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Understanding of Sustainable Development Goals: The Case for Yarmouk University Science students' in Jordan

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Abstract

The Sustainable Development Goals (SDGs) became a global thought and the responsibility of their implementation reset on governments, institutions and even individuals, so that, it is necessary to assess the level of people's understanding of these goals in order to support any subsequent measures related to its implementation, When the university students understand the scope of SDGs, they can contribute to support, encourage, and achieve the development. This study aimed at assessing the level of understanding on Sustainable Development Goals (SDGs) among university students at scientific colleges in Yarmouk University, Jordan. Data for this research are collected by electronic test, its validity and reliability was verified. The research sample consisted of 362 male and female students. This research analyzes data by using descriptive statistics and Four-Way ANOVA. The results show that scientific students' understanding of SDGs was low, with an average of (11.09) degrees and a percentage (44.36%), and there were no significant differences for college type, gender, year of study and their academic grade. This research recommend Universities to focus on SDGs in the educational process by studying elective courses for university students that focus on the importance of the sustainable development goals and how to achieve them.

Keywords: Sustainable Development Goals, Understanding level, Education for Sustainability, University students, Higher education.

1. Introduction

During the past three decades, the world has witnessed an increasing awareness of the accelerated development model represented by the industrial revolution and economic competition, which left a negative impact on the ecosystems and the human being such as poverty, hunger, poor health conditions, deforestation, water and air pollution, climate change, floods, and depletion of non-renewable resources, which called the critics of that model to present an alternative sustainable development model that works to achieve harmony between achieving development goals and protecting the environment and its sustainability, which meets the current needs without compromising the right of future generation's needs, and that will come through global partnership in order to achieve sustainable development (United Nations, 1987).

To achieve that, Millennium Development Goals (MDGs) came as an action plan that drew global priorities for the period 2000-2015 (United Nations, 2015), as it was applied to meet the needs of the world's poorest people, as it was able to reduce extreme poverty and reduce the spread of HIV / AIDS, contributing to providing basic education for all (Tadamun, 2016). However, despite the great achievements made by the MDG at the global level, they did not address many important areas and issues at the global level (UNESCO, 2017). As a successor to it, the Sustainable Development Goals (SDGs) came as a global action plan that will be implemented during the period (2015-2030), to complement what the MDG started with a broader and more comprehensive scope, so instead of eight goals, 17 goals with 169 indicators include economic, social and environmental dimensions (Tadamun, 2016). By agreement of the 193 member states, including Jordan, under the title "Transforming our world: the 2030 Agenda for Sustainable Development", these goals stimulated the following five pillars: people, prosperity, planet, peace and partnership, and one of the most important features that distinguished was including of all countries and peoples of the world (United Nations, 2015). Figure 1 shows the UN's graphic of the SDGs (United Nations, 2020).

1.1 Education for sustainable development

Education sector is one of the few sectors that can help, promote, and contribute to achieving all of the SDGS (Ahmadein, 2019). Given the importance of education in our lives, the United Nations has set the fourth goal of the SDGs (UNESCO, 2017), and the Target 4.7 of the SDGs

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Fig. 1: 17 SDGs (UN, 2020)

states "By 2030, ensure that all learners acquire knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable" (United Nations, 2015, p.17), this allows individuals to participate in change in different levels, it also accelerates the achieving of learning outcomes in the cognitive, social, emotional and behavioral fields that enable individuals to deal with the challenges posed by each of the SDGs, thus facilitating their achievement (UNESCO, 2017). As shown in figure (2), quality education (SDG4) targets intersects directly or indirectly with the rest of

Direct and indirectly relationships between SDG 4 with the other 16 SDGS

SDG	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL
Directly related	0	0	8	0	0	0	10	0	0	0	4	9	2	0	2	3	38
Indirectly related	50	14	46	15	16	2	40	9	20	16	15	6	6	9	25	33	322
Total	50	14	54	15	16	2	50	9	20	16	19	15	8	9	27	36	360

the goals, as education contributes to the achievement of all the other sixteen SDGs (Lawrence, Ihebuzor & Lawrence, 2020).

1.2 Sustainability in higher education

Higher education institutions, in particular universities, play a pioneering role in achieving the SDGs (Owens, 2017). Universities, through their functional scope, carry out many activities related to sustainable development fields, and can use their expertise, proficiencies, and leadership to guidance stakeholders to adopt sustainable practices (Ahmadein, 2019). They can provide the next generation with the skills, high knowledge and deep understanding to promote sustainable development, to face sustainability challenges and contribute to the advancement, enrichment and dissemination of knowledge through their research that accelerate the achievements of the sustainable development agenda (Zamora-Polo, Sánchez-Martín, Corrales-Serrano & Espejo-Antúnez, 2019).

The ultimate impact of the integration of SDGs in universities by its impact on students, linking it to their various specializations, providing them with the knowledge and thinking skills to better understand and more awareness of the challenges facing SDG's achievement, as well as enabling them to cooperate, negotiate and communicate with each other to promote the SDG's (UNESCO, 2017). They should also consider that their mission is not inside university campus, but they should expand to the local communities to create a real change (Ahmadein, 2019).

One of the most important examples of universities' interest in raising awareness and understanding of the SDGs is the implementation of the Sustainability Literacy Test online platform (Suiltset), it aims to develop training and assessment tools to understand and increase awareness of the SDGs (Higher Education Sustainability Initiative, 2019). Sulitest has spread as a reference educational tool, especially in universities, widely used by nearly 700 higher education institutions and organizations in 61 countries, and nearly 80,000 people have used it to date, Sulitest is developing a variety of programs to provide internationally recognized tools aligned with the SDG framework (SDGs), including a test that each of its questions is in line with one or more of the SDGs in order to create the largest data hall on citizens' awareness and understanding of the goals (SULITEST, 2019).

According to a study by the Centro de Investigationes Sociológicas (2019), despite Spanish Government has joined in (Agenda 2030), only 10.8% of the Spanish residents knew about it, which indicates a lack of knowledge of the Sustainable Development Goals.

Akinlolu, Grace, Damilola & Esther (2017) state that the students and employees of Osun State University had a low level of knowledge toward SDGs, the study displayed that only 43% of respondents were aware of the SDGs and only 4.2% had good knowledge of the SDGs, and this has serious negative impacts for achieving the SDGs, they recommended that the university should focus on employing the SDGs through adopting new methods in the educational process, such as developing educational curricula. Ando, Baars & Asari (2019) found that Kyoto university students know about SDGs but a little of them understand all of 17 goals and their current employment.

As for the study of Zamora-Polo et al (2019) that was conducted in Spain, it aimed to evaluate students' knowledge towards the SDGs, a survey was applied to university students of various degrees and in (Engineering, Education and Health) colleges. The results showed a low knowledge of the SDGs in whole sample, and significant differences between colleges, as the education colleges participated more professionally with the SDGs than the others. The study recommended the necessity of the university's contribution to develop the concepts and dimensions of the SDGs among its students.

Jati, Darsono, Hermawan, Yudhi & Rahman (2019) also found in their study that students' knowledge was only affected by the accessibility of information and students' awareness was related to not only accessibility of information but also gender.

The studies related to sustainable development in higher education are very little at the level of the Arab world. This is what was confirmed by Sunthonkanokpong & Murphy (2019) when they reviewed more than 500 articles related to sustainable development in higher education from more than 300 organizations, they found that only 8% came from Asia. They indicated the necessity for investigation from countries previously underrepresented in the literature. Zamora-Polo et al also confirmed that students' previous knowledge related to SDGs had not been analyzed.

Despite some literatures have been imprecise to distinguish awareness and knowledge, Jati et al (2019), simplify the notion that the assessment of awareness of SDGs examines if people have heard or not, how much SDGs are important to them, and what their attitude and necessity for SDGs, while knowledge is assessed to investigate their level of understanding regarding issues related to SDGs.

It is very important to assess both awareness and knowledge to estimate the implementation progress of the global agenda, As the concept "leave no one behind" created on SDGs, the participant should started by the good level of awareness and knowledge before proceeding to the important actions to achieve the goals eventually (Jati, 2019).

Jordan is committed to the Agenda 2030 and to leaving no one behind, the government presented its roadmap to implement the Agenda and achieving all SDGs. One of the priority elements was raising awareness of the 2030 Agenda for Sustainable Development and its goals, targets, indicators and means of implementation (United Nation, 2017), higher education institutes composed of lecturers and students set the supportive ground to achieve the agenda. The SDGs should be integrated in the educational process and introduced to the students who act as the agent of changes (Jati, 2019).

Therefore, this study aimed to assess the level of SDGs' understanding among students at scientific colleges in Yarmouk University in Jordan.

1.3 Study Questions:

This study attempted to answer the following questions:

- What is the level of SDGs' understanding among students of scientific colleges at Yarmouk University?
- Does the level of SDGs' understanding among students of scientific colleges at Yarmouk University differ according to gender, college, year of study and their Grade Point Average (GPA)?

2. Method

It consists of the following:

2.1 Research Design

The study was carried out at Yarmouk University in Irbid city, Jordan. This was a Descriptive-survey research. Data for the study were collected in November 2020.

2.2 Population and Sample

The study population was consisted of students of scientific colleges at Yarmouk University, and the sample size was estimated using the table of Krejcie & Morgan (Krejcie & Morgan, 1970). However, eventually, 362 respondents completed the test. The descriptive statistics is shown in Table 1.

Table 1: Socio-demographic characteristics of respondents (N= 362).

Gender	*Numbers of participants*	*Percentage (%)*	*Mean*	*Standard deviation*
Male	133	37%	11.16	3.42
Female	229	63%	11.10	3.16
Total	362		11.12	3.25
Type of college	*Numbers of participants*	*Percentage (%)*	*Mean*	*Std. Deviation*
Medicine	72	20%	12.03	3.38
Pharmacy	33	9%	11.70	3.98
Engineering	80	22%	10.90	2.49
Science	149	41%	10.63	3.21
IT	28	8%	11.32	3.73
Total	362		11.12	3.25
Year of study	*Numbers of participants*	*Percentage %*	*Mean*	*Std. Deviation*
First	46	13%	10.54	2.89
Second	153	42%	11.08	2.94
Third	69	19%	11.23	3.54
Forth	54	15%	11.24	3.87
Fifth	24	7%	11.88	3.64
Sixth	16	4%	11.06	3.13
Total	362		11.12	3.25
GPA	*Numbers of participants*	*Percentage %*	*Mean*	*Std. Deviation*
Weak	19	5%	10.58	2.80
Good	85	23%	10.75	3.75
Very good	150	41%	11.15	3.11
Excellent	108	30%	11.45	3.09
Total	362		11.12	3.25

2.3 Data Collection Tools

Several studies that measure students' level of SDGs understanding and knowledge were reviewed, and the researcher found that most of studies were based on general questions about the SDGs, such as (the year it was launched,

number of SDGs goals, number of SDGs targets in, and the year it ended). The researcher relied on this study specialized questions based on international tests such as (Sustainable development United Organization, 2020; The Agence Française de Développement, 2017; World health organization, 2020) in addition to the latest reports of the Sustainable Development Goals (United Nations, 2019; United Nations, 2020), and used what fit the study goal. There were twenty five questions to measure their understanding, each question covered the understanding of one or more of the 17 SDGs. The final test as in appendix (1), attached.

2.4 Reliability

The test was validated through a panel of judges, and the reliability of the test was conducted using Cronbach alpha after applying the test on a pilot sample consisting of (65) student, where the Cronbach alpha value reached (0.91) which is very suitable for the study purposes.

2.5 Data Collection

The test was sent by mail to the students in the Faculty of (Medicine, Pharmacy, Science, Engineering Technology, Information Technology and Computer Science) at Yarmouk University, using the multiple choices questions. Each question correctly answered was gave a score of one while each wrong answer was assigned (zero). Any respondent who achieved over 70% of the total mark was assigned as having high understanding, while those who scored 50-69% were categorized as having an average understanding and those who scored less than 50% were categorized as having low understanding. For learning perspective, they were allowed to see their scores and the questions they answered incorrectly and feedback, directly after they submitted the test. The data were analyzed using SPSS statistics software.

Relevant frequency distribution tables were generated. The 4-way ANOVA was used to demonstrate relations between categorical variables, and level of statistical significance was set at P-value ≤0.05.

3. Findings

- **Research question 1:** What is the level of SDGs' understanding among students of scientific colleges at Yarmouk University?

The results related to this research question are presented in Table 2. Each of the 25 items reflects one or more SDGs-related learning objective. For example, SDG 13 is "Climate action", the related test question is "The global average temperature in 2018 compared to the pre-industrial baseline is….?". The table present test items ranked from highest to lowest percentages of correct answers. The table also shows, the Understanding level for each of the 25 items, (e.g., High, Average and Low).

Means, standard deviations and the rank were calculated for 25 questions. According to the results obtained, the overall mean score was 11.09 (44,36%), indicating a low level of understanding of students of scientific colleges at Yarmouk University toward SDGs, the standard deviation was (3.18), and the mean of the items ranged between (0.12) and (0.83). Five questions (Q3, Q2, Q9, Q1 and Q24) had a high level of understanding, and four questions (Q12, Q7, Q16 and Q4) had an average level of understanding, while the other 14 questions had a low level of understanding.

Table 2: Means, Standard deviations of students' understanding toward SDGs.

Question. No	*Mean*	*Standard deviation*	*Numbers of correct answer*	*Rank*	*Understanding Level*
Q3	0.83	0.38	299	83%	High
Q2	0.77	0.42	277	77%	High
Q9	0.77	0.42	278	77%	High
Q1	0.74	0.44	267	74%	High
Q24	0.23	0.42	259	72%	High
Q12	0.67	0.47	241	67%	Average
Q7	0.64	0.48	233	64%	Average
Q16	0.63	0.48	229	63%	Average
Q4	0.55	0.50	198	55%	Average
Q13	0.46	0.50	168	46%	Low
Q18	0.45	0.50	162	45%	Low
Q17	0.42	0.49	152	42%	Low
Q6	0.40	0.49	146	40%	Low
Q10	0.37	0.48	134	37%	Low
Q14	0.32	0.47	115	32%	Low
Q19	0.32	0.47	116	32%	Low
Q20	0.14	0.34	116	32%	Low
Q11	0.30	0.46	107	30%	Low
Q5	0.29	0.45	105	29%	Low
Q22	0.14	0.34	97	27%	Low
Q25	0.35	0.48	85	23%	Low
Q8	0.21	0.41	77	21%	Low
Q21	0.27	0.44	49	14%	Low
Q23	0.72	0.45	49	14%	Low
Q15	0.12	0.33	44	12%	Low
	11.09	3.18			

- **Research question 2:** Does the level of SDGs' understanding among students of scientific colleges at Yarmouk University differ according to their gender, college, year of study and their grade?

Means and standard deviations were calculated according to gender, college , year of study and GPA, as shown in Table 2.

There were apparent differences between the means, and indicated some differences in understanding level of scientific colleges students in Yarmouk university among SDGs according to their gender, college , year of study, and their grades. And to find out whether these differences were statistically significant, a 4- way ANOVA was calculated, as shown in Table 3.

Table 3: 4-way ANOVA Analysis

Source	*Sum of Squares*	*Df*	*Mean Squares*	*F*	*Sig*
Gender	0.310	1	0.310	0.030	0.863
College	91.028	4	22.757	2.184	0.070
Study year	62.703	5	12.541	1.204	0.307
GPA	39.985	3	13.328	1.279	0.281
Error	3625.524	348	10.418		
Total	48571.000	362			
Corrected Total	3817.892	361			

Results in table (3) showed that there was no statistical significant differences between the means where the p-values of gender, college , year of study and grade were bigger than (0.05); it means that the understanding level of scientific colleges at Yarmouk university among SDGs was not affected by their gender, college , year of study and grade.

4. Discussion

This study conceptualized sustainability as an environmental, economic and social imperative. This conceptualization is consistent with the UN's 17 SDGs. The study focused on scientific colleges students' understanding towards 17 SDGs. The research questions focused on overall results as well as tests of significance to determine differences based on gender, college, year of study and grade.

The comparatively lower levels of SDGs understanding (only 44.36%) indicate that students may not have the enough sustainability knowledge to perform the expected role in achieving the sustainable development goals.

After 5 years of SDGs implementation, this result can be considered low as the SDGs motto "no one must be left behind". In 2020, Sulitest organization conducted a global test to investigate the awareness and understanding level of SDGs, the global average result of was 57.8%, and they recommended the need for the development of education and initiatives to raise awareness on specific SDGs (SULITEST, 2020), which indicates a lower level of scientific students at Yarmouk University comparing to the international level.

This result is congruent with a study by CIS (2019), which found only 10.8% of the Spanish residents knew about SDGs. However, the student knowledge result in this study is higher than the study from Akinlolu et al (2017), which displayed that only 43% of respondents were aware of the SDGs and only 4.2% had good knowledge of the SDGs. Ando, et al (2019) also state that a little of Kyoto university students understood all of 17 goals and their current employment.

The results of this study are lower than the study of Jati, et al that found 62.5% of students have high knowledge about SDGs, but it was consistence with the results of this study in terms of the gender variable, as there were no relationship with the knowledge on SDGs among the students. This results is in line with SDG 5 "Gender Equality: achieve gender equality and empower all women and girls", SDG 5 aims to grant women and girls equal rights regarding the process of gaining knowledge in university.

The results of this study were also consistent with the college variable in (Zamora-Polo. et al, 2019) study, which showed that there is no relationship of medical and engineering colleges on the level of knowledge of the sustainable development goals.

The implications of the findings of this study are important, because the university system is the highpoint of learning/ education, and this low level of students understating indicates that the social level will be far lower and the SDGs motto that no one is left behind will remain a challenge.

5. Conclusions and Recommendation

Educational institutions in Jordan that have large numbers of students and employees should make awareness of the sustainable development goals a priority, and should define their learning goals and contents compatible with the SDGs, and also provide teaching methods and curricula that enable students to know more about SDGs and its implementation and how to achieve them.

One clarification for these results is the fact that students in different colleges were not exposed enough to the importance of SDGs practice in the curriculum (Khataybeh, Subbarini & Shurman, 2010). Another explanation for such results might be due to the lack of educational courses related to sustainable development, either at the college level or as elective courses offered by the university, Therefore, most of the students' knowledge about SDGs may come from School curricula's or from the media and social media networks.

The university can offer one elective course related to sustainability within the study plan of Bachelor degree, or providing students an optional diploma in sustainable development apart from receiving their Bachelor degree.

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Appendix

Appendix 1: Study test (25 Questions)

1. The concept of "sustainable development" means:
A. Development related to the economic growth of countries
B. Development related environment
C. Meeting the needs of current generations without prejudice to the rights of future generations
D. Development related to social welfare provision

2. Countries allowed to participate in the Sustainable Development Goals (2030) are:
A. Rich countries
B. Poor countries
C. All states
D. Donor countries

3. The implementation responsibility of the Sustainable Development Goals (2030) falls on:
A. Government, ministries and universities
B. Industrial enterprises
C. Individuals
D. All of the above

4. The responsible agency for implementing Sustainable Development Goals worldwide is:
A. UNICEF
B. United nations
C. European Union
D. World Health Organization

5. According to the International Labor Organization (ILO), 215 million children (5-17 years old) were affected by child labor worldwide in 2008, in agriculture (70%), industry (10%) and non-domestic services (20%). How did the number of children affected by child labor evolve in 2016?
A. Remained stable
B. Significantly increased
C. Significantly reduced
D. Child labor has been eliminated

6. How many people are facing food hunger in the world? (2017)
A. 1 out of 9 people
B. 1 out of 90 people
C. 1 in 900 people
D. 1 in 9,000 people

7. What is the main cause of child mortality in Developing countries?
A. Wars
B. Malnutrition
C. Infectious diseases
D. Natural disasters

8. There are more than 300,000 known plant species on Earth. According to the United Nations Environment Program Convention on Biological Diversity, the percentage of compounds extracted from these plant species that are used to prepare modern medicinal drugs is:
A. 5%
B. 25%
C. 50%
D. 75%

9. Notions of equality and justice for all should begin in:
A. Primary school
B. Lower secondary school
C. Upper secondary school
D. Higher Education

10. What proportion of parliamentarians around the world are women?
A. 24%
B. 11%
C. 45%
D. 2%

11. The average hourly wages for men compared to women around the world are approximately:

A. 12% higher than the wage rate for women
B. 37% higher than the wage rate for women
C. 80% higher than the wage rate for women
D. The average wage for men and women is equal

12. What is the meaning of hydropower?

A. Wave electricity
B. Electricity from rainwater runoff
C. Electricity produced using the energy of rivers, streams and lakes
D. Electricity from ground water

13. The main use of water that is taken from lakes, rivers and basins is for:

A. Laundry
B. Crop irrigation
C. Industry
D. Domestic use

14. The proportion of global renewable energy consumption out of the total energy is approximately:

A. 50%
B. 35%
C. 17%
D. 6%

15. Which is the most used renewable energy in the world:

A. Solar energy
B. Hydropower
C. Wind Energy
D. Tidal Energy

16. For companies, the step of adopting sustainable development policies is often voluntary, according to recent studies. How does the adoption of such measures affect the company's performance in the long term?

A. These procedures are often costly and thus have a negative impact on the company's performance
B. The company's performance is not affected by such actions
C. It is very likely that companies that adopt sustainability policies will have better financial performance in the long run than companies that do not
D. We cannot anticipate how these measures might affect the company's performance

17. Globally, the digital gender gap (difference between the number of male and female Internet users) globally in 2016 was about:

A. About 53% are more in favor of males
B. About 12% more in favor of males
C. About 53% more favorable to females
D. About 12% more in favor of females

18. Cities cover 3% of the earth's land mass, but what percentage of global carbon dioxide emissions produced from them?

A. 3%
B. 10%
C. 50%
D. 70%

19. The global average temperature in 2018 compared to the pre-industrial baseline?

A. About 2 °C above the specified baseline
B. About 1 °C above the specified baseline
C. Half one degree above the established baseline
D. There was no change in the global temperature

20. Oceans absorb a great deal of the heat trapped on Earth due to the greenhouse effect. The percentage of the excess thermal energy stored by the Earth and absorbed by the ocean is:

A. Less than 10%
B. About 25%
C. About 50%
D. More than 90%

21. Coal is the most environmentally harmful fossil fuel. How much electricity was generated from coal in 2014 globally?

A. Less than 5%
B. About 20%
C. More than 80%
D. About 40%

22. The main cause of work-related accident or disease that cause death is:

A. An accident on the way to work
B. Occupational disease
C. Accident at work
D. Error in work

23. A democracy is a country governed by:

A. An educated and rich group of people
B. Representatives elected by the inhabitants
C. President for life
D. A hereditary monarchy

24. Out of 196 countries in the world, how many countries are called "Developing country"? (2018):

A. 30 countries
B. 100 countries
C. 150 countries
D. 50 countries

25. The Earth Summit, held in Rio in 1992, set three pillars of sustainable development:

A. Financial power, global trade regulation and media control
B. Education, agriculture and health
C. Economic progress, social welfare and environmental protection
D. Education, health and the economy