# The Effectiveness of Using the Suchman Model in Developing the Geographical Conceptual Knowledge and Inferential Thinking of Intermediate-School Students in the Kingdom of Saudi Arabia

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## Abstract

This study is an attempt to identify the effectiveness of using the Suchman model in developing the Geographical Conceptual knowledge and inferential Thinking of intermediate-school students in the Kingdom of Saudi Arabia, especially in Jouf. The research group consists of (38) students at Kairouan intermediate school. The research tools and materials are geographical-conceptual knowledge and inferential-thinking tests, the Teacher's Guide to teaching the "Earth" unit in accordance with the Suchman model, activities dedicated to the same selected unit of study, pre and post applications of geographical conceptual knowledge and inferential- thinking tests to the research group, and monitoring results. All research results indicate the effectiveness of using the Suchman model in developing the geographical conceptual knowledge and inferential thinking
of intermediate-school students (grade one) At the level (0.01) of the experimental research group.

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## First: Research Problem and Study Plan:

Education has so influential a role to play in shaping character and correcting behavior, which makes the individual an essential element in the society progress formula. Some studies refer students' low educational level back to the teaching methods adopted inside the classroom. In this respect, replacing the memorization based methods of teaching with the ones that develop the thinking abilities of students has become a necessity nowadays. Hence is the need to reconsider the traditional methods used in teaching social studies with an aim to carry students from the narrow scope of reception to a broader one of interaction and participation. Among these studies are Majdy Kamel Khairuddin's (2007), Jamal Hassan Al-Sayed's (2008), Ali Naser Abdullatif's (2008), Yousef Ogla Almarshad's (2009), and Khairuddin and Yousry Ahmed Sayed's (2010).

With the advance of education, there emerges the Suchman teaching model that addresses students' thinking skills, stimulating their abilities for research and investigation and facilitating their acquiring knowledge. Joyce (2001)claims that "the Suchman model hinges on a variety of mental strategies likely to enable students to understand how and why things happen" (234). Recent Studies-Adel Rasmy Hammad's (2003), Al-Sayed's (2008), Almarshad's (2009), and Khairuddin and Sayed's (2010)--highlight the effectiveness of using such a model in teaching social studies at the different educational stages. In other words, it is a model that sharply contrasts with the traditional methods that rely on teachers' narration and students' memorization.

The world now Witnesses "a great scientific surge qualitatively and quantitatively affecting human knowledge. This reality imposes on educationalists, especially of social studies, that they should attend to new methods and strategies

capable enough of reconsidering Concepts and getting students involved in the continuing process of development" (Al-Sherbiny, 1410,64). Khairy Ali Ibrahim (1998) believes that understanding the basics and concepts of any knowledge makes easy its the acquisition of such knowledge. Putting Concepts and basics in a certain Arrangement facilitates the process of their communication.

By so doing, learning becomes much more effective extending into wider situations and occasions in addition to Bridging the Gap between previous and recent knowledge. Another point in case is that focusing on concepts helps in fluent gaining of information as well as in the understanding of the content and significance of such information. (262)

That's why "learning concepts should be an educational end in its own right" (Haidar, 1983, 82).

Strictly speaking, "advanced nations are the outcome of advanced minds, ones that are able to produce theory and application, problem and solution" (Al-Leqany, 2000, 5). Accordingly, curricula have become more profound and provocative to thinking, and learners have become the focus of the educational process. Hence is the need to create the proper atmosphere for Better Learning and acquisition of higher thinking skills. This trend has become the major worry of Education throughout the different educational stages, replacing mere narration and memorization with thinking and investigation. In this situation, developing the thinking skills of students as well as their ability to acquire and judge what they are learning has become the end of Education in the twenty-first century. Students shouldn't be restricted to one particular thinking skill. Providing them with multiple thinking skills should be an educational priority targeting curricula, methodologies, activities, teaching aids, and assessment.

However, there is no specific strategy for developing the thinking skills of students as diverse strategies are attended to. Such strategies can be divided into two groups: strategies

seeking to directly develop thinking through content; others indirectly developing thinking by focusing on skills related to the subject--the former represents the traditional school of teaching while the latter is the modern trend of developing thinking. This atmosphere results in a new educational philosophy developing students' way of thinking, curricula, and teaching methods. The main goal is to "carry students from merely gaining information to discovering relationships among things, from knowledge to Beyond knowledge" (Ubaid, 1998, 307). It is therefore the responsibility of teachers to address the mental habits and thinking skills of students and to regard this educational shift as a major teaching objective.

## I - Research Problem:

Most educationalists are criticized for ignoring those teaching methods that rely on the mental habits and thinking skills of students. Thus, it becomes of paramount importance to search for teaching models capable enough of enhancing the cognitive achievement and inferential thinking of students as well as of creating the proper atmosphere that admits of interaction and organization of gained information. This reality urges the researcher to examine the effectiveness of using the Suchman model in developing the geographical Conceptual knowledge and inferential thinking of intermediate-school students (grade one) in Jouf-Kingdom of Saudi Arabia.

The researcher conducts a survey study to identify the methods of teaching social studies used in developing the geographical conceptual knowledge and inferential thinking of intermediate-school students in Jouf. The study is based on 30 teachers who received a questionnaire of five questions. Those teachers proved to be unaware of the thinking skills that can be developed through social studies at the intermediate stage at 90%. Lack of interest in developing the inferential-thinking skills of students at 94% and relying on narration,

memorization, dialogue, and discussion in developing inferential- thinking skills at 90% are also major results.

The diagnostic test applied to a group of intermediate-school students (grade one) showed deficiencies in the their acquisition of geographical Conceptual knowledge. However, most teachers stress the importance of thinking in general and inferential thinking in particular in the cognitive structure of students, pointing to the lack of models and employment of traditional teaching methods. Hence is the need to adopt new models that can develop the geographical Conceptual knowledge and inferential thinking of intermediate-school students when teaching the social studies course.

Since there is no previous study investigating the use of the Suchman model in teaching social studies in the Kingdom of Saudi Arabia, the present study is an investigation into the effectiveness of using such a model in developing the geographical Conceptual knowledge and inferential thinking of intermediate-school students (grade one) in Jouf. In other words, the study is an attempt to answer the following question:

What is the effectiveness of using the Suchman model in developing the geographical Conceptual knowledge and inferential thinking of intermediate-school students in the Kingdom of Saudi Arabia? Rather,

What are the geographical concepts and inferential thinking skills that should be developed for intermediate-school students in the Kingdom of Saudi Arabia?

**The following questions are also posed:**

1- What is the effectiveness of using the Suchman model in developing the geographical conceptual knowledge of intermediate-school students in the Kingdom of Saudi Arabia?

2- What is the effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school

students at the induction level in the Kingdom of Saudi Arabia?

3- What is the effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students at the deduction level in the Kingdom of Saudi Arabia?

4- What is the effectiveness of using the Suchman modal in developing the inferential thinking of intermediate-school students as a whole in the Kingdom of Saudi Arabia?

**II - Research Objectives:**

1- Preparing a list of the geographical conceptual knowledge and a list of the inferential-thinking skills necessary for intermediate-school students in the Kingdom of Saudi Arabia .

2- Developing the geographical conceptual knowledge of intermediate- school students in the Kingdom of Saudi Arabia.

3- Training the group of teachers selected to use the Suchman model in teaching social studies

4- Encouraging teachers of social studies to use modern models and methods of teaching.

5- Helping intermediate-school students to think and investigate facts.

6- A teacher's guide to teaching the selected lessons.

7- Geographical-conceptual-knowledge and inferential thinking tests for intermediate-school students (grade one).

**III - Research Hypotheses:**

1- First Hypothesis: There are statistical differences at level 0,01 between the average levels of the pre and post applications of the geographical-conceptual-knowledge test in favor of the post application to the research group.

2- Second Hypothesis: There are statistical differences at level 0,01 between the average levels of the pre and post applications of the inferential-thinking test at the induction level in favour of the post application to the research group.
3- Third Hypothesis: There are statistical differences at level 0,01 between the average levels of the pre and post applications of the inferential-thinking test at the deduction level in favor of the post application to the research group.
4- Fourth Hypothesis: There are statistical differences at level 0,01 between the average levels of the pre and post applications of the inferential-thinking test as a whole in favor of the post application to the research group.

## IV - Research Importance:

By examining the effectiveness of using the Suchman model in developing the geographical conceptual knowledge and inferential thinking of Intermediate-school students in Jouf, the research aims to identify:

1- The geographical Conceptual knowledge necessary for intermediate- school students in the Kingdom of Saudi Arabia..
2- The effectiveness of using the Suchman model in developing the geographical Conceptual knowledge of intermediate-school students in the Kingdom of Saudi Arabia.
3- The effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students at the induction level in the Kingdom of Saudi Arabia
4- The effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students at the deduction level in the Kingdom of Saudi Arabia.

5- The effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students as a whole in the Kingdom of Saudi Arabia.

## V - Research Tools and Materials:

1- A list of the geographical conceptual knowledge necessary for intermediate-school students in the Kingdom of Saudi Arabia.

2- The teacher's guide to teaching the selected lessons.

3- A list of the inferential-thinking skills necessary for intermediate-school students in the Kingdom of Saudi Arabia.

4- Geographical-conceptual-knowledge and inferential thinking tests for intermediate-school students (grade one).

## VI - Research Limitations:

1- Lessons of social studies for intermediate-school students (grade one), taught using the Suchman model.

2- The first semester of the academic year 1436-1437 AH.

## VII - Research Methodology:

1- Attending to the descriptive approach, consulting related studies and researches, preparing research tools and materials, monitoring and analyzing results.

2- Using the quasi-experimental approach in applying the research tools and materials to the research group.

## VIII- Research Steps:

1 – Relying on the previous researches and studies related to the research problem.

2 - Preparing a list of the geographical conceptual knowledge necessary for intermediate-school students in the Kingdom of Saudi Arabia.

3 - Analyzing the content of the social-studies course taught in the first semester of the academic year 1436-1437 AH.

4 -Using the Teacher's Guide to teaching social studies according to the Suchman model.

5- Preparing a geographical-conceptual-knowledge test for intermediate- school students in the Kingdom of Saudi Arabia.

6- Preparing an inferential-thinking test for intermediate-school students and presenting it to referees, in addition to the experimental test, to determine its validity and time.

7- Selecting a research group of 38 intermediate-school students (grade one) to study the selected unit according to the Suchman model.

8 - A pre application of the inferential- thinking test to the research group.

9 – Teaching the experimental group the selected lessons according to the Suchman model.

10- A post application of the inferential-thinking test to the research group.

11- Monitoring and analyzing results.

12- Recommendations and suggestions.

## IX - Research Terminology:

1- The Suchman Model: "a model used to train students to investigate and analyze phenomena by practicing some thinking skills" (Qelada, 1998, 241). This model "combines induction and deduction, the two modes of inferential thinking, which enables students to solve their problems easily and skillfully" (Reat, 2002, 19).

2 - Geographical Conceptual Knowledge: A kind of "mental perception giving a name or sign to a certain phenomenon or event by examining the shared qualities of such phenomena or events" (Shalaby, 1998, 251).

3 - Inferential Thinking: A mental process aiming to extract conclusions out of given introductions.

## Second: The Theoretical Framework:

The theoretical framework is divided into three main axes:

### I - First Axis: The Suchman Model of Teaching:

It is a model that combines induction and deduction to the extent that enables students to deal with problems easily and skillfully within the educational process. It was "designed to develop the students' skills in raising questions and finding answers that satisfy their curiosity" (Joyce, 1992, 21). In other words, this model aims to stimulate the students' mental operations of observation, classification, organization of information, and raising hypotheses. It also provides the students with the requirements for creativity and self reliance in addition to creating the proper cognitive atmosphere. That is why "the model should be applied in an organized and logical way in order to fulfill its goal" (Qelada, 1998, 234). To put the matter at its simplest, the Suchman model can be

**Summed up in the following points:**

1- Providing students with the know-how of dealing with problems, relying on their own thinking skills.
2- Getting students acquainted with new strategies in addition to the ones familiar to them.
3- Conveying the view that knowledge is subject to experiment and inquiry.

The Suchman model consists of five stages discussed as follows:

1-The First Stage: The teacher provides a problematic situation and allows students to raise questions and get yes answers first in order to verify the students' realization of facts and concepts.

2- The Second Stage: The students collect information to make sure that the puzzling situation occurs.
3- The Third Stage: The students set the associated variables and try to identify causal relationships.
4- The Fourth Stage: The students organize the information collected in an attempt to decode contradictions so as to get a possible explanation for the problematic situation.
5- The Fifth Stage: The students suggest ways to enhance and develop the solutions to the confusing problem.

The "implementation of the Suchman model stages in the classroom requires three main steps" (Reat, 2002, 47):

**1- Planning and verifying the research activities by:**

**A- Setting Goals:** A major stage for planning verification activities of the Suchman model in order to achieve goals and reach the proper decision or solution to the problem.

**B- Building the Problem:** After sitting the goals, the teacher should build the problem that will be the starting point of the activity.

when preparing the problem the following points should be taken into account:

- The event should pose a problem that requires illustration and solution .
- The level of the problem should be appropriate to the students' ability level
- The event causing the problem should be exciting, stimulating the students' curiosity and investigation .
- The event should represent a specific problem, allowing of no sub other ones to rise.

**C- preparing the proper learning environment.**

1- Implementing the Suchman model activities by:

A- Proposing the problem to the students.

B- Hypothesizing and collecting information and facts about the given problem.

C- Concluding activities .

2-Evaluating the verification activities.

The evaluation process is the final stage according to the Suchman model. It includes an evaluation model measuring content, students' acquisition of geographical conceptual knowledge, and the degree of their inferential-thinking skills. Adel Rasmy Hammad's (2003) is one of the studies that try to identify the effectiveness of using the Suchman Model in teaching controversial issues, enhancing achievement, and developing the inferential thinking of preparatory-school students (grade one). The study reveals the excellence of the experimental group in the achievement and inferential-thinking tests. Another study is Omnia Al-Jendy and Naima Hassan's (2005) that tries to identify the effect of the training model on the questioning and scientific investigation as well as motivation for students who are law achieving in science at the preparatory stage. All results assert the effectiveness of the model.

Ehab Juda Tolba's study (2007) is an attempt to measure the effectiveness of using the investigative training model in achieving physical concepts and developing the cognitive abilities and the emotional knowledge of creative thinking of intermediate-school students. Then comes the study of Muhammad Rushdi Abu Shama, (2008) to identify the effectiveness of using the investigative training strategy for contradictory events in the achievement and development of some thinking skills of intermediate-school students. Results indicat the growth of achievement and thinking skills of the research group. The study of Naglaa Ismail Al-Sayed's (2008) is a study aiming to measure the effectiveness of using the questioning training model in correcting alternative perceptions and the development of scientific investigation skills of preparatory-school students. The results indicate the growth of

Scientific investigation and correction of alternative perceptions of some concepts in the research group.

For the above reasons, the researcher realizes the importance of using the Suchman model in teaching social studies for intermediate-school students (grade one) in the Kingdom of Saudi Arabia.

**II - The second axis: Geographical Conceptual Knowledge:**

Concepts are the source and basis of true knowledge. "No acquisition of any knowledge can take place without acquiring its concepts and principles, which enhances the ability for generalization in addition to self-learning and continuous education" (Klausmeier, 1995, 269). Learning concepts contributes to understanding the basics of any science that has its rules and origins. Concepts are also considered tools of thinking, being an inherently mental process of inference. Several attempts have recently emerged to develop teaching models of conceptual knowledge, including the models of Gagne, Hilda Taba, Bruner, Merrill & Tennyson, Klausmeier, Jawdat Ahmed Saada, and Jamal Al-Youssef.

Geographical conceptual knowledge occupies an important place in social studies. It "is not a mere word or term. Rather, it is the content of this word and the meaning of this term in the mind of the learner" ( Shalaby, 1997, 133)

**1- Definition of Geographical Conceptual Knowledge:**

Geographical conceptual knowledge can be defined as a collection of objects, symbols, or special events grouped together on bases of common characteristics that can be denoted by a specific name, or symbol. It is procedurally known as a kind of mental perception of a set of elements, facts or situations. to give a name or sign to the geographical phenomenon.

**2- Classification of Geographical Conceptual Knowledge:**

Geographical conceptual knowledge can be classified as:

A - Joining Concepts: a set of related elements.

B- Dividing Concepts: a set of unstable facts.

C- Relational Concepts: The relationship between two or more characteristics of the concept.

**Geographical conceptual knowledge can also be classified into the following other types:**

A- Concepts of Time: abstract and complex concepts bearing many interpretations such as the "summer season."

B- Concepts of Space: complex concepts such as "longitude" and "latitude."

C- New Concepts: newly emerging concepts such as "environmental pollution."

**3- Learning Geographical Conceptual Knowledge:**

Learning the geographical conceptual knowledge occurs as a result of creating educational situations and proper activities likely to make easy the acquisition of such knowledge.

Learning concepts undergoes two stages:

**A- Concept Formation: a**n inductive process of discovering distinctive characteristics and incorporating these characteristics into the composition of the mental image or special questions--the learner cannot name the concept at this point.

**B- Concept Learning:** a process that increases the ability of the learner to give one response to a set of variables in which similar characteristics take part.

As for the factors affecting the learning of geographical conceptual knowledge, they are multiple and varied. "The characteristics of the learner, the characteristics of the educational situation, and the characteristics of the concept itself are clear examples" Al-Leqany, 1990, 166).

Learning geographical conceptual knowledge, requires some Mental processes such as deduction, induction, interaction, and divergence.

The development of geographical conceptual knowledge is, therefore, an educational task that aims to "help students

understand the concept and its content" (Shalaby, 1997, 137). Accordingly, teachers of social studies should pay much attention to developing the geographical conceptual knowledge of their students in order to help those students to understand the basics of science and the comprehensiveness of the subject matter in addition to making the process of learning meaningful. The main purpose is to make easy the process of explanation, prediction, application, and understanding of the nature of science to the extent that enables students to deal with natural and social problems of the environment.

Teacher of social studies can evaluate students' acquisition of geographical conceptual knowledge through different evaluation methods including "written (essay and objective tests) and oral tests, observation, and discussion of students" (Shalaby, 1998, 257). It can be said that the student has acquired the geographical conceptual knowledge by his ability to realize the relationship between the learned concept and the other ones, and to classify examples related to the concept. Another point in case is the ability of the student to verbally express the concept with the possibility of applying it to the various life situations experienced. Many studies and researches have been concerned with teaching and acquiring concepts in general through models and modern methods such as Scheja & Petterssom's (2010) that address "students' conceptual perception during the process of learning and their abilities to understand concepts through speech or writing contexts" (21). Bracken & Crawford's study (2010) is interested in concepts basic in early childhood according to the educational standards in fifty American states. The study reveals Deficiencies in the research group's acquisition of cosmic concepts, especially those of "depth" and "breadth." It stresses the importance of "basic concepts as they help students to describe the world around them and provide the ability to discuss and exchange opinions in different regions of the world" (25). Several studies focus on developing geographical

conceptual knowledge, including Karami Muhammad Badawi's (2004), Usama Abdulrahman Ahmed's (2005), Majdy Kamel Khairuddin's (2007), Khairuddin & Ashraf Abdel Munem Muhammad's (2007), Ali Nasser Abdullatif's (2008), Jamal Hassan Al- Sayed's (2008), Yousef Ogla Almarshad's (2009), and Khairuddin & Yousry Ahmed Sayed's (2010).

**III- Third Axis: Inferential Thinking:**

Inference is a process for reaching righteousness and avoiding error in any confusing situation or problem facing the educated person.

**1- Definition of Inferential Thinking:**

Hussein Kamal Zaytoun, (2003) defines inferential thinking as "a way to generate new knowledge by realizing available information and evidence, and using logical rules to reach specific conclusions" (83). According to Adel Rasmy Hammad (2003), it is a "mental process through which we move from available information or the so called introductions to other information called results that carry more meaning than contained in introductions" (88). Thus, it can be said that inferential thinking is a mental
process for reaching results from given introductions.

**2- Characteristics of Inferential Thinking:**

A- A logical process in which results are necessarily the outcome of introductions according to the rules of logic.

B- A relational-thinking process regarding the relationship between cause
and outcome as the base of distinction and generalization.

C- A process in which the individual moves from the unknown to knowledge.

D- A problem-solving process.

E- Results rising from the inference process are primarily valid and accurate.

**3- Components of Inferential Thinking:**

A- Deductive Inferential Thinking: a mode of thinking is connected with:

- Conditional Deductive Inference: It is the one whose cases are dependent on other cases in judgment. It consists of a major introduction formulated by default, a minor introduction that represents a dependent issue, and an outcome inferred from both types of introduction. " 'If it rains, the plants will grow' is a good example" ( Jarwan, 2003, 350)
- Imbedded Deductive Inference: a kind of thinking in which the judgment issued on the subject is stated in the main issue that may include all or part of the subject and may be affirmative or negative in the form of statements. " 'The Mediterranean Sea has a hot dry climate and a mild warm summer' is a good example" ( Al-Hila, 2001, 316).

**B - Inductive Inferential Thinking: a** mode of thinking divided into:

- Complete Induction: a kind of induction in which a conclusion is reached after examining all cases or the vocabulary related to the topic or the specific phenomenon with an aim to reach a specific conclusion.
- Incomplete Induction: a kind of induction through which the conclusion is reached after studying a sample of cases or vocabulary related to a certain topic or phenomenon. This kind of induction is most prevalent in scientific research in Natural Sciences or Humanities. In other words, the more cases or vocabulary of the sample studied, the more accurate in expressing reality the conclusion of induction will be.

**4- Importance of Inferential Thinking:**

A- Helping the learner to acquire and apply knowledge.

B- Providing the learner with logical ways of thinking, which enables him to benefit from what he has learnt.

C- Providing a vehicle for success in life, work, and study.

D- Providing a tool for enriching science and developing thinking by discovering new facts.

E- Supporting the induction of the past and prediction of the future.

**5- Methods of Developing Inferential Thinking:**

A- Avoiding the methods in which the teacher bears all the burden of teaching while the learner does nothing but reception.

B- Getting Learners involved in group discussions, seminars, and debates.

C- Exchanging opinions under the guidance and supervision of teachers.

D- Creating an atmosphere of interaction and participation while teaching.

E- Training students to situations that require their understanding and application of deduction.

F- Training students to situations that require their understanding and application of induction.

The question training model, Fadia Mohammed Al-Ghazaly (2002) believes, is "a model focusing on the learner's important role under the supervision and guidance of the teacher, which creates an atmosphere of interaction and participation" (91).

**General Comment on Related Studies and Researches:**

Generally speaking, studies and researches have emphasized the importance of using different models in teaching, providing a framework that can be used to benefit from the Suchman teaching model. The distinction of the present study lies in that none of the other attempts has given adequate attention to the use of the Suchman model in teaching

social studies at the intermediate stage as well as in the model used, the subject and educational stage chosen, the goal sought (the development of geographical conceptual knowledge and inferential Thinking), and the two tests prepared.

**Third: Research Procedures:**

I - Selecting Research Topics: The lessons of the "Earth" unit of the social studies course for intermediate-school students (grade one) in the first semester of the academic year 1436-1437 AH were selected.

II - Preparing a List of Geographical Conceptual Knowledge: A list of geographical conceptual knowledge included in the social studies course for intermediate-school students (grade one) was prepared according to the following steps:

1- Setting the List Goal: the geographical conceptual knowledge included in the social studies course for intermediate-school students (grade one).

2- Collecting Sources for the List:

A- Books, references, and researches specialized in social studies.

B- Analyzing the content of the social studies course for intermediate-school students (grade one) in the first semester, 1436-1437 AH that has an interval of three weeks. The researcher calculated the agreement degree between the two analyses that mounted 94%. He then presented the initial form of the list to a specialized group of referees on whose academic remarks the final form of the geographical-conceptual-knowledge list was based.

III- Preparing the Teacher's Guide: The teacher's guide to teaching the selected lessons was prepared according to the Suchman model, taking into account:

1- The guide conforms to the Suchman model in teaching the social- studies course.

2- The guide has an introduction clarifying its objectives.

3-The guide contains the distribution of the selected lessons.

The teacher's guide was presented in its initial form to a specialized group of referees on whose academic remarks the final form of the teacher's guide was based.

**IV - Preparing the Geographical-Conceptual-Knowledge Test:**

1- Appendix 1: Referees

2-Appendix 2: The List of Geographical Conceptual Knowledge

3- Appendix 3: The Teacher's Guide As the research advances, the following points are taken into consideration:

1. The aim of the test is to measure the growth of the geographical conceptual knowledge level of intermediate-school students (grade one).
2. The test was built according to the specifications table, and the test included twenty items.
3. The twenty-five test vocabularies, one of them is of the multiple-choice type, were presented to specialized referees for academic remarks and
4. modifications.
5. The pilot study was conducted on a group of students at Ibn Al-Qayyim Intermediate School with the aim of setting the test time which reached (35) minutes, including (5) minutes for giving the test instructions.
6. Necessary modifications were made according to the remarks given by referees.
7. The researcher used the validity and stability calculation of the test as suggested by referees.
8. The researcher calculated the correlation coefficient of the raw scores between odd and even questions, using "the Spearman equation for calculating the stability coefficient" (Khattab, 2001, 210). The stability

9. coefficient test mounted 0,97, which is a strong value that asserts the validity of the test applied to the core research group.
10. Calculating the coefficients of ease and difficulty of the vocabulary test, using the statistical equation. The coefficients of ease and difficulty of the test ranged from to 0.76 to 0.23. Vocabularies whose ease coefficient was less than 20% were deleted as well asw the ones whose difficulty coefficient was more than 80% . The test in its final form became valid for application.

**V -Preparing the Inferential-Thinking Test:**

In preparing the inferential-thinking test, the researcher followed the steps below:

1- Setting Test Goal: measuring the inferential-thinking skills with the deductive and inductive modes for intermediate-school students (grade one).

2- Setting Test Dimensions: the two levels of inferential thinking:

A- Deductive Reasoning: the cognitive performance in which a student moves from general to particular issues.

B- Inductive Reasoning: the mental cognitive process in which a student moves from particular to general issues.

3- Formulation of Test Vocabulary: Several specialized studies and researches have been consulted in preparing the inferential-thinking test. Among them are Hammad's (2003), Badawy's (2004), Khairuddin & Ashraf Abdulmoneim's (2007), and Almarshad's (2009). The inferential-thinking test consists of 30 vocabularies, 15 for deductive inference and 15 others for inductive inference.

4- Initial Form of the Inferential-Thinking Test: After completing the preparation of the test items, it was presented to a specialized group of referees to get their

opinions and observations about the test. All the modifications were carefully made.

5- Specifications of the Inferential-Thinking Test: The inferential-thinking test consists in its initial form of 30 vocabularies,15 for deductive inference and 15 others for inductive inference.

6- Exploratory Experiment of the Inferential-Thinking Test: The survey test was applied to 38 students at Kairouan Intermediate-School (grade one).

7- Calculating the Test Stability Value: The researcher calculated the stability coefficients of the test as a whole. Then, he calculated it for each dimension of the test, using the Spearman equation. The results show that the deduction stability coefficient level mounts 0.85 whereas that of induction mounts 0.86 as shown by the stability of the test as a whole.

8- Calculating the Test Validity Value: Calculating the validity of the inferential-thinking test for the stability coefficient of the test as a whole and for each level of its dimensions gives 0.92 for deduction, and 0.92 for induction, and 0.92 for the test as a whole. The test proves to be highly valid.

9- Calculating Test Time Value: The researcher has calculated the response time for the inferential-thinking test, using the formula for calculating the test time, the test time reached (45) minutes.

10- The Test in its Final Form: The test of inferential thinking has become in its final form of twenty vocabularies, ten vocabularies for induction and ten others for deduction.

This is after the removal of the vocabularies of high difficulty and ease. Thus, the test of inferential thinking is now valid to apply to the experimental research group.

## VI - Research Procedures:

1- Selecting the Research Group and Setting Variables: 38 students at Kairouan Intermediate School (grade one) were selected for the research group, taking into account the variables of age and experiment time.

2- Pre Application of the Geographical-Conceptual-Knowledge and Inferential-Thinking Tests: The Geographical-conceptual-knowledge and inferential-thinking tests were applied to the research group, and the results were monitored..

3- Teaching the Experiment: The basic research experiment was applied in the first semester of the academic year 1436/1437 AH. The Experimental group studied the "Earth" unit lessons, using the Suchman model after training teachers to it. It took two months to carry out the experiment on the research group.

4- The Post-Application of the Geographical-Conceptual-Knowledge and Inferential-Thinking Tests: After teaching the selected lessons, the post application of the geographical-conceptual-knowledge and inferential-thinking tests was carried out on the experimental group in order to identify the effectiveness of teaching the social studies course, using the Suchman model in developing the geographical conceptual knowledge and inferential thinking of students.

5- Statistical Methods Used in the Research: Many statistical methods were used in the analysis and explanation of research results, including Black's equation for calculating the effectiveness of using the Suchman model.

**Fourth – Analysis of Research Results, Recommendations, and Topics for Further Studies**:

**I - Analysis of Research Results:**

To answer the first question of the research (What is the effectiveness of using the Suchman model in developing the geographical conceptual knowledge of intermediate-school students (grade one) in the Kingdom of Saudi Arabia?), the first hypothesis (There are statistical differences at level 0,01 between the average levels of the pre and post applications of the geographical-conceptual-knowledge test in favor of the post application to the research group) has been verified. This is by calculating the average student score and its standard-deviation difference in the pre and post applications of the geographical-conceptual-knowledge test to the research group in order to get the (D) value and its statistical significance level, as shown in table 1:

***Table 1***

| Application | Number of Students | Average | Standard Deviation | D Value | Statistical Significance |
|---|---|---|---|---|---|
| **Pre** | **38** | **3.81** | **1.67** | **34.60** | **0.01** |
| **Post** | | **17.13** | **1.39** | | |

The above table shows that the average score of the research group in the pre application is 3.81 with a standard deviation of 1.67 whereas theirs in the post-application of the same test is 7.13 with a standard deviation of 1.39. The table also shows that the (D) value is 34.60 with statistical significance at the Level 0.01 in favor of the post application to the research group. This result indicates the growth of the geographical conceptual knowledge of the basic research group, which is consistent with what related other studies have shown.

To answer the second question of the research (What is the effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students at the induction level in the Kingdom of Saudi Arabia?) the second hypothesis (There are statistical differences at level 0,01

between the average levels of the pre and post applications of the inferential-thinking test at the induction level in favour of the post application to the research group) has been verified. This is by calculating the average student score and its standard-deviation difference in the pre and post applications of the inferential-thinking test at the induction level to the research group in order to get the (D) value and its statistical significance level, as shown in table 2:

***Table 2***

| Application | Number of Students | Average | Standard Deviation | D Value | Statistical Significance |
|---|---|---|---|---|---|
| Pre | 38 | 2.26 | 0.92 | 33.32 | 0.01 |
| Post | | 8.76 | 0.67 | | |

The above table shows that the average score of the research group in the pre application is 2.62 with a standard deviation of 0.92 whereas theirs in the post-application of the same test is 8.76 with a standard deviation of 0.67. The table also shows that the (D) value is 33.32 with statistical significance at the Level 0.01 in favor of the post application to the research group. This result indicates the growth of the inferential thinking of the basic research group at the induction level.

To answer the third question of the research (What is the effectiveness of using the Suchman model in developing the inferential thinking of intermediate-school students at the deduction level in the Kingdom of Saudi Arabia?) the third hypothesis (There are statistical differences at level

0,01 between the average levels of the pre and post applications of the inferential-thinking test at the deduction level in favor of the post application to the research group) has been verified. This is by calculating the average student score and its standard-deviation difference in the pre and post applications of the inferential-thinking test at the deduction

level to the research group in order to get the (D) value and its statistical significance level, as shown in table 3:

***Table 3***

| Application | Number of Students | Average | Standard Deviation | D Value | Statistical Significance |
|---|---|---|---|---|---|
| Pre | 38 | 2.28 | 0.98 | 36.33 | 0.01 |
| Post | | 8.92 | 0.74 | | |

The above table shows that the average score of the research group in the pre application is 2.28 with a standard deviation of 0.98 whereas theirs in the post-application of the same test is 8.92 with a standard deviation of 0.74. The table also shows that the (D) value is 36.33 with statistical significance at the Level 0.01 in favor of the post application to the research group. This result indicates the growth of the inferential thinking of the basic research group at the deduction level.

To answer the fourth question of the research (What is the effectiveness of using the Suchman modal in developing the inferential thinking of intermediate-school students as a whole in the Kingdom of Saudi Arabia?) the fourth hypothesis (There are statistical differences at level 0,01 between the average levels of the pre and post applications of the inferential-thinking test as a whole in favor of the post application to the research group) has been verified. This is by calculating the average student score and its standard-deviation difference in the pre and post applications of the inferential-thinking test as a whole to the research group in order to get the (T) value and its statistical significance level, as shown in table 4:

***Table 4***

| Application | Number of Students | Average | Standard Deviation | D Value | Statistical Significance |
|---|---|---|---|---|---|
| Pre | 38 | 4.55 | 1.38 | 50.01 | 0.01 |
| Post | | 17.57 | 0.79 | | |

The above table shows that the average score of the research group in the pre application is 4.55 with a standard deviation of 1.38 whereas theirs in the post-application of the same test is 17.57 with a standard deviation of 0.79. The table also shows that the (D) value is 50.01 with statistical significance at the Level 0.01 in favor of the post application to the research group. This result indicates the growth of the inferential thinking as a whole of the basic research group.

The growth of inferential thinking with its two modes of induction and deduction can be attributed to the following elements:

1- Using the Suchman model, students have been placed in rich educational situations in which they practice the induction and deduction skills through various activities and exercises.

2- Using the model helps to display information in an interesting way, highlighting the causal relationships, which leads to the growth of the students' ’readiness for analysis, induction, and deduction.

3- Presenting the content using the Suchman model, which enables students to realize the relationships and organization of ideas.

4- The Suchman model leads to results consistent with those of many studies that have examined the effectiveness of various methods for developing the inferential thinking of students. These studies include Hammad’s (2003), Badawi’s (2004), Khairuddin & Abdulmoneim’s (2007) and Almarshad’s (2009). Thus, the research hypotheses have been verified.

To calculate the effectiveness of using the Suchman model in developing the geographical conceptual knowledge and inferential thinking of intermediate-school students (grade one), Black's modified-gain equation has been adopted, as shown in table 5:

***Table (5)***

| Application | Number of Students | Average | Maximum Score | Gain Rate | Statistical Level |
|---|---|---|---|---|---|
| Pre | 38 | 3.81 | 20 | 1.48 | Statistical Function |
| Post | | 17.13 | | | |

The above table shows that the modified-gain rate of using the Suchman model in developing the geographical conceptual knowledge is 1.48, which is an acceptable rate because it exceeds 1.2, the minimum that Black has set for effectiveness.

To determine the rate of adjusted gain of using the Suchman model in developing inferential thinking at the induction level, the percentage of the adjusted gain has been calculated, as shown in table 6:

***Table 6***

| Application | Number of Students | Average | Maximum Score | Gain Rate | Statistical Level |
|---|---|---|---|---|---|
| Pre | 38 | 2.26 | 10 | 1.37 | Statistical Function |
| Post | | 8.76 | | | |

The above table shows that the modified-gain rate of using the Suchman model in developing inferential thinking at the induction level is 1.37, which is an acceptable rate because it exceeds 1.2, the minimum that Black has set for effectiveness.

To determine the ratio of the modified gain of using the Suchman model in developing inferential thinking at the

deduction level, the following calculations have been done, as shown in table 7:

***Table 7***

| Application | Number of Students | Average | Maximum Score | Gain Rate | Statistical Level |
|---|---|---|---|---|---|
| Pre | 38 | 2.28 | 10 | 1.52 | Statistical Function |
| Post | | 8.92 | | | |

The above table shows that the modified-gain rate of using the Suchman model in developing inferential thinking at the deduction level is 1.52, which is an acceptable rate because it exceeds 1.2, the minimum that Black has set for effectiveness.

To determine the ratio of gain for using the Suchman model in developing the inferential thinking as a whole, the following calculations have been done, as shown in table 8:

***Table 8***

| Application | Number of Students | Average | Maximum Score | Gain Rate | Statistical Level |
|---|---|---|---|---|---|
| Pre | 38 | 4.55 | 20 | 1.50 | Statistical Function |
| Post | | 17.57 | | | |

The above table shows that the modified-gain rate of using the Suchman model in developing inferential thinking as a whole is 1.50, which is an acceptable rate because it exceeds 1.2, the minimum that Black has set for effectiveness.

## II -Research Recommendations:

**The researcher provides the following recommendations:**

1- Paying much attention to developing the geographical conceptual knowledge of students at all educational stages.

2- Paying much attention to teaching thinking skills at all educational stages.

3- Paying much attention to using different teaching models that contribute to the development of students' thinking skills.

4 - Training students to investigation, thinking, and research.

5- Training teachers of social studies to use different teaching models and methods to develop thinking and investigation.

## III- Topics for Further Studies:

In light of the research results, the following topics can be tackled:

1- A proposed program for developing the inferential-thinking skills of intermediate-school students.
2- The effectiveness of using the Suckman model in developing some different thinking skills.
3- A proposed program to train teachers to develop the thinking skills of their students.
4- Using different teaching models to develop geographical knowledge.
5- Evaluating the thinking skills of social studies teachers.

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