

Science Teachers' Understanding of Science Passion in Jordanian Schools

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ABSTRACT

This study aimed at investigating the level of science teachers' understanding of the science passion in Jordan in the light of some variables (Experience and qualification), the population consisted of (460) science teachers' for the basic stages of government schools and the sample of the study consisted of (235) teachers' selected randomly; The study followed the quantitative descriptive approach and a test of 27-statement was applied. The results concluded that the mean of science teachers' understanding of science passion was weak, and there are no statistically significant differences regarding teachers' teaching experience and qualification.

Keywords: science passion, science teachers, domain, Jordanian Schools.

INTRODUCTION

Educational research is concerned with the learner's brain, perceptions, past experiences and learning pattern. Teaching science also aims to provide learners with the practical and mental scientific skills that make them the owners of a balanced intellectual and scientific system (Khataybeh, 2011).

In order to achieve the goals of effective and contemporary teaching in science, the learner's attitudes towards school, activities, achievement, thinking and creativity must be improved, and passion is one of the important index that a student must possess (Vallerand & Honlfort, 2003). Passion is a strong motivation for a particular behaviour or activity, a sense of enthusiasm and dedication towards an object or concept, and leads to regular investment of time and energy (Vallerand, 2016).

The concept of passion is closely linked to learning and the experience of new ideas, enthusiasm and interest, which are essential features of effective teaching. And when the passion is compatible with learning, the feeling of difficulty will disappear and the learner will feel pleasant while spending more hours learning. The difference between learning with or without passion will be clear. Moreover, passion provides students with sufficient energy to overcome the various obstacles they face, whether real or imaginative. There will therefore be increased self-confidence and courage to express their thoughts and opinions (Oslo, 2003).

Vallerand and his colleagues are among the first researchers to study passion (Vallerand et al., 2003) in the context of education so that academic passion from their perspective is divided into two qualities according to the bilateral model: harmonious passion and compulsive/obsessive passion. Harmonious passion is defined as a level of passion that is voluntarily controlled by the individual and through which he or she integrates into an activity of his or her own will becomes part of the individual's own benevolence and thus strikes a

balance between academic and other outside activities. Either compulsive or obsessive passion is a level of passion results from students feeling an internal desire to control their feelings during academic activity and beyond the individual's control due to social or personal stress; This makes him vulnerable to emotional and behavioural stress and negative consequences that prevent him from participating in other activities, which is reflected in the level of performance and academic achievement in a negative manner; Lack of sufficient flexibility, frustration and self-exclusion (Vallerand, 2010).

Most studies dealing with passion within the context of education note that they have centred around harmonic passion because of its positive effects on students in terms of their performance, perseverance, focus, flexibility and academic participation (Ruiz-Alfonso & Leon, 2017; Vallerand, 2010; Vallerand et al., 2007).

Belanger and Retelle (2021) noted that academic passion makes individuals fond of their field of study, motivated, energy, time and effort; This helps students to raise their level of integration and academic performance, which is accompanied by perseverance, motivation and focus.

Passion for a particular activity or task grows through interaction between (activity, individual and environment) and needs to have certain conditions in the activity as an

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interest in meeting students' different psychological needs and free participation that are consistent with their own abilities and tendencies and when they are also allowed to engage and interact with others (Lalande et al., 2017). Passion enables an individual to reach higher levels of mental willingness to challenge difficulties in accomplishing difficult work (Fesharaki, 2019). Passion is a human experience that shapes an individual's identity. Without it, it will not make sense for his life by providing him with psychological energy to integrate into valuable activities and make individuals feel positive emotions during study or activities (Curran et al., 2015). In his study, Al-Dabue (2021) explained that the individual integrates into the exercise of activities not just for performance but to reach a state of internal satisfaction without any external considerations or incentives, and the motivation and flow towards learning, seeking and employing information is a direct result of passion. Academic passion also includes a serious component through a keen inclination and desire to study knowingly through an individual's understanding of the importance and value of what he learns and skills by investing time, effort and perseverance for mastery and creativity.

With reference to pedagogical literature, the domain for scientific passion Science passion have been classified by Al-Khataybeh et al. (2021) to 11 domains, as follows: Motivation, Get Involved, directing goals, Flexibility, Sharing, Research and investigation skills, Behavioural persistence and practice, Adventure, Creating positive feelings, Independence, Long-life learning.

On the other hand, Serin (2017) noted through his essay (*The Role of Passion in Learning and Education*) that passion is the essence of effective and good teaching and is indispensable. Passionate teachers' and their practitioners seek to increase their students' learning potential by creating effective educational environments so as to provide students with motivational force and a love for the subject that may improve the quality of teaching. Serin identified the passionate teacher as a fond, loving knowledge person who delves into issues and ideas that challenge our world and are designed to create the creations of young people who come to class every day. What it means to be a passionate teacher is to stop isolating within the classroom and refuse to undergo a culture of indifference or ridicule and to look beyond that during the day. The researchers added that "educational changes fail when there is no passion within the classroom" and that successful learning depends on building a close relationship with learners and an effective classroom environment.

In order to fulfil the role assigned to the science teacher, he must possess competence in the knowledge, trends, skills and scientific values associated with the specialization and related educational practices that help him to achieve this (Chi, 2009).

Some studies targeted school teachers', including: The Study of Al-Dabue (2019), which aimed to reveal the correlation

between self-indulgence at work and academic passion for a sample of 136 (kindergarten teacher). The results showed a statistically positive correlation between compulsive passion and self-indulgence and a negative correlation between compulsive passion and self-indulgentleness

While Leon and Ruiz-Alfonso (2017) studied the relationship between the teachers' focus on the usefulness of class content and students' passion for harmony and the essential motivation for learning and achievement in mathematics, The sample consisted of 1,170 high school students and statistically analyzed the data, The results showed that students with a harmonious passion recognized the fundamental motivations for learning as different structures and the positive association of academic harmonious passion with mathematics achievement. and the indirect impact of motivation towards learning on the relationship between passion and progress in academic performance as well as a positive relationship between teachers' focus on the usefulness of class content and students' passion for learning.

Studies targeting school teachers' also include the (Carbonneau et al., 2008) Study, which investigated the relationship between academic passion, psychological burning and job satisfaction of school teachers' in general, the sample consisted of 494 teachers' from French-Canadian schools, using a binary passion measure, so that the results showed a positive correlation between possessory passion and psychological burning and that harmonious passion increases the level of functional satisfaction.

Castillo et al. (2017) examined the relationship between the passion of sports teachers' and their perception of the academic burning of a sample of 161 teachers' and found that there was a negative correlation between harmonious passion and academic burning and that teachers' behaviors served as intermediaries between possessory passion and academic burning.

Based on the foregoing, in order for learners to acquire and develop domain of scientific passion, teachers' must have a broad and accurate understanding of the concept of science passion and how to practice and apply its domains efficiently within and outside the classroom; So as to convey the learning effect to the student as desired. The study therefore examined the science teachers for the basic stage understanding of scientific passion domain.

RESEARCH QUESTIONS

- 1- To what level do science teachers understand science passion?
- 2- Are there statistically significant differences in science teachers' understanding of the science passion regarding their teaching experience and qualifications?

METHODOLOGY

This study is classified as a quantitative descriptive study to measure the level to which science teachers' understand the science passion domain, quantitative data were processed after the application of the test scale, where means, standard deviations and the use of binary variation analysis were calculated (Two -Way ANOVA) for the impact of study variables (qualification, teaching experience), through the Statistical Package for Social Sciences (SPSS).

Population and sample of the study

The study population are science teachers' (in all sub-disciplines) for the basic stage at the government schools of the Directorates of Education in (Bani Obaid) and (Kasbah Irbid) for the academic year 2022/2023, numbering (460) teachers' according to the statistics of the Department of Educational Planning for the same year, while the study sample consisted of (235) teachers' of science selected randomly; which is equal (51.1%) of the population.

Tool of the study

The tool for understanding the domain of scientific passion consisted of a test. It sought to reveal the level of science teachers' understanding of scientific passion. The test was made of (27) a statement indicating the domain of scientific passion as following:

- Engagement, motivation and independence: this domain included statements (1,2,3,4,5,6,7)
- Behavioral perseverance and flexibility: this domain included statements (8, 9, 10, 11, 12)
- Create Positive feelings: this domain included statements (13, 14)
- Adventure and participation: this domain included statements (15, 16, 17, 18)
- Target guidance and long-life learning: this domain included statements (19, 20, 21, 22)
- Research and survey skills: this domain included statements (23,24, 25, 26, 27)

Validity and Reliability

To ascertain the face and content validity of the test, panel of judgment from university pedagogical professors and educational supervisors from the Ministry of Education with specialized science curricula and teaching methods were presented to them.

In the light of their comments, some statements have been redrafted and the test procedures clarified, and the test is therefore finalized as a test application instruction and (27) statements, and the answer statement model for test statements.

Index of difficulty and discrimination were investigated to test the domain of scientific passion by applying it to a survey

sample of (30) teachers' outside the study sample using the SPSS program. The result was that the difficulty index for statements ranged from (0.24 -0.61) and discrimination index ranging from (0.34 - 0.63). As indicated by Odeh (2010) of the acceptable extent of the difficulty of the statement, ranging from (0.20 - 0.8), as well as of the statement's discrimination; The statement is considered to be good if its discrimination factor is higher than (0.39), acceptable and advised to be improved if its discrimination factor is between (0.20-0.39), the statement is considered weak and recommended to be deleted if its discrimination factor is between (0-0.19), and has to be deleted if its negative, so none of the test statements has been deleted based on the difficulty and discrimination index.

To ascertain the reliability of the study, the coefficient of internal consistency (Cronbach alpha) has been calculated, which was equal (0.741).

RESULT AND DISCUSSION

The first question

"To what level do science teachers' understand science passion domain?"

To answer this: The frequencies and percentages of the responses of members of the study sample of science teachers' were calculated on the study scale to see their level of understanding of the scientific passion domain in science, and table (1) shows this.

*Correct answer

Table (1) shows that question (26) has been ranked first in terms of the number of correct answers to the questions, answering the question correctly. (79.6%) of the study sample's (235) teachers', while question No. (27) was ranked last in terms of the number of teachers' who answered it correctly and by only (16.6%).

Also, table (1) shows that the percentage of correct responses in the first domain (engagement, motivation and independence) was concentrated in statements (1,2,3,4,6); This indicates a good awareness among teachers' about the concepts of engagement and motivation, Abu al-Rayah & Khatab (2020) indicates that engagement represents the level of attention, interest, enthusiasm and emotion that an individual exhibits during learning so that learners become part of the learning process and participate in building what they learn by applying a constructive model in the educational process and using modern technological methods in teaching.

The concept of motivation for learning was defined by Mahmoud (2011) as the learner's internal situation, which defines his or her behaviour and performance and endeavours to sustain his or her behaviour towards a particular goal, and is linked to the tasks offered by the teacher to learners, must be a source of interest and pleasure by going through experiences

Table 1: Frequencies and percentages responses of science teachers on the scale of scientific passion

question number	Answer code							
	A		B		C		D	
	%	wFreq-uency	%	Freq-uency	%	Freq-uency	%	Freq-uency
1	3	7	13.6	32	*75.7	178	7.7	18
2	*75.3	177	11.5	27	6	14	7.2	17
3	3.8	9	14.9	35	*75.3	177	6	14
4	12.3	29	10.2	24	*76.2	179	1.3	3
5	17	40	35.7	84	28.1	66	*19.1	45
6	10.2	24	11.1	26	*73.2	172	5.5	13
7	21.3	50	45.5	107	14.5	34	*18.7	44
8	*78.7	185	4.3	10	14.9	35	2.1	5
9	7.2	17	10.2	24	*80.9	190	1.7	4
10	10.2	24	11.5	27	11.9	28	*66.4	156
11	4.3	10	*58.3	137	3	7	34.5	81
12	23	54	22.1	52	12.3	29	*42.6	100
13	15.7	37	6.4	15	*65.5	154	12.3	29
14	15.3	36	3	7	28.9	65	*52.8	124
15	*48.9	115	7.2	17	10.6	25	33.2	78
16	9.4	22	*47.2	111	16.6	39	26.8	63
17	15.3	36	7.2	17	23	54	*54.2	128
18	25.1	59	41.7	98	11.5	27	21.7*	51
19	52.8	124	*20.9	49	21.7	51	4.7	11
20	*20.4	48	20.4	48	29.4	69	29.8	70
21	57	134	14.9	35	*23.4	55	4.7	11
22	42.1	99	13.2	31	10.6	25	*34	80
23	*34.9	82	21.3	50	31.5	74	12.3	29
24	6.4	15	10.6	25	*68.9	162	14	33
25	*59.6	140	12.3	29	22.1	52	6	14
26	2.6	6	6.4	15	*79.6	187	11.5	27
27	43	101	26.4	62	*16.6	39	14	33

that do not go away once the task is completed (Meng & Hu, 2023); That is, the effect of learning stays longer.

Increasing the motivation of learners towards learning through teachers' having effective teaching skills and exciting the love of surveying them through thought-provoking activities and providing them with a desire for positive interaction with their surroundings which helps in achieving learning goals (Al-Yarobi & Al-Ayasreh, 2016).

As for statements (5,7) the correct response percentage was low. This indicates a misunderstanding among science teachers about the concept of independence and how to make the learner responsible for his/her learning, his/her ability to reflect critically and have an entrepreneurial spirit.

Nurjanah et al. (2022) indicated that the independence in learning is the process of making the individual independent in making his/her own decisions and conducting his/her own education. It is an important domain to be introduced into the educational and academic process through the formation of the learner's personality to gain the spirit of independence based on educational methods based on free and diverse spontaneous activities that meet their needs and make them responsible for their learning, activities such as planning and implementation, completion and distribution of tasks, division of business, time management and self-reflection.

Farhat (2019) explained that a self-esteemed learner and freedom perform tasks brilliantly and feel their entity, giving

them a sense of independence, reflecting on the learner's daily life, how to plan his/her business and take responsibility, and overcoming the obstacles he/her can face.

The science educators' awareness of these concepts is associated with their scientific passion as indicated (Lalande, 2017; Taha, 2020; Belanger & Retelle, 2021).

Percentage of correct responses in the second domain (behavioural perseverance and practice) They were good in statements (8, 9, 10, 11). This shows a good awareness of science teachers about the concept of behavioral perseverance and flexibility. Flexibility places the learner at the center of the educational process by using multiple strategies to solve the same type of tasks and produce alternative options when faced with different situations and the teacher's ability to adapt to these attitudes and bring the learner into different aspects of the learning experience; To meet the needs of students with individual differences and develop perspectives for potential problems, it is impossible to apply one solution for all students in all situations and this reflects a good understanding of the successful teaching process (Gecikli&Ak,2022).

The teacher's understanding of behavioral perseverance depends on his or her expectations and value for success and optimistic thinking. The teacher must guide students on how to achieve their goals and find alternative solutions to overcome their obstacles and set high expectations for success. The teacher's self-competence should be taken care of and the value of the task they offer to students that helps to achieve behavioral perseverance (Muwouge et al.,2017).

The correct response ratio in statement (12) indicates a misunderstanding by science teachers about their perception of the importance of prioritizing and freely selecting the existence of diverse tasks by the learner; To take into account individual differences in learners and to raise the level of learner performance and behavioural perseverance, thereby promoting passion for tasks and activities. This is consistent with the following studies (Vallerand,2003;2010; Chichikian&Vallerand,2022).

Given the third domain (create positive feelings), the percentage of correct answers was close and somewhat acceptable in the statements (13,14), which demonstrates the awareness of some science teachers' of the importance of creating a safe and positive learning environment by focusing on the positive aspect of the learner, supporting and motivating him, creating a sense of enthusiasm and energy during the lesson and setting high expectations for learners so as to focus on the learner's emotional state (Stump&Newberry,2021). Having passion is also associated with having positive feelings during study or activities (curran et al., 2015).

The percentage of correct answers to statements (15, 16, 18) in the domain (adventure and participation) shows that there is a lack of awareness among most science teachers about the concepts of adventure and participation as well

as a misunderstanding about the terms of tasks that enable the student to overcome difficulties and challenges and how to apply them, and about the meaning of achieving active participation in the educational process and its objectives.

In order to be adventurous, the learner must engage in a range of scientific tasks and activities through which he/she acquires the skill of dealing with problems and confronting challenges so that he/she has the opportunity to think critically and can apply higher thinking skills; What grows has innovation and creativity. These tasks must be commensurate with learners' attitudes, tendencies, cognitive, skill and developmental abilities. Every learner has the abilities and characteristics to differentiate them from others. Science educators must therefore observe these requirements as well as provide more than one way of solving and leave the learner free to organize information and relationships between concepts so that they are motivated to conclude the solution and decision-making (H. Zaytoon & K.Zaytoon, 2003).

Active participation in the educational process also contributes to improving both the performance of the teacher and the learner. Professional participation with colleagues through meetings, discussions, class visits and attending training workshops contributes to raising teachers' efficiency and effectiveness, bringing them closer together, identifying their training needs, enhancing strengths, addressing weaknesses and learning developments. Similarly, the application of the teacher to participate in classrooms in a structured manner according to specific and effective teaching strategies that allow learners to build meaning through their interaction with experiences in their social environment through a negotiation process to arrive at a socially acceptable common perception under the guidance and supervision of the teacher, thereby contributing to their high skill in communication, communication and democratic meaningful dialogue as well as the development of knowledge (Abd Al-Karim, 2011). Having a passion in the context of education with (adventure and participation) is directly related to a positive relationship (Leon & Ruiz-Alfonso, 2016; 2017).

While the ratio of correct responses in statements (19, 20, 21 ,22) belonging to the domain (target orientation and long-life learning) was clearly low; This indicates the low level of science teachers' awareness of the right meaning and a misunderstanding of how each is activated in the educational process and the importance of this in achieving the goals of teaching science education, and the misunderstanding of the majority of science teachers' in viewing the goal of effective teaching as a transfer of knowledge from one knowing person to another ignorant rather than providing students with experience in the process of building knowledge.

Mentz et al. (2019) explained that goals orientation is the level to which a learner takes responsibility for learning and the

ability to self-management. The definition is consistent with the assumptions of constructive theory of the importance of determining the purpose, interests and needs of learning; An individual must pursue certain objectives that contribute to solving a problem, answering confusing questions or satisfying an internal tendency towards learning a subject to meet his or her needs and concerns (Zaytoon, 2007).

This requires science teachers to allow learners to identify and conclude goals during learning. When a learner sets close and realistic goals they can achieve themselves, this increases their motivation towards effectively performing academic tasks with continuous guidance from teachers' (Muwouge et al.,2017).

Nichols (2011) noted that teachers should recognize the relationship between passion and motivational goals, educational attitudes and achievement; To better equip students to use diverse strategies that include independent and successful academic performance, encouraging students to embrace goal characteristics with their emotions will have a positive impact on the development of cognitive strategies and academic achievement.

Long-life learning is defined as a long-life activity with the aim of improving skills and competencies within a personal, civil, social or work perspective and is important for acquiring new skills compatible with the zeitgeist and labour market and developing all aspects of the learner's personality, In addition, it is an individual's lifestyle of self-fulfilment through which the individual seeks to continue life-long learning with the highest domains of positivity, motivation and enthusiasm for learning and depends on the centrality of the needs of the teacher and learner; To raise their level of professional performance and competitiveness in the labour market (Redman,2016).

Teachers' must also know and realize how to apply the content of the lesson in conjunction with the realistic environment, societal needs and intellectual maturity of the learner, so that it becomes interesting, creating an educational environment full of passion and this is consistent with (Serin,2017).

Given the proportion of correct answers in statements (24, 25 , 26) that belong to a domain (Research and survey skills)

The level of teachers' awareness and perception of observational skill, adjusting variables and formulating hypotheses was good compared to the response ratio in statements (23, 27) There is a misunderstanding among the majority of science teachers' about the order of the scientific methodology steps being followed to properly resolve investigative tasks and activities, although they are included in the advanced science curriculum currently being taught; This may be due to the fact that teachers' were unable to raise their understanding of them because there was insufficient time during the school year to carry out the tasks and investigative activities included in the textbooks. In addition, the training and rehabilitation courses do not focus on enabling science teachers to research, investigate and practise scientific methodology in practice, but on devoting part of the developed curriculum course to teaching them in textbooks.

This is holistic. In terms of the percentage level of science teachers' understanding of the domain for science passion according to the different fields in the study, Table (2) indicates the means and standard deviation to the level of science teachers' understanding of science passion domains.

Table (2) shows that the level of science teachers' understanding of the science passion ranged from medium to weak, with the field found to be (behavioral perseverance and flexibility) came first in terms of the level of understanding with perception (65.39) and standard deviation (12.10), while (target orientation and long-life learning) ranked least with (24.68%) and standard deviation (14.18).

In all, the level of science teachers' understanding of the scientific passion was found to be weak (51.42%), and a standard deviation (8.19) levels.

This result may be attributed to the fact that most of science teachers are holding pure science qualification with no educational curricula are added therein. in addition to the lack of training programmes to promote and understand scientific passion, The weak combination of theoretical and applied understanding and does not meet the basic requirements of technological development and labour market requirements, Rather, the Ministry of Education focuses on lessons planning and evaluation, engaging in modern teaching methods

Table 2: Means and standard deviation to the level of science teachers' understanding of science passion domains

<i>Number</i>	<i>Domain of science passion</i>	<i>Standard deviation</i>	<i>Means</i>	<i>Level of understanding</i>
1	Engagement, motivation and independence	8.18	59.08	Weak
2	Behavioural perseverance and flexibility	12.10	65.39	Medium
3	Create positive feelings	15.12	59.15	Weak
4	Adventure and Participation	13.45	43.15	Weak
5	Target orientation and long-life learning	14.18	24.68	Weak
6	Research and survey skills	12.58	51.92	Weak
7	Total Level	8.19	51.42	Weak

and how to take into account individual differences among students, which has enhanced the level of science teachers' understanding of the domain of (behavioural perseverance and flexibility) more than others; Teachers' are often keen to find different solutions and diverse examples of concepts and choose the most effective alternatives that suit learning planning, making them manage the teaching process easier, and it is difficult to achieve an understanding of these domain unless all curricula in science are consistent with them, and even the

curricula developed in science lack to reinforce some domains of scientific passion (Independence, goal orientation, creating positive feelings, adventure, participation) As a result of the study (Khataybeh et al., 2021), most educational supervisors do not follow up on the level of teachers' understanding of the domains of scientific passion, but do not address them when they meet in class visits, as well as the lack of access by science teachers' to educational updates, magazines and research that are interested in publishing articles and research on the

Table 3: Means and standard deviation of science teachers' understanding of science passion domains according to independent variables

Variable	Domains	Category	Standard deviation	Means
Qualification	Engagement, Motivation and independence	Bachelor's	7.12	59.53
		Postgraduate studies	9.79	57.98
	Behavioral perseverance and exibility	Bachelor's	12.42	64.27
		Postgraduate studies	10.87	68.13
	Create positive feelings	Bachelor's	13.84	59.93
		Postgraduate Studies	14.69	59.82
	Adventure and Participation	Bachelor's	13.36	42.28
		Postgraduate studies	14.14	47.70
	Target orientation and long-life learning	Bachelor's	14.00	26.79
		Postgraduate studies	15.28	27.61
	Research and survey skills	Bachelor's level	11.48	51.08
		Postgraduate studies	13.09	53.66
Total Level	Bachelor's	6.95	50.74	
	Postgraduate Studies	10.76	53.10	
Teaching experience	Engagement, Motivation and independence	Less than 5 years	10.07	60.71
		5 - Less than 10 years	8.35	61.98
		More than 10 years	8.89	57.44
	Behavioural perseverance and exibility	Less than 5 years	11.54	72.39
		5 - Less than 10 years	12.48	69.89
		More than 10 years	12.61	61.82
	Create positive feelings	Less than 5 years	14.40	59.33
		5 - Less than 10 years	13.33	58.79
		More than 10 years	15.94	60.51
	Adventure and Participation	Less than 5 years	12.76	48.62
		5 - Less than 10 years	14.69	45.50
		More than 10 years	13.58	42.04
	Target orientation and long-life learning	Less than 5 years	15.08	27.25
		5 - Less than 10 years	14.85	21.40
		More than 10 years	14.11	24.72
	Research and survey skills	Less than 5 years	12.18	50.25
		5 - Less than 10 years	14.07	54.29
		More than 10 years	12.83	51.33
Total Level	Less than 5 years	8.84	54.05	
	5 - Less than 10 years	7.68	53.34	
	More than 10 years	8.13	49.98	

concept of scientific passion and its domain and their relevance in the educational process and how they are applied.

The second question

“Are there statistically significant differences in science teachers’ understanding of the science passion regarding their teaching experience and qualifications?”

Table (3) indicates the means and standard deviation of science teachers’ understanding of science passion domains according to independent variables.

Table (4) shows that there are apparent differences between means to the level of science teachers’ understanding of science passion domain due to qualification and teaching experience variables, and to ensure that these differences are significant, the multifarious analysis test Multivariate Analysis of Variance has been used. (MANOVA), to measure differences the level of science teachers’ understanding of the basic stage of scientific passion domain attributable to the variables of qualification, teaching experience, table (4) shows the results of this test.

Table 4: MANOVA of science teachers’ understanding of science passion domain according to their qualification and teaching experience

Source of variation	Field	Mean of squares	Level of freedom	Sum of squares	F value	significant figure
Qualification	Engagement, motivation and independence	227.746	1	227.746	.490	.484
	Behavioural perseverance and flexibility	256.121	1	256.121	.445	.506
	Create positive feelings	.551	1	.551	.001	.976
	Adventure and Participation	1008.358	1	1008.358	1.810	.180
	Target orientation and long-life learning	1084.889	1	1084.889	2.371	.125
	Research and survey skills	363.628	1	363.628	.525	.470
	Total Level	150.341	1	150.341	.657	.418
Teaching experience	Engagement, motivation and independence	547.223	2	1094.446	1.178	.310
	Behavioural perseverance and flexibility	2079.075	2	4158.150	2.609	.069
	Create positive feelings	69.629	2	139.258	.113	.893
	Adventure and Participation	472.752	2	945.504	.848	.429
	Target orientation and long-life learning	391.447	2	782.894	.855	.426
	Research and survey skills	332.784	2	665.568	.480	.619
	Total Level	310.865	2	621.729	1.359	.259
Error	Engagement, motivation and independence	464.447	231	107287.20		
	Behavioural perseverance and flexibility	576.061	231	133070.04		
	Create positive feelings	614.748	231	142006.74		
	Adventure and Participation	557.196	231	128712.38		
	Target orientation and long-life learning	457.577	231	105700.24		
	Research and survey skills	692.928	231	160066.47		
	Total Level	228.797	231	52852.215		
Total	Engagement, motivation and independence		235	928979.59		
	Behavioural perseverance and flexibility		235	1142777.7		

Source of variation	Field	Mean of squares	Level of freedom	Sum of squares	F value	significant figure
	Create positive feelings		235	412222.222		
	Adventure and Participation		235	433125.00		
	Target orientation and long-life learning		235	294375.00		
	Research and survey skills		235	974375.00		
	Total Level		235	675240.05		

Table (4) shows that there are no statistically significant differences at ($\alpha= 0.05$) due to the teachers' qualification or the teaching experience in science teachers' understanding of scientific passion domain, where all F values calculated on the variation values between the categories of independent variables were weak and statistically insignificant at ($\alpha= 0.05$).

This result may be due to the fact that science teachers are exposed to the same field and methodological working conditions as science education. The pressures and burdens faced by teachers during the service make it difficult for them to access and keep abreast of educational developments and research. The way they prepare and qualify before and during service, which focuses more on teaching methods than on areas of scientific passion, is similar. training and rehabilitation courses are often imposed on teachers for promotion purposes and lack a combination of theory and practice, making them easy to forget and relying on deaf conservation, the supervisors of teacher training are the same, and most highly qualified teachers have been purely scientific rather than pedagogical.

Some reasons may also lead to the weakness of a category of graduates of postgraduate programmes; As a lack of competence or social motivation for teachers to obtain higher degrees; This leads to a weakness in the cognitive, research and teaching composition of these graduates, in addition to the fact that the expansion and inflation of the number of students admitted to postgraduate educational programmes may come at the expense of the quality offered to them; It affects the success of its objectives and the characteristics of its graduates.

CONCLUSION AND RECOMMENDATIONS

Starting from these results, attention must be given by educational policymakers to the inclusion of scientific passion domain in educational plans, qualification programs and training for teachers before and during service. Understanding these domains and recognizing their importance in the educational process is not only an increase in the number of courses or vocational training for teachers' but also a change in the institutional environment as a whole to become a systematic feature.

Based on the results, the study recommends that:

- Lectures and training workshops for science educators to develop the concept of their scientific passion and ways of integrating theoretical concept with application.
- Emphasizing the role of educational supervision in following up teachers on their proper understanding of the domain of scientific passion and their importance in the educational process.
- Further studies and educational research on the level of understanding of teachers' scientific passion domains in different disciplines.
- Doing comparative studies on having science passion domains for science teachers' in other developed countries for the purpose of benefiting from their expertise.

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