

The Effectiveness of Employing the Strategy of Free Inquiry Based on Debate During Teaching Social Studies in Developing Students' Self-Learning and Research Skills

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ABSTRACT

The study aimed to investigate the effectiveness of employing the strategy of open inquiry based on argumentation in teaching social studies in developing research skills among students in Jordan. The study adopted the experimental approach using a quasi-experimental design. A purposive sample of ninth-grade female students was selected, totaling 50 students. They were divided into two groups)28(students in the experimental group and)22(in the control group.To achieve the objectives of the study, the researchers developed a measurement tool in the form of a research skills questionnaire, which consisted of four main skills and)24(sub-items. This tool was applied to both groups before and after the intervention. The results showed statistically significant differences in the mean scores of research skills in favor of the experimental group. Furthermore, it was found that 55.5% of the variance in the post-test performance of the study sample in research skills could be attributed to the open inquiry strategy based on argumentation, indicating a large effect size for the strategy .The researchers recommended the continuous use of the open inquiry strategy based on argumentation in social studies classes and emphasized the need to reconsider the design of social studies curricula to include activities and learning situations based on this strategy at all educational levels.

Keywords: Strategy, Open Inquiry, Argumentation, Argumentation-Based Open Inquiry, Research Skills

INTRODUCTION

In light of the general objectives of social studies and the essential learning skills of the 21st century alongside the crises and challenges imposed by the modern era on human societies and the surrounding environment, and in parallel with the ongoing changes in science and technological tools educational efforts in classrooms must be intensified. This is necessary to equip students with these skills, prepare them to overcome obstacles, adapt to and solve problems, and adopt scientific research methods for acquiring and organizing information. The goal is to enable them to make informed decisions based on solid scientific foundations, contribute to sustainability across environmental, economic, and social fields, and be well-prepared for higher education with advanced intellectual capabilities. this view is supported by Tawalbeh and Obeidat (2015, p. 77), who emphasized that social studies is one of the core subjects taught across all levels of general education and is among the most important. This subject bears a clear responsibility in developing students' affective and cognitive dimensions toward their countries, security, and the world, fostering their growth in the area of good citizenship, and preparing them for their future roles. The most appropriate path to achieving these goals may lie in adopting instructional strategies that follow scientific research methods, encouraging learners to explore, investigate, inquire, and engage in self-directed learning. Such strategies shift the learner from being a passive recipient of knowledge to an active explorer, thinker,

and analyst. Among these, the argumentation-based open inquiry strategy may be the most effective approach to realizing this vision. Tawalbeh (2025) affirms that the social studies teacher has the ability to inspire enthusiasm and engagement among students, motivating them to read more books for the purpose of enrichment and benefit, rather than limiting themselves to the content of school textbooks.

The open inquiry strategy is a powerful instructional approach that encourages students to become active participants in their own learning journey (Kaate, 2024). In this method, students are not merely recipients of information; instead, they are encouraged to pose their own questions and explore topics independently, often leading to a more meaningful and personalized understanding of the subject (Hadi, Susantini, & Agustini, 2018). Unlike traditional teaching methods, open inquiry empowers students by giving them the freedom to choose areas that spark their curiosity and engage deeply in investigation, promoting a hands-on approach to knowledge acquisition (Soliman, 2024). Through open inquiry, students develop a sense of ownership over their learning as they explore, discover, and critically analyze information on their own. This autonomy in learning also builds self-confidence, as students come to realize their ability to navigate complex topics independently. Moreover, open inquiry fosters a natural sense of curiosity and intrinsic motivation to learn, often resulting in deeper retention of information and a long-term interest in academic subjects (Jeong & Lee, 2013).

The open inquiry strategy is also considered one of the modern teaching methods in contemporary scientific education. It aims to motivate learners and encourage them to independently discover issues, phenomena, and their interconnected relationships. It has become a cornerstone of the educational process (Morris, 2025). This approach emerged as a response that rejects traditional teaching methods which marginalize the learner's role, focus solely on rote memorization, and require learners to strictly follow predetermined steps and execute them precisely. In contrast, the inquiry strategy seeks to place full attention on the learner's role, aiming to activate their participation in the educational process in a strong and effective way, and to equip them with the skills needed to explore knowledge (Al-Ghaidani, 2023), rather than merely involving them in scientific practices such as questioning, reasoning, and argumentation (Morris, 2025).

Acar and Tuncdogan (2019) stated that classrooms that adopt the open inquiry strategy in teaching their students were found to be more distinguished and creative compared to students in classrooms that implemented other levels of inquiry or followed traditional teaching methods. Open inquiry-based learning fosters in students the development of key skills and desirable behaviors such as innovation, creativity, knowledge discovery, and generation. It can be concluded that an educational environment grounded in open inquiry teaching strategies produces outstanding learning outcomes, as it focuses on motivating students to find real solutions to problems and construct new knowledge. Moreover, it equips students with a high ability to overcome the challenges they face.

Based on the nature of the social studies subject, which is characterized by its ability to incorporate controversial issues and problems within its topics and given its objective of engaging students in thinking processes and applying reasoning to various social, economic, and political problems, as well as helping them form balanced and fair perspectives on both local and global issues (Al-Ghazawi, 2024) it becomes necessary to integrate argumentative discussion within the classroom in light of these topics. This integration enables the addressing of problems through a sequence of steps that ensure the active involvement of students in problem-solving in effective ways. Obeidat (2011) emphasized the importance of teachers recognizing their role during argumentative discussions not as controllers of the process, but rather as facilitators and guides, supporting students in adopting viewpoints through logical thinking methods, and granting them the freedom to make their own decisions.

Addressing social studies topics through a focus on argumentation in teaching has a positive impact on learners' behavior within the educational process. It activates learners' engagement and guides them to develop their own ideas about various topics, allowing them to arrive at relevant knowledge independently rather than receiving it passively in pre-structured formats (Sayed, 2021). Furthermore, it encourages them to engage in research, inquiry, and questioning, while training them to understand social problems and make decisions regarding them. It also strengthens their ability to predict and think about the future, enhances their discussion skills, prepares them to use higher-order thinking abilities, and accustoms them to problem-solving and making sound decisions (Khudr, 2011).

Argumentation-Based Open Inquiry builds upon the foundations of open inquiry but adds a structured approach to discussion and debate. In this enhanced method, students not only investigate topics independently but also engage in presenting and defending their ideas or positions through respectful, evidence-based dialogue (Kata', 2024). This type of structured argumentation encourages students to refine their critical thinking skills, as they are required to evaluate multiple perspectives, construct sound arguments, and thoughtfully respond to others' viewpoints. Arguments and evidence are especially effective in the field of social studies, where students frequently confront complex historical and social issues that allow for multiple interpretations (Rohmah & Prahani, 2021).

The steps of Argumentation-Based Open Inquiry are based on several stages of the argumentation inquiry model, with additional elements drawn from the open inquiry approach. Below is a detailed description of the main stages of argumentation-based open inquiry, which includes six key phases. The first phase is as follows:

1. The Preparatory Phase

In this phase, the teacher poses an open-ended question at the beginning of the lesson or presents a learning scenario that requires applying the steps of argumentation-based open inquiry. Alternatively, the teacher may introduce a specific problem related to the subject (e.g., social studies), prompting students to engage in deep and comprehensive thinking about the topic from multiple angles and to generate as many diverse ideas as possible regarding the social issues at hand. This phase also includes motivating students, such as asking them to think of examples related to the topic based on their interests and inclinations. During this step, the teacher takes into account individual differences among students. Additionally, students are divided into small groups to work collaboratively on group tasks, while some activities involve individual open inquiry, encouraging self-directed learning.

2. The Inquiry and Research Phase

In this phase, students are guided to conduct research and investigation. The teacher directs them to explore the topic (the learning scenario presented) from all relevant aspects. This includes helping students formulate their own inquiry questions and research hypotheses, design their own methods, and follow the procedures they determine in order to answer their questions and either accept or reject their hypotheses. The teacher also guides students to use a variety of reliable sources, including textbooks, the internet, scholarly articles, and peer-reviewed journals, to gather information. Students are further encouraged to make claims and justify them, being prompted to present arguments, evidence, and reasoning to support the information they gather. This may involve the use of resources such as maps, images, tables, illustrations, videos, articles, and charts. At the end of this phase, students are expected to write their exploratory reports and document the references they used.

3. The Argumentative Discussion Phase

In this phase, students present their findings and exploratory reports to the class. They share the results of their research, and a discussion is opened among the students to ask and answer questions, following the expected norms of respectful communication and grounded in scientific methodology using an argumentative approach.

4. Encouraging Argumentation

In this phase, students are encouraged to defend their opinions using the evidence they gathered during their research in a scientific manner. They support their research findings with justifications, explanations, and scientific evidence.

5. Evaluation and Summary Phase

In this phase, the main points discussed are summarized and students' self-learning skills and research skills are assessed. Student performance is evaluated based on criteria such as the quality of the information collected, the ability to present ideas clearly and organized, and active participation in the discussion and argumentation.

6. Feedback Phase

In this phase, the teacher provides positive and constructive feedback on the students' research reports, along with suggestions for possible improvements.

Research skills are essential in teaching students, as they enable them to effectively gather, evaluate, and summarize information. These skills form the backbone of independent inquiry, allowing students to critically assess sources, organize findings, and present information coherently (Byun & Kim, 2011). Research skills also include the ability to identify reliable sources, summarize key points, and draw connections between different pieces of information. Mastering these skills not only enhances students' academic success but also prepares them to make informed decisions in real-life situations where data-driven analysis is crucial (Rohmah & Prahani, 2021).

Furthermore, developing research skills empowers students to move beyond superficial understanding, as they acquire the ability to question information and verify its reliability, thereby fostering habits of intellectual rigor and sound judgment. Additionally, these skills are necessary as students advance in higher education and eventually

enter the workforce, where the ability to conduct thorough and reliable research is highly valued (Eristya & Aznam, 2019).

Integrating free inquiry with argumentation in social studies is a highly effective approach to enhance research skills among students. By encouraging them to explore topics independently and participate in organized discussions, this strategy empowers them to take responsibility for their learning and develop critical thinking (Chen, Hand & Park, 2016; Widowati, 2008). The element of argumentation enhances students' ability to analyze information, evaluate evidence, and confidently communicate their ideas, thereby strengthening their skills in research, discovery, and inquiry. Ultimately, this approach equips students with the skills necessary for academic success, effective citizenship, and lifelong learning. By learning free inquiry and constructive argumentation, students become better prepared to navigate the complexities of the modern world, armed with the confidence and competence to face challenges and pursue knowledge in an ever-changing society (Hadi et al., 2018).

This aligns with what Tawalbeh (2025) pointed out that the subject of social studies is the human being. It focuses on the holistic upbringing of the individual, providing them with a sound understanding of the self as a member of a human environment that influences and is influenced. The individual is entrusted with practicing roles and responsibilities throughout all stages of life as a citizen who adopts a value system reflected in their words, actions, behaviors, and attitudes, and who bears the responsibility for them. Social studies also prepare and enable the individual to make sound decisions concerning their current and future roles.

A number of related studies have been conducted on the topic of this research, including the study by Tekindur and Kingir (2024), which aimed to examine the impact of the inquiry-based debate method on improving elementary students' achievements in science, inquiry skills, scientific writing skills, and determining students' attitudes towards this method. The study used a mixed explanatory sequential design with a quasi-experimental approach, including pre- and post-tests for the experimental and control groups in the quantitative part, and semi-structured interviews in the qualitative part. Forty-seven fourth-grade students from a public school participated in the study. The experimental group was taught using the inquiry-based debate method through four science units, while the control group studied the same units using the teacher's conventional teaching methods. Independent t-tests were conducted to analyze the data collected from science achievement tests, inquiry skills tests, and scientific writing skills assessment criteria. The results showed statistically significant differences in favor of the experimental group in science achievement, inquiry skills, and scientific writing. Qualitative analyses also revealed that students held positive attitudes towards the inquiry-based debate method. The study concluded that the positive effects of this method continued to increase throughout the study period.

Karaer et al. (2024) conducted a study aimed at examining the long-term impact of the Science Writing Heuristic (SWH) approach a debate-based inquiry method on students' science achievement growth, whether they had Individualized Education Programs (IEPs) or not. The students in this longitudinal study were divided into two groups: a control group with no experience or less than one year of experience with the SWH approach, and an experimental group with at least one year of experience using the Science Writing Heuristic approach. Polynomial growth modeling was used to analyze longitudinal data collected from elementary (fourth grade) through high school (eleventh grade), using assessment test data from the state of Iowa. The main findings showed that younger students taught with the SWH approach demonstrated better growth in achievement, and that years of experience with this approach produced different effects on science achievement for students with and without individualized education programs.

Based on the above, this study was conducted to investigate the effectiveness of employing the free inquiry strategy based on debate during the teaching of social studies to develop research skills among students in Jordan.

Problem Statement and Research Questions

Engagement in an inquiry-based learning environment, particularly free inquiry, is crucial in classrooms as it prepares students with advanced learning skills. It also fosters the teaching and learning of scientific debate based on well-established scientific principles, as well as skills of persuasion and scientific argumentation about facts, concepts, and scientific principles related to social topics. Moreover, enhancing research skills among students is essential to prepare them for future challenges (Al-Zahrani & Allam, 2021). However, from the researchers' perspective and based on field observations in social studies, teaching social studies often remains limited to traditional methods, where students receive information passively instead of actively engaging in learning and critical thinking, which negatively affects the learning environment for students. This aligns with Tawalbeh (2025) findings that students hold negative judgments towards social studies subjects (history, geography, and national and civic education), viewing them as boring and uninteresting. These negative perceptions likely stem from previous negative experiences, often caused by teachers who teach these subjects by merely reading without effectively employing engaging teaching methods. The free inquiry strategy based on debate presents an

opportunity to address this limitation by encouraging students to independently explore topics, engage in critical thinking, and participate in meaningful dialogue.

According to a survey conducted by the researchers related to the topic of this study and directed at social studies teachers, the results indicated that one of the main challenges is the lack of training and resources available to teachers. Many teachers in Jordan are not familiar with inquiry-based methods or the practices necessary to facilitate debate in the classroom. Transitioning to this active, student-centered approach requires specialized skills, including the ability to guide open inquiry and manage organized discussions.

Furthermore, schools often lack the necessary resources such as training programs, educational materials, and supportive classroom environments to support these dynamic learning strategies. The survey results also highlighted an issue of resistance to change within the educational system, where traditional methods are deeply entrenched at a time when calls for educational reforms in Jordan and increased access to quality education are intensifying. This aligns with what Al-Shaqirat and Tawalbeh (2025) pointed out that social studies is a very important subject for students, and therefore, it is essential to move away from traditional teaching methods that generate boredom among students. Instead, modern strategies with significant impact on developing thinking patterns and learning methods must be adopted.

Moreover, there is a noticeable gap in research concerning the impact and effectiveness of free inquiry based on debate in Jordanian classrooms. Few studies have explored how this strategy influences the development of research skills among Jordanian students, especially in the field of social studies.

This gap in the literature, alongside the practical challenges faced by teachers, underscores the need for further research on the potential of inquiry-based debate strategies in Jordanian education. Such research would provide valuable insights into how these approaches can enhance critical thinking and research skills among students in Jordan. By exploring the effectiveness of these strategies, educators and policymakers in Jordan can gain a clearer understanding of how to modernize social studies education and promote active, engaged learning. The core problem of the study can be summarized by answering the main research question:

"To what extent is the employment of the free inquiry strategy based on debate effective in developing research skills among ninth-grade female students in social studies?" From this, a sub-question arises:

"Is there a statistically significant difference at the level of significance ($\alpha = 0.05$) between the mean scores of students in the experimental and control groups on the research skills scale attributable to the teaching method (free inquiry based on debate strategy vs. conventional strategy)?"

Study Significance

The theoretical significance of this study lies in its vital role in enriching the academic understanding of modern teaching strategies, particularly the free inquiry approach. By analyzing this strategy, the study offers a theoretical framework that deepens comprehension of fundamental concepts related to research skills. The theoretical analysis demonstrates how active learning strategies contribute to the development of students' critical and analytical thinking skills. Furthermore, this study helps fill a notable gap in Jordanian educational literature, as many previous studies lacked a comprehensive evaluation of the impact of free inquiry, particularly in social studies. By providing new insights and reliable information, it builds a knowledge base for future research, thereby enhancing educational practices and encouraging ongoing inquiry in this field.

From a practical perspective, this study holds great importance in developing the educational practices of social studies teachers in Jordan. It offers concrete recommendations and guidelines that teachers and educational supervisors in social studies can use to effectively implement the free inquiry-based debate strategy in classrooms. The study also provides a set of practical strategies and tools useful for curriculum design and teacher training. Through offering training programs based on best practices, it can improve teachers' efficiency in managing classrooms in a way that encourages inquiry and effective discussion. These findings serve as a reliable reference for decision-makers at the Jordanian Ministry of Education to develop innovative educational policies that support an interactive and dynamic learning environment. Ultimately, the practical significance of this study lies in its potential to transform educational dynamics in Jordan by fostering a culture of research among students in general, and specifically in social studies. It prepares them to face cognitive and social challenges in a rapidly evolving society.

Terminological and Operational Definitions of the Study

1) Free Inquiry Strategy: It is a student-centered teaching strategy where the student begins by formulating questions, then designs procedures, conducts research and inquiry, performs experiments, and finally reaches conclusions (Kadir & Satriawati, 2017, p.3).

Operational definition: The researcher defines it as an educational strategy involving a set of planned activities and tasks posed by the teacher as a research problem or educational situation, whereby ninth-grade female students independently and willingly conduct research and inquiry on specified social studies topics without predetermined instructions or outcomes. This includes reading tasks, scanning attached barcodes, conducting experiments and field visits, and carrying out individual and group activities. Students formulate their research questions and hypotheses, design their own research methods, select sources and tools according to their interests, gather information from diverse sources, present their research findings, and discuss them with peers.

2) Argumentation (Debate): It is a discussion method involving presenting and debating different viewpoints on a specific topic, encouraging critical thinking and analyzing arguments and evidence (Chen et al., 2016, p.3).

Operational definition: The researcher defines it as ninth-grade female students' use of argumentation during social studies classes through organizing discussions on social issues and geographical problems, where each student presents her viewpoint supported by evidence.

3) Research Skills: A set of abilities that enable a student to search for information, evaluate it, analyze it, and apply it to solve problems and build knowledge (Tekindur & Kingir, 2024, p.3).

Operational definition: The researcher defines these as the skills possessed by ninth-grade female students that enable them to conduct research projects, including formulating research questions, searching for information, organizing data, analyzing results, and presenting them logically and based on evidence. These skills will be measured using a research skills questionnaire covering four main areas: scientific research steps execution, collecting information from various sources, writing research reports, and personal and social skills.

STUDY METHODOLOGY

The researchers used the experimental method with a quasi-experimental design, as it is the most appropriate for examining the effectiveness of employing the free inquiry strategy based on argumentation during the teaching of social studies in developing research skills among students in Jordan.

Study Participants

The study participants consisted of ninth-grade female students at Jinin Al-Safa Mixed Secondary School. The school was purposively selected due to the suitability of its geographic location, which facilitated one of the researchers' consistent attendance, as well as the cooperation demonstrated by the teaching and administrative staff. Additionally, the results of the electronic survey indicated that the teachers had a good understanding of the employed strategy, along with the students' need to develop their research and inquiry skills.

Study Material

To achieve the study objectives, the researchers developed a teacher's guide as a reference for teaching the unit titled "Contemporary Environmental Issues" from the Social Studies curriculum using the Free Inquiry Based on Debate strategy. To ensure that the study material was valid and appropriate for ninth-grade female students, the researchers developed the material by consulting theoretical literature and previous studies related to free inquiry based on debate and its teaching methods, such as the studies by Al-Ghaidani (2023), Al-Zahrani and Al-Amoudi (2024), and Abdel Fattah (2023). The second unit of the Social Studies curriculum assigned to ninth-grade female students in the second semester, titled "Contemporary Environmental Issues," was selected. The researchers then prepared the initial version of the teacher's guide, which included both theoretical and practical dimensions. The guide contains an introduction and a conceptual background of the educational program based on the free inquiry with debate strategy during Social Studies instruction, clarification of the target group, general and specific learning outcomes, an explanation of the main roles of the teacher and students within the program, and special instructions for the teacher on how to use the guide as well as guidelines for students to achieve the intended objectives. Additionally, the guide outlines the implementation procedures and practical application, provides a time schedule for teaching the unit lessons, and formulates general outcomes for the educational unit along with specific outcomes for each lesson. These outcomes ensure the development of students' behavioral and research skills. The guide also includes scientific content, teaching strategies, methods, necessary materials and tools, activities appropriate for the free inquiry based on debate strategy, procedures for lesson implementation, the required time for each lesson, and tests representing formative and summative assessment methods.

Face Validity of the Teacher's Guide

The face validity of the guide was verified by presenting it to a group of 14 expert evaluators specialized in the field. These included doctorate holders in Social Studies Curricula and Teaching Methods from the Curriculum

and Instruction Department, university professors from the Geography Department, as well as several educational supervisors holding masters and doctoral degrees in Social Studies Curricula. The purpose was to obtain their feedback and suggestions regarding the guide's suitability and alignment with the educational level, its appropriateness for the target group, and whether the content and strategies effectively reflected the development of the desired skills. Additionally, the guide was reviewed by a language specialist to ensure its linguistic and grammatical accuracy. The evaluators' comments were carefully considered, and necessary modifications were made based on the consensus of the majority of the evaluators.

Study Instrument

To achieve the objectives of the study, which focus on examining the effectiveness of employing the free inquiry strategy based on debate during the teaching of social studies in developing research skills among students in Jordan, a Research Skills Scale was developed. This scale serves as a measurement tool characterized by an acceptable level of validity and reliability, and is suitable for ninth-grade female students. The development of the scale was based on a review of theoretical literature and previous studies. Initial items were formulated by referencing instruments such as the Al-Alaqami and Al-Dosouqi scale (2022), as well as studies addressing research skills measurement, such as Al-Dugheim and Al-Shadoukhi (2020). The scale was divided into five skill areas: Performing the steps of scientific research, Collecting information from diverse sources, Writing the research report, Personal and social skills.

Validity and Reliability Indicators of the Questionnaire Tool

Face Validity

The face validity of the scale was verified by presenting it to a panel of experts specialized in the field, totaling 14 reviewers. These included PhD holders in Social Studies Curricula and Instruction from the Curriculum and Teaching Department, as well as several educational supervisors holding masters and doctoral degrees in Social Studies Curricula. The purpose was to obtain their feedback and suggestions regarding the comprehensiveness of the items, their relevance to each domain, and their suitability for the target group. The scale was also reviewed by a language specialist to ensure linguistic and grammatical accuracy of the items. Comments and recommendations from the experts were taken into consideration, and necessary modifications were made based on the consensus of the majority. The final scale included five skill areas comprising a total of 24 items Self-assessment.

Construct Validity

To verify the construct validity indicators for all items of the Research Skills Scale, the scale was administered to a pilot sample consisting of 25 students from the study population. Construct validity indicators were calculated using Pearson's correlation coefficient between each item and the skill it belongs to, as well as between each item and the overall scale, as shown in Table (1).

Table (1) The correlation coefficient values between each item of the research skills and its corresponding skill domain, as well as the overall instrument.

Skill	Paragraph number	Correlation with	
		The skill it belongs to	The total score of the instrument
Implementation of the scientific research steps	1	.69**	.63**
	2	.74**	.41*
	3	.64**	.67**
	4	.65**	.59**
	5	.56**	.69**
	6	.67**	.62**
	7	.76**	.71**
	8	.82**	.75**
	9	.84**	.76**
	10	.67**	.63**
Collecting information from diverse sources	11	.66**	.78**
	12	.69**	.66**
	13	.73**	.68**
	14	.84**	.73**

	15	.65**	.62**
	16	.74**	.63**
	17	.81**	.78**
	18	.72**	.65**
Writing the research report	19	.72**	.73**
	20	.88**	.67**
	21	.73**	.70**
Personal and social skills	22	.76**	.68**
	23	.75**	.67**
	24	.84**	.77**

*Statistically significant at the level of ($\alpha = 0.05$)

**Statistically significant at the level of ($\alpha = 0.01$)

Table (1) shows that all correlation coefficients are statistically significant at the significance level ($\alpha = 0.05$). A correlation coefficient value of (0.20) was adopted as the criterion for item acceptance, as indicated by Ouda (2010). Therefore, none of the items of the research skills scale were deleted, and the final version of the scale consisted of 24 items.

Reliability of the Scale: To verify the reliability of the scale, it was administered to a pilot sample of 25 ninth-grade female students from within the study population but outside the main sample. Cronbach's Alpha coefficients were calculated to assess internal consistency. Additionally, the scale was re-administered to the same sample after a two-week interval to calculate the test-retest reliability (correlation coefficient between the two administrations), as shown in Table (2).

Table (2): Reliability Indicators for the Research Skills Scale

Dimension	Internal consistency reliability	Test-retest reliability	Number of paragraphs
Implementation of the scientific research steps	0.82	0.75	10
Collecting information from diverse sources	0.87	0.83	8
Writing the research report	0.80	0.78	3
Personal and social skills	0.84	0.82	3
The scale as a whole	0.88	0.80	24

The results in Table (2) also referred to as Table (5) show that the internal consistency reliability coefficients (Cronbach's Alpha) for the sub-skills ranged between 0.80 and 0.87, and 0.88 for the overall scale. Additionally, the test-retest reliability coefficients ranged between 0.75 and 0.83 for the sub-skills, and 0.80 for the overall scale. All these values exceed the acceptable threshold of 0.70, which indicates that the scale is reliable (Cronbach, 1951).

Scoring the Research Skills Scale

Based on this scale, a five-point Likert scale was adopted to score the study instrument. Each item was assigned a score according to the following: 5 points for "Applies to me completely", 4 points for "Applies to me to a great extent", 3 points for "Applies to me to a moderate extent", 2 points for "Applies to me to a small extent", 1 point for "Does not apply to me at all".

Equivalence of the Study Groups on the Research Skills Scale

The equivalence of the experimental and control groups in their pre-test performance on the research skills scale was examined using an independent samples t-test. Table (3) shows the results.

Table (3) Results of the t-test for examining the equivalence of the study groups in pre-test performance on the research skills scale

Dependent variable	Group	Arithmetic mean	Standard deviation	t-test	Degree of freedom	Statistical significance
Implementation of the scientific research steps	Experimental	1.86	.48	.662	48	.511
	Control	1.76	.51			
Collecting information from diverse sources	Experimental	1.57	.42	.401	48	.690
	Control	1.52	.45			
Writing the research report	Experimental	1.51	.56	-.786	48	.436
	Control	1.65	.70			
Personal and social skills	Experimental	1.51	.43	1.317	48	.194
	Control	1.35	.44			
The research skills scale as a whole	Experimental	1.67	.38	.571	48	.571
	Control	1.62	.34			

It is evident from Table (3) that there is no statistically significant difference between the mean scores of the two study groups on the research skills scale and its sub-skills. This indicates that the two groups were statistically equivalent before the implementation of the intervention.

Study Procedures

To achieve the objectives of the study, the following procedures were followed:

- Identifying the research problem and its questions.
- Reviewing educational literature, theoretical frameworks, and previous studies related to the study variables: open inquiry, scientific argumentation, self-directed learning, and research skills.
- Defining the study population, which consisted of ninth-grade students in all public secondary schools in Jordan.
- Selecting the study sample, represented by ninth-grade female students at Jenin Al-Safa Mixed Secondary School.
- Choosing the unit “Contemporary Environmental Issues” from the Social Studies curriculum for its relevance to the study topic, and designing a teacher’s guide to teach the unit based on the strategy of open inquiry through argumentation.
- Developing the study instrument, represented by a Research Skills Scale questionnaire.
- Presenting the study instrument and its material to a panel of experts, including social studies teachers, supervisors, university professors in curriculum and instruction of social studies, and geography professors, to ensure the validity of the study tools.
- Considering the experts’ opinions, comments, and suggestions on the instrument and materials to ensure their suitability to the study objectives, and making the necessary modifications accordingly.

- Obtaining formal approval from the Faculty of Educational Sciences at Yarmouk University, and securing an official letter to facilitate the implementation of the study.
- Obtaining ethical approval from the Human Research Ethics Committee under reference number (IRB/2025/270).
- Getting official permission from the Education Directorate of Al-Koura District, along with a facilitation letter.
- Holding several meetings with the teacher implementing the unit, explaining the teacher's guide in detail and how to implement it using the open inquiry through argumentation strategy.
- Administering the study instrument to the pilot sample.
- Conducting the pre-test of the study instrument on the actual study sample (experimental and control groups).
- Implementing a field experiment where the experimental group received instruction using the open inquiry through argumentation strategy, while the control group received traditional instruction. The study was conducted from April 6, 2025 to May 15, 2025, with the unit taught over 16 class periods, each lasting 45 minutes.
- Assessing and monitoring the development of students' self-learning and research skills through ongoing observations.
- Conducting the post-test of the study instrument on the actual study sample (experimental and control groups).
- Verifying the reliability of the study instrument (Research Skills Scale questionnaire).
- Recording students' responses and scoring their performance before and after the educational intervention, and analyzing the results using appropriate statistical tests.
- Presenting and interpreting the study results.
- Offering recommendations and suggestions based on the findings.

STUDY RESULTS

Findings Related to the Research Question to address the study's main research question: "Is there a statistically significant difference at the significance level ($\alpha = 0.05$) between the mean scores of the two study groups (experimental, control) on the Research Skills Scale, attributable to the teaching method (free inquiry-based debate strategy vs. conventional)?"

The first null hypothesis was formulated and tested:

-There is no statistically significant difference at the level of significance ($\alpha = 0.05$) between the mean scores of the two groups (experimental and control) on the Research Skills Scale due to the method of instruction (free inquiry-based debate vs. conventional).

This hypothesis was tested by extracting the means and standard deviations for both groups on the Research Skills Scale as well as its sub-skills. Table (4) presents these statistics:

Table (4) Descriptive statistics—means, standard deviations, standard errors, and adjusted means—for the pre- and post-intervention performance of the experimental and control groups on the Research Skills Scale and its sub-skills.

group	Treatment method		Skill	pretest		Posttest		Adjusted mean	Standard
				X	S	X	S		
experimental	Free Inquiry Strategy Based on Debate		Implementation of the scientific research steps	1.86	.48	3.47	.61	3.419a	.086
			Collecting information from diverse sources	1.57	.42	3.18	.66	3.151a	.112
			Writing the research report	1.51	.56	2.87	.81	2.815a	.128
			Personal and social skills	1.51	.43	2.67	.75	2.643a	.097
			The scale as a whole	1.67	.38	3.20	.60	3.181	.085

Control	Conventional	Implementation of the scientific research steps	1.76	.51	2.38	.37	2.448a	.098
		Collecting information from diverse sources	1.52	.45	2.13	.52	2.166a	.127
		Writing the research report	1.65	.70	1.77	.65	1.841a	.145
		Personal and social skills	1.35	.44	2.03	.31	2.060a	.110
group	Treatment method	Skill	Pretest		Posttest		Adjusted mean	Standard
			X	S	X	S		
The scale as a whole			1.62	.34	2.18	.36	2.199	.096
X: Arithmetic mean S: Standard Deviation								

It is evident from Table (4) that there are notable differences between the mean scores of the study participants on the dimensions of the Research Skills Scale for both the experimental and control groups. The mean score of the experimental group on the overall research skills scale in the pre-test was (1.67), while the post-test mean increased to (3.20). Similarly, the mean score of the control group on the overall scale in the pre-test was (1.62), and in the post-test, it rose to (2.18).

To determine whether these differences are statistically significant, the researchers employed Analysis of Covariance (ANCOVA) for the post-test scores on the Research Skills Scale, using the pre-test scores as a covariate. This approach controls for any pre-existing differences, attributing observed changes more confidently to the independent variable (i.e., the teaching strategy). Accordingly, a one-way ANCOVA was applied, as detailed in Table (5), which presents the results of this analysis.

Table (5) Results of One-Way ANCOVA on Post-Test Scores of the Research Skills Scale

Source of variation	Sum of squares	Degrees of freedom	Mean square	F	Statistical significance	Eta square
Covariate (pretest measure)	3.030	1	3.030	15.018	.000	.242
Teaching method	11.810	1	11.810	58.523	.000	.555
Error	9.484	47	.202			
Total	25.415	49				

*Statistical function at significance level ($\alpha = 0.05$).

It is observed from Table (5) that the value of (F) related to the overall research skills scale reached (58.523), which is statistically significant at the significance level ($\alpha = 0.05$). This indicates the presence of statistically significant differences between the post-test scores of the two groups. Upon reviewing the means, it was found that the differences are in favor of the experimental group, as the adjusted post-test mean for the experimental group was higher than that of the control group. The adjusted mean for the experimental group was (3.181), while that for the control group was (2.199). To determine the effect size of the strategy—the inquiry-based learning strategy grounded in argumentation—on overall research skills, Eta squared (η^2) was calculated, yielding a value of (0.555). This means that approximately 55.5% of the variance in the post-test performance of the study sample on research skills can be attributed to the strategy used. According to Kilani and Al-Sharifain (2016), an effect size is considered high if it exceeds (16%); thus, the effect size here is high.

Based on the above, the second hypothesis in its current form is rejected and reformulated as follows: "There is a statistically significant difference at the ($\alpha = 0.05$) level between the mean scores of students in the two groups (experimental and control) on the research skills scale, attributed to the teaching method (inquiry-based learning strategy grounded in argumentation vs. traditional method)."

A Multivariate Analysis of Covariance (MANCOVA) was also conducted on the post-test mean scores of the study sample on the research skills scale, considering the pre-test scores as a covariate. Table (6) presents the results of this analysis.

Table (6) Results of the Multivariate Analysis of Covariance (MANCOVA) on the post-test mean scores of the study sample on the research skills scale.

Source	Skill	Hotelling's T-squared test value and its significance	Sum of squares	Degrees of freedom	Mean square	F	Statistical significance	Eta square
Pretest	Implementation of the scientific research steps		.632	1	.632	3.190	.081	.068
	Collecting information from diverse sources		.448	1	.448	1.344	.253	.030
	Writing the research report		.016	1	.016	.037	.848	.001
	Personal and social skills		.745	1	.745	2.981	.091	.063
Group	Implementation of the scientific research steps	F=12.645 Sig=0.000	10.344	1	10.344	52.251	.000	.543
	Collecting information from diverse sources		10.644	1	10.644	31.928	.000	.421
	Writing the research report		10.409	1	10.409	23.993	.000	.353
	Personal and social skills		3.726	1	3.726	14.902	.000	.253
Error	Implementation of the scientific research steps		8.710	44	.198			
	Collecting information from diverse sources		14.668	44	.333			
	Writing the research report		19.088	44	.434			
	Personal and social skills		11.001	44	.250			
Total	Implementation of the scientific research steps		27.637	49				
	Collecting information from diverse sources		31.369	49				
	Skill	Hotelling's T-squared test value and its significance	Sum of squares	Degrees of freedom	Mean square	F	Statistical significance	Eta square
	Writing the research report		41.413	49				
	Personal and social skills		22.080	49				

It is evident from Table (6) that there are statistically significant differences in the sub-skills of the research skills scale, which are as follows:

•**Skill of implementing the steps of scientific research:** The (F) value was (52.251), which is statistically significant at the significance level ($\alpha = 0.05$), indicating an improvement in the level of implementing the steps of scientific research in favor of the experimental group. The adjusted mean score for the experimental group was (3.419), while it was (2.448) for the control group. Additionally, the value of the partial Eta squared was (0.543), meaning that the use of the inquiry-based learning strategy grounded in argumentation explained 54.3% of the variance between the two groups in the scores on this skill. According to Kilani and Al-Sharifain (2016), an effect size is considered high if it exceeds 16%, so this effect size is considered high. This may be attributed to the steps and skills embedded in the inquiry-based argumentation strategy, which closely align with research skills. These included actively engaging students in the learning process, which contributed to the development of their research skills, such as formulating research questions and hypotheses, collecting information from credible sources, and respecting intellectual property. The strategy also helped students acquire scientific documentation skills and the ability to write and present research reports using argumentation. Furthermore, the teacher's guide, organized according to this strategy, included a variety of activities encompassing most modern active learning strategies (brainstorming, debate, hot seat), which focus on actual student engagement and take into account individual differences to ensure the participation of all students in the learning process. Field observations by the researchers also revealed that the female students excelled in formulating diverse research questions and hypotheses and demonstrated deep conceptual mastery of the topics discussed. They showed the ability to retrieve information from credible sources to support their claims with clear evidence and rational justification. The students also displayed positive attitudes toward the adopted strategy, resulting in an atmosphere of enjoyment and healthy

competition in acquiring knowledge and presenting it in their reports. This result aligns with the findings of Al-Ghaidaney (2022), Zulfiani et al. (2017), and Al-Kurawi (2020), which indicate that using the inquiry-based argumentation strategy in teaching advances learners to higher-order thinking processes and shapes their personality. It enables them to plan to achieve personal goals, select the appropriate tools and materials that suit their abilities, and thereby develop their research, analytical, and critical thinking skills. It also builds their capacity to solve problems efficiently and acquire knowledge according to their interests.

•**Skill of collecting information from various sources:** The (F) value was (31.928), which is statistically significant at the ($\alpha = 0.05$) level, indicating an improvement in the ability to collect information from diverse sources in favor of the experimental group. The adjusted mean score for the experimental group was (3.151), while that of the control group was (2.166). The partial Eta squared value reached (0.421), meaning that the use of the inquiry-based learning strategy grounded in argumentation explained 42.1% of the variance between the experimental and control groups in this skill. According to Kilani and Al-Sharifain (2016), an effect size is considered high if it exceeds (16%), and thus, the effect size here is considered high. This may be attributed to the strategy's emphasis on placing the learner at the center of the educational process, activating their continuous and active role during class, while limiting the teacher's role to guidance and facilitation. As a result, the students acted as researchers and explorers of knowledge from various sources and presented their findings to the teacher without relying on predetermined answers. This led to a variety of ideas and information, with students seeking multiple solutions to problems. This result is consistent with the findings of Al-Ghaidaney (2023), Morris (2025), Listiono et al. (2025), Abu Sharekh (2008), and Banchi & Bell (2008), which emphasize that using modern learning strategies such as the inquiry-based learning strategy grounded in argumentation fundamentally engages the learner. This, in turn, enhances research and analytical skills and strengthens students' intrinsic motivation to discover knowledge.

•**Skill of writing the research report:** The (F) value was (23.993), which is statistically significant at the ($\alpha = 0.05$) level, indicating an improvement in the skill of writing research reports in favor of the experimental group. The adjusted mean score for the experimental group was (2.815), while it was (1.841) for the control group. The partial Eta squared value was (0.353), meaning that the use of the inquiry-based learning strategy grounded in argumentation explained (35.3)% of the variance between the experimental and control groups in scores related to research report writing. Thus, the effect size is considered high, as Kilani and Al-Sharifain (2016) state that an effect size is high if it exceeds (16)%. This result may be attributed to the implementation of the inquiry-based argumentation strategy in the classroom, which aims to develop several skills, including the skill of writing exploratory reports and presenting them either individually or collaboratively in groups. This contributed to enhancing students' ability to write research reports. Furthermore, the diverse educational activities included in the teacher's instructional guide based on the inquiry-based argumentation strategy also aimed to strengthen this skill among students.

•**Personal and social skills:** The (F) value was (14.902), which is statistically significant at the ($\alpha = 0.05$) level, indicating an improvement in personal and social skills in favor of the experimental group. The adjusted mean score for the experimental group was (2.643), while it was (2.060) for the control group. The partial Eta squared value was (0.253), meaning that the use of the inquiry-based learning strategy grounded in argumentation explained (25.3) % of the variance between the experimental and control groups in scores related to personal and social skills. Therefore, the effect size is considered high, as Kilani and Al-Sharifain (2016) note that an effect size above 16% is classified as high. This result may be attributed to the diverse use of tools, materials, and resources necessary for implementing the inquiry-based argumentation strategy, which significantly contributed to its successful execution. The learning environment was transformed from traditional, monotonous social studies classes into a more engaging setting suited for the strategy. Students had access to computers, projectors, iPads, smartphones, printing and office supplies, drawing and writing papers, colored markers, whiteboards, and digital mapping technologies. All of this helped create a stimulating learning environment, enhanced motivation, and encouraged active participation among students, thereby strengthening their research, personal, and social skills.

Research Recommendations

1.The necessity of employing the inquiry-based learning strategy grounded in argumentation in social studies classrooms by designing instructional situations and learning activities that actively engage students in the educational process, as this contributes to the development of research, personal, social, technical, and technological skills.

2.The study recommends that curriculum designers update the content of social studies curricula to include educational situations and activities that support inquiry-based learning and scientific argumentation.

3. The study recommends conducting further field and experimental research on the inquiry-based learning strategy grounded in argumentation to explore its effectiveness in developing other variables such as academic achievement, life skills, and its overall effectiveness in teaching social studies across all educational levels.

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