

Attitudes toward Pillars of Sustainable Development: The Case for University Science Education Students in Jordan

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Abstract

The primary aim of the study is to determine the attitudes of science education students at a public university in Jordan toward sustainable development. The validated instrument has been applied to a sample of 198 university students taking science education classes. Descriptive analyses have been used to analyse the data collected. Results of the study indicate overall positive attitudes toward three pillars of sustainable development (economic viability, society, and education). However, students' attitudes toward the environment as a pillar of sustainable development are negative. The study offers recommendations for theory and practice.

Keywords: sustainable development, environment, society, economic viability, education, university students.

Introduction

The concept of sustainable development has become a top priority for local, regional, and global organisations and countries with an emphasis on sustaining the present for the benefit of future generations. Sustainable development should be a normal practice for everyone in the world, including business organisations, the university system, families, and government agencies. The importance and usefulness of sustainable development relies on the increasing interest in three pillars of the United Nations Educational, Scientific and Cultural Organization (UNESCO) encompassing economy, society, and environment (Michalos et al., 2012; Olsson, Gericke, & Chang Rundgren, 2015; UNESCO, 2005). This highlights the interdependence of economy, society, and environment locally and globally to meet the needs of the present and the future (UNESCO, 2009).

However, the fourth pillar named “education for sustainable development” was later emphasised by Biasutti and Frate (2017) as equally important pillar of sustainable development. The role of education is emphasised strongly in global frameworks such as Chapter 36 (UNESCO, 1992), United Nations' Decade of Education for Sustainable Development (2005–2014) and the Global Action Programme on Education for

Sustainable Development (post-2014) where it is considered crucial for improving the capacity of people to address sustainable development issues equally to the other components of sustainable development (Olsson et al., 2015; UNESCO, 2014).

Moreover, education is viewed as an empowerment tool that can help people achieve sustainable development and make important judgments and choice in favour of environmental protection, economic viability, and social justice for present and future generations (Barth, Godemann, Rieckmann, & Stoltenberg, 2007; UNESCO, 2013). It can enable people to make the world safer, healthier, and more prosperous (Council of Ministers of Education Canada, 2010).

Education for Sustainable Development

Sustainable development was first introduced in the United Nations' Brundtland Commission in 1987 known as "Our Common Future". According to the Brundtland report published by the World Commission on Environment and Development (WCED), sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (WCED, 1987, p. 43). In spite of this attention and recognition of the importance of sustainable development, there is growing evidence that many nations are not pursuing development tactics that are sustainable into the future (Meadows et al., 1992). Based on that premise, a conference on environment and development was held in 1992 by the United Nations to accelerate the move toward sustainable development through improving the capacity and maximising the potential of people through education to address sustainable development issues (UNCED, 1992).

It has been asserted in the literature that the university system can be considered the main contributor to the sustainable development of a society through reducing their environmental impact and increasing their social impact (Barth & Rieckmann, 2012; De la Harpe & Thomas, 2009; Dickson et al., 2013; Godemann et al., 2014; James & Card, 2012). The university system can also play an important role in developing students' knowledge, skills, and attitudes (KSA) needed as global change agents to promote, create, and shape a more sustainable future for the world (Kelley & Nahser, 2014; Mcmillin & Dyball, 2009; UNESCO, 2009; Wiek et al., 2016).

Kabadayi (2016) and Sterling (2012) emphasised that the university system has the responsibility to provide graduates with the needed KSA and understanding that can be used now and in the vague future to be considered as change agents of sustainable development. Thomas (2005) argued that the main responsibilities of the university system were to produce graduates with a high degree of sustainable development. Based on that premise, education for sustainable development (ESD) has been provided by universities to help students act as local and global citizens with regard to social, economic, and environmental issues (Tingey-Holyoak & Burritt, 2012). Thus, the university system can aid in solving many of the issues that face a human being to reach a sustainable future.

In this regard, the United Nations established a special United Nations Decade for Sustainable Development (UNDESD) where everyone has the opportunity to gain knowledge, skills, and attitudes from education and learn the principles, values, and practices needed for sustainable future (James & Card, 2012; Pipere, Veisson, & Salite, 2015). The Reorient University Curricula to Address Sustainability (RUCAS) project

was incorporated within the university system in 11 European and Middle Eastern universities, one of which was Jordan representing part of EU-Tempus initiative. The purpose of the project was to infuse principles of sustainable development in several university courses from colleges of education, economics, engineering, social sciences, and applied sciences (Kostoulas-Makrakis & Makrakis, 2012). As part of the project, the faculty members were instructed to revise the curriculum and move to a student-centred teaching style allowing university students to express their values and become more of critical thinkers (Kostoulas-Makrakis & Makrakis, 2012).

Based on the above-mentioned discussion, it is concluded that students' attitudes toward the four pillars of sustainable development is a key factor in any future efforts to sustain and preserve the current resources for future generations. Sustainable development has received a great deal of attention from people, organisations, universities, governments, and researchers on a worldwide basis. Sustainable development is geared toward sustaining the present for the benefit of future generations in the four major pillars, including economy, society, environment, and education. The university system is expected to rise to this challenge and play a crucial role in resolving the key sustainability issues through graduates that have the needed attitudes to act as responsible change agents and global citizens. There is evidence that students, in general, do not place enough weight and justification for involvement in sustainable development (Erskine & Johnson, 2012). Furthermore, there is a growing interest in research that measures attitudes toward sustainable development (Olsson, Gericke, & Chang Rundgren, 2015; Schneller, Johnson, & Bogner, 2015). To the researchers' best knowledge; there is paucity of research in Jordan that addresses the attitudes of university students toward sustainable development. Therefore, the primary aim of this study is to determine the attitudes of science education students at a public university in Jordan toward sustainable development.

Methodology

Participants

The target population for this study is 668 undergraduate students from the Faculty of Educational Sciences with a major in classroom teacher selected from one public university in Jordan. The accessible population is 350 students who completed or registered in one or more of the three science education courses (physical sciences, biological sciences, and conceptual chemistry) for the second semester of the academic year 2017–2018. A sample of 220 students was drawn from the accessible population. This sample is considered acceptable representation of the target and accessible population. A total of 198 usable instruments were returned with a response rate of 90%. The sample distribution was 4 males (2%) and 194 females (98%). Students in this study were informed that the data collection and presentation of results were confidential.

Instrument and Procedures

The instrument used in this study was a survey named "Attitudes toward Sustainable Development Scale" (ASDS) developed by Biasutti & Frate (2017). This survey aimed at measuring attitudes of 484 Italian university undergraduate students toward sustainable development. The ASDS composed of 20 items was distributed on four dimensions as

follows: environment (5 items), economy (5 items), society (5 items), and education (5 items). These items were rated on a Likert-type scale ranged as follows: 1 “Strongly Disagree”, 2 “Disagree”, 3 “Neutral”, 4 “Agree”, and 5 “Strongly Agree”.

The original English version of the ASDS was developed after an extensive review of related literature; relevant questionnaires that measured attitudes, beliefs, and interest toward sustainable development and the environment; UNESCO (2005) and UN (2012) documents; and by a panel of experts in the fields of sustainable development and education for sustainable development. The expert panel was asked to review items and to determine ease of understanding, formulation of items, and conceptual validity. The ASDS was shown to have content validity. The construct validity of the instrument was established through exploratory and confirmatory factor analyses.

The process of developing the ASDS survey represented by the content and construct validity procedures ensures that the survey can be used in different contexts and is suitable for use in Jordan. The issue of sustainable development is a global issue and is not limited to one specific country. The RUCAS project was implemented among university students in Jordan within the Faculty of Education. This implies that university students within the Faculty of Education are exposed to the principles of sustainable development. It is also worth mentioning that the ASDS items were developed based on world principles (e.g., UNESCO and UN documents) that could be used in the university setting. In spite of the cultural differences, which may underline the framework of the instrument, there is a common core within the Tempus project to require inclusion of an elective course in sustainable development, in addition to infusing the sustainability concepts within science courses. Moreover, the university under study offers an optional route for science students to complete 24-credit hour courses in sustainability where students are offered professional diploma in sustainable development, apart from receiving their Bachelor degree.

Reliability alpha coefficients were satisfied for the four dimensions of the instrument as follows: environment ($\alpha = .74$), economy ($\alpha = .74$), society ($\alpha = .66$), and education ($\alpha = .76$). Cronbach's alpha of below .70 was considered acceptable when scale items were below six (Biasutti & Frezza, 2009; Kyle, Graefe, & Manning, 2005; Ugulu, 2015).

The original survey was translated by an expert faculty member being bilingual in English and Arabic. This faculty member was instructed to retain both the language and the meaning of the items as close to the original as possible but to give priority to meaning equivalence. When the Arabic translation was completed, the survey items went through back translation from Arabic to English by another faculty member being bilingual in English and Arabic. The back-translated items were then evaluated by a third faculty member to ensure that the item meanings were equivalent in both the original English version and the back-translated version. If differences in meaning were found between items, those items were put through the translation process again. The Arabic version of the ASDS was then pilot tested with a group of 10 students and three faculty members to collect feedback about utility and validity of the instrument. The faculty members emphasised that the survey had both face and content validity.

Finally, the survey was then pilot tested with a group of 50 undergraduate students. Based on that, the alpha reliability for the four dimensions was as follows: environment ($\alpha = .72$), economy ($\alpha = .69$), society ($\alpha = .85$), and education ($\alpha = .82$). These results are acceptable (Robinson, Shaver, & Wrightsman, 1991) and indicate that the instrument is suitable to measure attitudes toward sustainable development among university students in Jordan.

Results

To address the aim of the research, means and standard deviations were computed for items of the four sustainable development dimensions. To determine attitudes of students' responses, the following classification was followed: above 3 (positive attitudes) and below 3 (negative attitudes).

The first sustainable development dimension was the environment. According to Table 1, the overall mean score for this dimension was 2.66, indicating negative attitudes of university students toward the environment for sustainable development. The second sustainable development dimension was economy. According to Table 1, the overall mean score for this dimension was 3.15, indicating positive attitudes of university students toward the economy for sustainable development. The third sustainable development dimension was society. The overall mean score for this dimension was 3.10, indicating positive attitudes of university students toward the society for sustainable development. The fourth sustainable development dimension was education. According to the results obtained, the overall mean score for this dimension was 3.17, indicating positive attitudes of university students toward education for sustainable development. This is an interesting result and an important indication of the value of education for sustainable development more than other dimensions mentioned in the table (environment, society, and economy).

Table 1
Means and Standard Deviations for the Dimensions of Sustainable Development

Dimensions	Mean	Std. Deviation
Environment	2.66	.79
Economy	3.15	.88
Society	3.10	1.10
Education	3.17	.99

Discussion

Education is a key factor in human development, which can maintain productive and secure world through addressing issues related to sustainable environment (Somayyeh Ghorbani, Jafari, & Sharifian, 2018). The educational system has a responsibility to deal with the challenges posed by the issue of sustainability (Eva Carbach & Fischer, 2017). Therefore, the primary aim of this study is to determine the attitudes of science education students at a public university in Jordan toward sustainable development. The pillars of sustainable development investigated in this study have been grouped into four dimensions, including the environment, economy, society, and education.

With regard to the environment dimension, the overall mean of the students' responding to this dimension reflected a negative response. In other words, students had negative attitudes toward the environment as a sustainable development practice. They perceived that people's interference with the environment might produce catastrophic consequences impacting people's quality of life. Moreover, students perceived that industrial growth, agricultural production, and building developments were more important than environmental protection. These results are disturbing and deserve further attention because in other parts of the world previous studies indicated that students had positive attitudes toward the environment as an important pillar of sustainable development

(Azapagic, Perdan, & Shallcross, 2005; Choi, Shim, So, & Yeau, 2010; Ju & Lee, 2011; Kagawa, 2007).

Furthermore, it seems that students were not knowledgeable and less aware of the environmental dimension of sustainability and the way it could affect present and future generation's quality of life. Students should be aware that any threat to the environment is a threat to development efforts in the country (World Bank, 2012).

One explanation for these results might be the fact that students were not exposed enough to the importance of the environment as a sustainable development practice in the curriculum (Lozano, Lozano, Mulder, Huisingh, & Waas, 2013). Students can take one elective sustainability course within their study plan. The university under study also offers an optional route for science students to complete 24-credit hour courses in sustainability leading to earning a professional diploma in sustainable development, apart from receiving their Bachelor degree. Another explanation for such results is the fact that the three science courses include few concepts related to environmental sustainability where it is possible in the syllabus dependent on the faculty member. Therefore, the students in this study may have not taken the elective course on sustainability and may not have taken the optional diploma that is designed to classroom teachers.

Another explanation for the results of the study is that students are living in a country that is small in size with a large population, much dry land, and low water resources, which may have impacted their attitudes as to the importance of the environment dimension of sustainability compared to other dimensions.

On the contrary, the other three pillars of sustainable development received positive attitudes from university students under study. These results are not consistent with previous research indicating that university students in different parts of the world (e.g., UK and Australia) had positive attitudes toward one pillar of sustainable development (the environment) while neglecting the other three pillars of sustainable development (economy, society, and education) (Azapagic et al., 2005; Choi et al., 2010; Ju & Lee, 2011; Segalas, Ferrer-Balas, & Mulder, 2010).

With regard to the economic pillar of sustainable development, the overall mean of the students' responding to this dimension reflected a positive response. They perceived that government economic policies should spend more money to increase sustainable production and fair trade; reduce economic differences between people; and reduce poverty and hunger in the world on the expense of increasing the economic well-being of the industrialized countries. These results can be justified by the fact that the economic conditions in Jordan have influenced the perceptions of participants especially when it comes to reducing differences between people and reducing poverty and hunger. It is well known that there are countries in the world that continue to get richer on the expense of other countries where they continue to get poorer leading to poverty and hunger. However, students did not agree that government economic policies in Jordan should act as if a country were wasting its natural resources. This result is justified by the fact that Jordan has limited natural resources and government policies are geared toward sustaining those resources.

As far as the society pillar of sustainable development is concerned, the overall mean of the students' responding to this dimension reflected a positive response. They perceived that the society should promote equal opportunities for both genders, keep peace in the world, provide free health services, and keep contacts with other cultures. In fact, these results are consistent with the role that Jordan is playing in keeping peace

among different countries and cultures within its boundaries and in the world and in providing free health services for needy people. Moreover, the public university under study has taken proactive steps toward equal opportunities for males and females such as women empowerment in leadership positions. However, respondents did not agree that the society should take responsibility for the welfare of individuals and families. This attitude is regarded as noble because Jordan as a country does not have enough economic and natural resources to meet such demand.

With regard to the education pillar of sustainable development, the overall mean of the students' responding to this dimension reflected a positive response. They perceived that faculty members should use student-centred teaching methods; promote future-oriented and critical thinking; connect between local and global issues. These results are in line with previous research indicating that education should be used for sustainable development (Sharma & Kelly, 2012). It is worth mentioning that the university under study is regarded as a leader in providing students with the best teaching methods, strategies, training workshops, seminars, activities, and state of art technology to enhance their critical and future-oriented thinking from a local and global perspective. However, students did not believe that faculty members were promoting interdisciplinary between subjects. In fact, this is an issue that deserves further investigation because such an action can provide students with system view and better understanding of issues involved.

Conclusion and Suggestions for Future Research

In conclusion, three pillars of sustainable development (economy, society, and education) received positive attitudes from university students. However, the fourth pillar of environment as a sustainable development practice received negative attitudes from university students. Based on the above discussion, the following recommendations for theory and practice are provided:

1. More studies should be carried out at other universities in Jordan that include equal representation of male and female students.
2. Research into the antecedents of sustainable development seems appropriate. For example, we may look at variables such as economic status of participants and place of residence (urban vs. rural).
3. University leadership should establish an environmental education course as mandatory to all university students. For example, the course may include subjects related to the natural resources of the country, the link between environmental sustainability and people's quality of life, the roles of industrial growth, agricultural production, environmental protection in the development of people and nations, and the responsibility of the society toward individuals and families.
4. The university system should include sustainability as part of its business strategy. For example, faculty members should infuse courses with sustainability concepts and issues to better prepare students for their future professions to become better productive citizens (Creel & Paz, 2018). Thus, the sustainability course should be mandatory and not optional for teacher education classroom teachers.
5. The university system should develop sustainable reports to encourage students' engagement in sustainability issues, improve university management, and foster

public relations with various stakeholders (Eva Carbach & Fischer, 2017). There is a need to develop a research framework that assesses the benefits of sustainable development in higher education institutions, which can help university students now and in the future (Maragakis & Maragakis, 2016).

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