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EXPLORATORY BEHAVIOR IN MATHEMATICS FOR MIDDLE SCHOOL GIRLS

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Abstract
This research aims to study the exploratory behavior in mathematics among middle school girls in Maysan Governorate, Iraq. The research sample consisted of (130) female students from the second middle school grade. The exploratory behavior scale was used to collect data. The research recommends the following:
- Applying the exploratory behavior scale to students in schools and colleges.
-Reducing the fear of mathematics in general.
-Increasing the efficiency of teaching and learning.
-Encouraging teachers to use exploratory behavior in teaching mathematics.
Thr research results showed that:
- The female students of the second middle school grade in Maysan do not possess exploratory behavior.
-Exploratory behavior in the educational environment does not meet the needs of students effectively to improve the level of academic achievement and achieve the desired goals.

Keywords: exploratory behavior, mathematics, third intermediate, educational environment and efficiency.

INTRODUCTION

Key findings:

The key findings of this abstract are that middle school girls in Maysan Governorate, Iraq, lack exploratory behavior in mathematics, and the educational environment does not effectively meet the needs of students to improve academic achievement. This highlights the need for teachers to adopt exploratory learning strategies and reduce math anxiety to enhance student engagement and performance.

What is known and what is new?

The known aspect of this abstract is the focus on exploring the behavior in mathematics among middle school girls in Maysan Governorate, Iraq. The new contribution is the identification of the lack of exploratory behavior among female students in the second

middle school grade and the recommendation to enhance teaching methods, reduce math anxiety, and promote exploratory learning strategies to improve academic achievement.

What is the implication, and what should change now?

The implication of this abstract is the urgent need to address the lack of exploratory behavior in middle school girls in mathematics in Maysan Governorate, Iraq. Changes needed include implementing the recommended strategies such as applying the exploratory behavior scale, reducing math anxiety, improving teaching efficiency, and encouraging the use of exploratory learning methods to enhance academic achievement and student engagement.

Chapter One:

First: The Research Problem

The desire of adolescents to explore and their love of curiosity through trying new responses develops self-confidence and gives them fixed values that later turn into learning needs (Conger, 1970: 264). This called the behaviors that lead to positive results exploratory behaviors. The comprehensive model of exploratory behavior provides a basis for better understanding in adolescence. Researchers, clinicians, and policymakers are encouraged to shift their perspective on exploratory behavior from a completely negative set of behaviors to a traditional healthy study of behavior and exploratory development (Skaar, 2009: 6).Al-Kubaisi (2010) believes that the problems lie in the seriousness of students in memorizing and studying the educational materials, including mathematics lessons (Al-Kubaisi, 2010: 1). Among the positive behaviors that adolescents practice are spending time with family, getting good grades, participating in extracurricular activities, and practicing different sports (Linda Berg, 2007). The curiosity motive is a type of intrinsic motivation that can be conceptualized as an intentional act aimed at obtaining information about a topic or idea through exploratory behavior. The individual wants to feel effective and capable of self-control when engaging in this behavior

It should be clear to us that exploratory behavior begins in humans from early childhood. They experiment with things, search for them, learn about the new, and are attracted to strange things (Al-Naghmishi, 1994: 119). Mao and Mao (1964), William James, and Cronbach considered exploratory behavior as a tendency that a person shows towards strange, contradictory, or new things in the environment in order to learn about them and explore them. Some have considered it a behavioral habit that is acquired through learning (Al-Qazzaz, 1989: 26). This is what we find in the behavior of adolescents when they explore, ask questions, or take risks. It is an intrinsic need that comes from within the self and requires satisfaction, guidance, and investment (Al-Saqr, 2004: 4). Some exploratory behaviors are considered necessary. It is clear that learning is an adventure. It is considered a given and successful teaching because it encourages students to explore, such as the student's attempt to undertake difficult tasks. In the current research, answered the question:

“Is there exploratory behavior in mathematics for female students in Iraq?”

Second: The Importance of Research

The importance of research can be summarized in two aspects:

First: The Theoretical Importance

1- The value of this research is related to its description as one of the research in exploratory behavior that can be applied to understanding the competencies of the twenty-first century.

2- This research helps to encourage teachers to use exploratory behavior, which changes their educational impact.

Second: The Practical Side 1- The research may help curriculum developers in the Ministry of Education to design curricula that are appropriate for students according to exploration.

2- Knowing the level of exploratory behavior in mathematics among students, this important segment contributes to the development and modernization of society.

Third: The Research Objective:

To know the level of exploratory behavior in mathematics for middle school girls.

Fourth: Research Hypothesis

There is no statistically significant difference at the level (0.05) between the hypothetical mean and the arithmetic mean of the students' scores on the exploratory behavior scale in mathematics.

Fifth : Research Limits

This research is limited to the following:

1- Spatial boundaries: The public middle schools affiliated with the Maysan Directorate of Education for the academic year (2020-2021).

2- Human boundaries: Female students of the second middle school grade in Maysan Governorate.

3- Subject boundaries: Exploratory behavior

Sixth: Definition of Terms:

Exploratory behavior:

Oxford Dictionary (1961) defines it as: The desire to test or experience strange or new things in order to get to know them.

Rizk (1979) defines it as: A tendency to search for knowledge through exploratory activity and the pursuit of investigation and reaching new results. It is also defined as : The desire to test or experience strange or new things in order to get to know them through experimenting with behavioral patterns, the results of which can be either positive or negative.

Chapter Two: Theoretical Background and Previous Studies:

First: Exploratory Behavior:

Exploratory behavior represents the first roots of the desire for knowledge and its acquisition. Humans learn about psychological, social, and environmental issues through exploration and questioning, which lead to facts and answers to questions (Abdul Razzaq, 2009: 1). Many

researchers and educators warn against neglecting or suppressing this behavior. When an individual, especially a child, is punished for their exploratory attempts and questions about the unknown in their environment, they suppress themselves and thus fall into a dilemma between their love of exploration and leaving it for frustration. When the environment lacks stimuli and enrichment activities that develop and motivate the motive, it becomes dull and may disappear (Al-Saqr, 2003: 5). Bruner (1972) indicates that the school should work to stimulate curiosity, exploration, and cognitive experiences in order to strengthen and enhance the cognitive structure (Bruner, 1972: 33). Exploratory behaviors are determined through learning, which in turn helps improve memory performance. Therefore, memory is an active process that is closely linked to behavior. Gagné pointed out that exploration is a set of activities that an individual performs to solve a problem that includes a new phenomenon that challenges their thinking while searching for a solution to the problem. Suchman also emphasized that exploration is a process in which there is a sudden representation of information or stimuli that the individual receives in a given situation, as a result of the interaction that occurs between the conceptual system that the individual originally has and the stimuli of new situations (Abu Jadu, 2000: 301).

The teacher should develop the student's abilities and readiness by using different teaching methods in addition to encouraging students to participate in various school activities that can help achieve the student's goals and develop their academic abilities and readiness. Providing students with the scientific method of thinking can also increase their ability to explore by asking a set of questions or reasons that are behind the problem or related to it (Al-Kafafi, 417).

The changes that occur to the different aspects of the adolescent strongly enhance the motive of exploration and discovery in adolescence, especially in the mental and cognitive aspects. The adolescent possesses new and distinctive capabilities that enable him to understand and examine things. Therefore, this exploration is part of what prompts adolescents to ask many questions, read a lot, and sometimes spy and risk themselves. It is noticeable that some adolescents tend to acquire books, stories, newspapers, and magazines and read them and dwell on them and enjoy the events, analyzes, stories, heroic models, and changing ideas they contain. The adolescent is attracted to these things because of what these activities meet of the need for exploration, adventure, and discovery. The adolescent may resort to extensive reading in various fields, because of the lack of acceptance he finds in the field of work and responsibilities, where he does not find anything that satisfies his desire from a practical, realistic angle, nor what satisfies his desire for work and responsibility (Al-Naghmeshi, 1994: 121). The adolescent's speed of achievement also increases, and this is noticeable in reading and the ability to acquire materials such as geometry and algebra. Research indicates that most of the adolescents' readings in this stage revolve around entertainment topics such as stories, jokes, and funny topics, especially those that agree with their inclinations (Zuhran, 1994: 369).

Berlyne and Former (1960) conducted a study in which they concluded that the question-and-answer approach is a form of cognitive behavior that can be aroused by new, contradictory, complex, or unknown things, which can be obtained through the learning

process. Al-Qazzaz (1989) indicates that questions are clearer for younger children and more accurate for older children, leading to knowledge and the removal of doubts. Another aspect of exploratory behavior is curiosity, which is defined as the need or desire for knowledge and is a prerequisite for exploratory behavior (Berlyne, 1960).Curiosity can be a motivating force for this behavior. In 1971, Angoff conducted research on curiosity and concluded that curiosity has motivational drives and is considered an indicator for measuring exploratory behavior (Adelman, 1997). Cognitive curiosity can be aroused and maintained by assigning learners real and complex problems with sufficient evidence. Cognitive curiosity becomes clear when searching for an answer to the problem.

Previous Studies:

Studies that dealt with exploratory behavior:

1- A study by Abu Duniya (1991) aimed to know the relationship between exploratory tendencies and mental variables (attention - perception - memory).

2- A study by Hussein (2003) aimed to explore the effect of using a proposed program with small games in the preparatory section of the lesson in developing exploratory behavior among first-middle-grade female students.

3- A study by Muhammad (2005) aimed to explore the effect of using two programs with basic and exploratory motor games in developing some basic motor skills and sports exploratory behavior.

Studies that dealt with exploratory behavior:

Search results	Search tools	Sample size	Academic level	Research year	The Country's Name	**Researcher's name**	
There is a positive relationship between exploratory tendencies and each of attention, perception, and memory	- Exploratory tendencies scale - Bandar-Gestalt visual-motor test to measure memory - Crossing out test to measure attention - Word formation test (ama) to measure awareness	674	First and second year of high-school	1991	Egypt	Abu Dunya	1
There were statistically significant differences in the post-test between the female students of the two research groups in developing exploratory behavior in favor of the experimental group	- Al-Qazzaz scale for exploratory behavior - Small games program – Traditional program - -	32	First year of middle school	2003	Iraq	Hussein	2
The effectiveness of the two proposed programs in developing some basic motor skills and exploratory athletic behavior	Constructing a measure of illustrated mathematical exploratory behavior - And a comparison between the two proposed programs and the traditional lesson	120	Second year of primary school	2005	Iraq	Mohammed	3

Chapter Three :

Research procedures:

This chapter includes a presentation of the research procedures followed by the researcher in terms of the research methodology, defining the population, choosing the sample, and building the tool used in the research, as well as the statistical methods used in it.

First: Research Methodology: The current research employs the descriptive approach due to its suitability for the nature of its objectives. This approach does not merely collect and categorize data; it goes beyond that to include some interpretation, analysis, comparison, and evaluation of the data, leading to generalizations. Descriptive research is a scientific diagnosis of a phenomenon, providing quantitative insight into it using linguistic and mathematical symbols (Anwar and Adnan, 2007: 37-38).

Second: Research Population:
The research population is defined as female students in the second intermediate grade in Iraq for the academic year 2020-2021, with a total of (2789) students.

Third: Research Sample:
A purposive sample of (150) female students from the second intermediate grade was selected.

Fourth: Research tools:
Since the current research aims to identify exploratory behavior, it requires the use of a scale that meets the criteria of psychological and educational scales to verify the research objectives. The researcher will present the steps as follows:

1- Exploratory Behavior Scale
As the current research explores the exploratory behavior of female students in the research sample, it necessitates the adoption of an exploratory behavior scale based on scientific and educational principles. The researcher took these principles into account when adopting this scale, including:
a) The items should be derived from the results of previous studies on exploratory behavior and research related to mathematics topics.
b) The items of the exploratory behavior scale should be clear and precise, and can be observed and measured.

Validity of the Behavioral Problems Scale:
An instrument is considered valid if it actually measures what it was designed to measure and does not measure anything else instead or in addition to it (Al-Aissawi, 1975: 54). In order to verify this, the researcher relied on:
Face validity: This represents the extent to which the content of the items is related to the trait being measured. The items were presented in their initial form to a group of (24) experts specializing in mathematics teaching methods, mathematics, and educational sciences (Appendix 1) to give their opinion on their suitability and the extent to which the items are relevant, clear, and linguistically sound. The researcher also considered whether there were any suggestions for amendment or deletion of items in the questionnaire.
In verifying the validity of the instrument, the researcher relied on:
- The literature and previous studies that the researcher reviewed.

The researcher benefited from reviewing some Arab and foreign studies related to the topic of identifying exploratory behavior items and reviewing some educational sources related to exploratory behavior in general education stages and the practices and behaviors required in educational situations to form a general idea, such as the scale (Skaar, 2009) and the scale of Fatima Nasser Hussein (2003) and the scale of Al-Aithawi (2014), which the researcher adopted in this research. The total number of items in this scale is (60) items, which represent the items of exploratory behavior. A list was organized

The three-way distribution of the single item in the exploratory behavior items was adopted, as follows:

- Always applies (3) degrees - Sometimes applies (2) degrees - Never applies (1) degree) (Hall, 1980: 146).

Reliability of the Exploratory Behavior Scale:

After verifying the validity of the scale and in order to rely on it as one of the tools of the current research, it is necessary to ensure its reliability, which means that it gives the same results when repeated on the same individuals and under the same conditions (Lindvel, 1968: 82). Extracting the reliability coefficient is a prerequisite for achieving objectivity (Van Dalen, 1984: 513).

The following method was used to extract the reliability coefficient of the instrument:

1- The researcher used the Test-Retest method to measure exploratory behavior, which was applied to the pilot sample of (30) male and female students (morning) who were randomly selected from the students. The time period between the first and second application of the scale was between (14-18) days, which is confirmed by Adams (1966: 85) who states that "the time period between the first and second application should be between two and three weeks." The scale was applied for the first time on 8/12/2020 and for the second time on 22/12/2020. Using Pearson's correlation coefficient, the reliability coefficient was found to be (0.90), which is a good reliability coefficient. This confirms the reliability of the research instrument, which is the exploratory behavior scale.

Final Application of the Scale: In light of the statistical analysis, the exploratory behavior scale is now ready for application in its final form on the study sample (Appendix 2).

The researcher applied the exploratory behavior scale on Monday and Tuesday due to the Corona pandemic, as attendance was limited to these two days for the second intermediate grade in Maysan Governorate on 8-9-16-15/2/2021.

Statistical Tools:

The SPSS program was used.

Chapter Five:

Presentation and Interpretation of Results:

The results are presented in light of the research objectives and hypotheses:

First: Presentation and Interpretation of Results

In order to verify the hypothesis that stated:

There is no statistically significant difference at the level of (0.05) between the hypothetical mean and the arithmetic mean of the students' scores on the exploratory behavior scale in mathematics. The average score of the second intermediate students on the scale was (99.741) with a standard deviation of (18.6414). When this average was compared with the hypothetical average of the scale, which is (120), using the one-sample t-test, it was found that the difference was statistically significant in favor of the hypothetical average.

Table (1) Results of the t-test to calculate the significance of the difference between the average scores of the student sample and the hypothesized average for the exploratory behavior scale

Significance level of 0.05	Residual Value		Arithmetic Mean	Standard Deviation	Arithmetic Mean	Sample
	Tabulated	Calculated				
Non-functional	1.96	0.1121	120	18.6414	99.741	130

It is noticeable in **Table 1**, that the calculated "t" value (0.1121) is less than the table "t" value at the significance level (0.05). This means that the hypothesis is correct and that the significance of the difference between the arithmetic mean and the hypothetical mean indicates that the second intermediate female students in Maysan Governorate do not possess exploratory behavior.

This may be attributed to:

A. The content of the taught curriculum may not develop exploratory behavior to the required level.

B. The inability of teachers to use exploratory behavior in new situations within the subject of mathematics.

Second: Conclusions

In light of the research results, the researcher can conclude the following:

The second intermediate female students in Maysan do not possess exploratory behavior.

Exploratory behavior in the educational environment does not effectively meet the needs of students to improve their academic achievement and achieve the desired goals.

Third: Recommendations

In light of the results of the current study, the researcher can recommend the following:

Applying the exploratory behavior scale to students in schools and colleges.

Reducing the fear of mathematics in general.

To increase the efficiency of teaching and learning.

Encouraging teachers to use exploratory behavior while teaching mathematics.

Fourth: Proposals

In completion of the current study, the researcher proposes to do the following:

A similar study to the current study on middle school students.

A study to explore the relationship between exploratory behavior and other variables such as (mathematical thinking, mind habits, etc.).

An experimental study to investigate the effect of developing mathematical power among students of the Faculty of Basic Education on their exploratory behavior.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of University of Maysan.

References

1. Conger, John et al., (1970). Child Psychology and Personality. Translated by Ahmed Abdel Aziz Salama and Abdel Hamid Jabr, Dar Al-Nahda Al-Arabiyya.
2. Skaar, N.R. (2009). Development Of The Adolescent Exploratory And Risk Behavior Rating Scale. Dissertation, University of Minnesota.m
3. Al-Kubaisi, Abdul Wahid Hamid. (2010). "The Effect of Using the Data Show Device on the Achievement and Attitude of Middle School Students in Mathematics." Journal of the College of Basic Education, no. 16, Maysan.
4. Linda berg l. (2007). Teen Risk Taking: A Statistical Portrait.
5. Al-Dusouqi, Wafaa Salah El-Din Ibrahim. (2009)."The Interaction between Educational Control Styles and Curiosity Levels and Its Effect on Developing Internet Dealing Skills." Conference on Qualitative Education and Its Role in Human Development in the Age of Globalization.
6. Al-Naghmishi, Abdul Aziz bin Muhammad. (1994). Adolescents: An Islamic Psychological Study. 3rd ed., Dar Al-Muslim for Publishing and Distribution.
7. Maw, W.H., and Maw, E.M. (1962). "Establishing Criterion Groups for evaluating Measures of Curiosity." Journal of Experimental Education, vol. 29, https://archive.org/details/elementsoftechni00pear.
8. Al-Saqir, Hana bint Ali bin Abdullah. (2004). "Exploration in Our Children Why, How and When." Symposium on Early Childhood: Its Characteristics and Needs, Ministry of Education, Kingdom of Saudi Arabia.
9. Oxford. (1961). The Oxford English Dictionary Sounded-Society, vol. lii, Oxford Press, www.csun.edu.com.
10. Rizq, Asad. (1979). Encyclopedia of Psychology. 2nd ed., Arab Institution for Studies and Publishing, Beirut.
11. Abdel Razzaq, Muhammad Al-Sayyid (2009). "The Art of Dealing with Curiosity". Internet.

12. Bruner, J.S., (1972). "The Nature Of Immaturity." Journal Of American Psychologist, vol. 1, no. 2.
13. Abu Jadu, Saleh Muhammad Ali, (2000). "Educational Psychology". 2nd ed., Dar Al-Masirah for Publishing and Distribution, Amman, Jordan.
14. Al-Kafafi, Alaa El-Din. (2009). "Evolutionary Psychology, Psychology of Childhood and Adolescence". Dar Al-Fikr for Publishing and Distribution,.
15. Zuhran, Hamed Abdel Salam. (1994). Developmental Psychology of Childhood and Adolescence. 1st ed., Alam Al-Kutub, Cairo.
16. Berlyne, D.E., (1960) Conflict Arousal And Curiosity.
17. Al-Qazzaz, Mahfouz Muhammad Mohsen. (1989). "Exploratory Behavior and Its Relationship to Some Variables Among Sixth Grade Elementary Pupils in Nineveh Governorate." Unpublished PhD Thesis, College of Education - Ibn Rushd, University of Baghdad.
18. Adelman, S., (1997). Curiosity And Exploration. www.csun.edu.com .
19. Abu Danya, Nadia Abdel-Moneim, (1996). "Exploratory Tendencies and Their Relationship to Some Cognitive Mental Processes." Journal of Educational and Social Studies, vol. 2, no. 3-4, Al-Omrania Offset Printing Press, Faculty of Education, Helwan University.
20. Hussein, Fatima Nasser, (2003). "The Effect of a Proposed Program of Small Games in the Preparatory Section of the Lesson on Developing Exploratory Behavior in First Intermediate Female Students." Journal of Physical Education, vol. 12, no. 14, College of Physical Education, University of Baghdad.
21. Muhammad, Birifian Abdullah. (2004). "The Effect of Using Two Programs of Motor and Exploratory Games in Developing Some Basic Motor Skills and Sports Exploratory Behavior." Master's Thesis, College of Education, University of Baghdad.
22. Anwar Hussein Abdul Rahman and Adnan Zankana. (2007) Methodological Patterns and Their Applications in Human and Applied Sciences. 1st ed., Dar Al-Wafaqi, Baghdad.
23. Al-Aissawi, Abdul Rahman. (1974). Measurement and Experimentation in Psychology and Education. Dar Al-Nahda Al-Arabiyya for Printing.
24. Al-Aithawi, Ruwa Rashid Hamid, (2014). "Exploratory Behavior and Its Relationship to Self-Regulation in High School Students." Master's Thesis, College of Education for Human Sciences, University of Diyala.
25. Hall, E. Gene. (1984). "Competency – based Education: A process for the Improvement." Hall Inc., Englewood Cliffs, NJ.
26. Lindvel, S. M. (1968). Testing and Evaluation Methods in Education and Teaching. Translated by Abdel Malik Al-Nashf and Saeed Al-Tel, Franklin Foundation.
27. Van Dalen, DeMo Yould. (1984) Research Methods in Education and Psychology. Translated by Nabil Noufal and others, 3rd ed., Anglo Egyptian Library.
28. Adams, G. S., (1964). Measurement And Psychology, Guidance. Holt, Rinchart And Winston.