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A Sense of Responsibility of Science Teachers Towards Students' Learning

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Abstract

The purpose of the study is to identify the Sense of responsibility of science teachers towards the learning of their students from the perspective of the teachers themselves; the study has included three domains (cognitive, skillful, and emotional); and to demonstrate the differences in the level of responsibility among science teachers based on gender, rank, and educational qualification. The study's sample consists of (123) teachers from the Salt Region's Directorate of Education. The research instrument includes (28) items whose validity and reliability is verified. The results reveal that there is no statistical significant difference in the sense of responsibility among teachers based on their gender or their rank. However, the results reveal that teachers with an educational qualification had a greater sense of responsibility than their peers who lack such a qualification.

Keywords: Responsibility, A Sense of Responsibility, Science Teachers

Introduction

The teacher's roles are directed by the system of societal norms, and he is motivated by the inherited ethical behaviors that shape his personality and relationship with his students. Through his commitment to the ethics of the profession and the norms of excellent learning, he attempts to assume responsibility for the education of his students, as the teaching profession entails numerous tasks and responsibilities connected to what should be done. It can be done inside or outside of the classroom, including what exposes the teacher to legal liability if the behavior is performed or not performed.

Metwalli (1990, p.15) admits that the emergence and development of responsibility are social products. Thus, it involves acquisition and learning. In the field of education, it is important to uncover the educational and psychological conditions, causes, and influences that stimulate and promote the formation of responsibility and that assist in the establishment of responsibility-related behavioral patterns among society's members. The manifestation of compatibility is a sense of responsibility, which is an individual's awareness of the implications of his conduct and actions and his sensitivity to the needs of others.

Lauermann and Karabenick (2013) affirm that the teacher's responsibility is tied to his inner emotions and psychological satisfaction with the accomplishment of one or more of his goals, as well as holding him accountable for what he has achieved, what he offers, and what he intends to achieve. Such as developing positive attitudes toward science and building strong relationships with his students to establish bridges of trust with them. It is also connected to the science teacher's moral responsibility, as demonstrated by his actions in and outside of the classroom as a role model for his students.

Crossland et al. (2001) argue that a teacher's accountability is proportional to his direct influence on his students' moral, scientific, and behavioral performance, as well as

their decision-making abilities. Furthermore, responsibility increases among teachers who have the opportunity to pursue postgraduate studies in the specialized field of education, as well as among those who obtain training opportunities through professional development courses in the education sector; thus, responsibility is correlated with teacher self-efficacy. Against this backdrop, numerous educational studies and researches in this sector have been conducted, This lack of research is, unfortunately, a reflection of the low level of importance assigned to education in the Arab world which can be observed in the limited number of resources allocated to this area. Following is a brief overview of the published studies and research at the Arab and international levels.

Al-Zahrani (2022) conducts a study to determine the role of the professional license in the development of professional values and obligations among a sample of Saudi Arabian female science instructors. The study sample includes 274 science teachers, including 130 middle school teachers and 174 elementary school teachers. The researcher states that there are also statistically significant differences at a significant level $(0.05 = \alpha)$ among the views of the parameters towards the role of a professional license in the development

of teacher's performance attributable to the qualification for a higher class. One of the most important recommendations of the study was to raise awareness of the importance of the role of a professional license in the development of teacher's performance and attention to the Professional Rehabilitation Program for the preparation of the teacher for a teaching license and the development of educational school programs in Saudi Arabia to become compatible with the terms and requirements of the teachers.

A group of female students from the Faculty of Educational Sciences at Mutah University are surveyed in Saleh's (2018) study to assess their sense of responsibility. Three hundred students make up the study's sample population. It is employed a scale measuring a person's sense of responsibility, which consists of 38 items in three dimensions. The results indicate that the values of the overall meaning of life were average, the experience values and the situational values have a high arithmetic mean, whereas the creative values are medium, and the degree of bearing responsibility has a high arithmetic mean in all its dimensions (national and social), except for personal responsibility, which is intermediate level . There are statistically significant differences in favor of the level between the means of life values and the cumulative average; the cumulative average is "outstanding."

Daniels et al. (2018) conduct a study with the objective of determining the extent to which teachers assume their responsibilities for encouraging and enhancing students. The sample consists of (180) male and female teachers from Canada. The interview instrument is administered to six members of the study sample, while the scale contains 116 items distributed across four domains: personal responsibility for encouraging students, student accomplishment, student relations, and teaching approach. This mixed-methods study reveals fascinating points of convergence and divergence in the ways teachers quantitatively record versus qualitatively express feeling personally accountable for student motivation. All qualitative participants reported feeling personally accountable, regardless of their TRS score, which was low for half of the participants. Consequently, the disconcerting concern that teachers report low degrees of personal responsibility for motivation (e.g., Lauermann and Karabenick, 2013; Eren, 2014; Daniels et al., 2016) may be more of a measurement issue than an issue of experience. The quantitative findings provide additional confirmation of the TRS's internal consistency; nevertheless, the cross-validation study suggests that the instrument may underrepresent instructors' levels of personal responsibility for student motivation.The findings highlight the significance of knowing and appreciating the experiences and views of instructors who are really living out the constructs that researchers are attempting to quantify, in this case, personal responsibility for student motivation.

Matteucci et al. (2017) conduct a study with the purpose of determining the extent to which Italian instructors feel personal and professional responsibility, specifically with regard to the learning of their students. The study sample includes (181) female teachers and (106) male teachers, for a total of (287) teachers of varying educational experience and specialization. A sense of responsibility scale consists of twelve items divided into four major categories. Due to its likely implications for students and teachers, the significance of investigating the concept of teacher responsibility is confirmed by the present research. Discovering the relationship between instructors' ideas about their professional responsibility for student outcomes and their instructional methods is essential for comprehending how to design effective learning environments. In addition, the research of professional conditions that are determinants of teachers' psychosocial wellbeing (work engagement and career-choice satisfaction) is a fundamental challenge for enhancing the school environment by fostering a good and healthy workplace.

Lauermann's study (2013) provides a thorough analysis of teachers' opinions regarding the antecedents and effects of responsibility. It is shown that instructors' sense of responsibility has significant implications for their willingness to work hard and offer kids a high-quality education. The teachers' responses revealed a wide range of responsibilities, from satisfying state and district regulations to performing community service outside of school hours. This study focuses on measurable outcomes in order to provide clearer instructions and decrease ambiguity. It also focuses on teachers' perceptions of antecedents and consequences in order to comprehend the psychological principles via which instructors' sense of responsibility influences the teaching process. The findings indicate that kids benefit from having responsible teachers because they act as great role models, work long hours, and are highly driven and dedicated to helping their pupils achieve. However, it is unclear why and how accountability may encourage teachers to engage in such actions. The results necessitate additional research of teacher responsibility as an independent outcome and how it is influenced by other variables, such as teachers' personal traits and organizational environment features. Lauermann and Karabenck (2013) present a critical analysis of existing measures of teacher responsibility, discuss the reasoning for, and introduce a new Teacher Responsibility Scale (TRS). Evidence from a sample of German pre-service teachers (Study 1) and American in-service teachers (Study 2) supported a multidimensional model of teacher accountability with four subscales measuring responsibility for student motivation, student achievement, student relationships, and teaching. The study proved that teacher accountability is conceptually and empirically separate from self-efficacy, and that the connections between accountability and self-efficacy vary depending on the

type of educational outcome. The implications for teaching and teacher education research are highlighted.

Eren (2013) states that personal accountability, along with academic optimism, hope, and feelings about teaching, have not been studied combined in a single study of preservice teachers. However, in order to identify the elements influencing future teachers' dedication to the profession, it is crucial to take into account hope, academic optimism, and feelings about teaching in addition to individual responsibility. Indeed, this is a global issue that preoccupies academics and policymakers in education from all over the world. This study set out to investigate the connections between prospective educators' sense of personal responsibility, academic optimism, hope, and emotions about teaching, with a particular focus on the mediating effects of hope and academic optimism in these relationships. A total of 455 aspiring educators took part in the survey out of their own free will. The authors conduct studies of correlation, regression, and structural equation modeling to probe the interrelationships between their research variables. Optimism, hope, and a sense of personal responsibility are all found to have a strong correlation with the respondents' feelings about teaching. The results also show that PTs' academic optimism moderately mediated the relationships between their emotions about teaching, responsibility for student achievement, and teaching, while PTs' hope moderately mediated the relationships between their emotions about teaching, responsibility for student motivation, and teaching. Future research directions and implications for teacher education are also highlighted. Guskey (1981) discusses the process of creating and testing a scale to measure educators' sense of agency in terms of their students' academic outcomes. Like other locus of control scales, the goal of the Responsibility for Student Achievement Questionnaire (RSA) is to quantify how much weight people give to their own actions' vs the actions of others when it comes to academic success. While the IAR Questionnaire for children is generalizable, the RSA is designed to gauge educators' views on accountability just as it pertains to student success in the classroom. Evidence for the usefulness of measuring this construct using the present instrument is provided by the connections explored here between demographic characteristics and teachers' beliefs in their own control over factors impacting the academic achievement of children. The level of students' individual agency in their own learning may be an underexplored factor in studies of education.

According to the past studies that the two researchers studied, there is a limited interest in evaluating the level of accountability among non-Arab researchers. This may be due to the difficulties of adopting the study standards or the teachers' lack of responsiveness to the study standards. This is one of the most crucial factors that led researchers to measure the sense of responsibility among science teachers by varying

their gender, academic position, and scientific credentials. This study measures the sense of responsibility, which the researchers define as the degree to which a teacher carries out the functional and professional tasks and responsibilities entrusted to him by virtue of his employment in the teaching profession - as a teacher - from various personal, professional, and ethical perspectives. It is evident from the presentation of prior studies that researchers in different nations have diverse interests in the concept of a feeling of responsibility, and that the vast majority of these studies have been undertaken outside of the Arab milieu. Several countries are compared in terms of their practice of the so-called "sense of responsibility." This study is distinguished by its treatment of the term "sense of responsibility" among the most common categories of teachers who should practice it, namely the category of science teachers with different specializations who bear a multidimensional responsibility that includes theoretical and practical aspects related to the nature of their scientific disciplines. In addition, this study addressed variables that other studies did not. such as the academic rank, gender, and educational background of the teacher, as well as their relationship to the degree of sense of responsibility.

The Statement of the Problem

The problem of the study is generated by the researchers' perception of the psychological and work pressure that teachers in the educational field have been complaining about due to the large number of educational tasks required to be completed on paper and electronically in addition to their classroom responsibilities, which led some of them to believe that doing paper and electronic administrative work is what they have to do and take care of.

The family also partially abandons its assistance in strengthening and supporting the teacher and assuming its responsibilities that strengthen and support the responsibility of the teacher and his feeling relatively secure that there are other parties standing by him, and they observe the laxity of some teachers in taking responsibility for the learning of their students, and they affirm verbally and explicitly that they provide their best and are committed to the utmost degree. Homework, sometimes not following up on them, and the tendency to employ direct and shallow evaluation methods within their basic bounds without connecting them to the objectives of the classes and the required learning outcomes.

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it, and a propensity to use simple, direct evaluation techniques without linking them to the course objectives or necessary learning outcomes.

The Questions of study

Q1: What is the degree of the responsibility do the science teachers' in the Directorate of Education for the Salt region toward their students' learning?

Q2: Do gender (male, female), educational qualification (carrying or not carrying), and employment status (principal teacher and below, senior teacher and above) influence the sense of responsibility towards student learning among scientific instructors in the Directorate of Education in the Salt region?

Method

Research Design

Odeh (2010) indicates that the descriptive relational approach is the most suitable for measuring the relationship between two or more variables and determining the type of relationship between them. This approach is also the most suitable for determining the nature of the relationship between the variables. Due to the nature and objectives of this study, a descriptive relational approach was utilized to determine the level of responsibility of science teachers in the Directorate of Education for the Salt region towards student learning.

Population and Sample

The Population of the Study

All male and female science teachers working for the Salt region's public and private elementary and secondary schools during the first semester of the academic year 2022/2023 AD are included in the study population. There is a total of (199) teachers in the Salt area, with (123) male and (76) female teachers recorded by the Educational Planning Department of the Education Directorate.

The Study Sample

Directorate of Education in the Salt region selects 123 male and female science teachers from public and private elementary and secondary schools using a stratified random sampling method Which is accomplished by defining the study sample, receiving the number of scientific instructors from the Personnel Affairs Department of the Directorate of Education, classifying them according to gender, naming their workplaces, and then delivering the questionnaire to them for the first semester of the 2022/23 school year. These educators cover a wide range of science disciplines such as chemistry, physics, biology, earth and environmental sciences. Table 1 displays the distribution of the study sample across the variables (Gender, Rank, and Educational Level).

Table 1. Distribution of the study sample according to the variables (Gender, rank, and educational qualification).

The Variable	Category	Number	Percentage
Gender	Female	83	67.50
	Male	40	32.5
rank	Teacher and below	86	69.90
	Teacher and above	37	30.10
educational qualification	Holds an educational qualification	105	85.40
	NOT holding an educational qualification	18	14.60
Total		123	100%

Data Collection Tool

A Measure of Science Teachers' Sense of Responsibility towards Student Learning.

To determine the sense of responsibility among science teachers at the Directorate of Education for the Salt region towards student learning, a scale was developed after consulting relevant references and research, such as the study by Amawi (2013) and the study by Lauermann and Karabenck (2013). The preliminary study consists of thirty items separated into cognitive, skill, and emotional qualifications.

Validity of the research instrument

The initial version of the scale was presented to a panel of (20) arbitrators with expertise in science and Arabic language curriculum and pedagogy, as well as measurement and evaluation in Jordanian universities. The goal was to get their feedback on whether or not the scale's content was correct and whether or not it was appropriate for the study's intended sample.

In light of the arbitrators' remarks, the recommended adjustments to the scale's paragraphs centered on the language reformulation of one paragraph and the elimination of two paragraphs since they are incompatible with the study's aims. (80%). Thus, the scale after arbitration consists of (28) paragraphs divided into three domains: the cognitive domain, measured by paragraphs (1-11), the skill domain, measured by paragraphs (12-19), and the emotional domain, measured by paragraphs (20-28).

The construct validity of the measure was evaluated by a survey of 20 male and female educators from the study group and beyond. Indicators of a structure's reliability are computed using Pearson correlation coefficients, with values in each paragraph connected with the degree on the domain following it and the total degree on the scale shown in Table (2).

Table 2 displays the correlation coefficients between the scale's items and both the categories and the total score. The values vary from (0.58) to (0.78). and vary from (0.40) to (0.73)

Table 2: The correlation coefficients between the sense of responsibility items, on the one hand, and the domain score to which it corresponds, on the other, and the scale's overall score.

Number	The correlation with the domain	The correlation with the degree	Number	The correlation with the domain	The correlation with the degree
1	0.58	0.50	15	0.63	0.59
2	0.74	0.72	16	0.69	0.60
3	0.71	0.63	17	0.73	0.58
4	0.75	0.53	18	0.68	0.52
5	0.64	0.52	19	0.65	0.54
6	0.71	0.68	20	0.62	0.63
7	0.74	0.69	21	0.57	0.48
8	0.71	0.46	22	0.55	0.40
9	0.65	0.54	23	0.66	0.48
10	0.53	0.73	24	0.64	0.52
11	0.76	0.71	25	0.78	0.53
12	0.61	0.43	26	0.61	0.57
13	0.68	0.58	27	0.63	0.46
14	0.65	0.46	28	0.68	0.61

Both the domain and the degree are more than 0.20, and they are both statistically significant at the 0.05 level. These numbers are sufficient for preserving the items on the scale according to Odeh's (2010) criterion, which refers to keeping the items whose correlation coefficient increases. All paragraphs on the scale were accepted with a domain and total score of (0.20), hence the final version of the scale has a total of (28) paragraphs over three categories.

Using the Pearson correlation coefficient, the values of the intercorrelation coefficients were also determined for the domains of the sense of responsibility scale, as shown in table (3).

Table 3 shows that the values of the inter-correlation coefficients between the domains of the sense of responsibility scale ranged between (0.80-0.82) and ranged between (0.90-0.95) with the total score on the scale, all of which were statistically significant at the level of significance (=0.05), demonstrating the validity of the scale's construction.

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Reliability

Cronbach's alpha is used on the data of the initial survey application, which includes (20) male and female teachers from the study community and outside the sample, in order to determine the reliability of the scale's internal consistency and its domains. This is done by including both male and female

Table 3: The values of the intercorrelation coefficients for the sense of responsibility domains and their correlation with the total scale score

The domain	Knowledge domain	Skills domain	Emotional domain
Skills domain	0.83		
Emotional domain	0.82	0.80	
sense of responsibility	0.95	0.94	0.90

teachers in the study community and outside the sample. Table 4 displays the Pearson correlation coefficient between the first and second applications on the survey sample after two weeks had passed since the initial application is submitted.

Twenty male and female educators from the research community and beyond are surveyed to determine the internal consistency and dimensions of the scale using Cronbach's alpha. Table 4 displays the Pearson correlation coefficient between the first and second applications on the survey sample after two weeks have passed since the initial application.

It is evident from Table (4) that the internal consistency stability values for the sense of responsibility scale domains ranged from (0.79 to 0.81) and that the internal consistency stability value for the scale as a whole is (0.83). The repetition stability value for the entire scale is s (0.80).. This shows that the scale is reliable.

DATA COLLECTION

Correcting the measure of science teachers' sense of responsibility towards student learning

In its final version, the feeling of responsibility scale comprised (28) paragraphs distributed throughout three

categories, to be responded on a five-point scale with the following alternatives: (When correcting the scale, to a very large degree, 5 degrees are given; to a large degree, 4 degrees are given; to a medium degree, 3 degrees are given; to a degree few and given two degrees, I do not accept responsibility and given one degree), because all paragraphs had a positive trend.

The final form of the scale measuring sense of responsibility contained twenty-eight paragraphs, divided into three sections, to which respondents could assign one of five possible responses.

The corrections to the scale reflect this overall optimistic tone: (to a very large degree, 5 degrees are provided; to a large degree, 4 degrees are given; to a medium degree, 3 degrees are given; to a degree few, 2 degrees are given; I do not accept responsibility, 1 degree is given).

The range of each category was determined by subtracting the lower limit from the upper limit (5-1 = 4), dividing that number by the highest value on the scale (4 5 = 0.8), and then adding the resulting number to the lower limit to arrive at

an objective evaluation of the average responses of the study sample (1). The length of the categories was adjusted so that the very high range was between 4.21 and 5.00, the high range was between 3.40 and 4.20, the medium range was between 2.61 and 3.40, the low range was between 1.80 and 2.60, and the very low range was between 1.81 and 4.20. (1.00 and 1.80). Following statistical analysis, an objective assessment of the study sample's mean responses was made using the range's width.

FINDINGS

Research question 1: Results from the first study question will be provided first:

"What is the degree of the responsibility do the science teachers' in the Directorate of Education for the Salt region toward their students' learning?"

To do so, we estimated the means, standard deviations, and decreasing order of the scale items based on the arithmetic averages of the responses from the study sample, as shown in Table (5).

Table 4: The values of the internal consistency stability coefficients and the repetition stability of the sense of responsibility scale, as well as their respective domains.

The domain	stability coefficients	Re-test stability coefficients	Number of domains
Knowledge domain	0.81	0.78	11
Skills domain	0.79	0.75	8
Emotional domain	0.80	0.76	9
sense of responsibility	0.83	0.80	28

Table 5: The sense of responsibility for students' learning scale's arithmetic means and standard deviations are listed in descending order.

The Rank in the domain	the items on the scale of the sense of responsibility towards students' learning	Arithmetic mean	Standard deviation	Level
1	I am responsible for the student's grade in science	3.73	0.88	High
2	I am responsible for the student's inability to apply scientific information.	3.61	1.08	High
3	I am responsible for the student's confusion between ideas with similar pronunciations (oxidizing agent - reducing agent)	3.55	1.00	High
4	I am responsible for students' confusion between contradictory concepts (tid-tidal, eclipse-eclipse)	3.51	1.06	High
5	I am responsible for the students' lack of understanding of the connections between scientific concepts.	3.49	0.99	High
6	I am responsible for the low level of students' observation, measurement, classification, and scientific prediction abilities.	3.46	1.03	High
7	I am responsible for the low proficiency of my students in the following integrative science processes: data interpretation, procedural definition, and hypothesis imposition.	3.43	0.99	High
8	I am responsible for the inability of students to complete textbook exercises	3.28	0.93	intermediate
9	I am responsible for science's inadequate scientific foundation	3.23	1.09	intermediate
10	I am responsible for the memorizing of scientific concepts by students.	3.17	1.08	intermediate
11	I am responsible for students' deficiencies in mathematical operations	3.10	1.04	intermediate
Knowledge Domain		3.41	0.77	High
1	I am responsible for the students' inability to derive laws.	3.41	0.99	High

The Rank in the domain	the items on the scale of the sense of responsibility towards students' learning	Arithmetic mean	Standard deviation	Level
2	I am responsible for students' poor ability to use scientific units	3.40	0.98	intermediate
3	I am responsible for students' poor ability to generate scientific units	3.38	0.98	intermediate
4	I am responsible for the students' inability to derive laws.	3.35	1.03	intermediate
5	I am responsible for the lack of manual skill in the practical experiment.	3.28	1.05	intermediate
6	I am responsible for the students' inability to graphically express the data accurately.	3.28	1.03	intermediate
7	I am responsible for the students' inability to appropriately employ mathematical equations	3.24	0.99	intermediate
8	I am responsible for the students' inability to estimate logically (estimating the distance between two points).	3.22	0.97	intermediate
Skills Domain		3.32	0.87	intermediate
1	I am responsible for the students' quickness in forming snap judgments and broad generalizations.	3.37	1.02	intermediate
2	I am responsible for the students' inability to translate scientific language into mathematical calculations.	3.36	0.92	intermediate
3	I am responsible for the poor level of scientific persistence in science education.	3.33	1.06	intermediate
4	I am responsible for the poor level of scientific precision in science education.	3.30	1.02	intermediate
5	I am responsible for the students' adoption of the negative stereotype of science.	3.28	1.04	intermediate
6	I am responsible for the students' low desire to seek out scientific information.	3.28	1.08	intermediate
7	I am responsible for the students' low level of active participation in science class.	3.23	0.97	intermediate
8	I am responsible for the decline in scientific honesty in learning science.	3.20	0.97	intermediate
9	I am responsible for students' acceptance of certain scientific ideas and misconceptions	3.01	1.10	intermediate
Emotional Domain		3.26	0.84	intermediate
A Sense of responsibility towards the students' learning		3.34	0.77	intermediate

From the data in Table 5, we infer that the respondents' sense of responsibility towards the students' learning (as a whole) fell within the (intermediate) level (M=3.34, SD=0.77); the knowledge domain fell within the (high) level (M=3.41, SD=0.77); the skill and emotional domains fell within the (intermediate) level (M=3.26, SD=0.84); and the sense of responsibility fell within the respective domains. The cognitive field comes in first, followed by the skill field in second, and the emotional field in place.

Research question 2

The second part of the paper will present findings in response to the research question, "Do gender (male, female), educational qualification (carrying or not carrying), and employment status (principal teacher and below, senior teacher and above) influence the sense of responsibility towards student learning among scientific instructors in the Directorate of Education in the Salt region?" Mathematical means and standard deviations for the study sample's sense of responsibility for student learning were calculated across the categories (gender, rank,

and education qualification) in Table to provide a response to this question (6).

It is evident that the arithmetic means varied. The researchers do a three-way ANOVA analysis to determine whether the differences are statistically significant or not. Differences in the arithmetic mean of a sense of responsibility for student learning may be seen within the study sample according to the variables (gender, rank, and educational qualification) (Table 6). The statistical significance of the observed differences is explored by a three-way analysis of variance (three-way ANOVA) (as shown in Table 7).

Counting the significance level (0.05) in the study sample, it appears that the arithmetic means of the sense of responsibility are not statistically significant in relation to any of the variables (sex, rank, and educational qualification). Where the calculated F values for the three variables are (0.085, 0.718, 2.362) statistically relevant The arithmetic mean of students' sense of responsibility toward their learning (as a whole) does not differ significantly from any of the variables at the 0.05 level of significance (Table 7) (Gender, rank, and educational qualification).

Table 6: The sample's arithmetic means and standard deviations of student learning responsibility are shown (Gender, rank, and educational qualification).

The Variable	Category	Statistics	Domains of sense of responsibility towards students' learning			
			Knowledge Domain	Skills Domain	Emotional Domain	A Sense of responsibility towards students' learning
Gender	Female	arithmetic mean	3.41	3.34	3.21	3.33
		Standard deviation	0.78	0.82	0.78	0.74
	Male	arithmetic mean	3.43	3.27	3.36	3.36
		Standard deviation	0.78	0.98	0.95	0.84
Rank	Teacher and below	arithmetic mean	3.46	3.36	3.29	3.37
		Standard deviation	0.72	0.81	0.84	0.73
	Teacher and above	arithmetic mean	3.32	3.23	3.20	3.26
		Standard deviation	0.90	1.00	0.84	0.87
Educational qualification	Holding an educational qualification	arithmetic mean	3.10	3.21	2.99	3.09
		Standard deviation	0.80	0.75	0.97	0.79
	NOT holding an educational qualification	arithmetic mean	3.47	3.34	3.31	3.38
		Standard deviation	0.76	0.89	0.81	0.77

Table 7: The variables' triple variance analysis of the study sample's sense of responsibility for student learning showed that (gender, rank, and educational qualification)

source of difference	sum of squares	degrees of freedom	mean sum of squares	The calculated F value	Statistical significance
Gender	0.051	1	0.051	0.085	0.771
rank	0.430	1	0.430	0.718	0.398
Educational qualification	1.413	1	1.413	2.362	0.127
Error	71.170	119	0.598		
Total	72.958	122			

* Statistically significant at level (0.05)

Table 8: The multiple triple variance analysis of the sample's sense of duty toward student learning revealed the components (gender, rank, and educational qualificatio6n).

source of difference	Dependent variable	sum of squares	degrees of freedom	mean sum of squares	The calculated F value	Statistical significance
Gender Hotelling's Trace=0.061 Sig=0.073	Knowledge domain	0.034	1	0.034	0.058	0.810
	Skills domain	0.177	1	0.177	0.230	0.632
	Emotional domain	0.720	1	0.720	1.036	0.311
Rank Hotelling's Trace =0.012 Sig=0.718	Knowledge domain	0.599	1	0.599	1.015	0.316
	Skills domain	0.543	1	0.543	0.706	0.402
	Emotional domain	0.192	1	0.192	0.276	0.600
Educational qualification Hotelling's Trace =0.077 Sig=0.033*	Knowledge domain	2.332	1	2.332	3.952	*0.049
	Skills domain	0.268	1	0.268	0.348	0.557
	Emotional domain	1.880	1	1.880	2.705	0.103
Error	Knowledge domain	70.230	119	0.590		
	Skills domain	91.611	119	0.770		
	Emotional domain	82.721	119	0.695		
Total	Knowledge domain	73.044	122			
	Skills domain	92.536	122			
	Emotional domain	85.312	122			

*Statistically significant at level (0.05)

Regarding aspects of responsibility awareness, a three-way multiple analysis of variance (3-WAY MANOVA) was used. The purpose of this research was to evaluate the statistical significance of the observed differences in the geometric mean of the domains of responsibility for student learning throughout the study sample by gender, rank, and level of education (see Table (8).

Triple multiple variance data for regions of students' perceptions of their own responsibility for learning in the sample population are presented in Table 8. (gender, rank, and educational qualification).

As can be shown in Table 8,

There are no statistically significant differences between the arithmetic mean of all domains of the study sample's sense of responsibility towards student learning related factors (Gender, rank).

There are substantial variations in the arithmetic mean of the sense of responsibility for students' learning in the cognitive domain between teachers with and without a college degree in the study sample, with the advantage going to the teachers with a college degree. The mathematical means of the two domains (competence and affect) do not differ significantly (= 0.05) by level of schooling.

The results showed that there were no significant differences in the study sample's sense of responsibility towards students' learning based on gender or rank, but there were significant differences in the sense of responsibility towards students' learning in the knowledge field based on the educational qualification, in favor of the teachers who held the educational qualification.

Discussion

The science teachers' sense of responsibility for their student' learning were uniformly average. This conclusion contradicts the findings of Eren (2013), Matteucci et al. (2017), and Daniels et al. (2018), which indicate that the level of teachers' responsibility is high. This result follows from the incorporation of paragraphs that probe not only the rigor, commitment, and, at times, stagnation that characterize the majority of science teachers from a cognitive standpoint, but also the other domains (cognitive, skillful, and emotional). Therefore, the cognitive domain had a high level of sense of responsibility, and while science teachers valued tight commitment, they realized that they paid little attention to the emotional and skill dimensions. This conclusion is consistent with the findings of Al-Zahrani (2022), Guskey (1981), and Saleh (2018), which all indicate that the level of teacher responsibility is average. The circumstances surrounding the Jordanian teacher in general and the science teacher in particular, in terms of demographics, may be the most significant factor in explaining this conclusion (high stakes, his/her relationship with his/her direct management, illness, and his/her level of satisfaction with the salary). According to

Lauermann (2013), the level of responsibility is determined by the conditions surrounding the teacher.

Science teachers with degrees feel more of a sense of responsibility to their students than their less-qualified counterparts. The conclusions of Lauermann and Karabenck are supported by this result (2013), who found that a teacher's experience plays a significant and direct role in his level of responsibility for the learning and outcomes of his students, and contrasts with the findings of Guskey (1981), who found that females are more responsible than males. It is due to their tight adherence to school rules and methods, regardless of their gender, as well as the nature of their own paternal emotion, which forces them to demonstrate a sense of responsibility in its degrees and its many domains.

What the teacher acquires is based on experience and courses that grow the professional component of teachers, although these courses may not directly connect to developing the responsibility aspect of teachers. As for the existence of differences due to the educational qualification variable, this may be attributable to the degree to which the teacher with the educational qualification is aware of the legal aspects and responsibilities that fall upon him, as a result of what he learns in postgraduate courses about student learning.

As for the variables of gender and academic rank of teachers, the researchers attribute the lack of statistically significant differences in the level of sense of responsibility for any of these two variables to the lack of difference in the work environment (which is the Jordanian environment) in which both males and females work, in addition to any common customs and traditions that prevail in the society in which Teachers of both sexes deal with it, and as for the variable of age, the researchers attribute the absence of statistically significant differences in the level of sense of responsibility. The manifestations of the sense of responsibility among science teachers are limited to their inner feeling of the need to provide knowledge content and develop the practical aspects of students based on what is in the textbook, as well as their discipline with the regulations and instructions that govern their relationship with their direct managers.

Conclusions and Recommendations

The conclusion of your study? Relate back to the RQs, the level of responsibility and whether the teachers' sense of responsibility differ based on the gender, rank and academic qualifications.

This study reaches several conclusions based on its findings, which are given below:

- The sense of responsibility of science teachers is within the typical range.
- Due to the variables, there are no differences in the level of responsibility towards student learning across scientific teachers (gender, rank).

- Science teachers with advanced academic credentials have a greater sense of responsibility than their classmates who lack scientific credentials.

The researchers make the following recommendations based on the results of the study:

The need to improve training courses and teachers' training programs focusing on teachers' sense of responsibility in order to strengthen and disseminate this sentiment among teachers of various genders, levels of experience, and work locations.

The need to conduct a field study on the amount of responsibility in various educational settings, taking basic criteria such as school categorization (for the poor and military culture) and school location (city, countryside, desert, camps) into account.

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