of Knowledge And Ideas That Are Reached. And Work To Develop It.

2)Asking And Preparing Questions

One Of The Principles Of The Inquiry Process Is Directing The Teacher To A Set Of Questions About The Information And Knowledge Provided To The Learners, And Training Them To Ask Questions Of The Type (Why? How? What) And Inquiries That Achieve The Learner's Understanding Of Ideas And Meanings, And Provoke A Desire To Search And Explore For Their Answers.

3) Building Work Theories

There Is An Important And Necessary Condition For Learners To Understand The Problem Or Topic, Which Is To Formulate The Learners Themselves The Problem Hypotheses Or Develop Explanations For It. At The Beginning Of The Investigation Process, It Is Important For Learners To Try To Explain The Problem Or Topic From Their Basic Background Knowledge. It Has A Number Of Objectives, Which Is To Highlight The Previous Concepts Of The Issues And Problems Raised. The Attempt To Explain The Learner Those Interpretations To His Peers Is One Of The Effective Ways To Test The Learner's Own Understanding Of The Research Problem, And It Works In Creating A Common Understanding Among The Learners Of The Problem Raised.

4) Critical Evaluation

Its Aim Is To Identify The Strengths And Weaknesses In All The Assumptions And Interpretations Developed By The Group Of Learners In Order To Organize The Joint Efforts Made To Build And Direct Knowledge, And This Stage Or Phase Also Includes An Evaluation Of The Inquiry Process Itself And Not Only An Evaluation Of The Final Result In Other Words, The Focus Is Not On The Assumptions And Interpretations Only, But We Evaluate The Method Followed By The Group Of Learners To Reach At These Different Assumptions And Interpretations.

5)He Deep And Broad Search For Knowledge:

The Progressive Inquiry Model Is Concerned With Learners Using A Variety Of Learning Sources That May Be Printed Or Electronic To Enable Them To Search In Depth And Broad For Knowledge To

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Answer Their Questions. The Search For Information And Knowledge And Identifying It From Different Sources Provides An Opportunity For Investigation, Conclusion And Treatment In A Broad Way, And Then The Teacher Must Specify For The Learners The Information And Knowledge That He Wants To Deepen In His Study, And Those That They Must Expand And Search For In The Various Sources Of Knowledge.

6) Generate Sub-Questions

The Inquiry Process Focuses On Training Learners To Transform The Main Questions Posed By The Teacher To More Specific Sub-Questions, Based On Their Assessment Of The New Knowledge They Have Reached. The Formulation Of Sub-Questions Helps Focus On The Investigation Process, And Reorient The Learners Towards The Previously Identified Problem In Order To Generate More Sub-Questions To Help Learners Deepen Their Understanding Of The Problem, Making The Questions More Clear To Them.

7) Develop New Theories

The Knowledge That The Learners Access Helps The Emergence Of New Interpretations. This Process Includes Publishing Summaries And Conclusions Of The Learners Group On The Internet, Taking Into Account The Organization Of The Results Reached In An Electronic Database, And All Learners Should Be Able To Access Those Data Easily, Which Makes The Development Of Concepts And Information Visible To All.

8) Distributed Experience

It Means The Diversity Of Experiences Among The Learners And The Interaction Among Them In The Development And Construction Of Knowledge. The Responsibilities Of The Learners Group Include Sharing The Cognitive Responsibility For The Success Of The Inquiry, Then The Learners Gather For Discussion And Dialogue, And In The End The Teacher Evaluates The Work They Have Reached.
(Muukkonen, & Other, 2005:531-534)

The Two Researchers Believe That The Importance Of The Progressive Inquiry Model Is To Prepare Learners For The Knowledge Society And Provide Them With Skills To Solve Problems And Build Knowledge By Working In Cooperative Groups And Guiding Them To Participate In Each Other's Participation When Assigned To Duties And Activities, Which Leads To Their Sharing Of Knowledge And Their Acquisition Of Self-Learning Skills Through Research, Investigation, And Information Gathering. Group Learning Achieves Understanding And Enrichment Of Information For Learners Through Dialogue And Discussion, So The Educational Design Was Built According To This Model.

Third: Mathematical Excellence

The Fourth Document On Curriculum-Building For Excellence Issued By The Scottish Government 2009 Indicates That Excellence Means That The Learner Possesses The Basic Skills For Success In The

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Learning Process, In Life And At Work, And That He Has An Effective And Sound Life Model By Focusing On Account, Public Health, Well-Being, Scientific Enlightenment And Sound Structure. Scottish Government, 2009:17).

Mathematics Is A Fertile Environment Through Which Learners Can Develop Their Mathematical Excellence, Because It Depends On Imagination, Mental Images And Logic In Addition To The Nature That It Enjoys, Which Is Experimental, Synthetic, Inferential And Practical, As It Can Bring Pleasure To Its Students (Al-Sayed, 2019: 2).

And (NCTM, 2015) Mentioned By (Mohammed, 2020) That Mathematical Excellence Has Become An Imperative At The Present Time Because It Is One Of The Requirements Of Life In The Twenty-First Century, Because It Enables Learners To Succeed In Career Work In Order To Enable Them To Solve Life Problems And Perform Arithmetic Operations Efficiently (Muhammad,230:2020), And Mathematical Excellence Includes The Following Elements:

• The Use Of Motivation, Participation, And Imagination In Mathematics Through Learning, Life, And Work.

• Include Effective Mathematics Teaching And Learning Experiences.

• Full And Clear Understanding Of Mathematical Knowledge And Use Of Mathematical Concepts And Skills In The Real World, Including Basic Arithmetic Skills, And Appropriate Use Of Techniques.

Effective Evaluation As A Bridge Between Teaching And Learning. A Distinguished Teacher Makes Sure Of The Experiences His Students Have Attained Before Moving On To Teach Them Other New Experiences. (Maths Excellence Group,2011:3)

Fourth: Mathematical Excellence Skills

Views Differed On Determining The Skills Of Mathematical Excellence, As The Ministry Of Education In Ontario, Canada Indicated That The Mathematical Excellence Skills Of Learners Are Represented In Understanding Sports Concepts, Critical Thinking Skills, Creative Thinking, Creative Problem-Solving Skills, Mathematical Communication Skills, Effective Cooperation, And Conscious Decision-Making Skills. (Ministry Of Education Ontario,2014:5)

Curricula For Excellence Focused On A Number Of Mathematical Excellence Skills And Their Development Among Learners, Including Early Algebraic Thinking Skills, Which Deepens Their Understanding Of Mathematics, Increases Confidence In Its Use, And Encourages Learners To Think Logically, Creatively, And Critically,Correcting Errors For Mathematical Concepts, Using Mathematical Modeling And Educational Scaffolding To Develop Mathematical Thinking, And Mathematical Problem-Solving Skills As A Focus For Teaching Mathematics, In Addition To Using Mental Arithmetic And Linking Mathematics With Other Fields, And Studying The Impact Of Mathematics On The Development Of The World From The Past, Present And Future (Government, Scot, 2009. :37-38)

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The Report Issued By The Excellence In Mathematics Group (MEG, 2011) Also Identified A Number Of Mathematical Excellence Skills That The Learner Must Possess In Order To Achieve Excellence In Mathematics:

1- Understanding: It Is The Set Of Mental Processes That The Learner Employs To Understand Mathematics, As He Interprets, Applies And Corrects Mistakes.

2- Mathematical Sense: It Allows The Learner To Manipulate Numbers, Understand The Connections Between Operations, Be Able To Measure, Graphs, And Probabilities, And Use Them To Solve Mathematical Problems.

3- Mathematical Communication: The Learner Has The Ability To Use The Appropriate Mathematical Language And Deal With It.

4-Mathematical Coherence: It Integrates The Branches Of Mathematics And Between Mathematics And Other Sciences.

5- Life Skills: The Ability To Solve A Wide Range Of Mathematical Problems That Include Life Context Or From Other School Curricula.

6- Mathematical Reasoning: The Learner Is Able To Reach Logical Conclusions And Be Able To Justify Them Logically.

7- Algebraic Thinking: The Learner's Ability To Use Symbols, Algebraic Relations, Activities, And Use Mathematical Patterns And Generalizations And Work With Them.

(Math Excellencegroup,2011:11-14)

The Two Researchers Believe That The Learner’s Possession Of The Skills Of Mathematical Excellence Makes Him Think In A Way That Enables Him To Evaluate His Ideas And Make The Right Decision. Therefore, The Mathematical Content Of Many Problems That Are Related To The Context In Which He Lives Should Be Included, So That The Role Of Mathematical Concepts And Skills Appears In Solving Them, It Makes The Learner Have The Ability To Process And Organize His Information Through His Interaction With His Peers And Exchange Knowledge About Mathematics, Which Leads To Enhancing Their Confidence And Realizing The Role That Mathematics Plays In Their Daily Lives In Light Of Scientific And Technological Progress.

Literature Of Review

After Reviewing A Number Of Literature On The Subject And References, As Well As Searching On The Internet, Previous Studies Were Obtained That Dealt With The Progressive Inquiry Model And The Skills Of Mathematical Excellence.

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Table (1) *Studies Dealing With The Progressive Inquiry Model And Mathematical Excellence*

Study Location	Sample Size	Study Objective	Results
Mahdi, (2019 .) Egypt	56 Male And Female Students	Knowing The Effectiveness Of A Proposed Unit In Modern, Renewable Mathematics "Fuzzy Logic" By Using Post-Constructivist Models In Developing Achievement And Attitude Towards Mathematics Among Primary School Students.	There Is A Statistically Significant Difference Between The Scores Of The Students Of The Experimental Group That Studies The Proposed Unit In The Pre And Post Applications Of The Achievement Test And The Trend In Favor Of The Post Application.
(Hassan, 2021) Egypt	40 Male Students	Knowing The Effectiveness Of The Progressive Inquiry Model And Developing The Creative Solution To The Problems Of Mathematics And High-Ranking Thinking Among Secondary School Students.	There Is A Statistically Significant Difference Between The Mean Scores Of Students In The Post Application Of The Two Research Groups To Test The Creative Solution To Mathematics Problems And The High-Ranking Thinking Test In Favor Of The Experimental Group.
Alsyad., (2019) Sultanate Of Oman	71 Female Students	Recognizing The Effectiveness Of A Program Of Activities Based On Active Learning To Develop The Skills Of Excellence And Creativity In Mathematics Among Students Of Basic Education In The Sultanate Of Oman.	There Are Statistically Significant Differences Between The Scores Of The Students Of The Experimental And Control Groups In The Results Of The Post Application Of The Excellence And Creativity Test In Mathematics In Favor Of The Experimental Group..
(El-Deeb,2020) Palestine	94 Female Students	Recognizing The Effectiveness Of The Constructivist Learning Model In Developing Systemic Thinking Skills And Mathematical Excellence Among Seventh Grade Students In Gaza Governorate.	There Is A Statistically Significant Difference In Favor Of The Experimental Group Students, And The Effectiveness Of The Model In Developing Systemic Thinking And Mathematical Excellence, And A Strong Correlation Between Systemic Thinking And Mathematical Excellence, Emerged.

Research Procedures

Research Methodology

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Based On The Nature Of The Research And The Objectives It Seeks To Achieve, The Two Researchers Used The Experimental Method To Achieve The Objectives Of The Research, And The Researchers Chose A Quasi-Experimental Design For Two Experimental And Control Groups With A Pre- And Post-Test.

Research Community And Sample

1- Research Community

The Research Community Includes All Second-Grade Students In The Middle School In The Governmental Middle And Secondary Day Schools Of The General Directorate Of Education In Baghdad / Rusafa I For The Academic Year (2021-2022), As The Total Number Of The Research Community Reached (14799) Students.

2- Research Sample

The Two Researchers Chose Al-Harith Intermediate School For Boys Intentionally To Be The Place Of Application Of The Experiment, As The Current Research Sample Reached (63) Students, (32) For The Experimental Group And (31) For The Control Group.

Adjustment Procedures:

1- The Internal Safety Of The Experimental Design: The Researcher Was Keen To Statistically Equalize The Two Groups Of Research In Some Variables That May Affect The Dependent Variable, Namely (Test Of Previous Requirements, Chronological Age Of Students Calculated In Months, Previous Achievement, Intelligence Test, Test Of Mathematical Excellence Skills).

2- The External Safety Of The Experimental Design: To Maintain The Integrity Of The Application Of The Experiment, And In Order To Reach Reliable Results, There Are Some Non-Experimental Factors That May Affect The Safety Of The Results Of The Experiment, So The Researcher Must Identify And Control Them, And These Factors Include: (Experiment Duration, Study Material , Physical And Environmental Conditions, Experimental Extinction).

Research Requirement : Include

1- Building Educational-Learning Design

To Achieve The Research Objectives Of Building The Educational-Learning Design According To The Model Of The Progressive Inquiry In Mathematics For The Second Intermediate Grade, The Two Researchers Followed The Construction Of The Educational-Learning Design, Which Is Theoretically Based On The Following Steps As Well As The Stage Of Feedback With Each Stage, Which Is As

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Follows: (Analysis Stage , Preparation Stage (Design And Development), Implementation Stage, Evaluation Stage.

Research Tools:

One Of The Research Requirements Is To Prepare A Test That Fits The Research Sample, And Serves The Research Objectives And Hypothesis.

1- Determining The Objective Of The Test: The Test Aims To Measure The Skills Of The Second Intermediate Grade Students, The Research Sample In The Skills Of Mathematical Excellence.

2- Determining The Skills Of Mathematical Excellence: After Reviewing International Sources Such As Documents For Building Curricula For Excellence In A Number Of Countries, Reports And Documents For Building The Curriculum For Excellence Issued By The Scottish Ministry Of Education (2004-2014), In Order To Adopt The Mathematical Excellence Skills That Were Identified By The Excellence Group In Mathematics In Scotland Maths Excellence Group,2011)) In Constructing The Mathematical Excellence Skills Test.

Presenting The Skills To The Arbitrators: After The Mathematical Excellence Skills Were Determined, A Questionnaire Was Prepared And Presented To A Number Of Arbitrators, To Know Their Opinions About Their Suitability To The Research Sample And To Add Any Skill According To Their Experience And To Verify The Indicators Of These Skills.

4- Drafting The Test Items: For The Purpose Of Formulating The Paragraphs, Some Previous Studies Related To This Topic Were Reviewed And Based On The Theoretical Aspect Of This Research, The Two Researchers Prepared (32) Paragraphs Of The Two Objective Types (22) Paragraphs, And The Article Type (10) Paragraphs.

5- Prepare Test Instructions

A. Answer Instructions: The Instructions For Answering The Test Items Were Formulated, So The Two Researchers Prepared Instructions Explaining The Required Performance, Showing The Method And Place Of The Answer, And Distributing Scores On Its Paragraphs. It Also Included Some Information That Pertains To The Student And To Give An Idea Of The Purpose Of The Test, And It Was Emphasized That No Paragraph Was Left Unanswered.

B. Correction Instructions: An Exemplary Answer Was Developed For The Test Items That Were Approved In The Correction, As One Point Was Given For The Correct Answer And Zero For The Wrong Answer For The Substantive Items. As For The Essay Items, Their Range Ranged Between (0-2) And (0-3) Degrees, After Their Presentation. On A Group Of Specialists In The Field Of Mathematics And Its Teaching Methods.

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6- Presentation Of The Test Items To The Arbitrators: The Test Items Were Presented To A Number Of Arbitrators In The Field Of Mathematics And Its Teaching Methods, To See Their Suitability To The Research Sample And To Verify The Correctness Of Its Wording And To Make What They Deem Appropriate Of Modifications And Based On Their Opinions, The Difference Between Those Who Did Not Agree To The Paragraph Was Calculated The Percentage Was Used As A Criterion To Measure The Validity Of The Test Items; It Obtained The Approval Of More Than 80% Of The Arbitrators' Opinions, And Thus The Apparent Sincerity Indicators Were Obtained, And Thus The Test Was Ready In Its Initial Form.

7- Applying The Test To The Exploratory Sample: The Test Was Applied To An Exploratory Sample In Order To Verify The Psychometric Properties Of This Test, As The Sample Consisted Of (100) Students, And The Two Researchers Applied The Test And After Completing The Answer It Was Found That The Paragraphs Are Clear And There Was No Problem, And That The Average Time The Time Taken To Answer The Mathematical Excellence Skills Test Is (75) Minutes.

8- Statistical Analysis Of The Test Items: After The Test Items Were Corrected, And Statistical Analyzes Were Performed On The Two Groups (The Coefficient Of Difficulty, Distinction And Effectiveness Of Wrong Alternatives), It Was Found That The Coefficients We Can Say Are Acceptable Because They Ranged Between (0.20-0.80), Except For Two Items (14) And (32) Had A Coefficient Of Difficulty (0.14) And (0.17), And Thus These Two Items Were Dropped From The Test.

9- Validity Of The Test: The Validity Of The Mathematical Excellence Skills Test Was Verified By Using Two Types Of Honesty: Apparent Honesty And Construct Validity.

10- The Stability Of The Test: The Two Researchers Used The Alpha-Cronbach Equation To Calculate The Reliability Of The Mathematical Excellence Skills Test, Which Was Applied To The Sample Of Statistical Analysis, Due To Its Validity For The Objective And Article Paragraphs That Make Up This Test. It Was Found That It Is Equal To (0.84) And Is Considered A Good Value.

With All These Procedures, The Mathematical Excellence Skills Test Is Now Ready In Its Final Form, With A New Sequence, Prepared For The Final Application Of (30) Items.

Application Of The Research Tool:

After Completing The Teaching Of The Prescribed Material For The Students Of The Two Groups, A Post-Test For The Skills Of Mathematical Excellence Was Applied On Wednesday, 1/2021).

Statistical Means: The Following Statistical Methods Were Used (T-Test For Two Independent Samples, Kewder-Richardson Equation 20), Alpha-Cronbach Equation, Equations Of Difficulty Coefficient, Item Discrimination And The Effectiveness Of Wrong Alternatives.

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Presentation And Interpretation Of Results

To Know The Results That Were Reached In The Light Of The Statistical Treatment According To The Research Objectives And Hypotheses, And To Present The Conclusions And Recommendations, And The Proposals That This Research Reached.

First: Presentation And Interpretation Of The Results

The Results Are Presented According To The Research Objectives And Hypotheses, As Follows:

The First Objective: Building The Educational-Learning Design According To The Model Of The Progressive Inquiry For Second-Grade Students In The Middle School In Mathematics.

This Goal Has Been Achieved By A Number Of Steps Represented In The Stages Of Design Construction That Were Mentioned Previously In The Research Methodology And Its Procedures, According To The Procedures Followed In Building An Educational-Learning Design.

The Second Objective: To Identify The Effectiveness Of The Educational-Learning Design According To The Progressive Inquiry Model In Testing The Skills Of Mathematical Excellence.

For The Purpose Of Verifying The Null Hypothesis, Which States That:

There Is No Statistically Significant Difference At The Significance Level (0.05) Between The Mean Scores Of The Experimental Group Students Who Studied The Material According To The Educational-Learning Design And The Control Group Students Who Studied The Same Material In The Usual Way In The Mathematical Excellence Skills Test.

After The Two Researchers Applied To Test The Skills Of Mathematical Excellence And Correction Of The Students' Answers, And Extracted The Statistical Description Of The Data Of The Two Groups Using The Statistical Program ((Spss), As The Arithmetic Mean Of The Scores Of The Experimental Group Students Was Equal To (29.8750), With A Standard Deviation Of (6.95028), While The Average Score Of The Control Group Was (22.2903) With A Standard Deviation Of (8.17392), And By Using Levin's Test To Find Out The Statistical Difference Between The Variance Of The Two Groups' Scores, The F-Value Of Levin's Test Reached (0.481) At The Significance Level (0.491), Which Is Greater Than The Approved Significance Level (0.05).), And This Means That There Is Homogeneity Between The Two Groups In Mathematical Excellence.

In Order To Find Out The Significance Of The Statistical Difference Between The Two Research Groups, The Two Researchers Adopted The T-Test For Two Unequal Independent Samples, As The Calculated Value Of (T) Equaled (3.972) At The Significance Level (0.000) And With A Degree Of Freedom (61), It Is Smaller Than The Significance Level (0.05), And This Indicates The Existence Of A Statistically Significant Difference Between The Mean Scores Of The Experimental Group Students Who Studied By Adopting The Educational-Learning Design According To The Progressive Inquiry Model And The

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Students Of The Control Group Who Studied In The Usual Way In The Mathematical Excellence Skills Test, And In Favor Of The Experimental Group. , And Table (2) Shows That:

Table (2) *Statistical Description Of The Experimental And Control Groups In The Mathematical Excellence Skills Test*

Two Groups	No	Levin's Test		Mean	Standard Deviation	Degree Of Freedom	T Test		Statistical Significance At (0.05)
		Value F	Significance Level				Value T	Significance Level	
Experimental	32	0.481	0.491	29.8750	6.95028	61	3.972	0.000	Significant
Control	31			22.2903	8.17392				

As A Result, The Null Hypothesis Is Rejected And The Alternative Hypothesis Is Accepted, Meaning That There Is A Statistically Significant Difference At The Significance Level (0.05) Between The Mean Scores Of The Students Of The Experimental Group Who Studied The Material According To The Educational-Learning Design And The Students Of The Control Group Who Studied The Same Material In The Usual Way In The Test Of Mathematical Excellence Skills For The Benefit Of The Experimental Group.

In Order To Verify The Effectiveness Of The Educational-Learning Design In The Mathematical Excellence Skills Of The Experimental Group, The Haredy Simple Gain Ratio Equation Was Calculated This Equation Is Suitable For Measuring The Effectiveness Of Experimental Treatments In Experimental Educational Research That Depends On Tests And Measures That Measure Knowledge, Mental Skills And Trends, And The Range For This Percentage Extends From (0) To (1), (Sayed, 2017: 161).

And After Calculating The Percentage Of Gain Between The Pre- And Post-Test Of The Mathematical Excellence Skills For The Students Of The Experimental Group, It Reached (0.5), Which Is An Acceptable Effectiveness As Shown In Table (3).

Table (3) *Hardy's Simple Gain Percentage For The Mathematical Excellence Skills Of The Experimental Group*

Pre-Test	Post-Test	Final Degree	) Hardy's Simple Gain
9.4063	29.875	42	0.5

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The Two Researchers Attribute The Existence Of A Statistically Significant Difference Between The Two Groups In Favor Of The Experimental Ones Who Studied According To The Educational-Learning Design By Testing The Mathematical Excellence Skills To The Following Reasons:

1. Educational-Learning Design Contributed To Increasing Their Mathematical Excellence, And The Two Researchers Attribute This To The Design's Contribution To Revealing Students' Prior Knowledge And Employing It In A Meaningful Way By Linking Previous Learning With Subsequent Learning, Deducing Information, Increasing Discussion And Participation, And Finding Appropriate Solutions To Mathematical Problems.

2. The Educational-Learning Design According To The Progressive Inquiry Model Helped The Learner To Organize Information In A New Way By Going Through A Situation, So The Learner Works To Organize His Stored Information And Knowledge And Find The Appropriate Way To Address This Situation, Which Contributed To Their Mathematical Excellence.

3. Inclusion Of Educational-Learning Design Life Problems And Clarified The Role Of Mathematical Concepts And Relationships In Solving Many Of Them, Which Enhanced The Learners' Ability To Employ Mathematical Knowledge In Solving Many Life Problems.

4. The Inclusion Of The Educational-Learning Design By Asking Questions Of The Type "Why, How, What" Developed The Learners' Ability To Explain, Justify, Mathematical Inference And Formulate Their Solutions In Different Forms, Which Helped To Achieve More Distinction.

Second: Conclusions

In Light Of The Findings Of The Two Researchers, We Draw The Following Conclusions:

1. There Is An Effectiveness Of The Educational -Learning Design According To The Progressive Inquiry Model In Improving The Mathematical Excellence Skills Of The Students Of The Experimental Group.

2. The Effectiveness Of The Educational-Learning Design Was Good In Mathematical Excellence Skills.

3. The Possibility Of Using The Design In Teaching Mathematics To The Intermediate Stage With The Available Capabilities In Schools.

Third: Recommendations

In Light Of The Findings Of The Two Researchers, They Recommend The Following:

1. Directing Planners And Developers Of Mathematics Curricula To Reconsider The Formulation Of Curricula In The Stages Of General Education In Light Of The Post-Constructivist Models In General And The Progressive Inquiry Model In Particular.

2. Directing Male And Female Teachers To Use The Educational - Learning Design According To The Progressive Inquiry Model, Due To The Effectiveness Of The Research In Improving Achievement And Mathematical Excellence Skills.

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3. Including And Paying Attention To The Skills Of Mathematical Excellence In Mathematics Books In The Different Stages Of Education.

Fourth: Propositions:

In Light Of The Findings Of The Researchers, They Suggested The Following:

1. Conducting A Similar Study For Female Students And For The Same Stage To Find Out The Results For Females.
2. A Study Of Content Analysis Of Mathematics Books For The Secondary Stage In Light Of The Principles Of Post-Constructivism.
3. Analyzing Mathematics Curricula According To Mathematical Excellence Skills And Comparing Them With Excellence Curricula In Foreign Countries.

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