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The Degree of Jordanian Science Teachers' Practice of Soft Skills in the Classroom

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Abstract

This study investigated the degree of practicing soft skills by science teachers using the descriptive approach. To achieve the study's objective, an observation card was developed. It was used to monitor three lessons for each subject (n=60) science teachers, who were distributed into six groups according to work experience and educational qualification, in the Directorate of Education of Bani Kinanah District in Irbid Governorate. The results showed that science teachers practice soft skills such as communication, problem-solving, negotiation, planning and time management, teamwork, leadership, and critical thinking to a high degree, with an explained variance (9.13%), on all dimensions of the observation card. However, the results also indicated statistically significant differences ($\alpha = 0.05$) between the arithmetic means of the teaching practices of soft skills among science teachers resulting from the different levels of educational qualification and teaching experience. Thus, teachers with educational qualifications typically practice soft skills to a greater extent with an average level of (14.48%) than their peers without educational degrees. Teachers with advanced experience are more likely to exercise soft skills with an average level of (11.73%) than their counterparts with medium and simple experience. Therefore, the study recommended including soft skills practice as a university course, endorsing it in universities, and continuous training for science teachers on teaching practices for soft skills through training courses and workshops.

Keywords: Soft skills, teaching practices, science teacher.

Introduction

This era, which is referred to as the era of knowledge, is marked by economic competitiveness, rapid technological advancement, and continuous change in many facets of daily life. This transition has affected several fields, including the educational systems, necessitating a review of programs and curricula that provide students with the knowledge and skills needed to properly prepare them for the demands of life and employment in the twenty-first century. Teaching skills have received considerable attention from modern movements advocating for educational reform, particularly curricula. For example, the General Framework of Jordanian curricula emphasised the need to change their instruction from quantitative to qualitative instruction based on critical and creative thinking skills and provide students with opportunities to practice twenty-first-century skills, digital learning skills, dialogue skills, and continuous learning. Along with teaching students a set of principles that promote respect for oneself and another (General Framework of Jordanian Curricula, 2020).

Undoubtedly, one of the reasons that raise the modern educational theories' interest in teaching skills is the significant gap between the skills students learn in reality and the ones they need for life and the labour market (Sobhi, 2016; Al-Agha, 2018, Rashwan, 2021) state that the demands of the labour market's ongoing changes necessitate individuals to possess different skills that guide their behaviour in their workplace, foster creativity, adaptability, leadership, and positive interactions among coworkers, and allow them to coexist successfully with the demands of the twenty-first century. Science is considered the intellectual capital on which societies depend for achieving progress and prosperity in fundamental development areas like health, engineering, technology, and other fields (Susilawati et al., 2020). Science education strives to impart scientific knowledge, principles, and abilities to learners, which contributes to building their personality and self-confidence while cultivating a spirit of collaboration, leadership, problem-solving, and decision-making. Herein lies the school's duty in developing abilities to create a mature and aspirational generation that is prepared for life with a spirit of challenge and competitiveness, a love of work and productivity, and they have the capability to keep up with and adapt to change (Al-Ghamdi, 2019).

Skill is typically determined by achieving tasks efficiently and proficiently in the shortest possible time. Scientific skills in teaching and learning science include practical manual skills, teaching-learning (academic) skills, and social skills (Zaitoun, 2014).

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However, there has been an upsurge in interest in social skills over the past three decades, as seen by the various labels for these skills in educational literature, such as "non-cognitive skills," "mankind skills," "personal skills," "employability skills," and "soft skills" (Robles, 2012; Banard, 2019; Pretti, & Fannon, 2018).

The concept of soft skills is relatively new in the realm of education; it first emerged in the United States of America in 1991, when a committee was established to address the issue of student unemployment by bridging the gap between educational system outputs and labour market demands. The committee conducted in-depth one-on-one and group interviews with business owners and employers to compile a list of the skills and competencies necessary for their employment. These skills were divided into three categories: hard skills, including academic credentials, computer and language skills, and soft skills, like interpersonal abilities (Al-Taher, 2022).

According to Hiong and Osman (2013), soft skills are among the 21st-century competencies closely tied to social and personal traits, interpersonal interactions, and personality traits. It fosters success, initiative, leadership, adaptability, social connection, and the capacity to overcome challenges (Abdullah, 2015). Soft skills include communication, problem-solving, negotiation, planning, time management, teamwork, leadership, and Critical thinking, which vary depending on the type of work. They are considered important skills in the labour market, which requires individuals with a high ability to persuade and be flexible in dealing with others (Matteson, et al., 2016). Alharoun (2016) and Ritter et al. (2018) see that due to the demand for soft skills across all educational stages, there is a pressing need to master them and create appropriate training programs.

Numerous studies have been conducted about soft skills due to their importance. For example, Susilawati et al. (2020) studied how science teachers view the soft skills required to understand science. Data were gathered through a questionnaire administered to a sample of (100) science teachers as part of the descriptive approach. The findings revealed that 34% of teachers reported that critical thinking, teamwork, creativity, communication, problem-solving, curiosity, accuracy, integrity, analysis, research, inquiry, information literacy, and objectivity are among the twelve soft skills crucial for learning science. Using the descriptive correlative approach, Al-Zahrani (2021) examines student activities' role in developing soft skills from female teachers' perspective in Makkah. A questionnaire of six axes (communication, time management, teamwork, problem-solving, decision making and leadership) was administered to a cluster sample (n=127) teachers. The results demonstrated that from a teacher's perspective, the activities did not achieve the level necessary to develop soft skills. There were no statistically significant differences at the significance level (= 0.05) for the contribution of student activities to the development of skills in decision-making, time management, and teamwork attributable to educational qualifications and years of work experience.

Omoush's (2021) study sought to identify the role of the university practicum program, from the point of view of cooperating teachers, in enhancing the soft skills of female classroom student teachers. Accordingly, 58 cooperating female teachers from the Directorate of Education for the first and second Zarqa governorates were recruited. The results showed that the practicum program moderately enhances the student teachers' soft skills. And that there were statistically significant differences at the significance level ($\alpha = 0.05$) between the average responses of the participants due to the job qualification variable and the academic qualification variable in favour of the university practicum program. However, no statistically significant differences attributed to the years of experience variable or the directorate variable were observed.

Muhammad's (2019) study aimed to identify the impact of a proposed program based on interactive activities to develop soft skills and successful intelligence skills among gifted kindergarten children. The sample consisted of (27) children. The semi-experimental descriptive approach was followed. The researcher prepared a list of soft skills, successful intelligence skills, a soft skills observation card, a successful intelligence skills test, and a suggested program based on interactive activities. The pre and post-measure results showed statistically significant differences between the two applications in favour of the post-performance in both tools (soft skills observation card and successful intelligence skills test), indicating the positive impact of the proposed program on the development of soft skills and successful intelligence skills among gifted kindergarten children. The study recommended including kindergarten curricula with interactive activities to create a learning environment that enhances students' learning, refines their personalities, and nurtures their talents.

The descriptive approach was utilised in a study by Nasser Alddin (2021) to assess how well teachers exhibit soft skills from their perspective using a questionnaire of (64) items distributed over (8) domains. The study sample consisted of (237) female classroom teachers in the Qweismeh District Education Directorate in Jordan. The results showed that classroom teachers have moderate soft skills. No statistically significant differences were found due to the variables of educational qualification and years of experience. The study recommended training classroom teachers on soft skills to raise their level to a high degree.

It can be seen from reviewing the previous studies that they dealt with some topics linked to gaining soft skills. For example, whereas Nasser Alddin (2021) sought to gauge the degree to which female teachers of the first three grades possess soft skills, Al-Zahrani (2021) sought to shed light on the role of student activities in the development of particular soft skills. In addition, the study (Omoush, 2021) sought to identify how university practicum programs help female classroom teacher students who are taught in schools improve their soft skills. However, the research on learning soft skills is still open to cover the various educational and learning process components, utilising alternative research approaches. It should be emphasised that all the previously mentioned studies employed questionnaires to collect data.

Al-Adwan (2014) aimed to identify the soft skills of public school principals in the Directorate of Education in Southern Shuna. He used the descriptive approach. The study sample consisted of (489) male and female teachers. The results showed that school principals had a high degree of soft skills. And there were no statistically significant differences at the

significance level ($\alpha = 0.05$) in the participants' responses due to gender, marital status, age, educational qualification and years of experience. The study recommended the need to develop managers' skills in line with the dimensions and areas of soft skills, increase research on soft skills, and link soft skills to education and curricula.

Al-Alawi and Al-Jarida (2018) examined the degree of soft skills practice by school principals in Sur, Sultanate of Oman. The study sample consisted of (50) individuals. The results indicated that the degree of school principals' practice of soft skills was high. There were statistically significant differences in the degree of principals' practice of soft skills due to the variables of gender and job title. There were no statistically significant differences due to the variables of educational qualification and years of experience. The study recommended training school principals on planning and time management skills.

Shabir (2016) conducted a study to identify the relationship between soft skills and entrepreneurial tendencies among students of technical and vocational colleges in Gaza Governorate, using the descriptive analytical approach on the study sample (388) students. The results showed statistical results between students' soft skills and entrepreneurial tendencies and their enjoyment of the following soft skills: time management, planning, communication, negotiation, problem-solving and decision-making, teamwork, and leadership. There are no statistically significant differences due to the variable (gender, training courses), and there are statistically significant differences due to the academic degree variable.

Using the experimental method (Ibrahim et al., 2017) conducted a study to measure the impact of soft skills and training methodology on employee performance. A random sample of (260) employees was selected. The results showed a positive relationship between (soft skills and training methodology) and work performance. Furthermore, the more employees possess systematic soft skills within a training system, the higher their performance and the higher the operating institution. Fixsen et al. (2018) conducted a study on self-care and entrepreneurship: an ethnography of soft skills development for higher education personnel. The study sample consisted of a university in the United Kingdom, and the descriptive approach was used. Interviews were conducted with the program participants. Few studies dealt with how academic services staff use programs such as LDPS for self-care. Time management was ranked higher for self-development and desirable traits, such as self-confidence.

El-Halabi & Abdullah (2015) studied the levels and types of soft skills students at Al-Fakhoora University need, which Al-Fakhoora University students possess and want to acquire, and the required skills to increase the opportunity for graduates to join the local labour market efficiently. Use the descriptive method. The study sample consisted of (177) male and female students. Their ages ranged between (20-37). Employers reported that all soft skills are important, but the skills related to morals rank highly among the other skills. The research team used the 25 most needed skills for each discipline. These skills were used to conduct a case study for each student.

Dmitrenko et al. (2020) did a study to develop soft skills for teachers through learning (EPS) based on problem-solving in the educational learning process and to identify its impact on teachers' personalities by setting theoretical hypotheses and testing the level of skills development. Use the experimental method. The study sample consisted of (160) male and female students from the second year of the research study and was distributed into (8) groups. Students' soft skills were assessed twice at the beginning and end of the experimental stage. As a result, it was found that learning (EPS) based on problem-solving gives teachers valuable soft skills (critical thinking, information analysis, cooperation with colleagues in the group, emotional intelligence) and student motivation to improve their ability to achieve good results in the educational-learning process.

Study Problem and Questions

A general objective of teaching science is to help students develop their scientific skills (Zaitoun, 2014). Skills are acquired over time through practice and instruction across the many educational phases. However, educational literature indicates a problem with the skills students learn from science curricula. For example, Bybee (2010) claimed that the learning outcomes in science courses are insufficient for preparing students for employment in the twenty-first century. In the same vein, Sobhi (2016) revealed a significant disconnect between the abilities children gain in school and those required for the labour market in the knowledge age.

To prepare a generation with the knowledge, values, and skills required to live in the twenty-first century, the Jordanian Ministry of Education has paid close attention to science curricula. As a result, it has changed the curricula, authored new textbooks for science at all educational levels beginning in the academic year 2020–2021, and trained teachers to implement the new curricula.

Soft skills are now essential for preparing a citizen who can engage and coexist with society in the modern era. The science teacher significantly impacts students' acquisition of soft skills through his teaching style and his use of these skills in classroom settings, which will favour students' learning of these abilities. In addition to the fact that the research on this subject was limited, according to the knowledge of the researchers, therefore, this study came to shed light on the practice of science teachers of soft skills during teaching and specifically tried to answer the following questions:

1. To what degree do science teachers practice soft skills?
2. Are there statistically significant differences ($\alpha = 0.05$) between the mean scores of science teachers' soft skills practices attributed to educational qualification and teaching experience?

Study Objectives

This study aims to reveal the following:

1. The degree of practising soft skills by science teachers in the classroom, including communication, problem-solving, negotiation, planning and time management, teamwork, leadership, and critical thinking
2. To investigate whether there is a difference in the degree of soft skills practice among science teachers inside the classroom due to the variables of educational qualification and teaching experience.

Study Importance

This study was conducted in response to current trends that urge teachers and students to acquire soft skills. In addition, the results of this study may pave the way for new research in this area and enrich the Arab literature regarding using soft skills by science teachers. It is also hoped that the researchers will benefit from the tools of the current study in their research and that the Ministry of Education will benefit from its results in determining the training needs of teachers in general and science teachers in particular.

Study limits

The current study was limited to investigating the practice of soft skills, among a sample of science teachers in public schools affiliated with the Jordanian Ministry of Education in the Bani Kinana district, in the first semester of the academic year (2022/2023). Its results are determined by the validity of the observation card used to monitor the practices of soft skills. And the reliability of the analysis for the recorded classes.

Study Terminology

Teachers' practices: The actual teaching practices performed in the classroom determine the success of achieving the teaching objectives. It includes three main processes: planning, implementation, and evaluation (Abu Dawlah, 2022).

Soft skills: They are the skills that relate to a person's experience in dealing with others, presenting his ideas, communicating and interacting with others, and using leadership behaviour persuasively and tactfully (Abdulwahed, 2016). Operationally, the science teachers' soft skills practices are monitored through a note card prepared for this purpose. These skills include communication, problem-solving, negotiation, planning and time management, teamwork, leadership, and critical thinking.

METHODOLOGY

Approach

The descriptive approach was followed in this study as it is the most suitable approach for achieving the objectives of this study.

Population and Sample

The study recruited(60) male and female science teachers working in the schools of the Directorate of Education of Bani Kenana District in the first semester of the academic year (2022/2023) who were distributed into six groups using the Non-probability Quota Sampling Method (Bryman, 2016) according to work experience less than five years, from five to ten years, and more than ten years. And their educational qualifications: educational and non-educational. Each group included ten individuals.

Instruments

The researchers designed an observation card to measure science teachers' practices of soft skills in the classroom after referring to previous studies (Susilawati et al., 2020; Al-Zahrani, 2021; Al-Omoush, 2021; Muhammad, 2019; Al-Taher, 2022; Al-Sharif, 2022), and the classroom observation tool for the branches of science used in the educational supervision departments in the Ministry of Education. The observation card in its initial form consisted of (28) items included in six areas: planning and time management (4) items, communication (7) items, teamwork (4) items, leadership (2) two items, problem-solving (5) items, critical thinking (6) items.

Instrument Validity

To verify the logical validity of the observation card, it was presented to a panel of nine experts in the field of curricula and science teaching methods to assess the content of the card in terms of the adequacy of its fields, the clarity of its statements, the extent of the soundness of the linguistic wording, and addition, modification or deletion**.** All of the panel's suggestions for changing some statements, introducing new ones, and including the domain negotiation were considered. The observation card in its final form consisted of 44 items distributed over seven areas: planning and time management (10) items, communication (7) items, critical thinking (7) items, leadership (6) items, problem-solving (5) items, teamwork (4) items, and negotiating (5) items.

The instrument construct validity was validated by applying it to a pilot sample of 20 male and female teachers. First, the researchers recorded three videos for each teacher showing their practices in the classroom. After a week, the same procedure was followed then data from both applications (videorecording) were analysed by measuring the degree of each item on the observation card. Finally, mean scores for each teacher's performance were calculated to estimate the corrected correlation coefficients between the items and the total observation card and between the items and their fields as indicators of internal consistency validity.

It was found that the values of the corrected correlation coefficients between the items of the 'planning and time management' with their field ranged between (0.71-0.92), and between them and the observation, card ranged between (0.63-0.89). On the other hand, the values of the corrected correlation coefficients between the items of 'communication' with its field were (0.89-0.97), and between them and the observation card was (0.85-0.90). Likewise, the values of the corrected correlation coefficients between the items of critical thinking with its field ranged between (0.66-0.96), and between them and the observation card ranged between (0.60-0.94). Moreover, the values of the corrected correlation coefficients between the items of 'leadership' and its field were (0.91-0.97), and between them and the observation card, they were (0.90-0.94). The values of the corrected correlation coefficients between the items of 'problem-solving' and its field ranged between (0.87-0.95), and between them and the observation card were (0.83-0.92). However, the values of the corrected correlation coefficients between the items of the field of teamwork with its field were (0.91-0.97), and between them and the observation card were (0.84-0.94).

Furthermore, the values of the corrected correlation coefficients between the items of the 'negotiation skill' field ranged between (0.94-0.98) and between them, and the

observation card ranged between (0.92-0.94). The values of internal consistency between the contents of the items of the fields of the observation card showed that the values of the corrected correlation coefficients calculated for the relationship of the items with their fields did not decrease below its critical value of (0.4282478), which is calculated according to the (t) test of the correlation coefficients. This indicates the quality of constructing the items of the instrument. Furthermore, Pearson's correlation coefficients were also calculated between the total degree of the practice of soft skills with the degree of the practice of the sub-domains, as shown in Table (1).

Table 1: The values of the correlation coefficients between the tool's overall degree with the degree of the practice of the sub-domains and the values of the inter-correlation coefficients between the sub-domains

Correlation coefficients		Planning &time management	Communication	Critical thinking	Leadership	Problem-solving	Teamwork	Negotiation
Communication	value	0.83*						
	level	high						
Critical thinking	value	0.89*	0.84*					
	level	high	high					
Leadership	value	0.89*	0.88*	0.94*				
	level	high	high	Very high				
Problem-solving	value	0.89*	0.89*	0.95*	0.97*			
	level	high	high	Very high	Very high			
Teamwork	value	0.87*	0.85*	0.93*	0.93*	0.94*		
	level	high	high	Very high	Very high	Very high		
Negotiation	value	0.85*	0.90*	0.88*	0.94*	0.93*	0.95*	
	level	high	Very high	high	Very high	Very high	Very high	
Total soft skills	value	0.94*	0.92*	0.96*	0.98*	0.98*	0.96*	0.96*
	level	Very high	Very high	Very high	Very high	Very high	Very high	Very high

The values of the Pearson correlation coefficients for the relationship between the observation card and its domains ranged between (0.92-0.98) and are classified as relationships of very high strength. Likewise, the values of the Pearson correlation coefficients between the subdomains ranged between (0.84-0.98) and are classified as strong relationships ranging from (high to very high). Furthermore, the values of the calculated Pearson correlation coefficients for the relationship between the observation card and its fields, and for the relationship between the fields, did not decrease below its critical value of (0.4282478), which is calculated according to the (t) test while testing its null hypothesis; This indicates that these fields represent science teachers' practices of soft skills in the classroom.

Instrument reliability

Cronbach's alpha equation was used to calculate the internal consistency reliability of the observation card and its fields. And to find out the values of the test-retest reliability, the tool was applied to a pilot sample. Then, the Pearson correlation coefficient between the two applications was calculated, as shown in Table (2).

Table 2: Results of the tool's internal consistency reliability coefficients / test-retest reliability

Observation Card	Reliability coefficients Internal consistency		test-retest reliability		N
	Value	Level	Value	Level	
Planning and time management	0.89	High	0.84*	high	10
communication	0.99	Very high	0.87*	high	7
critical thinking	0.96	Very high	0.86*	high	7
Leadership	0.98	Very high	0.89*	high	6
Problem-Solving	0.96	Very high	0.92*	Very high	5
Teamwork	0.97	Very high	0.93*	Very high	4
negotiation	0.99	Very high	0.91*	Very high	5
Total	0.99	Very high	0.79*	high	44

* Statistically significant (α = 0.05); Because its calculated value is greater than its critical value (0.4282478) at (18) degrees of freedom.

Table (2) shows that the overall internal consistency reliability of the instrument observation card was (0.99) which is very high. Similarly, its fields' internal consistency reliability values were (0.89-0.99), representing (a high - very high)

degree of reliability. Furthermore, Table (2) shows that the overall value of test-retest reliability for the observation card was (0.79), which is very high. Also, the test-retest reliability values for the observation card fields ranged between (0.84-0.93), which is very high. In addition, the values of Pearson's correlation coefficients calculated (test-retest) for the relationship of both applications did not decrease below its critical value of (0.4282478), which is calculated according to the (t) test while testing its null hypothesis; This indicates the stability of measuring science teachers' practices of soft skills in the classroom.

Tool Correction

The observation card included forty-four items, which were answered during the analysis of the content of the classroom using a five-point scale that includes five alternatives: "always" given 5 degrees, "often" (4) degrees, "sometimes" (3) degrees, "rarely" (2) degrees, and "never" (1) degree. The raw scores for science teachers' practices of soft skills and its fields were as follows: (44-220) for the overall observation card, (10-50) for the planning and time management field, and (7-35) for each of the communication and critical thinking areas, and (6-30) for the leadership domain, (5-25) for each of the problem-solving and negotiation domains, and (4-20) for the teamwork domain.

Given the specificity of the observation card, which is based on measuring the degree of science teachers' practices of soft skills, the statistical model with a standard scale was adopted by comparing the computed arithmetic means of the overall observation card and its fields and items with the theoretical arithmetic mean and its value (3) because it mediates the rating scale.

The practice of soft skills was classified with a high degree if the value of the (t) test for one sample was greater than the theoretical arithmetic mean with a statistically significant difference ($\alpha = 0.05$) and with an acceptable degree if the value of the (t) test was greater than the arithmetic mean with a difference that was not statistically significant. And to an unacceptable degree if the value of the (t) test was smaller than the theoretical arithmetic means by a difference that is not statistically significant, and to a low degree if the value of the (t) test was smaller than the theoretical arithmetic means by a statistically significant difference.

Analysis reliability

To ensure the reliability and stability of recorded video lessons, one of the researchers analysed 15 lessons - which represent recorded lessons from five teachers - using the Inferential Ladder technique to avoid making quick decisions based on incorrect conclusions (MacNeil, C., 2022, Cockburn, 2018). The soft skills practice analysis results were recorded in an observation card list. After four weeks, the same researcher repeated the recorded lessons' content analysis. Three analysts were involved and trained to analyse the lessons using the inferential scale to ensure consistency across people. They were asked to analyse the video lessons of the five teachers. The analysis consistency rate was calculated over time by the analysing researcher and across people between the analysing researcher and the other three analysts using Holsti's method ([consistency frequency/ (consistency + inconsistency)]*100%) (Holsti, 1969) as shown in Table (3).

Table 3: Consistency ratios for self- & interpersonal analysis of science teachers' soft skills practices

Fields	Consistency					
	Self-analysis	Interpersonal analysis				N
		1	2	3	Mean	
Planning and time management	90%	100%	90%	90%	93.3%	10
communication	85.7%	85.7%	85.7%	100%	90.5%	7
critical thinking	85.7%	71.4%	100%	100%	90.5%	7
Leadership	83.3%	100%	83.3%	100%	94.4%	6
Problem-Solving	80%	100%	80%	80%	86.7%	5
Teamwork	100%	100%	75%	100%	91.7%	4
negotiation	80%	80%	80%	100%	86.7%	5
Total	86.4%	90.9%	86.4%	95.5%	90.9%	44

Table (3) shows that the observation card's consistency percentage for the reliability of self-analysis was (86.4%), while the consistency percentages for each field ranged from (80%-100%). Additionally, the mean values of the percentages of the consistency for the reliability of the intra-analysis across people on the observation card ranged from 86.7%-94.4%, and these values are good indicators of the reliability of the analysis. The mean values of the consistency percentages for the stability of the intra-assessment of its fields were between (86.7%-94.4%).

Study variables

The study included the following variables

A. The dependent variables:

1. The educational qualification: (educational and non-educational).
2. Experience: less than five years, from five to ten years, and more than ten years.

B. The dependent variable: Science teachers' practices of soft skills.

Procedures

The following procedures were followed:

1. Determining the problem of the study, its objectives, and questions.
2. Examining previous literature and studies related to the subject of this study.
3. Identifying the study population and its sample.

4. Developing the observation card and verifying its validity and reliability.
5. Coordinating with the Directorate of Education and school administrations, and with the sample members, and obtaining their approval to make a video recording of three lessons for each participant.
6. Analysing the recorded lessons using the inferential ladder and recording the analysis results using the observation card.
7. Verifying the analysis's reliability.
8. Coding the results, processing, and obtaining the results.
9. Presenting and interpreting the findings and benefitting from theoretical literature and previous studies.

Statistical Analysis

Statistical processing of the study data was carried out using the statistical package for social sciences (SPSS V28), as follows (Statistics, 2021):

1. To answer the first study question, the arithmetic means and standard deviations of science teachers' practices of soft skills were calculated, followed by a one-sample (t) test, and the Cohen effect size was calculated for each of them. The size of the Cohen effect was then converted into a variance, which was explained by the squared correlation coefficient corresponding to the size of the Cohen effect, wherever appropriate. And the classification of the explained variance of the size of the Cohen effect according to its criterion, considering the order of the domains of soft skills and their items in descending order according to the calculated (t) test values.
2. To answer the second study question, The arithmetic means and standard deviations were calculated for science teachers' soft skills practices according to educational qualification, experience, and teaching. Then the (Bartlett) sphericity test was conducted between the values of the inter-correlation coefficients of the relationship between them according to educational qualification and teaching experience.

Results And Discussion

Results related to the first question

"To what degree do science teachers practice soft skills?"

Means and standard deviations of teachers' practice of soft skills were calculated on the tool and each of its fields, followed by conducting a (t) test to determine its score and calculating the size of the Cohen effect for its computed arithmetic means, and its explained variance to determine the practical implications of its mean. See Table (4).

Table 4: Results of the means and standard deviations of the soft skills practise and the (t) test, the Cohen effect size

Soft skills domains	Mean	Std.	T-test			Cohen effect size		
			value	rank	degree	value	interpreted variance	
							value	degree
Communication 2	3.78	1.05	5.77*	1	high	0.74	12.17	Medium
Negotiation 7	3.81	1.23	5.08*	2	high	0.66	9.71	Medium
Leadership 4	3.78	1.20	5.02*	3	high	0.65	9.50	Medium
Problem-solving 5	3.68	1.08	4.91*	4	high	0.63	9.12	Medium
Teamwork 6	3.76	1.20	4.91*	5	high	0.63	9.11	Medium
Critical thinking 3	3.60	1.09	4.29*	6	high	0.55	7.13	Low
Planning &time management 1	3.33	0.80	3.21*	7	high	0.41	4.11	Low
Total	3.64	1.01	4.91*		high	0.63	9.13	Medium

*The highest score is 5

Table (4) demonstrates that science teachers generally practice soft skills and their sub-fields to a high degree with an explained variance (9.13%). This result may be attributed to the interest of the Ministry of Education in applying contemporary educational theories such as the constructivist theory. This interest crystallised in science teachers' continuous training. Indeed, the Ministry of Education always urges teachers to employ modern instruction methods based on investigation, experimentation, and teamwork in implementing projects and applying scientific concepts and knowledge to solve real problems. It also emphasises the student's active role in implementing scientific activities and urges teachers to exercise their contemporary roles in the educational and learning process.

The developed science curricula have also contributed to the high soft skill practices among science teachers. Whereas the lessons were constructed in the science textbook in an investigation style, training sessions for teachers focused on implementing the new courses. The school administration and the technical supervisor followed up on the implementation process in the field, raising the level of teachers' awareness of the significance of soft skills in implementing activities. Consequently, the degree of their practice was high.

This result is consistent with (Shabir, 2016), which showed

that students of technical and vocational colleges at the University of Gaza have a set of soft skills that contribute highly to forming their entrepreneurial personalities. In contrast, it disagreed with the result of Nasser Alddin (2021), which showed that teachers of the first three grades practised soft skills to a medium degree. Considering the difference in specialisation between the sample members in Nasereddin's study and the sample members in the current study and the difference in methodology between the two studies.

The results related to the second question

Are there statistically significant differences ($\alpha = 0.05$) between the mean of science teachers' soft skills practices attributed to educational qualification and teaching experience? Means and standard deviations were calculated to show teachers' degree of soft practising skills and whether it is impacted by educational qualification, experience, and teaching variables, as shown in Table (5).

Table 5: Results of means and standard deviation of teachers' degree of practise soft skills

Soft skills		**Variable**				
		Educational qulaification		**Experience**		
		Non-educational	Educational	< 5 yrs	5-10 yrs	> 10 yrs
Planning & time manegement						
	Mean*	3.04	3.63	2.99	3.45	3.57
	SD	0.94	0.51	1	0.67	0.59
Communication						
	Mean*	3.5	4.06	3.26	3.93	4.15
	SD	1.26	0.69	1.38	0.81	0.64
Critical thinking						
	Mean*	3.19	4.02	3.14	3.84	3.83
	SD	1.25	0.69	1.29	1.02	0.79
Leadership						
	Mean*	3.39	4.17	3.28	4	4.06
	SD	1.47	0.7	1.37	1.09	1.02
Problem-solving						
	Mean*	3.27	4.1	3.23	3.94	3.88
	SD	1.29	0.59	1.27	0.96	0.87
Teamwork						
	Mean*	3.33	4.2	3.33	3.89	4.08
	SD	1.43	0.71	1.37	1.09	1.06
Negotiation						
	Mean*	3.43	4.19	3.32	3.94	4.17
	SD	1.51	0.72	1.37	1.19	1.02
Total soft skills						
	Mean*	3.28	4	3.19	3.81	3.92
	SD	1.22	0.58	1.23	0.88	0.75

*The highest score is 5

Table (5) shows significant differences between the mean of science teachers' soft skills practices due to the different levels of educational qualification and teaching experience. To identify these differences, two-way ANOVA was conducted, as shown in Table (6).

Table 6: Results of the Two-way ANOVA by educational qualification and teaching experience

Source of variance	**SS**	**DF**	**MS**	**F**	**Error probability**	**Effect size**
Educational Qualification	7.85	1	7.85	9.48*	0.00	0.1448
Experience	6.16	2	3.08	3.72*	0.03	0.1173
Error	46.39	56	0.83			

* Statistically significant ($\alpha = 0.05$)

There is a statistically significant difference (α=0.05) between the two arithmetic means of science teachers' practices of soft skills within the educational qualification. Science teachers who hold an educational qualification practice soft

skills with a mean of (Table 4: Table 5) more than their counterparts who do not hold an educational qualification (3.28: Table 5). Considering the effect size's value, it turns out that there is an improvement in the soft skills practices inside the classroom at an average level of (14.48%) when comparing science teachers who do not hold an educational qualification with those who do. This result can be attributed to the fact that science teachers who hold educational qualifications received educational and pedagogical courses during their university studies.

These courses focus on developing the learner's personality in all facets and prioritise the cognitive, practical, and emotional components of learning. Given the nature of scientific knowledge, educational programs in science curricula and teaching strategies strongly emphasise imparting and learning scientific abilities. One of the overarching objectives of teaching science is for students to become proficient in science operations. Due to the relationship between teaching and learning and the value they have for students, teachers with educational qualifications typically practice soft skills to a greater extent than their peers without educational degrees.

This study's findings contrast with those of studies by Nasir al-Din (2020), Adwan (2014), and Al-Batsh (2019), all of which found no statistically significant differences (= 0.05) between the two arithmetic means of the soft skills instruction methods used by science teachers in the classroom attributable to educational qualification. However, the result of this study is consistent with the findings of Al-Jarida's (2018) study, which indicated that the educational qualification variable caused statistically significant differences in how much soft skills were used by school principals. Considering the variation in the study sample.

Table (6) shows statistically significant differences (α = 0.05) between the mean of the soft skills teachers' practices attributable to the teaching experience. To determine the type of dimensional comparisons, the test to be used, because the teaching experience is multi-level, the (Levene) test was carried out according to the (F) probability distribution to verify the equivalence between the variance errors of the soft skills practices of science teachers according to each of educational qualification and teaching experience.

Where its calculated value was (5.24) with statistical significance (α = 0.05) at (5) degrees of freedom for the numerator and (54) degrees of freedom for the denominator, indicating that the variance errors for these practices are not equal, they are attributed to educational qualification and teaching experience. This necessitated using one of the dimensional comparisons tests that consider the unequalness of variance errors, represented by the (Games-Howell) test for multiple dimensional comparisons, to identify any differences between the means, which differed with statistical significance (α = 0.05) according to the different levels of (teaching experience), as shown in Table (7).

Table 7: Results of the James-Howell test for multiple dimensional comparisons between the mean of the soft skills of science teachers by teaching experience.

Experience		<5yrs	5-10yrs.
Games-Howell	mean	3.19	3.81
5-10 yrs.	3.81	0.62	
> 10yrs.	3.92	0.73*	0.10

* Statistically significant (α = 0.05)

Table (7) demonstrates that more experienced science teachers (those with more than ten years of experience) exercise soft skills with a mean of (3.92) than those with medium experience (those with five to ten years of experience) and simple skills. (less than five years). Additionally, there has been an improvement in the application of soft skills in the classroom within an average level of (11.73%: Table 5) when comparing the value of the effect size between the practices of teachers with experience of fewer than five years and those with experience of more than ten years. Since this number rises with experience, this conclusion can relate to the training programs teachers attend.

As a result, teachers with advanced experience are more likely to exercise soft skills than their counterparts with medium and simple experience. The moderate improvement in soft skill application with time may be attributed to science teachers' decreased interest in professional development due to the demands of their teaching responsibilities and the absence of incentives.

This result coincides with the study (Al-Tamimi & Al-Momani, 2022), which indicated statistically significant differences (α = 0.05) in the degree of teachers' possession of soft skills favouring those with more than five years of experience. It is also consistent with the results of Kashmar (2018), which found differences in the development of critical thinking due to the variable number of years of experience in favouring those with less than five years of experience. In comparison, it differed from the studies (Nasser Alddin, 2021; Al-Adwan, 2014; Al-Batsh, 2019), which found no statistically significant differences (α= 0.05) between the arithmetic means of the teaching practices of soft skills among science teachers attributable to teaching experience.

There are also significant differences between the mean of science teachers' practices in soft skills (planning and time management, communication, critical thinking, leadership, problem-solving, teamwork, and negotiation) resulting from different levels of educational qualification and teaching experience. To validate the significance of the significant differences, the values of the correlation coefficients between domains were calculated, followed by a Bartlett test for sphericity to determine the Two-way analysis of variance that should be used, as shown in Table (8).

Table 8: Results of the Bartlett test for the inter-correlation coefficients of science teachers' soft skills by educational qualification and experience

Relation	Planning &time management	Communication	Critical thinking	Leadership	Problem-solving	Team work
Communication	0.79*					
Critical thinking	0.86*	0.80*				
Leadership	0.86*	0.86*	0.93*			
Problem-solving	0.86*	0.87*	0.94*	0.96*		
Teamwork	0.84*	0.82*	0.92*	0.92*	0.93*	
Negotiating	0.82*	0.88*	0.86*	0.93*	0.92*	0.94*

The results of Bartlett's sphericity test for the fit of the correlation coefficients for the relationship of the dependent variables with each other according to the two variables

χ^2	df	statistical Error
697.17*	27	0.00

*** Statistically significant (α = 0.05)**

Table (8) reveals a statistically significant correlation (α = 0.05) between science teachers' practices of soft skills, attributed to the educational qualification and teaching experience. A Two-way ANOVA analysis was performed - without interaction - between the arithmetic mean of soft skills practices combined according to educational qualification and teaching experience, as shown in Table (9).

Table 9: Results of the Two-way ANOVA analysis by educational qualification & experience

Effect	ANOVA Type	Value	F	df Hypnosis	error	Statistical Error	Effect size
Educational Qualification	Hotelling's Trace	0.33	2.32*	7	50	0.04	0.245
Experience	Wilks' Lambda	0.74	1.18	14	100	0.30	0.1415

* Statistically significant (α = 0.05)

Table (9) shows no statistically significant effect (α = 0.05) for the teaching experience and a statistically significant effect (α = 0.05) for the educational qualification. To determine on which domain the effect of the educational qualification was significant, the two-way ANOVA analysis was conducted - without interaction - between the arithmetic means of practices on the domains, each separately according to educational qualification and teaching experience, as shown in Table (10).

Table 10: Results of the Two-way ANOVA analysis by educational qualification and teaching experience

Field Affected by source of variance	SS	DF	MS	F	Statical Error	Size effect
Problem-solving						
Educational Qualification	10.42	1	10.42	11.21*	0.00	0.1668
Experience	6.20	2	3.10	3.34+	0.04	0.1065
Error	52.05	56	0.93			
Critical thinking						
Educational Qualification	10.42	1	10.42	11.06*	0.00	0.1649
Experience	6.54	2	3.27	3.47+	0.04	0.1102
Error	52.77	56	0.94			
Planning & time management						
Educational Qualification	5.28	1	5.28	10.12*	0.00	0.1530
Experience	3.68	2	1.84	3.53+	0.04	0.1118
Error	29.23	56	0.52			
Teamwork						
Educational Qualification	11.48	1	11.48	9.46*	0.00	0.1445

Field Affected by source of variance	SS	DF	MS	F	Statical Error	Size effect
Experience	6.09	2	3.05	2.51	0.09	0.0823
Error	67.98	56	1.21			
Leadership						
Educational Qualification	8.95	1	8.95	7.24*	0.01	0.1145
Experience	7.45	2	3.73	3.02	0.06	0.0972
Error	69.19	56	1.24			
Negotiation						
Educational Qualification	8.82	1	8.82	6.73*	0.01	0.1072
Experience	7.73	2	3.87	2.95	0.06	0.0953
Error	73.41	56	1.31			
Communication						
Educational Qualification	4.74	1	4.74	5.13*	0.03	0.0839
Experience	8.50	2	4.25	4.60+	0.01	0.1412
Error	51.68	56	0.92			

* Statistically significant ($\alpha = 0.05$)

+ Error: the first kind because there is no effect of teaching experience in Two-way ANOVA analysis.

Table (10) exhibits a statistically significant difference (α=0.05) in science teachers' practices in soft skills areas (problem-solving, critical thinking, planning and time management, teamwork, leadership, negotiation, and communication) attributed to educational qualification. Where teachers who hold an educational qualification practice it with arithmetic means of (4.1, 4.02, 3.63, 4.2, 4.17, 4.19, and 4.06: Table 5) more than it is practised by their counterparts who do not hold an educational qualification with means of (3.27, 3.19, 3.04, 3.33, 3.39, 3.43, and 3.5: Table 5). Considering effect size values, it shows that by comparing the practices of science teachers who do not hold an educational qualification with those who hold an educational qualification, there is an improvement in the practices of the domains (problem-solving, critical thinking, planning and time management, teamwork, leadership, and negotiation) within an average level of (16.68%, 16%). .49%, 15.3%, 14.45%, 11.45%, 10.72%: Table 7), while the improvement in the practice of (communication) was at a low level (8.39%: Table 7).

Conclusion

Science teachers' practice of soft skills reveals various phenomena encountered in developing soft skills. Generally, teachers understand the importance and function of soft skills for students, but they are not totally understanding the application of soft skills in science learning. The important of soft skills, mostly science teachers believe soft skills are needed to promote students' achievements, character, personality, and attitude in interacting with the people in social community. In addition to its importance in the workplaces. There are 6 components of soft skills needed in science learning. problem-solving, critical thinking, planning and time management, teamwork, leadership, negotiation, and communication. The challenges of soft skill practice are the lack of teachers' understanding of soft skills and teaching materials, soft skills are not listed into objective learning and the last one is lack of support in soft skill development.

Recommendations

The researchers recommend the following:

1. Holding training courses and workshops for science teachers on employing soft skills during instruction.
2. Investigating the degree of students' acquisition of soft skills in the different educational stages.

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