



The Effect of Using Journal Writing on Ninth Graders' Achievement, Anxiety, and their Attitudes toward Mathematics

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ABSTRACT:

The current study aimed at investigating the effect of using journal writing on ninth graders' achievement, anxiety, and attitudes toward mathematics. The study sample consisted of 70 ninth grade students, from two sections, assigned randomly to the experimental group which was taught by using journal writing, and a control group taught using traditional teaching methods. Results of the study revealed that journal writing had a significant effect on improving students' academic achievement in mathematics, whereas, it had no obvious effect on reducing students' math anxiety or improving their attitudes toward mathematics.

Key words: Journal Writing, Achievement, Anxiety, Attitude, Mathematics.

الملخص:

هدفت هذه الدراسة إلى استقصاء أثر استخدام كتابة المجلة في تحصيل طلبة الصف التاسع ومستوى القلق والاتجاهات نحو الرياضيات، وقد تكونت عينة الدراسة من 70 طالبة، يمثلن شعبتين تم تعيين إحداهما عشوائياً كمجموعة تجريبية، تعلمت باستخدام كتابة المجلة، وتعيين الشعبة الأخرى كمجموعة ضابطة، تعلمت باستخدام الطريقة التقليدية. وقد أظهرت نتائج الدراسة أن استخدام كتابة المجلة له أثر دال إحصائياً في تحسين تحصيل الطلبة في الرياضيات، بينما لم يظهر أثر لاستخدام كتابة المجلة في تخفيض مستوى القلق أو في تحسين اتجاهاتهم نحو الرياضيات. الكلمات المفتاحية: كتابة المجلة، التحصيل، القلق، الاتجاهات، الرياضيات.

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INTRODUCTION:

Communication is one of the standards that the National Council of Teachers of Mathematics (NCTM, 2000) called for to be in mathematics curriculum and Instructional programs from pre-kindergarten through grade 12. This communication should enable all students to use the language of mathematics to express mathematical ideas precisely, and to consolidate their thinking, because it requires them to reflect on their work and clarify their thoughts about the ideas (p. 61).

When students are challenged to think and reason about mathematics and to communicate the results of their thinking to others orally or in writing, they learn to be clear and convincing.

(NCTM, 2000) standards stated that "Instructional programs from pre-kindergarten through grade 12 should enable all students to:

- Organize and consolidate their mathematical thinking through communication;
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- Analyze and evaluate the mathematical thinking and strategies of others;
- Use the language of mathematics to express mathematical ideas precisely."

The communication in mathematics can be oral, such as class discourse, or it can be written, such as written comments. Teachers can learn about their students' thinking through the students' writing as well as the students' spoken words, If the student talks and writes

about his ideas, he will clarify and deepen his understanding of the mathematics.

Language and mathematics are intrinsically related. Attention to language is an important component in developing students' conceptual understanding of mathematics.

Writing in mathematics also requires different and additional skills than other typical scholastic writing assignments. It requires a solid understanding of numeric, symbolic, graphical, and verbal representations, their uses, and their interconnections (Freitag, 1997).

According to literature review, there were many studies revealed that students demonstrate greater mathematical understanding and learning through writing to learn mathematics (Pugalee, 1997; Porter & Massingila, 2000; Aspinwall & Aspinwall, 2003).

To assess students learning in mathematics, and have a good idea about their progress toward achieving goals, we must use different strategies with different tools, that give the teacher an obvious picture about what the student do in mathematics, and this is a transfer process from "assessment of learning" to "assessment for learning".

The National Council of Teachers of Mathematics standers (NCTM, 2000) tells us that classroom assessment should look for evidence of learning from many sources, using many tools, such as: closed tasks, open tasks, projects, and informal assessment (Bush & Greer, 1999, p.34).

Journal writing is an example of an informal assessment tool, which requires students to write about math-

ematics on a regular basis, and it is one of the best ways to introduce writing in the class. It helps students stretch their thinking and make sense of problems. "When children write in journals, they examine, express, and keep track of their reasoning, which is especially useful when ideas are too complex to keep in their heads. By reading their journals, you can evaluate their progress and recognize their strengths and needs" (Burns & Silbey, 2001).

Journal writing has benefits for students, teachers and the mathematics program (Neill, 2005), which can be summarized to:

1) Promoting Understanding by building on the powerful links between writing and learning. It allows students to establish connections between mathematical ideas, to focus on what they do and do not know, to develop more precise ways of communicating, and to clarify, organize, and refine their thinking.

2) Promoting a Sense of Involvement with Mathematics: it encourages students to summarize goals, strategies, and reactions to mathematics, to record their accomplishments and openly vent frustrations, and to consider the relevance of mathematics in their lives.

3) Promoting Better Informed Teaching by providing teachers with:

* Formative data about students' understanding and dispositions, including students' emerging ideas about mathematical concepts.

* A basis for learning conversations (written and oral).

* An opportunity for feedback and feed-forward.

* Information that assists in short and long-term planning.

Teachers can use journal writing in the class to assess student's knowledge. When the student writes a journal about his learning of a certain subject, the teacher can discover what the strong points of his learning are, and what the weakness points in his learning are. Questions of the type: "what did you know about the subject ...? What are the similarities and differences between and?" can help teacher demonstrate students level of achievement.

Teacher also can use journal writing to assess student's beliefs and attitudes toward mathematics. A task of the type: "write in short sentences, the reasons that made you feel that the subject is important and useful in your life" can help teacher demonstrate students' point of view of mathematics.

Dowrick (2009) mentioned that journal writings have benefits, such as reducing stress and anxiety, increasing self-awareness, sharpening mental skills, genuine psychological insight, creative inspiration and motivation, strengthening ability to cope during difficult times, and overall physical and emotional well-being.

A journal writing in math can be used for many purposes, (Wetzel, 2009) summarized the importance of journal writing in math learning by the following purposes and advantages:

•Help students become aware of what they do and do not know.

•Connect prior knowledge with what the student is studying.

•Summarize the student's knowledge and give insight into understanding.

- Help the student raise questions about new ideas.
- Give the student a chance to reflect on what is known.
- Allow the student to construct mathematics for him or herself.
- Help the student keep his or her thoughts organized.
- Help address the issue of math anxiety.

The journal writing can also have several attributes; here are some prompts that address three types of these attributes (NIE, 2010).

When we decide to use journal writing in math lessons, we must follow some guidance (Russell, 2010), such as:

- * Applying journal writing should be at the end of a math exercise.
- * Journal writing should be in a separate book.
- * The math journal entries should take no more than 5-7 minutes.
- * Journal writing can be done with children and adults.
- * Journal writing should not be done

daily, it's better to use it with new concepts and mathematical problem solving.

* Journal writing takes time to learn. It is an entry of the mathematical thinking processes, and there's no right or wrong way of thinking, so we must be patient. Urquhart (2009) abbreviated the importance of using journal writing in mathematics teaching, he wrote: "Writing in mathematics gives me a window into my students' thoughts that I don't normally get when they just compute problems. It shows me their roadblocks, and it also gives me, as a teacher, a road map", (P. 3).

To assess students' journal writing, teacher must be very obvious and more reliable with students, by introducing scoring rubrics for the journals that students will write, before they begin writing. The rubrics may have more than one criterion; each of them has several levels, discriminating between quality of students doing.

The attribute	Some prompts to address the attribute
Affective or Attitudinal (How do you feel?)	<ul style="list-style-type: none"> • People use math to... because... • My best kept secret about math is ... • If math could be a color (shape, sound) it would be ... because...
Mathematical content (What is it about?)	<ul style="list-style-type: none"> • The difference between... is... because... • How would you describe a ... • What patterns do you notice in ... • Why can zero not be divided?
Process (Explain how!)	<ul style="list-style-type: none"> • The important idea of today's lesson was... because... • Find something that you learned today that is similar to something you already knew. • You know several ways to ... Which method is you favorite? Why?

RESEARCH IMPORTANCE:

-The use of journal writing will enhance what teachers tend to reach, namely, by directing their attention toward introducing the facilitation of students understanding and conceptualization of mathematics.

-The use of journal writing gives the teacher an alternative assessment method to measure students' performance in a real situation.

-This study is considered as one of the few studies in the Arab world that examines the effect of using journal writing in enhancing students' achievement in anxiety and attitudes toward math.

RESEARCH PROBLEM:

The current study used the written communication skill (journal writing), because the researcher wanted to examine student's ideas, thoughts, and beliefs, through giving the student longer time to edit and revise his ideas before sending them to the receiver, which is not available in the oral communication, which requires direct responses. The use of journal writing makes the students become fluent in the language of mathematics, and this may affect their understanding of the mathematical ideas and knowledge, because the student will be asked to write from his mind whatever he comments about the achievement of knowledge and about the situations and conditions surrounded the teaching and learning process, which may have made his learning,

easily or hardly happened.

The use of journal writing in teaching and learning mathematics requires from the student to examine and organize his ideas, which may reflect on his achievement level of math, and when the student uses journal writing he will take the enough time to respond, which may give him the feeling of working better, reduces his anxiety, and affects on his attitudes toward mathematics.

So, the current study concern and aim was to examine the effect of using journal writing on ninth graders achievement, anxiety and their attitudes toward mathematics. The ninth graders were chose to be the sample of the study, because in this stage of studying, the student can easily assess the learning process, and he can give an obvious picture about what happened in the classroom, academically and emotionally.

Specifically, this study tried to answer the following general question:

Does using journal writing in teaching mathematics affect ninth graders achievement in, and anxiety in, and attitudes toward mathematics?

The current study aimed at testing the following hypotheses:

1-There are no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and control group (which was taught traditionally) on the achievement test.

2-There are no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and control

group (which was taught traditionally) on an anxiety test.

3-There are no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and control group (which was taught traditionally) on an attitude test.

PROCEDURAL DEFINITIONS:

-Journal writing: it is an assessment tool that, teacher uses it through the assessment process, which requires from the student to write how he thinks and plans to solve the problem that faces him.

-Achievement in mathematics: it is the knowledge, understanding, and skills that student exquisite as a result of a specific educational experience. The achievement is measured by the students mark on the achievement test, which is developed by the researcher to be applied in this study.

-Anxiety in mathematics: it is a comprehensive and continuous feeling of tension when treating with problems solving, which relates to the daily life. The anxiety is measured by the students mark on the anxiety test, which is applied in this study.

-Attitudes toward mathematics: are trends qualifying a student to response to things he likes or dislikes in mathematics, in a specific psychological patterns. The attitudes are measured by the students mark on the attitude test, which is applied in this study.

-Ninth-graders: students age 14-16 years, who were in the ninth grade in the scholastic year 2010/2011.

LIMITATIONS OF THE STUDY:

-Instruments of the study were developed and translated by the researcher, so the interpretation of the results depends on the validity and reliability of these instruments. Despite the researcher verification from these psychometric characteristics.

-The research was applied to UNRWA schools in South Amman area, and this makes the generalization of results specified to study community or a similar community.

-The research was applied to ninth graders, and this limits the generalization of results to other grades.

LITERATURE REVIEW:

Dorofee (1995) conducted a study that aimed to measure the achievement of mathematics class through the use of journal writing. The sample of the study consisted of twenty-seven college level students; eighteen students represented the experimental group which kept a journal on various mathematics topics. The control group consisted of nine students and they did not keep a journal. It was concluded that there was no significant change in the mean level of achievement between the experimental group and the control group.

Jurdak & Abu Zein (1998) investigated the effect of journal writing on achievement in and attitudes toward mathematics. Subjects of the study were selected from first intermediate students (11-13 years). The journal-writing (JW) group received the same mathematics instruc-

tion as the no-journal-writing (NJW) group, except that the JW group engaged in prompted journal writing for 7 to 10 minutes at the end of each class period, three times a week, for 12 weeks. The results of ANCOVA suggest that journal writing has a positive impact on conceptual understanding, procedural knowledge, and mathematical communication but not on problem solving, school mathematics achievement, and attitudes toward mathematics. Student responses to a questionnaire indicated that students found journal writing to have both cognitive and affective benefits.

Al-Ali (2001) measured the extent of (418) tenth graders acquisition of mathematical communication skills in Irbid area in Jordan. The results revealed that the performance was low, and (74%) of the sample scored less than 50% of the test mark, and the performance of reading was better than the performance in translation and explanation.

To test the effectiveness of journal writing in mathematics classes, Pugalee (2004) created two groups of 10 students with equivalent abilities in mathematics and language arts. Over a six-day period, the two groups of 10 students were exposed to each problem. One group was asked to respond to one of the questions using written problem solving, and the other was asked to use verbal problem solving. The results of the study indicated that the writing group made significantly fewer procedural errors and also came up with the correct answer at significantly greater levels. In a study aimed to determine if the use of journal writing reduced

feelings of math anxiety in students and improved their attitudes toward the subject, Mavis (2005) selected Seventy-three tenth and eleventh grade students enrolled in a rural Midwest school to participate in the study. The students wrote daily in math journals for a six-week time period. The results of an attitudinal survey showed decreased levels of math anxiety; however, there was no evidence to support an improvement in student attitudes toward math.

In a qualitative research, Hashash (2004) observed the communication skills of (10) eighth and ninth graders in learning mathematics, and he analyzed students' documents, such as: abstract writings, and exam papers. The results revealed that there was no accuracy in verbal and nonverbal expressions.

Lim & Pugalee (2005) conducted an action research study in a grade 10 class to examine the effect of journal writing on Students' understanding of mathematics and attitudes toward mathematics. Findings of the study indicated that students' mathematical understanding improved through exposure to the various writing genres, and it revealed improved attitudes to learning mathematics. In an action research study of sixth grade mathematics,

Walz (2008) investigated how the use of written journals facilitates the learning of mathematics for students. Findings of the study revealed that students are more likely to explain their thoughts in-depth and go beyond the traditional basic steps to arrive at a solution. This suggests the value of integrating journal writing in a math curriculum as it can facilitate classroom discussion

from the students' written work. The result of some studies, which have been reviewed, revealed that using journal writing in teaching and learning mathematics gives good results and positive impact on achievement (Pugalee, 2004; Lim & Pugalee, 2005 & Walz, 2008), meanwhile some studies revealed no significant effect of using journal writing in math achievement (Dorofee, 1995 & Jurdak & Abu Zein, 1998). According to math anxiety, Mavis (2005) study revealed reducing math anxiety when using journal writing in teaching and learning math. According to attitudes toward mathematics, Lim & Pugalee's (2005) study revealed improvement of attitudes toward mathematics when using journal writing; meanwhile Jurdak & Abu Zein's (1998) & Mavis' (2005) studies revealed no significant effect of using journal writing to improve students attitudes toward mathematics. The previous studies revealed various and dissimilar results, which give the opportunity to re-examine the effect of using journal writing in students achievement and anxiety and attitudes toward mathematics.

METHODOLOGY AND PROCEDURES: STUDY SAMPLE:

The community of the study consisted of all ninth graders at UNRWA schools South Amman area, in the scholastic year 2010/2011. The sample of the study consisted of two sections from Attalibia School, which is randomly assigned from South Amman area schools. One section was selected randomly as an experimental group, which was taught by using journal writing, and the other section was selected as a control group, which was taught by the traditional method.

To verify that the two groups (experimental and control) are equivalent, students final marks in mathematics in the first exam of the scholastic year 2010/ 2011 were accredited, pre-test of anxiety and attitudes were applied, and t-test was used for analyzing the data. Table (1) shows t-test results. Table (1) reveals that t values of the pre- test had no statically significant effect on the significant level 0.05, and this means that the two groups: (experimental and control) are equivalent in achievement in, anxiety in and attitudes toward mathematics.

**TABLE (1)
T-TEST RESULTS FOR COMPARING BETWEEN THE EXPERIMENTAL
AND CONTROL GROUPS ON THE PRE- TEST**

Pre- test	Group	Number of students	Mean	Std. dev.	t- value	Sig.
achievement	Experimental	34	135.59	33.28	-0.089	0.929
	control	36	136.22	25.99		
Anxiety	Experimental	34	15.47	2.569	1.029	0.307
	control	36	14.89	2.169		

attitudes	Experi- mental	34	16.35	3.849	0.265	0.792
	control	36	16.14	2.889		

STUDY INSTRUMENTS: JOURNAL WRITINGS

During the period of the research application, students were asked to fill in journal writings, about several aspects related to the teaching and learning process, such as: journal writings about students understanding of the mathematical ideas and knowledge, about the learning process, and about the difficulties of learning the subject.

The students were also, asked to write journals about his attitudes and feelings about learning, such as: what were the interesting things in today's lesson? What are the reasons that made you like/ dislike today's lesson? ...

The filling of journal varies, according to the learning process, some of them were at the beginning of the lesson, about the previous students knowledge of the new subject (Appendix A), some of the journals at the end of the lesson, about the achieved knowledge and the students impression about the lesson, some of the journal were filled in the classroom, and others were filled at home. Students works were checked by the teacher, and notes about students writings were taken, some of these notes gave the teacher in assessing the teaching and learning process, which helped him to modify his teaching decision, according to students notes and impressions, so the journal writings supplies the teacher of things he did not see it in the classroom.

The teacher of the experimental group concurred with the researcher before the beginning of the application. The was trained how to apply a journal writing assignment in the classroom, by giving him instructions about the period of the task, the time of application during the teaching process, the post treatment with students works.

THE ACHIEVEMENT TEST:

Depending on content analysis, an achievement test was constructed, related to the mathematical knowledge taught in unit "Analytic Geometry", from the ninth grade mathematics curriculum in the scholastic year 2010/2011. The test was out of 30 marks, and it consisted of 30 multiple choice items, covering the mathematical knowledge in the three levels: procedural knowledge, conceptual knowledge, and problem solving. Here are examples of the test items in the three levels:

* Procedural knowledge:

If X (2, 3), Y (5, -1) are two points in the level, then the distance between X and Y is:

- a) 4 b) 5
c) 6 d) 7

* Conceptual knowledge:

If X-intercept of the line equals 4, then the line passes through the point:

- a) Z (0, 4) b) Z (0, -4)
c) Z (4, 0) d) Z (-4, 0)

*** Problem Solving:**

If X (3, 5), Y (6, 2) are two points, and the lines XZ, YZ intersect in the point Z and the slope of XZ = 1 and the slope of YZ = 2, then the coordinates of the point Z are:

- a)(12, 14) b)(12, -14)
c)(-12, 14) d)(-12, -14)

After the completion of the workout of the achievement test, it was given to a panel of judges to give notes about the validity of the items and the overall test. These notes were taken into consideration, and the corrections were made.

To establish the reliability of the achievement test, it was applied to 30 students; and by using alpha (KR-20) method, it was found that the reliability coefficient for the overall test was (0.89) which is an accepted value for the research purposes.

THE ANXIETY TEST:

Depending on the anxiety test (Appendix B), which developed by (Mavis, 2005), it was translated to Arabic language (the language that students learn in Jordan). The test was given to a panel of judges, who suggests some notes about translation, and these notes were taken in consideration.

To establish the reliability of the anxiety test, it was applied to 30 students, a reverse scoring was made to the negatively phrased items of the test, and by using a Internal Consistency method, it was found that the correlation coefficient of the whole test (α) equals (0.85), and the correlation coefficients between items of the test were between

(0.78- 0.89) which were an accepted values for the research purposes.

THE ATTITUDE TEST:

Depending on the attitude test (Appendix C), which developed by (Mavis, 2005), it was translated to Arabic language (the language that students learn in Jordan). The test was given to a panel of judges, who suggests some notes about translation, and these notes were taken in consideration.

To establish the reliability of the attitude test, it was applied to 30 students, a reverse scoring was made to the negatively phrased items of the test, and by using a Internal Consistency method, it was found that the correlation coefficient of the whole test (α) equals (0.87), and the correlation coefficients between items of the test were between (0.81- 0.91) which were an accepted values for the research purpose

STUDY PROCEDURES:

-An anxiety and attitude pre-tests were applied to the experimental and control group, to ensure that the two groups were equivalent.

-The experimental-group teacher who participated in the application of the study was trained in how to use journal writing in teaching.

-The experimental group was taught the unit "Analytic Geometry" by using journal writing in assessment, during the research period, which spanned four weeks. Meanwhile, the control group was taught by traditional method

of assessment during this period of application.

-An achievement, anxiety, and attitudes post-tests were applied to the two groups, and the results of the tests were analyzed by using SPSS program to test the hypotheses of the study.

STUDY VARIABLES:

1- Independent variable: "treatment": It has two levels (experimental, control).

2- Dependent variables:

- a) Achievement in mathematics.
- b) Anxiety in mathematics.
- c) Attitudes toward mathematics.

STATISTICAL TREATMENT:

To test the hypotheses of the study, means and standard deviations were computed to students' marks on the achievement, anxiety, and attitudes tests. MANOVA was used to compare between the means of the groups.

STUDY RESULTS AND DISCUSSION:

To examine the hypotheses of the study, means and standard deviations of students' responses to the three post-tests were computed in table (2).

TABLE (2)
MEANS AND STANDARD DEVIATIONS OF THE TWO GROUPS,
RESPONSES ON THE THREE POST- TESTS

Post- test	Group	Number of students	Mean	Std. dev.
Achievement	Experimental	34	22.29	4.75
	control	36	19.19	4.37
Anxiety	Experimental	34	14.85	2.39
	Control	36	14.61	2.54
Attitudes	Experimental	34	17.38	3.84
	control	36	16.64	3.24

And MANOVA was used to compare between the means of the two groups in the three post-tests.

TABLE (3)
MANOVA RESULTS FOR COMPARISON OF THE TWO GROUPS,
RESPONSES ON THE THREE POST- TESTS

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
GROUP	Achievement	168.002	1	168.002	8.087	0.006*
	Anxiety	1.023	1	1.023	.168	0.684
	Attitudes	9.665	1	9.665	.769	0.384

Error	Achievement	1412.698	68	20.775		
	Anxiety	414.820	68	6.100		
	Attitudes	854.335	68	12.564		
Corrected Total	Achievement	1580.700	69			
	Anxiety	415.843	69			
	Attitudes	864.000	69			

* Indicant on the significant level ($\alpha=0.05$)

1) RESULTS RELATED TO THE ACHIEVEMENT:

To examine the hypothesis: "There is no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and the control group (which was taught traditionally) on the achievement test", Table (3) revealed that there were statistically significant differences between the means of the two groups. Since the significant level of (f-value) is (0.006). Restitution to table (2), and comparing the means of the groups, the mean of the experimental group (22.29) was greater than the mean of the control group (19.19), and this means that the experimental group was better than the control group, and this result interprets the rejection of the first hypothesis.

This result seems to be a logical result, since mathematics teaching and learning requires giving attention toward the language of mathematics, which makes the student able to manipulate mathematical symbols, and feels at ease in reading, speaking, and writing the language. Moreover, when using journal

writing, we not only gave students with different learning styles and different ways to see the problem, but we also gave them an extra time they might require for learning.

In addition, when teachers use journal writing, they can assess students' misunderstandings by observing their language, which is a good alternative assessment method to develop students' conceptual understanding and increases their achievement levels.

On the other hand, journal writing may help teachers gain great insight into their students learning teacher can realizes students' knowledge, their limitations and how they express their thinking by reading their writings; Therefore, teachers may took this information and improved their instructional practices and helped them make changes to help students by changing some of their teaching methods.

The result of the current study about the effect of using journal writing in math achievement, agreed with the studies of (Pugalee, 2004; Lim & Pugalee, 2005 & Walz, 2008), meanwhile it contradicted the studies of (Dorofee, 1995 & Jurdak & Abu Zein, 1998).

2) RESULTS RELATED TO AN ANXIETY:

To examine the hypothesis: "There are no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and control group (which was taught traditionally) on an anxiety test". Table (3) revealed that there were no statistically significant differences between the means of the two groups, since the significant level of (f-value) is (0.684), and this result interprets the acceptance of the second hypothesis. This result may be logical result, since the problem of mathematics learning is a psychological problem, because mathematics is as a game, most of it is correlated with self confidence, and the least is correlated with self competency in doing the task.

Also the anxiety of math is an ordinary case, it happens for the student regardless to his achievement level, because each student of different achievement level will try to improve his learning and gain higher marks. The result of the current study about the effect of using journal writing in math anxiety, contradicted, the study of (Mavis, 2005).

3) RESULTS RELATED TO THE ATTITUDES:

To examine the hypothesis: "There are no statistically significant difference at a significance level ($\alpha=0.05$) between mean scores of the experimental group (which was taught by using journal writing), and control group (which was taught traditionally) on an attitude test",

Table (3) revealed that there were no statistically significant differences between the means of the two groups, since the significant level of (f-value) is (0.384), and this result interprets the acceptance of the third hypothesis.

This result can be clarified by looking for objectives in math teaching, teachers concentrate on it, which is in dominant, acknowledgment objectives, meanwhile, behavioral and emotional objectives are rarely objectives, so the student learn mathematics as an isolated subject, in separation of its importance and its role in real life, which may cause little effect of the attitudes toward mathematics.

The result of the current study about the effect of using journal writing in math attitudes, agrees with the studies of (Jurdak & Abu Zein, 1998 & Mavis, 2005), meanwhile it contradicts the study of (Lim & Pugalee, 2005)

RECOMMENDATIONS:

According to the results of the current study, which revealed that there was an efficiency of using journal writing in improving students' achievement in mathematics, and no efficiency of using journal writing in reducing math anxiety or improving attitudes toward mathematics, the following can be recommended:

1-Using journal writing in teaching and learning mathematics, especially in the middle basic grades.

2-Training math teachers on using journal writing as an alternative method of students' performance assessment.

3-Conducting other researches to examine the effect of journal writing in math anxiety and attitudes toward math, on samples of other grades and other studious communities

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Appendix A: Journal writing at the beginning of the unit:

* Write reflectively, in answering the following questions:

1) What are the difficulties that faced you in learning geometry?

2) What do you know about analytic geometry?

3) By giving examples, what is the meaning of the following?

a) Point in the level:

b) Line in the level:

Appendix B: Math Anxiety

1. My mind goes blank and I am unable to think clearly when working in mathematics.

2. I think I could handle more difficult mathematics.

3. Math is one of my favorite subjects.

4. I get nervous thinking about an upcoming math test.

5. I generally feel confident and at ease in math class.

6. It wouldn't bother me at all to take more math courses.

7. I only enroll in the math courses I am required to take.

8. I am not the type of person who does well in math class.

Appendix C: Math Attitude

1. Mathematics is about inventing new ideas.
2. I see math as a subject I will rarely use.
3. When solving math problems, I am willing to try a different approach when my attempt fails.
4. Mathematics is a collection of facts and procedures to be remembered.
5. I will use math in many ways as an adult.
6. I give up fairly easily when working on a difficult math problem.
7. I am interested in learning about math.
8. I feel confident using math to solve problems.