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Scientific Research Skills Training Needs for Faculty Members at Mathematics Departments at the University of Benghazi

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Abstract

The aim of this study is to identify the training needs in the field of scientific research skills for faculty members in the mathematics departments of the Faculties of Science and Education at the University of Benghazi. In addition, the study aimed to examine possible statistical differences in the responses of sample members regarding their training needs for scientific research skills according to variables such as gender, academic rank, specialization, and years of experience. The study used the descriptive analytical method, and a stratified sample of 68 faculty members from the University of Benghazi, Libya, was selected during the fall semester of the academic year 2023/2024.To collect data, a questionnaire consisting of (33) items was developed. The results showed a high level of training needs among faculty members in the mathematics departments at the University of Benghazi in the field of scientific research skills. Moreover, the results indicated that there were no statistically significant differences, at a significance level of ($\alpha \geq 0.05$), in faculty members' responses based on variables such as gender, academic qualification, academic rank, and professional experience. By conducting this research, valuable insights were obtained regarding the training requirements for scientific research skills among faculty members in the mathematics departments at the University of Benghazi. These results contribute to enhancing professional development programs for faculty members in pursuit of excellence in scientific research.

Keywords: Mathematics faculty, training needs, professional development, mathematics education, scientific research skills.

1 Introduction

Research is essential for social growth as well as university advancement and could act as the criterion for universities' ranking on an international level (Hoa, Huy, Van Trung, 2021). Thus, it is imperative for the higher education institutions to make changes to the scientific research process to improve its position on the international scene and to follow changes that take place in other countries (Ha et al., 2021, Ha et al., 2021). In the research, definition given by Al-Kilani and Al-Sharifin (2005) was used where scientific research skills refer to a number of abilities and competencies researched need to undertake research effectively. Some of the skills include the identification and definition of research issues, formulation of research questions and hypotheses, identification of relevant variables, procedural definition of terms, sampling procedures development of research instruments, analysis of results, discussion of results and interpretation of results as well as proper acknowledgment through citations and references. Training can also be specifically on issues to do with research integrity, plagiarism, problem solving for ethical dilemmas, and decision making processes (Brown & Johnson, 2017). These skills are important stated the as it is an organized method for discovering facts, verifying ancient facts and knowledge the relations that bind them or the laws governing which facilitate the solution of social and economic and other problems, using logical scientific approaches that is Al-Farijat, (2011).

However, there are many challenges confronting faculty members in scientific research skills, such as; a shortage of research methods (Al-Jadry & Abu Al-Helou, 2009); violation of scientific responsibility (Morrissey, 2008); inadequate funding for research and scientific projects, difficulties in accessing resources, and transforming the findings of the research into outcomes that can effectively serve society's needs (Al-Khalili, 2019); To fulfil the needs of the faculty members to obtain diverse skills, it becomes pertinent to provide training and development to uplift their research skill, teaching capacity and their engagement with the society (Dragicevic & Anderson, 2019). As noted by Andronescu and Solomon (2010 ''Training needs, therefore, mean the alterations in knowledge, skills, perceptions or past practice that an employee needs to acquire to meet up with the current requirements of the position of his or her job description." It is for this reason that it is important to identify the need of these professionals in order for any training effort to be effective (Haesner et al., 2015). Training needs can be classified into two categories: focused needs, which entails applied knowledge and skill deficiency at individual or group level and diffuse needs which involve a large population which requires improved knowledge and skill (Laird, 2010).

A training needs assessment involves a collection of information aimed at various aspects: defining the target group, identifying course content, budgeting and focusing on identified performance deficiencies (Clark, 2003). This is done in a scientific methodological study as advanced by Laird (2010). Tai (2006) observed that the assessment of training needs forms the core of every training development process. A number of researchers have underlined the need for the identification of the training requirements of the faculty members that serve in universities and the training them to improve their scientific research capacities and skills. Some of these are (Bukhamada, Al-Maqarhi, 2023; Saleh, 2021; Al-Fadali, 2020; Mugahed, 2020; Al-Baraki, 2019; Abdul-Rahman, 2019; Al-Asmari, 2019; Muhammad, Al-Faqih, 2015; Al-Twaiji, 2018; Barhoum, 2017; Al-Otaibi, 2015; Chertil, 2015; Al-Arifi, 2016).

The formal knowledge claim in the field of mathematics is that improving scientific research skills for/file path faculty members improves personal skills and impacts performance and student learning (Taher 2019). A lot of research has been done to establish which particular areas the faculty needs to be trained/informed in, in order to help them to improve their scientific research output in mathematics (Taher, 2023; Taher, 2019; Al-Maliki, Abdul Malik, bin Misfer, 2010; Lamanauskas & Eugenie, 2009; Gupta et al. 2006). Thus, identifying the needs of training mathematics faculty members is vital for improving these participant's functions in the educational process (Barakat, 2010). Accordingly, the purpose of this study is to assess the training requirements of scientific research skills needed for the faculty members in the mathematics departments of the University of Benghazi. In this regard, by identifying these needs, the study aims to be informative to design training programs in areas where the faculty members may require to improve on their scientific research skills.

In the field of mathematics, it is necessary that improving faculty members' scientific research skills promotes their personal skill development, which in turn affects students' performance and learning outcomes (Taher, 2019). Many academic studies have been conducted to identify the specific areas in which teachers need knowledge to improve their performance in scientific research in mathematics (Taher, 2023; Taher, 2019; Al-Maliki, Abdul Malik, bin Misfer, 2010; Malik ; Lamanauskas and Eugenie, 2009; Therefore, determining what type of training mathematics teachers need is crucial to improving their role in the classroom (Barakat, 2010). , which is required for faculty members in the mathematics departments at the University of Benghazi to have the competencies necessary to conduct scientific research. In this context, by presenting these requirements, the study hopes to provide insightful information for the creation of training courses aimed at Target the areas in which faculty members may need to improve their skills related to scholarly research.

1.1 The study problem

The objective of this current study is thus to assess the requisite of scientific research skill's training for the faculty staff in the mathematics department in the science and education college of Benghazi University. This scholar, after searching the literature, has not been able to find any such studies done, known to him or her, on these three skills in academics in mathematics departments in Libya. Therefore, this study aims at addressing such a problem to determine the training needs necessary for the scientific research skills needs by assisting the faculty member in the mathematics departments of the University of Benghazi to overcome the challenges

facing them while conducting their research. It means simple research skills including writing, research method, types of data analysis and scientific publishing. And as the researcher himself realised that establishing the research training needs of faculty members in mathematics at the University of Benghazi enhances the researcher's professional growth and develops market research (Outcome 5).

1.2 The study questions

1. What are the degree of scientific research skills training needs for faculty members in mathematics departments at the University of Benghazi?
2. Are there any statistically significant differences, at a significance level of ($\alpha \geq 0.05$), in the responses of faculty members in mathematics departments at the University of Benghazi based on demographic variables such as (gender, academic qualification, academic rank and professional experience)?

1.3 The study assumption

The following hypothesis emerged from the study questions: There are no statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of faculty members in mathematics departments at the University of Benghazi based on demographic variables such as (gender, academic qualification, academic rank and professional experience).

1.4 Significance of the study

The importance of this study could be underscored by the fact that, as far as the author of the research are aware, no study has been carried out to establish the training requirements of academic staff in the Mathematics Departments of the Faculties of Science and Education at Benghazi University. The identification of training needs is a research area that has received much attention in the past, and hence the current research seeks to fill the research gap definitely identified in the Faculty of Education in the Benghazi region. The recommendations as proposed in this study may be useful guideline for the policymakers and administrators of Benghazi University for the development of suitable training activities intended to improve the research performance of faculty members of mathematics departments. However, it is also true that these findings may be of interest for other departments of mathematics in Libya and may help Benghazi University's colleagues in other departments faced with similar difficulties improving their scientific research competencies. Furthermore, this research could help the faculty members increase involvement into training programs even more, fill the perceived research knowledge gaps, and attempt to eliminate them.

1.5 Study objectives

The study aims to achieve the following objectives:

1. Identify the degree of the training needs of faculty members in mathematics departments at the University of Benghazi in Libya regarding scientific research skills.
2. Examine whether there are statistically significant differences in the responses of faculty members in mathematics departments at the University of Benghazi based on demographic variables, including gender, place of work, academic qualification, academic rank, specialization, and professional experience.

1.6 Delimitations of the Study

- Objective limitations: The scope of this study was restricted to research training skills needs for faculty members at mathematics departments at the University of Benghazi
- Human Limitations: This study was limited to faculty members specializing in mathematics or statistics within the mathematics departments at the University of Benghazi, specifically within the College of Science and Education.

- Spatial boundaries: This study was limited to College of Science and Education at the University of Benghazi
- Time limits: Data collection for this study took place during the fall semester of the academic year 2023/2024.

1.7 Terminology of the Study

- **Scientific research skills** are defined as the set of skills that are applied in the process of conducting scientific research and include problem solving, hypothesis formation, data analysis, accurate writing and critical thinking in a logically progressive manner, as postulated by Al-Muqbil (2012). Within the context of this study, scientific research skills are defined as core competencies that the faculty members within mathematics departments at the University of Benghazi need to possess in order to conduct scientific research in their specialization. These skills cut across several dimensions, for instance, in the context of defining research topics, recognizing research issues, advocating for research questions, incorporating hypothesis formation and setting the scope of existing research. They also should be able to conduct literature reviews, choose research sources and samples, define research means, determine the terms, comply with documentation requirements in the texts as well as references and apply statistics in the context of research. Also, he/she should have the ability to organize, interpret, and discuss the result and write a clear and detailed research study, choose the right statistical test, present the research outcomes in both Arabic and English and publish the outcome within different scientific journals.
- **Training need** is the concept that refers to the needed change required within a person's knowledge, skills, belief system and experience to be able to successfully undertake the responsibilities that are expected of him or her at the place of work (Andronescu and Solomon, 2010). It seeks to target the areas where those people have gaps or are underperforming and supply them with the measures in the form of skills, knowledge and capacity to fulfill the expectations of that performance level. These needs are established with authentic techniques, such as observation, questionnaires, and tests to select appropriate training programs that meet those needs (Fink & Markholt, 2011). When used in this paper, training needs are the gaps in competencies as well as skills among faculty members in the mathematics departments of the faculties of science and education at the University of Benghazi especially in scientific research. The degree of training needs in this study is estimated using the responses of the sample participants in the paragraphs of the study instrument.
- **University of Benghazi**: It is recognized as the first Libyan university; it was founded in Benghazi in 1956.
- **Mathematics Departments:** It is the department that provides undergraduate or postgraduate degrees in mathematics. This department is part of the College of Science or College of Education at the University of Benghazi
- **Faculty Members**. Individuals who hold a specialized academic qualification in mathematics or statistics and who are entrusted with the task of teaching, scientific research and community service in the Department of Mathematics at the University of Benghazi.

2 Study Approach

The researcher analyzed the study question and objectives descriptively to determine the training needs in the area of Scientific research skills for mathematics academic staff members at the Faculties of Science and Education at the University of Benghazi. This approach was chosen based on the objectives of this study and the type of the study that was being conducted.

2.1 The study population and sample:

The study population of interest consisted of all faculty members who teach mathematics or statistics in the mathematics departments of the Faculties of Science and the Faculties of Education at the University of Benghazi during the fall semester of the 2023/2024 academic year, and their number reached (82). The study sample consisted of (68) faculty members, i.e. approximately (83%) of the total study population. The study sample was selected using a stratified random sampling method from the study population. Then the study sample members were distributed according to demographic variables as shown in (Table 1).

Table (1) The study population and sample

College name	Population	Sample
College of Arts and Sciences- Qamenis	6	5
College of Arts and Sciences- Al-Abyar	10	9
College of Arts and Sciences- Gallo	4	3
College of Arts and Sciences- AL-Kufra	6	5
College of Education Benghazi	11	9
College of Education, Al-Marj	6	5
College of Science Benghazi	23	19
College of Science, Al-Marj	16	13
Sum	82	68

2.2 Data collection instrument

In order to address the objectives of the study, the researcher developed a questionnaire that will help identify the research training needs of mathematics faculty members in the University of Benghazi. The questionnaire was designed with suggestions from prior studies in related fields. Consequently, the questionnaire was classified into two sections. The first part contained questions that regarded demographic data: gender, workplace, education levels, major, academic degree, years of experience. The second part at first consisted of (38) introductory paragraphs. The first draft of the questionnaire was shared with experienced professionals of the field and they also offered important remarks with regard to changes and exclusions to be made to the questionnaire. It was after this process that the final version of the questionnaire developed include (33) items. Surveys are given to faculty members to request their views and their training preferences using the five Likert choices check box.

2.3 Face validity

In order to check the validity of the research instruments, a ten experienced faculty members from the University of Benghazi was requested to go through the initial draft of the questionnaire used in the study and provided their feedback about the clarity of the paragraphs used in the questionnaire, the correctness of the language used in the questionnaire and the adequacy of the items used in the questionnaire to measure the objectives of the study. Appreciate the reviewer's comments and recommendations to say the least, those remarks in particular were taken into consideration. The remarks for any given paragraph were selected if they were more or less similar to each other else the particular section was subjected to certain modifications, reformulations, deletions or new additions. This process was done in an iterative manner with the hope of modifying the questionnaire on the scientific training required for the mathematics faculty members in enhancing the skills in scientific research. Therefore, the final version of the questionnaire was developed to include (33) items that define the scientific research skills training needs of the target population.

Internal consistency

Table 4 presents the internal consistency of all the variables that are involved in this study and show a high level of inter-item reliability. The results are presented for the examined constructs and reported in Table 2.

Table (2) Correlation Coefficients

Items	Correlation	Items	Correlation	Items	Correlation	Items	Correlation
(1)	.882**	(11)	.466**	(18)	.789**	(26)	.902**
(2)	.827**	(12)	.535**	(19)	.847**	(27)	.874**
(3)	.870**	(13)	.531**	(20)	.800**	(28)	.871**
(4)	.929**	(14)	.460*	(21)	.774**	(29)	.969**

(5)	.821**	(15)	.458*	(22)	.868**	(30)	.910**
(6)	.858**	(16)	.422*	(23)	.845**	(31)	.939**
(7)	.906**	(17)	.424*	(24)	.850**	(32)	.828**
(8)	.682**			(25)	.854**	(33)	.813**
(9)	.902**						
(10)	.906**						

.** Correlation is significant at the 0.01 level (2-tailed)
.* Correlation is significant at the 0.05 level (2-tailed)

2.4 The reliability of the study instrument

Test re-ability was obtained through the use of Cronbach's alpha coefficient. The study tool was completed by a sample of (30) academic staff of the University in the academic year 2023/2024. The alpha coefficient was computed at 0.980 as shown in table (3) above, this mean that the internal consistency among the 39 items in the study was high as considered acceptable for the purpose of the study.

Table (3) Reliability of the study instrument

Study topics	Items	The reliability
1	10	.960
2	7	.891
3	8	.932
4	8	.961
Sum	39	.980

2.5 Study variables

This study deals with the independent and dependent variables, which are as follows:

- The independent variables, which were represented in (gender, academic qualification, academic rank and professional experience) as shown in Table (4).
- The dependent variables, or the measured variables, represented in: scientific research skills training needs for faculty members at mathematics departments at the University of Benghazi

Table (4) Characteristics of the study sample

Variables	**Variable Levels**	**N**	**%**
Gender	Male	23	33.8
	Female	45	66.2
Academic qualification	Master's	49	72.1
	Doctorate	19	27.9
Academic degree	Assistant Lecturer	29	42.6
	Lecturer	25	36.8
	Assistant Professor	8	11.8
	Associate Professor	6	8.8
	Professor	-	-
Years of Experience	1-5 years	17	25.0
	6-10 years	26	38.2
	11-15 years	8	11.8
	16 years and above	17	25.0

2.6 Statistical Analysis

To achieve the objectives of the study, data were analyzed using Statistical Package for Social Sciences (SPSS), and the following statistical methods were used

- The Alpha- Cronbach coefficient was used to verify the stability of the study scales.
- The arithmetic means and standard deviations of respondents were computed the first research question
- Mann-Whitney U Test was used to reveal the presence of statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of scientific research skills training needs for

faculty members at mathematics departments at the University of Benghazi due to (gender, academic qualification).

- Kruskal Wallis Test was used to reveal the presence of statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of scientific research skills training needs for faculty members at mathematics departments at the University of Benghazi due to (academic rank and professional experience).

2.7 Classification of responses

The participants' perspective was evaluated using standard values, which were presented in Table 5. These values were used as criteria for classifying responses into various levels.

Table (5) Standard to determine the level of responses

Response Level	Very Low	Low	Moderate	High	Very High
Mean Score	1-1.80	1.81- 2.60	2.61-3.40	3.41-4.20	4.21-5

3 Study Results

3.1 Results related to the first question: What are the degree of scientific research training needs for faculty members in mathematics departments at the University of Benghazi?

To answer this question, the arithmetic means, standard deviations and the degree were calculated for the items on the scientific research skills training needs for faculty members at mathematics departments at the University of Benghazi, and Table (6) shows this.

Table (6) means, standard deviations for the scientific research skills training needs

Factors	Means	Standard deviations	Degree
Training Needs in Scientific Writing Skills	4.04	.735	High
Training Needs in Scientific Research Methodology	4.15	1.217	High
Training Needs in Statistics, Analysis, and Report Writing	4.14	.744	High
Training Needs in Publishing and Documentation	4.16	.651	High

Table 6 reveals a significant level of interest among faculty members in the Mathematics departments at the University of Benghazi regarding training programs that encompass all aspects of scientific research competencies. Their mean ratings ranged from 4.04 to 4.16, indicating a strong desire to enhance their scientific research skills and improve the quality of their research outcomes. This interest can be attributed to the faculty members' recognition of the crucial role that proper scientific research conduct plays in their professional development and career advancement.

This paper demonstrates that the production of scientific research papers in specialized disciplines is positively correlated to the promotion of faculty members. When students write their graduate theses and employ a proper research technique, the skills of faculty members' and their publications in peer reviewed-journals become significant factors. This finding aliens with previous researches (Bukhamada & Al-Megarih, 2023; Al-Fadali, 2020; Mugahed, 2020; Al-Anezi, 2019; AbdelRahman, 2019; Yousif et al., 2019) regarding the modern research experiences of faculty members and their enthusiasm for enhancing research competences. This enthusiasm underscores the critical role that scientific work play in professional development. However, these findings contrast with those of Al-Badarneh, Homaidat, and Al-Salaheen (2018) and Al-Baraki (2019) which revealed that respondents expressed moderate need for practicum placement training in research skills. Arithmetic means and standard deviations were employed in this study to assess the primly training needs for scientific research skills within the mathematics department, Benghazi University, particularly in the aforementioned dimensions.

First: Training Needs in Scientific Writing Skills

Table (7) Means and Standard Deviations for Training Needs in Scientific Writing Skills

	Items	Mean	Std. Deviation	Rank
1.	How to gather relevant information on the study topic from various scientific sources.	3.96	1.071	High
2.	How to select an appropriate topic and write an introduction to the research plan.	3.97	.977	High
3.	How to formulate the research problem and its justifications.	4.00	1.037	High
4.	How to formulate research questions, hypotheses, and objectives.	4.09	.942	High
5.	How to write the scope of the research and define its terms.	3.96	.921	High
6.	How to emphasize the theoretical and practical significance of the research.	4.07	.869	High
7.	How to write a literature review related to the study topic.	4.10	.883	High
8.	How to develop analytical and critical thinking skills to gain a deeper understanding of data and results, critically evaluate information and evidence, and draw accurate conclusions.	4.19	.902	High
9.	How to write the theoretical framework.	3.97	.863	High
10.	How to write an abstract.	4.10	.849	High
	Sum	4.04	.735	High

As indicated in Table 7, the high arithmetic mean, ranging from 3.96 to 4.19, suggests that faculty members in the Mathematics Department at the University of Benghazi are in urgent need of training and skill development in various aspects of scientific writing. The relatively low standard deviations, which range from 0.849 to 1.071, further indicate a consensus among faculty members regarding the importance of addressing these training needs. This study aligns with the findings of Al-Omari (2011) and Taher (2023), while differing from the research conducted by Nada (2013) and Alawnah and Salameh (2013), which suggested that the training needs in the field of scientific research were, to some extent, moderate. The researchers attribute this discrepancy to the understanding among mathematics faculty members that writing scientific articles is a specialized process requiring specific skills in structuring and presenting data and ideas, as well as conveying results in a clear and concise manner. Therefore, training is essential to achieve proficiency in these skills.

Second: Training Needs in Scientific Research Methodology

Table (8) Means and Standard Deviations for Training Needs in Scientific Research Methodology

	Items	Mean	Std. Deviation	Rank
1.	Understanding the methodologies and methods used in research and how to choose them.	4.12	.802	High
2.	Writing scientific research papers in various formats.	3.87	.731	High
3.	How to use appropriate tools for research.	4.03	.828	High
4.	Identifying the research population and selecting the research sample.	4.09	.926	High
5.	How to design questionnaires in educational research.	3.94	.944	High

6.	Writing research papers using LaTeX software.	3.96	.953	High
7.	Writing research papers using Microsoft Word software.	4.00	.914	High
	Sum	4.15	1.217	High

As indicated in Table 8, the high arithmetic means range from 3.87 to 4.12, provide a clear evidence that shows that the faculty members in mathematics department in the University of Benghazi lack training and skills in various aspects of research methodology in the sciences. The standard deviation which ranges from 0.731 to 0.953 suggests a consensus among the faculties regarding their training. This indicates that their understanding of scientific research methodology is at a moderate level (Taher, 2023; Nada, 2013; Alawnah & Salameh, 2013; Al-Omari, 2011). All respondents agreed that a fundamental understanding of research methodology, along with practical tools for conducting and executing research, is essential.

Third: Training Needs in Statistics, Analysis, and Report Writing

Table (9) means and standard deviations for training needs in statistics, analysis, and report writing

	Items	Mean	Std. Deviation	Rank
1.	How to choose and use appropriate statistical methods for data analysis.	4.06	.912	High
2.	How to analyze results, extract information, and establish connections between them.	4.22	.928	High
3.	Using software such as SPSS or other statistical analysis programs.	4.10	.883	High
4.	Using different mathematical software like MATLAB.	4.12	.873	High
5.	Presenting and organizing results in a clear manner.	4.19	.885	High
6.	Discussing and interpreting results based on logical scientific reasoning.	4.18	.897	High
7.	Comparing results and linking them to findings from previous studies.	4.12	.985	High
8.	Drawing recommendations based on research results.	4.06	.991	High
Sum		4.14	.744	High

Table 9 shows that all variables have high arithmetic means, ranging from 4.06 to 4.22. This suggests that faculty member in mathematics department at the university of Benghazi requires training and skill in statistical analysis and report writing.The lower standard deviations which range from 0.883 to 0.991 demonstrate that there is not much variation among faculties members regarding these training needs, consistent with studies such as (Taher, 2023; Nada, 2013; Alawnah & Salameh, 2013).The intensity or degree of training needs in the field of scientific research was found moderate. Educators understand that training in statistics equips them with the knowledge necessary to design a proper experiment, determine the suitable statistical tests, organize information, present data, write coherently, and interpret results correctly. This training improves the internal and external credibility of the findings of their research. Moreover, proficiency in statistical analysis prepares the faculty members to actively contribute to interdisciplinary studies and engage in research with practitioners from various disciplines.

Forth: Training Needs in Publishing and Documentation

Table (10) Means and Standard Deviations for Training Needs in Scientific Writing Skills

	Items	Mean	Std. Deviation	Rank
1.	Understanding different methods of documentation within the text and in reference writing.	4.16	.745	High
2.	Understanding the publication requirements of peer-reviewed scientific journals.	4.18	.772	High

3.	Knowledge of publication ethics.	4.28	.808	High
4.	Dealing with local and international electronic research sources in the specialized field.	4.31	.697	High
5.	Using libraries and digital resources in mathematics topics.	4.21	.783	High
6.	Extensive knowledge of journals and scientific publications in the field of mathematics.	4.18	.809	High
7.	Reference management software such as EndNote.	3.85	.885	High
8.	Understanding the ethics of scientific research.	4.29	.754	High
Sum		4.16	.651	High

The results presented in Table 10 indicate that the high arithmetic mean ranges from 3.85 to 4.31 suggests that faculty members in the mathematics department at the University of Benghazi have a significant need for training and skill development in various aspects of in statistics, analysis, and report writing. The relatively low standard deviations ranging from 0.697 to 0.885 indicate a consensus among faculty members regarding the importance of these training needs. This study contrasts with the research conducted by Taher (2023), Nada (2013), and Alawnah and Salameh (2013), which found that the training needs in the field of scientific research skills were at a moderate level. Publication training provides faculty on how to efficiently present research information. This includes identifying appropriate journals, writing papers, documenting research, understanding copyright and intellectual property, addressing various ethical issues in research, ensuring proper authorship, avoiding plagiarism, and adhering to general principles of integrity in scholarly work. Training in publishing also assist faculty members to reach a wider audience for their work therefore increasing the distribution of the work done. Therefore, they must be familiar with the publishing centres for scientific research to ensure that they can submit their work to peer-reviewed journals in accordance with specific guidelines and standards.

3.2 Normal distribution test

To ensure the normal distribution of the data, we examined it using the Kolmogorov-Smirnov, Shapiro - Wilk test as shown in Table 11.

Table (11) Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Gender	.423	68	.000	.597	68	.000
Academic Qualification	.452	68	.000	.562	68	.000
Academic Degree	.247	68	.000	.797	68	.000
Year Of Experience	.261	68	.000	.831	68	.000

Table 11 indicates that the p-values obtained from both the Smirnov test and the Shapiro-Wilk test for all study variables are below the predetermined level of significance ($\alpha = 0.05$). This indicates that the data collected from the study sample is not normally distributed, and therefore the researcher will employ non-parametric tests instead of parametric tests to evaluate the study hypotheses. The Mann-Whitney U Test was conducted based on the variable of (gender, academic qualification) and a Kruskal-Wallis H Test was conducted based on the variable of (academic rank and professional experience).

3.3 Results related to the second question, which states "Are there any statistically significant differences, at a significance level of ($\alpha \geq 0.05$), in the responses of faculty members in mathematics departments at the University of Benghazi based on demographic variables such as (gender, academic qualification).

To address this question, the following null hypothesis was formulated :There are no statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of faculty members in mathematics

departments at the University of Benghazi based on demographic variables such as gender, academic qualification. To test this hypothesis, a Mann-Whitney U Test was conducted as indicated in Table 12.

Table (12) Mann-Whitney U Test

Factors	Gender		Academic qualification	
	Mann-Whitney	Sig	Mann-Whitney	Sig
Training Needs in Scientific Writing Skills	356.500	.492	338.000	.410
Training Needs in Scientific Research Methodology	385.000	.813	375.000	.817
Training Needs in Statistics, Analysis, and Report Writing	396.000	.950	334.500	.378
Training Needs in Publishing and Documentation	309.500	.153	353.500	.565

Table 12 presents the results of the Mann-Whitney U test, which examined the relationship between different training needs and two factors: gender and academic qualification. The findings indicate that there are no statistically significant variances in training needs between genders in areas such as scientific writing skills, scientific research methodology, statistics, analysis, report writing, publishing, and documentation.This is consistent with studies by Al-Badarneh, Hamidat, and Al-Saleheen (2018), as well as studies by Barhoum (2017), Mohammed and Al-Faqih (2015), Nada (2013), and Al-Alauna and Salama (2013). However, this study contradicts the conclusion reached by Al-Baraki (2019), who indicated that females need more prior training than males. The researcher believes that these results indicate that there is equal training for all faculty members regardless of gender at the University of Benghazi. In addition, the study reveals no significant differences in training needs for scientific research skills based on the academic qualifications of the respondents in the areas of scientific writing, research methodology, statistical analysis, report writing, publishing, and documentation. This supports studies by Al-Badarneh, Hamidat, and Al-Saleheen (2018), Barham (2017), and Al-Alauna and Salama (2013), but the results contradict those of Al-Baraki (2019), who assumed that trainees with a master's degree need more training than those with a doctorate degree.
In other words, the human resources team at a university requires training programs for all faculty members, regardless of their gender or academic discipline, in the area of research to address the diverse performance needs of educators across different categories within their learning continuum.

3.4 Results related to the second question, which states "Are there any statistically significant differences, at a significance level of ($\alpha \geq 0.05$), in the responses of faculty members in mathematics departments at the University of Benghazi based on demographic variables such as (academic rank and professional experience).

To address this question, the following null hypothesis was formulated :There are no statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of faculty members in mathematics departments at the University of Benghazi based on demographic variables such as academic rank and professional experience. To test this hypothesis, a Kruskal-Wallis H Test was as indicated in Table 13.

Table (13) Kruskal-Wallis H

Factors	academic rank		professional experience	
	Kruskal-Wallis H	Sig	Kruskal-Wallis H	Sig
Training Needs in Scientific Writing Skills	2.475	.480	2.162	.539
Training Needs in Scientific Research Methodology	1.758	.624	4.804	.187
Training Needs in Statistics, Analysis, and Report Writing	1.607	.658	2.868	.412
Training Needs in Publishing and Documentation	4.763	.190	6.960	.073

Table 13 shows the results of the Kruskal-Wallis H test, which examined the relationship between various training needs and two factors: The factors include academic rank, and professional experience. The findings show that there is no significant difference between the respondent's response ($p > 0.05$) based on academic rank of the mathematics faculty members of the University of Benghazi. This study is consistent with the studies conducted by Al-Badarneh, Hamidat, and Al-Salahin (2018); Barhoum (2017); Mohammed and Al-

Faqih (2015); Al-Omari (2010); Nada (2013); and Al-Alauna and Salama (2013). The results indicate that there are no statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of faculty members in the Department of Mathematics at the University of Benghazi, based on academic rank. These results are consistent with those reported by Al-Badarneh, Hamidat, and Al-Salahin (2018); Barhoum (2017); Mohammed and Al-Faqih (2015); Al-Omari (2010); Nada (2013); and Al-Alauna and Salama (2013). Moreover, the results indicate that there are no statistically significant differences at the significance level ($\alpha \geq 0.05$) between the means of faculty members in the mathematics departments at the University of Benghazi based on years of experience. This study is consistent with the results of previous research conducted by Al-Badarneh, Hamidat, and Al-Salahin (2018); Barhoum (2017); Mohammed and Al-Faqih (2015); Al-Omari (2010); Nada (2013); and Al-Alauna and Salama (2013). In contrast, Al-Farhan's study (2012) identified statistically significant differences regarding the variable of professional experience, in favor of those with more experience.

Conclusion

The results showed a high level of training needs among faculty members in the Department of Mathematics at the University of Benghazi, especially in the field of scientific research skills, which confirms their keenness to improve their research capabilities. The results also indicated that there were no statistically significant differences at the significance level $\alpha \geq 0.05$ in faculty members' responses based on the variables of gender, academic qualification, academic rank, and professional experience, which indicates that training needs are similar among all faculty members in the Department of Mathematics. This similarity can be attributed to the fact that all faculty members in the Department of Mathematics have similar training needs, as they perform similar work within the same university, and adhere to the same systems and regulations, and therefore they need the same competencies for training, which ultimately enables them to achieve various promotions and leadership positions, as well as qualify for sabbatical leaves.

4 Recommendations.

Taking the results of the current study into consideration when designing training programs aimed at developing the scientific research skills of faculty members in the mathematics departments at the University of Benghazi is essential, particularly regarding their training needs. It is significant to participate in the provision of regular training programs to increase the research capacity of faculty members, which will be beneficial for promotions as well as for leadership training among them, enhancing their abilities to guide graduate students. Moreover, the university should incorporate these findings into its policy formulation to enhance the provision of resources for continuous professional development for faculty members.

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