

## The Level of Knowledge of Public Education Teachers on the Importance of Female Students Acquiring Knowledge of Sustainable Development Indicators in Light of the Requirements of Vision 2030

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### Abstract

The challenges of climate change and the urgent need to find alternative sources of energy have placed countries under increasing pressure to meet their sustainability goals. Saudi Arabia's Vision 2030 aims to facilitate the transition towards a cleaner, greener economy by educating teachers and students about the theory and practices of sustainable development. The aim of this study is to measure the extent to which female public education teachers are aware of the importance of students acquiring knowledge of the social, economic, and environmental dimensions of sustainable development within the context of Saudi Arabia's Vision 2030. Five variables: educational stage, academic qualification, specialization, practical experience, and training courses in the field of education, were used to measure differences in the levels of awareness among teachers across the social, economic, and environmental dimensions of sustainable development. An analytical/descriptive approach was deemed most appropriate to the study objectives. The data was collected using a questionnaire distributed to a sample of 365 public education female teachers at three levels of education: 122 primary teachers, 116 intermediate teachers, and 127 secondary school teachers. The results revealed a high level of awareness in relation to the social dimension, most notably the importance of educating students about equality and social justice, human rights, and the eradication of all forms of poverty. The results revealed average levels of awareness in relation to the economic dimension, most notably the need to plan student activities around saving energy, including water and electricity consumption. Teachers were also aware of the need to educate students about how national employment is important to facilitating economic development. The results showed average levels of awareness in relation to the environmental dimension, most notably the importance of protecting the environment, the need to teach students about environmentally sustainable practices, and the need to involve students in environmental preservation activities. Based on the findings, the researcher makes recommendations designed to address the existing gaps in knowledge among female public education teachers. The researcher also recommends extending the study to university students.

**Keywords:** Public education teachers, students' acquisition of indicators of sustainable development, requirements of Vision 2030, Saudi Arabia Vision 2030, public education teachers, raising awareness, sustainable development goals.

## 1. Introduction

The importance of sustainable development and its impact on all aspects of human behavior, economic, political, social, and environmental, cannot be dismissed in the context of local and global changes. All countries must base their development agendas on the concept of sustainability to address the needs of current generations without jeopardizing the ability of future generations to survive and prosper.

Muhammad (2022) describes sustainable development as a comprehensive process that balances economic, social, and environmental development to enhance present capabilities without damaging the environmental safety and economic survival of future generations. This is the route to achieving a just society for present and future generations.

Sustainable development aims to raise awareness of existing environmental problems, achieve rational use of resources, and promote technical and economic growth.

An education system is fundamentally important to all countries. A high-quality education system will provide citizens with the scientific and technical knowledge and skills necessary in developed countries. Education teaches individuals how to preserve their resources – economic, social, and environmental – without depletion due to unemployment, environmental degradation, or poverty (UNESCO, 2013).

Consequently, there is an urgent need to educate students about the concept of sustainable development to effectively implement its education (Nousheen et al., 2020; Saqib et al., 2020).

A study by Bourn et al. (2017) emphasized the potential for teachers' education to make an important contribution to increasing the understanding of sustainable development goals in education.

Fonseca et al. (2018) indicated that the concept of sustainable development includes three dimensions: social, economic, and environmental, and there are disparities in the interest of education in these dimensions. As a result, the field of Education for Sustainable Development lacks a consistent body of knowledge as it is fragmented by curricula, issues, and methodologies which have different impacts. Some courses focus on the social dimension, while others focus on the environment or the economic dimensions. These differences in emphasis suggest there is a need to raise awareness amongst female teachers about the dimensions, requirements, and challenges of sustainable development so they can provide this knowledge to their students.

## 2. Theoretical Framework and Previous Studies:

Sustainable development is a new, comprehensive, and balanced development pattern aimed at achieving consistency between the goals of economic development and environmental and social requirements (Al-Ayeb, 2011). It is based on the management of environmental resources and capabilities to meet the needs of the present without compromising future generations' needs, and is a balanced and harmonious economic and social development focused on improving the quality of life (Desouki, 2021).

Also known as continuous or progressive development, sustainable development is a relatively modern phenomenon. The goal is to achieve a balance between various dimensions of the environment, to develop natural and human resources. This is done without extravagance or waste according to a strategy that is planned collectively, cooperatively, and scientifically to meet the needs of the present and the future, and built on community participation while preserving cultural and civilizational specificity (Ahmed, 2021).

The concept of education for sustainable development is based on the Millennium Development Goals (Kopinina, 2020) and is a response to the need for education to meet the growing environmental challenges facing the planet. Education must respond by providing the knowledge, skills, values, and attitudes that enable teachers to contribute to sustainable development (Leicht et al., 2018). This global perspective enables teachers and students to understand how social, economic, and environmental factors are connected, the problems that arise, and how to create environmental protections. As a result, education can raise awareness and promote values directed towards a better life on the planet (Palmer, 1999).

The Sustainable Development Agenda 2030 emphasizes the need to integrate the principles of Education for Sustainable Development (ESD) in all levels of education. Education for Sustainable Development as an integral part of the quality of education and all educational institutions, from preschool to higher education, formal and non-formal education, can and should promote the development of sustainability competencies (Cebrián et al., 2020).

Based on previous research on the importance of integrating sustainable development concepts in the curricula, the researcher identified the dimensions of sustainable development as follows:

### 1- Environmental Dimension:

The environmental dimension focuses on managing natural resources to meet current needs without harming the interests of future generations. The quantity and quality of natural global resources must be sustainably consumed to avoid depletion and waste. The environmental dimension led to a shift away from the increasing exploitation of scarce resources to satisfy multiple human needs towards progressive or sustainable development that protects the environment. Economic development theories differ in focus. Green or sustainable economic development limits damage to the environment. Pure economic development focuses on growth without reference to environmental concerns.

## 2- The Social Dimension

The social dimension focuses on developing the individual. The goal is combatting all aspects of poverty, ensuring social justice, providing health and social services, and access to education and work. Democracy is promoted through the participation of people in decision-making with a high degree of transparency and integrity. The system is socially sustainable when it achieves access to basic health and educational services and minimum standards of security and respect for the rights of all members of the community.

## 3- The Economic Dimension

The economic dimension focuses on achieving a balance between the need for economic growth and the preservation and protection of natural resources for future generations. Sustainable economic development requires long-term strategic planning, which rationalizes the use of resources and prevents waste. Sustainable development requires ministries and institutions tasked with making long-term economic and planning decisions about environmental protection. This approach reduces environmental problems, limits environmental degradation, and increases the sustainability of economic growth (Al-Tantawy, 2021; Deeb and Muhanna, 2009). Additionally, an increased awareness of environmental issues amongst individuals is more effective than enacting laws and legislation, saving a lot of effort and money.

## 3. Literature Review

According to most previous studies, teachers exhibit average levels of awareness concerning the standards and indicators of sustainable development. A study by Al-Mumani (2015) revealed low levels of awareness concerning the dimensions of sustainable development. However, studies by Al-Khawaldeh and Al-Khawaldeh (2013) revealed high levels of awareness among schoolteachers in Jordan concerning all components of education for sustainable development. A study by Mahat and Idrus (2017) revealed a relationship between knowledge and the behavioral practices of students and teachers, particularly when the school participated in a national program. These findings stress how sustainable activities can effectively promote awareness of sustainable development in the school community.

Several studies related to the variables used in the current research were reviewed. A recent study by Masharqa (2021) dealt with strategic planning for higher education in Palestine and its relationship with national strategic planning in the light of certain sustainable development indicators. Masharqa used content analysis to review the strategic planning data from the Palestinian higher education sector and other specialized ministries. The researcher also reviewed data related to sustainable development issued by the Palestinian Central Bureau of Statistics and the Environment Quality Authority. Masharqa's study yielded several interesting results. A significant finding was that the Palestinian Higher Education Council lacked an effective role in the national strategic planning for higher education. The findings revealed there was no coordination and integration between Palestinian universities. Consequently, it was difficult for national strategic planning to address the social dimension of sustainable

development: poverty indicators, governance, health, higher education, security, and peace. Additionally, this lack of coordination led to failures in the economic dimension: unemployment indicators, gross domestic product, and production and consumption patterns. Finally, there were failures in the environmental dimension: water, wastewater and sewage networks, the marine and coastal environment, agricultural land, and biodiversity.

Al-Dhafiri (2021) measured the extent to which female secondary schoolteachers in Kuwait were aware of sustainable development characteristics. The sample consisted of 60 female teachers. A questionnaire was used to measure teachers' awareness across the three sustainable development dimensions: environmental, economic, and social. A descriptive approach was used to analyze the data. Al-Dhafiri (2021) concluded that participants' responses were generally positive according to a Likert scale, with 88% of respondents selecting "strongly agree" and "agree". The environmental awareness domain was 90%, the social awareness domain was 82%, and the economic domain was 93%.

The study recommendations included raising the profile of sustainable development by establishing sustainable educational projects, and providing further training for secondary school teachers to consolidate the concept of sustainable development and contribute to raising social awareness of sustainable development in the community.

A study by Ba Raidah and Al-Zubaidi (2021) proposed including the dimensions of sustainable development in the geography textbook content for secondary education in the Kingdom of Saudi Arabia. A descriptive method was used in the content analysis. To achieve the study goal, the researchers prepared a list of the main dimensions and sub-dimensions of sustainable development for inclusion in the textbook. The list was presented to several specialized arbitrators, and the final list was composed of three main dimensions. The researchers calculated the stability of the analysis tool by analyzing the same topic twice at separate intervals. The results revealed a discrepancy in the distribution of the sub-dimensions of sustainable development for inclusion in the textbook. The economic dimension scored first place at 51.16%, the environmental dimension scored second place at 43.06%, and the social dimension scored third place at 5.33%. These results were attributed to the nature of the geography textbook topics, and accordingly, the researchers built a proposal to include the dimensions of sustainable development in the geography textbook for secondary education.

A study by Al-Research questions (2021) examined the extent to which secondary-level Islamic education teachers in the Kingdom of Saudi Arabia were aware of the dimensions of sustainable development. The study sample consisted of 100 female secondary-level Islamic education teachers in the Asir region. A descriptive/analytical approach was used, with a questionnaire as the main data collection method. The study results emphasized the need to provide Islamic education teachers in Saudi Arabia with basic skills and knowledge about sustainable development and its related concepts.

Saqib et al. (2020) conducted a study in Pakistani Higher Education Institutions (HEIs), which examined how students and teachers perceived the implementation and effectiveness of Education for Sustainable Development (ESD). The study involved teachers and students in

public and private universities in Punjab, Pakistan. Data was collected from 1915 students and 120 teachers through semi-structured questionnaires during face-to-face interviews. The students and teachers were asked to rank social, environmental, and economic indicators of sustainability consciousness (SC) on a five-point Likert scale. The data was analyzed to assess their perceptions based on their knowledge of sustainability. The results indicated that ESD occurs at a very low level in Pakistani higher education institutions, and teachers have insufficient knowledge of sustainability. A relationship was found between students' grades/class and the effectiveness of ESD. There is a need to pay more attention to the implementation of ESD for undergraduates in Pakistani higher education institutions.

A study by Ates and Gül (2018) examined the relationship between pre-service science teachers' perceptions of sustainable development and sustainable behavior. The results showed that teachers are aware of the importance of sustainable development and sustainable behaviors and that they behave accordingly. The study recommended that pre-service teachers be given professional support to increase their awareness of sustainable development and associated behaviors.

Kovačič and Grubar (2016) conducted a study across three public universities in Slovenia to assess the awareness of sustainable development among geography students. The survey examined the current level of awareness and how it was acquired. 160 questionnaires were distributed, mainly amongst students on the first level. The students rated their awareness of sustainable development as very good, yet they lacked awareness of the social dimension. Their awareness was acquired mainly through formal education. An awareness of sustainable development improves during study in the first level, and especially so in the second level. This fact and the answers about integrating study programs with the subject of sustainable development (also the courses mentioned by the students) show that sustainable development is well integrated into the geography program.

A study by Al-Adwan (2016) measured the extent to which Geography teachers in Jordan were aware of sustainable development dimensions. The study sample consisted of 52 male and female teachers from the Education Directorate of the Qweismeh District during the academic year 2014/2015. Data was collected using a questionnaire consisting of 26 items distributed over three fields. The validity and reliability of the questionnaire were verified. The results showed that amongst Geography teachers, there was an average level of awareness of the dimensions of sustainable development. There was greater awareness of the economic field, followed by the environmental, and the social. The data revealed no statistically significant differences due to educational qualifications. However, there were statistically significant differences due to experience, in favor of teachers with fewer years of experience.

Previous studies, for example, Al-Qarni (2021) indicated there is a need to further develop the skills and knowledge of Islamic education teachers in the Kingdom of Saudi Arabia; this lack of knowledge affects both male and female students. The current study shows how education plays a central role in teaching students about sustainable development indicators and the requirements of Vision 2030.

This research is intended to promote the transition towards a knowledge economy, which is a crucial element of the Kingdom's Vision 2030 sustainable development agenda for global growth and progress. Consequently, the education system and its teachers have a role in making these goals a reality both in Saudi society and globally.

The review has revealed no previous studies that focus on what level of knowledge exists amongst public education teachers regarding the importance of female students acquiring knowledge of sustainable development indicators in the context of Vision 2030.

#### Research Questions:

What level of awareness exists amongst female public education teachers on the importance of female students acquiring knowledge of sustainable development indicators in the context of Vision 2030?

Four sub-questions will be addressed:

1. What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030?
2. What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030?
3. What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030?
4. What statistical differences arise in the study sample responses concerning levels of awareness across the social, economic, and environmental indicators in relation to the five study variables: stage of education, academic qualification, specialization, practical experience, training courses in the field.

#### Study Objectives

1. To ascertain the level of awareness among female public education teachers on the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030.
2. To ascertain the level of awareness among female public education teachers on the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030.
3. To ascertain the level of awareness among female public education teachers on the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030.

4. To identify the statistical differences that arise across the social, economic, and environmental indicators and to explain how they can be attributed to the five study variables: level of education, academic qualification, specialization, practical experience, training courses in the field.

Significance of the current study:

Theoretical significance:

1. This study will ascertain the existing level of awareness amongst teachers on the theory and practice of sustainable development (social, economic, and environmental) with the aim of identifying and addressing gaps in knowledge.
2. The study will support the Kingdom's Vision by emphasizing how all stages of education play a key role in the progressive development of society. As a result, female teachers and students can actively contribute to achieving the Vision 2030 development goals: social, economic, and environmental.
3. The study supports the role assigned to the Ministry of Education and emphasized by the Kingdom's Vision 2030. Primary, intermediate, and secondary education is viewed as a comprehensive and integrated system that provides the foundation for university study, which is fundamental to the development of a progressive, knowledge-based economy.
4. The study will add to the Arab literature in general and will enrich the existing Saudi literature, specifically in relation to the role of public education schools in achieving the Kingdom's Vision 2030 goals for education and sustainable development as approved by the United Nations Organization.

Applied Significance:

1. The results may be of interest to educators, specialists, individuals with an interest in educational affairs, and those working at all levels of educational organizations, who are tasked with integrating the sustainable development agenda into public education.
2. The results may provide useful feedback for Ministry of Education officials, especially those who are responsible for achieving the sustainable development goals under the Kingdom's Vision 2030 national transformation program.
3. The results may benefit Ministry of Education officials by providing information on the extent to which public education teachers are aware of sustainable development indicators. This information could prompt a review of academic content, curricular and extra-curricular activities, and an assessment of how they contribute to deepening understanding of social, economic, and environmentally sustainable development goals.

Research limits:

The current study examined the level of awareness among female public education teachers on the importance of female students acquiring knowledge of the social, economic, and environmental indicators of sustainable development in the context of Vision 2030. The  
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timespan was limited to the academic year 2022/2023. The spatial limits restricted the study to public education schools in the General Administration of Education in the Eastern Region of Saudi Arabia. The study population was limited to female teachers in three stages of public-school education: primary, intermediate, and secondary.

4. Research Methodology:

An analytical/descriptive approach was selected as most appropriate to the study objectives and questions.

The study population and sample:

The study population consisted of all female teachers in public education schools in the Eastern Region (East and West of Dammam City, Saudi Arabia). The total number based on statistics from the Public Education Department Eastern Region (East and West of Dammam City, Saudi Arabia) was 6184. The final study sample, based on the responses, was 365 female teachers randomly selected from public education schools. Table 1 shows data from the study sample population.

Table 1: The relative distribution of the study population according to demographic variables.

Demographic variables	Frequency	Percentage	Total	Percentage
Educational stage			365	100%
Primary stage	122	33.42 %		
Intermediate stage	116	31.78 %		
Secondary	127	34.79 %		
Academic qualification			365	100%
PhD	3	%0.82		
Master	20	%5.48		
Bachelor	316	86.58%		
Secondary	26	7.12%		
Specialization			365	100%
Literary	198	54.25%		
Scientific	125	34.25%		
Administrative and social	42	11.51%		
Work experience			365	100%
Less than 5 years	51	13.97%		
5 years to under 10 years	59	16.16%		
10 years to under 15 years	87	23.84%		
15 years and above	168	46.03%		
Training Courses			365	100%
No Training courses	30	8.22%		
Less than five training courses	63	17.26%		
Five courses and above	272	74.52%		

In relation to the demographic variables the study population was distributed as follows: 33.42% primary stage, 31.78% intermediate stage and 34.79% secondary stage. 86.58% of teachers were educated at a Bachelor level while only 0.82% were educated at a PhD level. 54.25% of teachers specialized in the literary field and only 11.51% specialized in the administrative and social field. 46.03% of teachers had practical experience totaling 15 years or above while only 13.97% had practical experience totaling under five years. 74.52% of teachers had undertaken five or more training courses while only 8.22% were without training courses.

Data collection method:

A questionnaire was selected as the most appropriate data collection tool. The questionnaire design was guided by the theoretical aims of the current study and by previous studies on the indicators of sustainable development. The questionnaire was applied to a sample of primary, intermediate, and secondary public education schoolteachers. Four questions were designed to identify what level of awareness exists amongst female public education teachers on the importance of female students acquiring knowledge of sustainable development indicators in the context of Vision 2030. The questionnaire was also designed to identify whether different levels of awareness concerning the social, economic, and environmental indicators of sustainable development could be attributed to the study variables: educational stage, academic qualification, specialization, practical experience, and training courses in the field.

The internal consistency of the questionnaire was calculated for validity using the Pearson coefficient after it was applied to a survey sample of 50 female teachers from primary, intermediate, and secondary public education schools. The researcher calculated the correlation coefficient between the degrees of each statement of the questionnaire and the total degrees of the items to which the statement belongs. The correlation coefficients ranged between 0.51–0.89. These results are acceptable values indicating the consistency of each item with the total score of the questionnaire. These results confirm the validity of the data collection tool as shown below.

Table 2: Correlation coefficients between the scores of each statement of the questionnaire and the total scores of the item to which the statement belongs.

Item	Statement Number	correlation coefficient,	level of significance
The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030.	1	0.62	0.01
	2	0.80	0.01
	3	0.60	0.01
	4	0.53	0.01
	5	0.59	0.01
	6	0.89	0.01
	7	0.79	0.01
	8	0.53	0.01
	9	0.77	0.01
	10	0.77	0.01
	11	0.66	0.01
	12	0.85	0.01

The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030	13	0.63	0.01
	14	0.52	0.01
	15	0.67	0.01
	16	0.66	0.01
	17	0.72	0.01
	18	0.80	0.01
	19	0.51	0.01
	20	0.70	0.01
	21	0.63	0.01
	22	0.51	0.01
The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030.	23	0.70	0.01
	24	0.69	0.01
	25	0.58	0.01
	26	0.57	0.01
	27	0.66	0.01
	28	0.66	0.01
	29	0.66	0.01
	30	0.53	0.01
	31	0.74	0.01
	32	0.64	0.01
	33	0.61	0.01
	34	0.54	0.01
	35	0.64	0.01

The correlation coefficients ranged between 0.51–0.89 and all of them are statistically significant; thus, the statements of the questionnaire are considered valid for what they were designed to measure.

Results of the constructive validity of the questionnaire:

To verify the constructive validity of the questionnaire, the researcher calculated the correlation coefficient between the total scores for each item of the questionnaire and the total score of the questionnaire.

Table 3: Correlation coefficients between the total scores for each item of the questionnaire and the total score for the questionnaire.

Items	Correlation coefficient	Level of significance
The first	0.84	0.01
The second	0.82	0.01
The third	0.80	0.01

The correlation coefficients 0.84, 0.82, 0.80 are all statistically significant, which indicates the validity and consistency of the questionnaire items.

The stability of the questionnaire and its items:

To verify the stability of the questionnaire and its items, the researcher used the Cronbach alpha coefficient method.

Table 4: Results of Cronbach's alpha test for the questionnaire and its items

Questionnaire Items	Number of statements	Cronbach's alpha stability coefficient values
The first item	13	0.91
The second item	9	0.82
The third item	13	0.87
The overall stability coefficient for the questionnaire	35	0.93

The stability coefficients of the items are 0.91, 0.82, and 0.87, with a high 0.93 as the stability coefficient for the questionnaire overall.

Table 5 shows the values and the mean of the responses to the questionnaire items according to the five-point Likert scale.

Statistical tools used in the study:

SPSS 25 was used to perform statistical analyses, in addition to the Pearson correlation coefficient, Cronbach's Alpha coefficient, the mean, standard deviation and one way ANOVA, and the LSD test for Pairwise comparisons.

Table 5: The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030.

The level of awareness among female public education teachers of the importance of students acquiring knowledge of sustainable development in the context of Vision 2030	The mean
Low level	1 ≥ 2.33
Intermediate level	2.34 ≥ 3.67
High level	3.68 ≥ 5

5. Results and Discussion:

Sub-question 1: What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030?

Table 6 shows how the teachers ranked the importance of the statements related to the social dimension of sustainable development.

#	Statement order	Statement	Mean	Standard Deviation	Degree of Agreement
The first item: the extent to which female public education teachers are aware of the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030					
1	6	I explain to the students the importance of equality and social justice.	4.53	0.70	High
2	1	I establish human and social values among female students.	4.81	0.46	High

3	10	I explain to female students the importance of eliminating poverty in all its forms	2.76	1.06	Average
4	13	I explain to female students the serious consequences of unemployment and its impact on the community	2.13	1.47	Low
5	9	I teach female students the importance of security and social peace in maintaining the protection of the community	3.36	1.22	Average
6	5	I involve female students in activities about raising awareness of the dangers of smoking and drugs on health.	4.62	0.71	High
7	4	I involve female students in awareness activities about malnutrition and its relationship with some diseases such as obesity.	4.64	0.65	High
8	11	I explain to female students the importance of the medical services provided to them.	2.23	1.34	Low
9	7	I enhance students' opportunities for good and comprehensive learning.	4.29	0.97	High
10	2	I instill positive citizenship values in female students	4.80	0.46	High
11	8	I instill values of voluntary work in the female students.	4.21	1.29	High
12	3	I instill non-violence values among female students.	4.79	0.47	High
13	12	I explain to female students the negative effects of poor distribution of population density on the community.	2.21	1.65	Low
The total score of the first item: the extent to which female public education teachers are aware of the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030			3.80	1.48	High

Regarding the first item: the extent to which public education female teachers are aware of the importance of female students acquiring knowledge of social sustainable development indicators in the context of Vision 2030. Table 6 shows the total mean value was high at 3.80. Most of the statements scored "high" degrees of agreement with a mean ranging between 2.13 and 4.81. This result is consistent with the study by Al-Dhafiri (2021) which showed the participants' responses generally trending towards the high side of the Likert scale. These results differ from the study by Al-Adwan (2016) which showed average levels of awareness among Geography teachers. The following indicators of sustainable social development scored the highest levels of agreement: "I establish human and social values among female students", "I instill positive citizenship values in female students", and "I instill non-violence values among female students". This feedback shows that teachers are aware of the importance of educating female students about these indicators and that schools are committed to developing this knowledge. Students need to acquire human and social values as well as citizenship values and the rejection of violence. These development goals are emphasized in the Kingdom's Vision for the Ministry of Education, which plays a vital role in the advancement towards a progressive economy.

The next statements in order of awareness were "I involve female students in activities about raising awareness of the dangers of smoking and drugs on health", and "I involve female students in awareness activities about malnutrition and its relationship to some diseases such as obesity". These two statements are important in educating students about the need to develop beneficial health practices, which are linked to social practices, including smoking. Smoking negatively affects not only the individual, but also the wider community. The responses emphasized the importance of educating students about equality and social justice, the value of volunteer work, and the need to provide students with a broad understanding of the issues.

These results are consistent with the findings of Ates and Gül (2018), which showed that female teachers recognized the importance of sustainable development and this awareness informed their sustainable behaviors. The results of the current study show a high level of sustainable behaviors amongst female teachers and that the relationship between their sustainable beliefs and behaviors is at an average level.

The lowest level of awareness concerned the statements, "I explain to female students the serious consequences of unemployment and its impact on the community", and "I explain to female students the negative effects of poor distribution of population density on the community". These results can be attributed to the fact that these indicators are associated with officials and not female teachers. Yet, there is a relationship between interest in teaching and joining appropriate professions in the labor market, so it is important to educate female students on the dangers of unemployment.

In the study by Kovačič and Grubar (2016) the students rated their awareness of sustainable development as "very good" despite their lack of awareness on the social aspects of sustainable development. This contrasts with the Masharqa (2021) study results. The most important findings included identifying the absence of an effective role for the Palestinian Higher Education Council in the national strategic planning for education, and the lack of required coordination and integration among Palestinian universities. Consequently, the national strategic planning authority failed to effectively address the social dimensions of sustainable development: including the indicators of poverty, governance, health, higher education, security, and peace. The national strategic planning authority also failed to effectively address the economic dimension: including the indicators of unemployment, gross domestic product, and patterns of production and consumption. Finally, the lack of required coordination and integration among Palestinian universities led to failure in addressing the environmental dimension: including water, wastewater and sewage networks, the marine and coastal environment, agriculture and land, and biodiversity.

Sub-question 2: What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030?

Table 7 shows how the teachers ranked the importance of the statements related to the economic dimension of sustainable development.

#	Statement order	Statement	Mean	Standard Deviation	Degree of Agreement
The second item: The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030					
14	7	I explain to female students the negative effects of poor distribution of population density on the economy.	2.03	1.27	Low
15	4	I explain to female students the importance of reducing the unemployment rate to improve the standard of living.	3.41	1.17	Average
16	9	I explain to female students the importance of increasing the small businesses' contribution to the economy.	1.79	1.35	Low
17	2	I involve female students in awareness activities on the importance of saving electricity consumption.	4.62	0.67	High
18	1	I involve female students in awareness activities on the importance of saving water and reducing its waste.	4.70	0.61	High
19	5	I explain to female students the importance of teamwork and its role in increasing production.	3.36	1.04	Average
20	3	I involve female students in activities that stress the importance of national employment to achieve economic development.	4.41	0.77	High
21	8	I involve female students in activities that explain the importance of utilizing scientific research in improving the economy	1.98	1.25	Low
22	6	I explain the importance of the role of women in economic development to female students.	3.06	1.13	Average
The total score of the second item: the extent to which female public education teachers are aware of the importance of students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030			3.26	1.52	Average

Regarding the second item: the extent to which public education female teachers are aware of the importance of female students acquiring knowledge of economic sustainable development indicators in the context of Vision 2030. Table (7) shows the total mean value was average at 3.36. The statement scores ranged between high, average, and low with a mean between 1.79–4.70. This result is consistent with the study by Al-Adwan (2016), which showed an average level of awareness among geography teachers. However, Al-Dhafiri (2021) revealed participant responses trending towards the higher side of the Likert scale.

The following indicator of sustainable economic development scored the highest level of agreement: "I involve female students in awareness activities about the importance of saving

water and reducing its waste.” This result is unsurprising as water preservation and the reduction of waste represent a large portion of the daily activities carried out by schools. The next statements in order of awareness were “I involve female students in awareness activities about the importance of saving electricity consumption” and “I involve female students in activities that stress the importance of national employment to achieve economic development.”

The lowest levels of awareness concerned the statements “I explain to female students the importance of increasing the small businesses’ contribution to the economy” and “I involve female students in activities that explain the importance of utilizing scientific research in improving the economy.” This result can be attributed to a lack of focus within the school and among its female teachers. Yet, scientific research and small businesses are crucial to economic development. Furthermore, the Kingdom’s Vision 2030 emphasizes that the Ministry of Education must change teaching practices to achieve its sustainable development targets.

Sub-question 3: What level of awareness exists among female public education teachers on the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030?

Table 8 shows how the teachers ranked the importance of the statements related to the environmental dimension of sustainable development.

#	Statement order	Statement	Mean	Standard Deviation	Degree of Agreement
The third item: The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030					
23	1	I am interested in spreading awareness of the importance of preserving the environment among female students.	4.72	0.54	High
24	2	I am interested in training female students on how to acquire sound environmental behavior.	4.69	0.57	High
25	3	I involve female students in environmental preservation activities.	4.61	0.66	High
26	10	I am keen to make female students acquire ways to protect the environment from threats and dangers.	2.00	1.23	Low
27	11	I am keen to make female students acquire the skill to identify environmental problems.	1.79	1.06	Low
28	9	I am interested in implementing programs and activities that develop social responsibility towards the environment.	2.01	1.06	Low
29	5	I explain the importance of living in a clean environment and breathing fresh air to female students	3.29	0.86	Average
30	6	I explain to the female students the negative consequences of increasing the consumption of environmental resources.	3.25	1.02	Average
31	7	I explain to the female students the importance of adhering to sustainable environmental lifestyles.	2.59	1.58	Average



32	4	I prepare awareness programs that contribute to reducing environmental pollution.	4.32	0.85	High
33	8	I organize awareness programs to reduce environmentally polluting emissions.	2.30	1.09	Low
34	13	I reinforce the role of the student in making the right decisions regarding environmental issues.	1.61	1.06	Low
35	12	I always benefit from the experiences of other cultures regarding environmental issues.	1.76	1.20	Low
The total score of the third item: the extent to which female public education teachers are aware of the importance of students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030			3.00	1.55	Average

Regarding the third item: The extent to which female public education teachers are aware of the importance of female students acquiring knowledge of environmentally sustainable development indicators in the context of Vision 2030. Table 8 shows the total mean value was average at 3.00. Most statements scored “low” with a mean between 1.61–4.72. This result differs from the findings by Al-Dhafiri (2021), which revealed participant responses generally trend towards the high side of the Likert scale.

The following indicator of sustainable economic development scored the highest level of agreement, “I am interested in spreading awareness of the importance of preserving the environment among female students”, followed by “I am interested in training female students on how to acquire sound environmental behavior.” The next statement was “I involve female students in environmental preservation activities.” This can be achieved through delivering awareness programs that contribute towards reducing environmental pollution. This result shows that female teachers are very aware of the need for environmental education and the achievement of its goals, which demonstrates that the schools are committed to environmentally sustainable development.

The lowest level of environmental awareness concerned the statement, “I reinforce the role of the student in making the right decisions regarding environmental issues” followed by “I always benefit from the experiences of other cultures regarding environmental issues” and finally “I am keen to make female students acquire the skills to identify environmental problems”. These results, which are generally associated with a poor awareness of the environmental dimension of sustainable development, are consistent with the study by Saqib et al. (2020), which concluded that the implementation of education for sustainable development in Pakistani educational institutions was low. Consequently, teachers had insufficient awareness of sustainability and its indicators or dimensions.

Previous research into education and the social, economic, and environmental dimensions of sustainable development revealed disparities in the knowledge and implementation of these programs (Fonseca et al., 2018). Education for sustainable development is fragmented by different approaches, issues, and methodologies. Consequently, some courses focus on the social dimension, while others pay more attention to the environmental or economic dimension. A

study by Ba Raidah and Al-Zubaidi (2021) revealed differences in how the dimensions of sustainable development were integrated into curricula and teaching practices, including extra-curricular activities. As a result, male and female teachers need further education and training on how to meet the challenges of sustainable development. Al-Qarni (2021) specified the need to provide female teachers with further knowledge about the basic concepts and practices of sustainable development.

Sub-question Four: What statistical differences arise in the study sample responses concerning levels of awareness across the social, economic, and environmental indicators in relation to the five study variables: stage of education, academic qualification, specialization, practical experience, and training courses in the field.

Regarding the effect of the study variables on levels of awareness: the first variable tested was stage of education.

Table 9 shows the results of the one-way ANOVA test for the difference between the averages of the estimates of study sample according to the stage of education: primary, intermediate, or secondary.

Sustainable development indicators	Source of variance	Sum of squares	Degrees of freedom	Mean of squares	F-value	Level of significance
Social	Among groups	0.88	2	0.44	2.80	0.062
	Within groups	57.20	362	0.16		
	Total	58.08	364			
Economic	Among groups	0.55	2	0.28	1.69	0.187
	Within groups	59.29	362	0.16		
	Total	59.84	364			
Environmental	Among groups	0.39	2	0.20	1.30	0.274
	Within groups	54.89	362	0.15		
	Total	55.29	364			

Table 9 shows that the F-values are not statistically significant in relation to the variable: stage of education. This result indicates that female public education teachers at primary, intermediate and secondary stages of education have similar levels of awareness concerning the importance of female students acquiring knowledge of the social, economic, and environmental indicators of sustainable development in the context of Vision 2030. This consistent response can be attributed to the Ministry of Education assuming responsibility for achieving the goals of the Kingdom's Vision 2030 agenda on education and sustainable development in line with progressive and international trends.

Regarding the effect of the study variables on levels of awareness: the second variable tested was academic qualification.

Table 10 shows the results of the one-way ANOVA test for the difference between the averages of the estimates of the study sample according to academic qualification.

Sustainable development indicators	Source of variance	Sum squares of	Degrees of freedom	Mean of squares	F-value	Level of significance
Social	Among groups	1.09	3	0.36	2.31	0.076
	Within groups	56.99	361	0.16		
	Total	58.08	364			
Economic	Among groups	1.10	3	0.37	2.24	0.083
	Within groups	58.75	361	0.16		
	Total	59.84	364			
Environmental	Among groups	0.38	3	0.13	0.82	0.482
	Within groups	54.91	361	0.15		
	Total	55.29	364			

Table 10 shows that the F-values are not statistically significant in relation to the variable: academic qualification. This result indicates that all female public education teachers were well-informed about the dimensions of sustainable development and the goals associated with them regardless of their qualification level. The teachers know what activities and knowledge they must provide to familiarize students with these dimensions. Female teachers with higher academic qualifications are likely to focus more on the quality and appropriateness of their teaching methods. These teachers will also be more interested in learning about the scientific seminars, conferences, and recent trends in relation to the role played by schools in achieving sustainable development.

This result is consistent with the study by Al-Adwan (2016) conducted with geography teachers in Jordan. When the teachers estimated their awareness of sustainable development indicators, the results showed that no statistically significant differences could be attributed to the variable: educational qualification.

Regarding the effect of the study variables on levels of awareness: the third variable tested was specialization.

Table 11 shows the results of the One-way ANOVA test for the difference between the averages of the estimates of study sample according to specialization.

Sustainable development indicators	Source of variance	Sum squares of	Degrees of freedom	Mean of squares	F-value	Level of significance
Social	Among groups	0.03	2	0.02	0.10	0.903
	Within groups	58.05	362	0.16		
	Total	58.08	364			

Economic	Among groups	0.05	2	0.02	0.15	0.860
	Within groups	59.79	362	0.17		
	Total	59.84	364			
Environmental	Among groups	0.41	2	0.21	1.37	0.256
	Within groups	54.87	362	0.15		
	Total	55.29	364			

Table 11 shows that the F-values are not statistically significant in relation to the variable: subject specialization. This result shows that the sample's responses to the indicators were similar despite the differences in specialization.

Regarding the effect of the study variables on levels of awareness, the fourth variable tested was practical experience.

Table 12 shows the results of the One-way ANOVA test for the difference between the averages of the estimates of study sample according to practical experience.

Sustainable development indicators	Source of variance	Sum of squares	Degrees of freedom	Mean squares	F-value	Level of significance
Social	Among groups	6.66	3	2.22	15.60	0.001
	Within groups	51.39	361	0.14		
	Total	58.05	364			
Economic	Among groups	6.01	3	2.00	13.41	0.001
	Within groups	53.91	361	0.15		
	Total	59.92	364			
Environmental	Among groups	2.66	3	0.89	6.10	0.001
	Within groups	52.53	361	0.15		
	Total	55.20	364			

Table 12 shows that the F-values are statistically significant at the level of 0.001 in relation to the variable practical experience. This result is consistent with the study by Al-Adwan (2016), which revealed statistically significant differences in the responses attributed to length of experience, in favor of female geography teachers who have recent experience. The following table shows the source of these differences.

Table 13 shows the means, standard deviations, and the trend of differences between them.

Indicators of sustainable development	Years of experience	N	Mean	Standard deviation
Social	Less than 5 years	51	4.12*	0.35
	5 years to less than 10 years	59	3.83	0.35
	10 years to less than 15 years	87	3.77	0.42
	15 years and above	168	3.71	0.37
Economic	Less than 5 years	51	*3.53	0.43
	5 years to less than 10 years	59	3.33	0.38
	10 years to less than 15 years	87	3.26	0.43

	15 years and above	168	3.15	0.35
Environmental	Less than 5 years	51	*3.18	0.46
	5 years to less than 10 years	59	3.02	0.37
	10 years to less than 15 years	87	3.01	0.44
	15 years and above	168	2.92	0.32

\* Statistically significant difference

The results of table 13 show the differences between the means of the estimates of the study sample according to the variable practical experience using the LSD test for Pairwise comparisons. Teachers with less than five years' experience had higher levels of awareness concerning the importance of female students acquiring knowledge of sustainable development indicators in the light of Vision 2030. This result can be explained by the fact that having less than five years of experience affects awareness of sustainable development and its dimensions positively. This may be due to more newly qualified teachers being more motivated to keep up with the latest in sustainable development and its alignment with Vision 2030. This is in agreement with the findings of Al-Adwan (2016).

Regarding the effect of the study variables on levels of awareness: the fifth variable tested was training courses in the field.

Table 14 shows the results of the one-way ANOVA test for the difference between the averages of the estimates of study sample according to the number of training courses undertaken.

Sustainable development indicators	Source of variance	Sum squares	Degrees of freedom	Mean squares	F-value	Level of significance
Social	Among groups	9.67	2	4.84	36.20	0.001
	Within groups	48.38	362	0.13		
	Total	58.05	364			
Economic	Among groups	1.64	2	0.82	5.08	0.001
	Within groups	58.28	362	0.16		
	Total	59.92	364			
Environmental	Among groups	5.63	2	2.81	20.56	0.001
	Within groups	49.57	362	0.14		
	Total	55.20	364			

Table 14 shows that the F-values are statistically significant at the level of 0.001 in relation to the variable training courses in the field. The following table shows the source of these differences.

Table 15 shows the means, standard deviations, and the trend of differences between them.

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Indicators of sustainable development	Years of experience	N	Mean	Standard deviation
Social	NA 30		*4.24	0.21
	Less than five training courses 63		3.55	0.43
	Five courses or above 272		3.81	0.36
Economic	NA 30	*3.45		0.44
	Less than five training courses 63	3.32		0.58
	Five courses or above 272	3.23		0.34
Environmental	NA 30	*3.41		0.47
	Less than five training courses 63	3.00		0.46
	Five courses or above 272	2.95		0.33

The results of table 15 show the differences between the means of the estimates of the study sample according to the variable training courses in the field using the LSD test for Pairwise comparisons. Teachers with no additional training or minimal training had lower levels of awareness concerning the importance of female students acquiring knowledge of sustainable development indicators in the light of Vision 2030. This result reveals that additional training courses do increase levels of awareness on the issues and requirements of social, economic, and environmentally sustainable development. This result emphasizes that training courses are a crucial factor in raising awareness among female teachers about how to educate female students on sustainable development dimensions and targets, and how to establish a supportive classroom environment.

To comply with the Kingdom's Vision 2030 development plan, the dimensions of social, economic, and environmentally sustainable development must be integrated into the curricula at all levels of formal and informal education from pre-school to higher education. Education can and should promote the development of sustainability competencies (Cebrián et al., 2020). Al-Dhafiri's study (2021) supports this claim by recommending an increased focus on the concept of sustainable development, the establishment of sustainable educational projects, and further training for secondary school female teachers to consolidate their knowledge and to raise awareness of sustainable development in the wider community. The Kingdom's Vision 2030 agenda for education fully supports this approach.

## 6. Recommendations

1. Female teachers should focus on providing female students with knowledge of the indicators related to sustainable social development in the context of Vision 2030, especially in relation to the importance of eliminating poverty in all its forms, the negative effects of poor distribution of population density on the community, and the negative effects of unemployment on the community.
2. Female teachers should focus on providing female students with knowledge of the indicators related to sustainable economic development in the context of Vision 2030, especially in relation to the importance of increasing the contribution of small businesses to the economy,

and involving the student in activities that highlight the importance of using scientific research to improve the economy.

3. Female teachers should focus on providing female students with knowledge of the indicators related to environmentally sustainable development in the context of Vision 2030, especially in relation to emphasizing the role of female students in correct decision-making on environmental issues, how to benefit from the experiences of other cultures regarding environmental protection, and ensuring that female students acquire the skills to identify environmental problems.

4. Male and female teachers in public education schools should be aware of how to educate female students about sustainable development indicators. This approach will motivate female students towards achieving these sustainability goals both inside and outside the school. The aim is to ensure this knowledge and these practices become integral to everyday societal behavior as a route to achieving the Kingdom's Vision 2030 sustainable development indicators. Consequently, the Kingdom of Saudi Arabia will be at the forefront of global competition by accelerating towards achieving its sustainable development goals. The achievement of these goals is crucial to future progress and investment, improved governance, a free economy, and comprehensive infrastructure development.

5. The current study shows that the Ministry of Education must have a strategic plan for integrating sustainable development education into the curricula at all levels. To make these indicators a tangible reality in policies of pre-university education, female public education teachers must be given further training to pass this knowledge onto their female students.

6. This study recommends examining the current study problem in the context of female university students. The resulting feedback should be assessed in the context of global trends for sustainable development in education.

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