

 Research Article

Science Curriculum Analysis in Terms of Sustainable Development Goals in Jordan

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Abstract

This study investigates the integration of Sustainable Development Goals (SDGs) within the science curriculum for grades one through eight, examining the extent to which social, ecological, and economic dimensions of sustainability are represented. Employing a descriptive qualitative approach, the research utilizes content analysis as its primary methodology. A specifically designed content analysis card served as the instrument to systematically analyze the science curricula for each grade level. The analysis revealed a significant gap in SDG inclusion, with 43 out of the 96 recognized SDGs entirely absent from the curriculum. Furthermore, the study's findings highlight a strong emphasis on the environmental dimension of sustainable development. This dimension dominated the curriculum content related to SDGs, registering a frequency of 765 instances and accounting for 39.11% of all SDG-related content. While environmental sustainability was clearly prioritized, social and economic aspects of the SDGs received considerably less attention. In terms of grade-level distribution, the sixth-grade science curriculum demonstrated the highest degree of SDG integration, featuring 642 instances of SDG inclusion, representing 32.82% of the total. Conversely, the eighth-grade science curriculum exhibited the lowest level of SDG incorporation, with only 70 instances (3.58%). This disparity across grade levels suggests inconsistencies in the curriculum's approach to sustainable development education. Based on these findings, the study proposes a series of recommendations aimed at enhancing the integration of all three dimensions of sustainable development (social, ecological, and economic) across all grade levels within the science curriculum. These recommendations seek to address the identified gaps and promote a more comprehensive and balanced approach to sustainability education, ensuring that students develop a holistic understanding of the SDGs and their interconnectedness. Further research could explore the pedagogical approaches used to teach these SDGs and assess student understanding of sustainable development concepts.

Keywords: Content Analysis, Science Curriculum, Sustainable Development Goals

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1. INTRODUCTION

Human individual and collective activities have greatly strained the planet and its dependent life forms by the enormous pressure they have been subjected to. As humanity makes a clear contribution to environmental degradation, the rapid erosion of biodiversity, and climate change, it is also imperative that it provides solutions to address the risks and challenges that have arisen. In addition to, increasing population technology and revolution and effect on the environment and lead to consuming resources. The natural resources have been considered as if they are endless. so the next generations suffering. Nationally and internationally, seeking solutions to save resources for next generations, and ensuring sustainability.

Accordingly, the theme of sustainable development has attracted the attention of the world in the economic, social, and global development fields. Development sustainability has become a global school of thought in most countries of the developing and industrialized world alike. Therefore, there has been much talk about the concept of sustainable development in the global development literature and the reports of international organizations as a central focus of State policy-building. Salite et al. (2020) stated that the unsustainable actions of members of the human race and the growth of complex challenges induced by the human species' civilization are driving forces for more explicit ESD research. The term sustainable development is often used in contemporary development literature. And today, the world is convinced that sustainable development, which eliminates the issues of underdevelopment, is the only way to ensure the viability of the present and the future.

The term sustainable development is due to the appearance of the Commission's report. It has been evolved considerably from the early 1960s to the present. (1960-1970), the concept of sustainable development was accompanied by economic growth, such as national income and per capita income (Ilshafe',2008). (1970-1980), the concept of development acquired social, political, and cultural dimensions, along with the economic dimension, and during the Third Development Decade (1980-1990) The concept of development acquired the legal and democratic dimension of public participation in the development decisions of adult governance. The Fourth Development Decade 1990 saw a qualitative shift in the concept of development. The concept of sustainable development was affirmed in the Rio Declaration of 1992 (Frank Dominique, 2005).

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The Food and Agriculture Organization of the United Nations (FAO) defined sustainable development as "managing and protecting the natural resource base, and institutional change to achieve, sustain and satisfy the human needs of present and future generations, in an environmentally appropriate, economically appropriate and socially acceptable manner (Abdurahman, 2007). The SDGs cover three main topics of social development, environmental protection, and economic growth. The social dimension, which is based on the principle of equity and the distributive consequences of policies and aims to satisfy human needs, achieve social justice and adequate income and improve the standard of living of individuals. This dimension also concerns health, education, housing, and work, ensuring the integrity of their traditional production systems and social environment (Falahi, 2015).

Secondly, the environmental or ecological dimension. Environmental sustainability refers to actions that ensure future generations have access to the natural resources they need to live a life that is equal to, if not better than, present generations (United Nations Environment Programme, 2020). it is based on the principle of flexibility or the ability of the ecosystem to maintain its ecological integrity and adaptability(Donano, 2003). It leads to ecosystem degradation, and on this basis, limits must be placed on consumption, population growth, pollution, environmental production patterns, water depletion, deforestation, and soil erosion (Naser, 2009).

The third (ecological) dimension aims to stop the waste of internal and superficial economic resources and to reduce income and wealth disparities, as well as the rational and rational use of economic possibilities. In addition, sustainable development is concerned with the equality of peoples and States at the level of economic development. Global indicators indicate that the people of developed countries enjoy wealth and social well-being and increase their level of economic development. This has led to the development of production and consumption patterns. This is the result of their dependence on the rent economy, the increase in military spending rather than the fight against poverty, and the economic crises that they are experiencing. This is why these resources are being used to protect the environment and improve the economic and social conditions of present and future generations (Falahi, 2015)

In collaboration with government, civil society, and private sector initiatives, education may play a critical role in the essential transformation into more environmentally sustainable communities. Education helps to establish attitudes and perspectives, as well as skills, concepts, and instruments that can be utilized to minimize or eliminate unsustainable practices. Education's diverse function in sustainability isn't always favorable; it can also promote unsustainable habits. Excessive resource consumption and the rapid destruction of relatively sustainable indigenous knowledge and livelihoods are examples. As a result,

education may need to be modified and transformed to have a good influence. Therefore, the science curriculum is the key to the attain the goals of sustainable development.

UNESCO defines education for sustainable development in three parts: It means education that enables people to foresee, face up to and solve the problems that threaten life on our planet. It also means education that disseminates the values and principles that are the basis of sustainable development (intergenerational equity, gender parity, social tolerance, poverty reduction, environmental protection and restoration, natural resource conservation, and just and peaceful societies). And lastly, it means education that highlights the complexity and interdependence of three spheres, the environment, society – broadly defined to include culture – and the economy (UNESCO, 2005b: 5). In harmony with the aforementioned, the UN Decade of Education for Sustainable Development (DESD) have encouraged both the integration of education for sustainable development (ESD) into the educational systems and altering of these systems to better address capacity building so empowering individuals to be involved in their societies' development pathways as active participants to constructing sustainable solutions (Didham, 2012).

Likewise, Mirsawi (2015) referred to education as a crucial key to acquiring knowledge, skills, competencies, and attitudes and values, which are necessary for social engagement. Also, it can propose projects and development plans and create mechanisms for their implementation and follow-up to change current realities for the better, and thus the best way to achieve the requirements of sustainable development. So Khan & Khanam (2016) added that for education to contribute effectively to sustainable development, some key axes must be pursued. It's Improving education, redirecting current education to address sustainable development, community education, and awareness development he has about sustainable development.

Jordan is one of the countries that has pursued development through economic reform and planning. States are striving for development at all levels of the economy. It is a process that is tied to advancement in all areas of politics, economics, social, cultural, and the environment. Meeting the present generation's resource needs without reducing the share of resources available to future generations is what sustainable development entails (Miqdadi, 2017). In developing countries, the relevance of sustainable development is expanding as they attempt to ensure economic progress and social well-being. Jordan is one of those countries with many economic and social as well as environmental challenges. It is therefore imperative for those concerned, educators and curriculum makers to ensure that sustainable development topics are included in the science curriculum as the key to educating future generations about the importance of development in its various aspects (gaining knowledge, skills, and attitudes) to reach and find solutions to environmental, social and economic problems for sustainable development. Education has the potential to transform unsustainable behaviors, such as resource overconsumption, thus it is necessary to adapt education and link it to sustainable production and consumption.

In line with that, the outcome document of the recent Rio+20 – UN Conference on Sustainable Development, *The Future We Want* (2012), promoted and encouraged the practice of educational sustainable development (ESD), "We resolve to promote education for sustainable development and to integrate sustainable development more actively into education beyond the United Nations Decade of Education for Sustainable Development". However, very few countries have incorporated educational sustainable development (ESD) into the educational curriculum. After that, a lot has taken place, but the studies on different conceptions of sustainable development in the curriculum are still not widespread (Landorf, Doscher, and Rocco, 2008).

The current study should provide benefits in two areas. First, theoretically, it adds educational literature related to sustainable development. As well as it reveals the degree to which sustainable development concepts are included in science textbooks in basic education in Jordan. The second is related to the practical importance, whose results, which have introduced 96 concepts, can be invested in sustainable development in the educational and awareness-raising landscape, and for the authors of science textbooks on sustainable education at the National Curriculum Centre and the Ministry of Education. In line with the mentioned, highlighting the need to link Jordan's science curricula to Vision 2030 and its various development issues.

- This is the first study, as far as the researchers know, that analyzed the science textbooks in the light of the sustainable development goals contained in the Kingdom's Vision 2030, and thus the results of this study are useful for providing feedback on these curricula.

- The findings of the study may contribute to the development of awareness of students to SDGs through teaching them about SDGs and providing them with essential proficiencies, literacies, understanding and altering their attitudes and behaviors, which assist in resolving issues/ problems.
- Textbooks may offer a worthwhile source of data about national devotedness to sustainable development education.
- The research is a response to global approaches and conference recommendations that recommend download, calendar, and development of education in general and in particular for the development of sustainable development dimensions.
- Providing an objective tool for downloading the contents of science books could benefit other researchers in analyzing other curricula in light of the dimensions of sustainable development.

The purpose of this study is to reveal the degree to which sustainable development concepts are included in science textbooks at the basic education level (1st grade to 8th grade). and the distribution of these concepts in the books and their proportions. Moreover, attainment of mindset regarding sustainable development, and meeting the global sustainable goals.

In addition, this study may be beneficial to modify science textbooks as an important referral for provision of students, and acquisition of qualifications demanded addressing and overcome the global problems starting in their societies.

Despite the importance of sustainable development and the adoption of education for sustainable development by States and their concern to include it in the content of school curricula, However, some studies in Europe and the Arab regions indicate that there are problems and disparities in the inclusion of sustainable development goals in their different dimensions like Taweel (2013), Alofoun & Alraziqi (2017), Svalfors (2017), Alharbi and Aljabr (2019) and Tatlihoğlu (2019).

There are problems in the science curriculum dealing with sustainable development issues and the Kingdom's Vision 2030 criteria. It was necessary to draw the attention of science textbook authors to the implementation of sustainable development requirements in school curricula as one of the contemporary approaches to the curriculum and the Kingdom's Vision 2030. The researchers, therefore, considered it necessary to conduct this study to ascertain the extent to which sustainable development goals are integrated into science textbooks' content and to present a proposed concept to contribute to the development of their content in light of these goals.

In addition, the absence of community members' ownership of the concepts of sustainable development may be indicated by the disregard for providing individuals' educational and educational systems with those concepts necessary for a safe sustainable life. This study is therefore intended to reveal the degree to which sustainable development concepts are incorporated in science curriculum by answering the following questions:

- To what extent do the science books include sustainable development dimensions (ecological, social, and economic dimensions)?
- Does the degree to which sustainable development goals are included in science books differ by dimensions of sustainable development?
- Does the degree to which sustainable development goals are included in the science textbooks vary by class?

1.1. Literature Review

Having considered previous Arabic and foreign literature, and through reference to libraries, periodicals, the Web, and related journals, it is clear that there are few studies in which the concept of sustainable development is included, so far as Arab studies, in particular in Jordan, are not available to researchers.

From these studies, Taweel (2013) conducted a study to reveal environmental education and its role in sustainable development. The descriptive approach and the content analysis approach of books of geography and civic education were applied, and used by the medium education institution in Biskra. A list that contains the environmental and sustainable development concepts was used to analyze the content of textbooks. A test also was used to measure the knowledge of students about SD. The findings of the study

showed that the pattern of environmental education, and what it incorporates as different parts, are not working to consolidate and strengthen the ties of interdependence and cohesion between components in an integrated and balanced manner to reach sustainable development within medium school education institution, they cause disorder, disturb the balance in the environmental education pattern and its role in achieving sustainable development.

In another study, Alofoun & Alraziqi (2017) analyzed the content of science textbooks at the elementary level in Iraq, according to the dimensions of sustainable development. A list of the three sustainable development and social, economic, and environmental in the final image has been built. Then the content of science textbooks in the elementary was analyzed and adopted the idea and unit for recording and repetition unit of the census, have been certified for analysis by a random sample of it presented to the arbitrators was carried out and all of them the validity of the analysis, and the use of Holsti equation has been the stability analysis account agreement with analysts outside and with the researcher herself, and the most important findings of the researcher's book Science for second grade primary in second place came by (32.48%) of (55) again. In light of the findings, several recommendations including; awareness of sub-neglected issues to be included in science textbooks for the primary stage.

Svalfors (2017) conducted a study to investigate the implementation of sustainable development concepts in the Swedish Curriculum of Upper Secondary School, the study followed the descriptive approach by applying the content analysis method. The articulations of sustainable development in the curriculum rest on an idea of the ecosystem that seems to enforce the natural scientific rationality instead of letting different rationalities contribute to the meaning. The descriptions of sustainable development in the curriculum can be interpreted as the social and economic, into the environmental (ecological) dimension. These results, and emphasizes the importance of taking a critical standpoint to the development of the Curriculum.

Another study was conducted by Hakim (2018) that analyzed the content of the social and national studies curriculum in the Kingdom of Saudi Arabia to reveal to what extent does the content of social and national studies curriculum at the intermediate level include the elements supporting sustainable development in its three areas of society, economy and the environment. The study aimed to improve the curriculum towards including sustainable development. The study sample consisted of the content of the social and national studies curriculum, student book (first semester) for the second year at intermediate school. The analytical approach was applied, and the units of analysis were determined according to the project (Y), specifically: (knowledge, local issues, skills, point of view, values). An analytic tool was used to reorient the curriculum towards sustainable development. The results showed that the curriculum has been short of content to enhance sustainable development in the areas of (society, economy, and environment). To enhance the curriculum towards including sustainable development, the study proposed including a set of knowledge, local issues, skills, perspectives, and values in each of the three areas. In addition to using the study findings to reallocate social studies curricula towards sustainable development.

Alharbi and Aljabr (2019) conducted an additional investigation to reveal the level of scientific book incorporation in the intermediate stage in Saudi Arabia in terms of sustainable development characteristics. The analytical descriptive approach with content analysis was employed to satisfy the study's objectives. The social, environmental, and economic components of sustainable development were included on a content analysis card. The results showed that the inclusion level of sustainable development dimensions in the content of science books in the intermediate stage was 33.33 %, the inclusion level of sustainable development dimensions in the content of 1st intermediate grade science book was 43.85 %, followed by 2nd intermediate grade science book, and 3rd intermediate grade science book in inclusion rates (29.27%) & (26.86%) respectively; weak inclusion rates. In addition, the social dimension was the most included one in the inclusion rate 60.28% while the economic and environmental dimensions came with weak levels; (22.60%) & (17.10%) respectively. Depending on the findings a set of recommendations was proposed; as the necessity for educationalists, experts, and curricula developers to take into consideration the dimensions of sustainable development as well as the need to develop science curricula in the intermediate stage and work on including sustainable development in their content.

Tatlilioğlu (2019) investigated how SDGs considering SDGs relevant competencies (Knowledge and understanding; Skills and applications; Values and attitudes) are addressed in the Turkish Middle School Science Curriculum and Science Textbooks. A qualitative case study was applied. Content analysis was

applied for the analysis of the objectives of the Science Curriculum and document analysis was employed for the analysis of Science Textbooks from 5th to 8th grades. The result of the study showed that there were reflected most of SDGs related objectives in 8th grade. There were 6 out of 17 SDGs in each grade. Furthermore, knowledge and understanding competence dominated the curriculum, with values and attitudes competence addressed only in the seventh and eighth grades. The importance of the environment was emphasized further in the curriculum's SDG-related objectives.

Previous research has aided researchers in establishing the study's problem, objectives, and questions, and previous research has identified flaws that the current study has attempted to address. And according to earlier research, the concept of sustainable development is a relatively new concept that is not addressed separately in school curricula.

In the previous studies, it has been noticed that the number of studies in this area is rare in Jordan, most studies are conducted in Saudi Arabia such as (Alofoun & Alraziqi, 2017; Alharbi and Aljabr, 2019) while Svalfors (2017) conducted the study in Sewed. And Tatlıoğlu (2019) in Turkey. The current study varies from prior studies in that science books were chosen for all levels (1st to 8th grade), Svalfors (2017) and Tatlıoğlu (2019) studied the science curriculum of the upper secondary school, while Alharbi and Aljabr (2019) applied the study on science books in an intermediate stage. And, according to the findings of most research, there are concerns and inequities in the level of integration of sustainable development concepts, topics, and regions in curriculum content discrepancy will be fulfilled and will a new context to the science curriculum regarding SDGs.

2. METHODS

In this study, a qualitative method was applied to achieve the goals of the study, and content analysis for science books from 1st grade to 8th grade was conducted.

2.1. Research Design

The researcher follows the following steps to analyze science textbooks:

- The purpose of content analysis: To determine the extent to which the content of the science books in terms of the dimensions of sustainable development according to the tool already prepared.
- Unit of analysis: the explicit idea as a unit for analyzing the science books. The words clearly and explicitly do not need much explanation and interpretation.
- Identification of categories of analysis is the (96) items in the content analysis card.
- Validity of analysis: to ascertain the validity of the analysis, the researcher presented a model of the analyzed material on some arbitrators in teaching methods, they were unanimous in the validity of the analysis process and that was considered as valid for the analysis process.
- Reliability of analysis: the constant analysis through agreement over time; It means coming together over time and coming together between the results obtained by the researchers at the time and reanalysis 30 days after the first analysis. And the reliability over time was .98, which is considered good and accepted.

A select sample of analysis: it includes all science textbooks (1st grade-8th grade), first and second semesters.

The steps:

- Reading the subject as a whole, so that the picture can be seen in the analyst's mind.
- Reading the subject again carefully to determine which ideas include sustainable development issues.
- Comparison of the paragraph with the paragraphs of the tool "Dimensions of sustainable development" to determine whether the idea belongs to the main issues and sub-issues, according to the match between the content of the idea and the content of the case in the tool.
- The type of idea in the phrases is determined in the light of the tool, the type of case, and the number that determines the type of case phrase.
- The results of the analysis are emptied into the analysis tables, giving one repeat for each phrase, and then converted into percentages for interpretation later.

2.2. Samples

The research community is all science textbooks; from 1st-grade to 8th-grade science textbooks in Jordan that are decided by the Ministry of Education. The research sample was all the content of science textbooks (from 1st grade-8th grade); the introduction and content list content, questions, figures, activities, and revision questions, as in Table 1.

Table 1. List of Science Textbooks

Grade	Title & Authors	Publisher	Copy/Edition	Number of Units	Year of Copy	No. of Analyzed Pages
First grade	Tarawneh,s. et al.	National Curriculum Development Centre	First (experimental)	6	2020	145
Second grade	Tarawneh,s. et al.	National Curriculum Development Centre	First (experimental)	6	2020	135
Third grade	Tarawneh,s. et al.	National Curriculum Development Centre	First	8	2014	166
Fourth grade	Tarawneh,s. et al.	National Curriculum Development Centre	First (experimental)	10	2020	208
Fifth grade	Tarawneh,s. et al.	National Curriculum Development Centre	First (experimental)	10	2020	216
Sixth grade	Tarawneh,s. et al.	National Curriculum Development Centre	First	6	2015	256
Seventh grade	Tarawneh,s. et al.	National Curriculum Development Centre	First copy (experimental)	10	2020	299
Eighth grade	Tarawneh,s. et al.	National Curriculum Development Centre	First copy	7	2016	337
Total				63		1762

2.3. Research Instruments

To achieve the purpose of the current study, and access to a collection of literature and research on sustainable development, and review of studies on sustainable development dimensions, a content analysis card was constructed and developed, that include the three dimensions of sustainable development goals, and under each dimension, many sub-dimensions that should be embodied in science textbooks were included. The research tool has been developed with the list of three SDGs; social, ecological, and economic dimensions, as well as sub-dimensions.

2.4. Procedures

The factual validity was measured by showing the tool to a set of experts, the extent to which the paragraphs represent what it is measuring. The instrument in its initial form, which consisted of (88) items spread over three areas, was presented to a panel of arbitrators, and specialists in curriculum and teaching

methods. They were asked to arbitrate the tool (deletion, addition, and modification). The final form of the tool consisted of (96) items distributed on three dimensions; social dimension (public health, demography, housing, education, and security) and includes (45) items from (1-45), ecological dimension (bodies of water, atmosphere, earth and fresh water and biodiversity) consisted of (36) items from (46-81), and the economic dimension (transportation, recycling, natural resources, renewable and nonrenewable energy) it includes (15) items from (82-96).

The second measure of quality in a quantitative study is reliability or the accuracy of an instrument. In other words, “the extent to which a research instrument consistently has the same results if it is used in the same situation on repeated occasions” (Heale & Twycross, 2015). One researcher performed the content analysis of the books in question the first time, and the other researcher acted as an external evaluator (re-analyzing again) in an independent manner, where the ratio of agreement between the first analysis and the second analysis was calculated, and the percentage of agreement was 98%.

2.5. Data Analysis

For statistical analysis frequencies and percentages have been used to calculate the degree of inclusion of sustainable development goals in science textbooks. Also, the Holsti formula was used to calculate the percentage of reliability of the content analysis.

3. RESULTS AND DISCUSSION

This study emphasizes the critical need to evaluate science curricula to determine the extent and quality of SDG integration.. By preparing a list of the most important sustainable development goals to be found in science books, and then identifying the extent to which these goals are included in the content of science books.

3.1. Results and Discussion of the First Question

The question is: “*To what extent do the science books include sustainable development dimensions (ecological, social, and economic dimensions)?*”

To answer this question, the content of science textbooks of 1st to 8th grade was analyzed using a content analysis card, the analysis included (63) units in (1762) pages, and then the frequencies and percentages of SD dimensions in the science books were calculated (see Table 2).

Table 2. Frequency and Percentage of Sustainable Development Goals

Sustainable Development Goals (SDGs)	Grade	Frequency & Percentage
SDG1: Social Development Goals		
Public Health		
1. Reducing health risks from environmental pollution	6 th	1(0.16%)
2. Control of communicable and infectious diseases	4 th	1(0.48%)
3. Protection of children’s health	1 st	1(0.68%)
	7 th	1(0.70%)
4. Support and care for elderly	non	0
5. Ensuring women’s health and reproductive care	non	0
6. Women’s access to reproductive rights	non	0
7. Raising awareness of the need to follow healthy habits (food & sports)	1 st	44(30.14%)
	2 nd	75(41.21%)
	4 th	65(31.10%)
	5 th	8(2.18%)
	6 th	257
	7 th	2(1.41%)
	8 th	4(5.71%)
8. Dangers of smoking awareness	2 nd	2(1.09%)
	6 th	1

Sustainable Development Goals (SDGs)	Grade	Frequency & Percentage
9. Health awareness campaigns	2 nd	1(0.55%)
	6 th	2
10. Primary Health care	non	0
11. Reducing Maternal and child mortality rates	non	0
12. Timing of pregnancy to reduce population growth	non	0
13. Educating women about reproductive health	non	0
Demography		
14. Population growth rate	non	0
15. Registration of all births and deaths	non	0
16. Improving rural services to reduce migration	5 th	1(0.27%)
17. Implementation of well-planned and managed migration policies	non	0
18. Ensure and respect the rights of illegal migrants, including smuggled migrants, and close down the means of exploitation.	non	0
19. Protecting workers' rights and promoting a safe and secure working environment for all workers, including migrant workers, especially women	non	0
Housing		
20. Provision of adequate housing for citizens	1 st	9(6.16%)
21. provision of housing and land in affordable costs	non	0
22. Planning, Management and Urban Governance	non	0
23. Innovative human settlement financing	non	0
24. Provision of environment-compatible basic services	non	0
Education		
25. Ensure that all girls and boys complete free, equitable and quality primary and secondary education	non	0
26. Promoting lifelong learning opportunities for all	non	0
27. Promotion of vocational and technical training	non	0
28. Ensure equal access for all women and men to vocational, quality and affordable higher education, including university education	non	0
29. Ensure equal access to all levels of education and vocational training for vulnerable groups, including persons with disabilities,	4 th	6 2.87%
30. Climate change disaster preparedness and adaptation	2 nd	27(14.84%)
	3 rd	91(45.96%)
	5 th	30(8.17%)
31. Awareness-raising and environmental education initiatives	non	0
32. Setting up environmental clubs in schools	non	0
33. Increase Literacy rate	non	0
(Mainstreaming reading among young people)		
34. Provision of qualified teachers, through international cooperation for teacher training in developing countries	non	0
35. Building gender-sensitive educational facilities	4 th	16(7.66%)
36. Building educational facilities sensitive to persons with disabilities	non	0
37. Building facilities suitable for children	non	0
38. Promoting a culture of peace and renunciation violence	non	0
39. Cultural diversity, and appreciation of the contribution of culture to sustainable development	non	0
40. Redirection of education towards sustainable education.	non	0
41. Promoting and disseminating environmentally sound values and behaviors	non	0
42. Reducing unemployment	non	0
Security		
43. Protecting people from crimes	non	0
44. Elimination of all forms of discrimination and violence against all women and girls	non	0

Sustainable Development Goals (SDGs)	Grade	Frequency & Percentage
45. A well-developed and equitable security management system to protect citizens from crime (Drug crimes, violence and crimes against children and women)	non	0
SDGS2: Ecological Development		
Bodies of Water		
46. Sustainable exploitation of fish and other living resources	2 nd	3(1.65%)
47. Reducing marine pollution from shipping and bodies of water oil and gas projects	6 th	1(0.16%)
48. Utilization of treated water	5 th	3(0.82%)
	6 th	54(8.41%)
	7 th	10(7.04%)
49. Raising awareness of the harm of dumping factories' wastes and sewage into the sea and oceans	5 th	4(1.09%)
50. Desalination of seawater	3 rd	8(4.04%)
	6 th	15(2.34%)
	7 th	3(2.11%)
51. Generating energy from water	2 nd	1(0.55%)
	3 rd	2(1.01%)
	4 th	5(2.39%)
	5 th	1(0.27%)
	6 th	10(1.56%)
52. Importance of algae in seas and oceans	8 th	10(14.29%)
53. Improving the quality of life in bodies of water	non	0
54. Conservation of biodiversity and ecosystem productivity	2 nd	1(0.55%)
	5 th	34(9.26%)
	7 th	6(4.22%)
	8 th	8(11.43%)
Atmosphere		
55. Treatment of air pollution	5 th	6(1.63%)
	7 th	2(1.41%)
56. Preventing Ozone depletion	non	0
57. Reducing the emission of contaminated and toxic gases	4 th	15(7.18%)
	5 th	12(3.27%)
	6 th	3(0.47%)
	7 th	11(7.75%)
Earth		
58. Increase in agricultural land area	4 th	8(3.83%)
	5 th	9(2.45%)
	6 th	2(0.31%)
	7 th	2(1.41%)
	8 th	2(2.86%)
59. Extension services to farmers from the Agricultural Extension Directorate	3 rd	2(1.01%)
	4 th	3(1.44%)
	5 th	2(0.54%)
	8 th	1(1.43%)
60. Planting forest trees	5 th	14(3.81%)
	8 th	5(7.14%)
61. Promotion of organic agriculture	non	0
62. Protection of the environment and natural resources	5 th	22(5.99%)
	7 th	3(2.11%)
	8 th	3(4.29%)
63. Ban on the use of agricultural pesticides	5 th	5(1.36%)
	6 th	2(0.31%)
	8 th	1(1.43%)
64. Combat desertification	5 th	1(0.27%)
65. Reducing urbanization	5 th	7(1.91%)
	8 th	1(1.43%)

Sustainable Development Goals (SDGs)	Grade	Frequency & Percentage
66. Activation of environmental laws	3 rd	1(0.51%)
	5 th	9(2.45%)
	7 th	1(0.70%)
67. Protection from disasters	5 th	7(1.91%)
68. Support for environment-friendly policies	non	0
69. Imposing Green Buildings	7 th	1(0.70%)
Freshwater		
70. Raising awareness of the problem of lack of drinking water	1 st	11(7.53%)
	3 rd	1(0.51%)
	4 th	3(1.44%)
	5 th	9(2.45%)
	6 th	28(4.36%)
	7 th	1(0.70%)
	8 th	1(1.43%)
71. Protection and quality of freshwater	1 st	1(0.68%)
	3 rd	2(1.01%)
	6 th	26(4.05%)
	7 th	6(4.23%)
72. Rationalization of water consumption	1 st	5(3.42%)
	3 rd	4(2.02%)
	4 th	2(0.96%)
	5 th	5(1.36%)
	6 th	20(3.12%)
	7 th	2(1.41%)
	8 th	3(4.29%)
73. Securing drinking water	4 th	2(0.96%)
	6 th	1(0.16%)
	7 th	6(4.23%)
74. Using rainwater	3 rd	1(0.51%)
	5 th	4(1.09%)
	6 th	22(3.43%)
75. Groundwater investment	non	0
76. Municipal imposition on citizens to build a well in each home	3 rd	1(0.51%)
	6 th	1(0.16%)
Biodiversity		
77. Conservation of wild plants with medicinal and therapeutic characteristics	2 nd	3(1.65%)
	3 rd	5(2.53%)
	4 th	1(0.48%)
	5 th	12(3.27%)
	7 th	32(22.54%)
	8 th	5(7.14%)
78. Animal welfare	1 st	19(13.01%)
	2 nd	8(4.39%)
	3 rd	5(2.53%)
	5 th	3(0.82%)
	7 th	4(2.82%)
	8 th	3(4.29%)
79. Conservation of endangered organisms	2 nd	4(2.19%)
	3 rd	25(12.63%)
	4 th	10(4.78%)
	5 th	22(5.99%)
	6 th	1(0.16%)
	7 th	
	8 th	4(2.82%)
		6(8.58%)
80. In the breeding months, the Ministry of the Environment has banned citizens from fishing.	3 rd	1(0.51%)
	5 th	9(2.45%)

Sustainable Development Goals (SDGs)	Grade	Frequency & Percentage
81. Creation of nature reserves	8 th	1(1.43%)
	1 st	23(15.75%)
	2 nd	3(1.65%)
	3 rd	40(20.20%)
	5 th	16(4.36%)
	8 th	2(2.86%)
SDG3: Economic Development		
82. Increased use of public transport	5 th	1(0.27%)
83. Use of environmentally friendly means of transport; Sustainable transport	non	0
84. Recycling of industrial and household waste	2 nd	4(2.19%)
	4 th	1(0.48%)
	5 th	25(6.81%)
	6 th	1(0.16%)
	7 th	11(7.75%)
	8 th	4(5.71%)
85. Dissemination of a culture of classification of wastes	2 nd	1(0.55%)
	4 th	2(0.96%)
86. Use of natural raw materials	1 st	31(21.23%)
	3 rd	11.54%
	4 th	27(12.92%)
	5 th	25(6.81%)
	6 th	53(8.26%)
	7 th	9.15%
	8 th	1(1.43%)
87. Renewable energy consumption	1 st	1(0.68%)
	2 nd	5(2.75%)
	3 rd	6(3.03%)
	4 th	7(3.35%)
	5 th	21(5.72%)
	6 th	51(7.94%)
	7 th	3(2.11%)
88. Rationalization of electricity consumption	4 th	8(3.83%)
	5 th	6(1.63%)
	6 th	28(4.36%)
89. Work on wind power projects	1 st	1(0.68%)
	2 nd	2(1.09%)
	3 th	3(1.52%)
	4 th	5(2.39%)
	5 th	1(0.27%)
	6 th	39(6.07%)
90. Promotion of solar lighting products	2 nd	1(0.55%)
	6 th	4(0.62%)
91. Reduction of waste of wastes and pollutants	5 th	1(0.27%)
	6 th	6(93%)
92. Design of environmentally efficient products	non	0
93. The Rational Exploitation of Environmental Resources	2 nd	20(10.99%)
	4 th	34(16.27%)
	5 th	32(8.72%)
	6 th	8(1.25%)
	7 th	17(11.97%)
	8 th	9(12.86%)
94. Economic empowerment of women through support for productive projects	non	0
95. Economic empowerment of migrants	non	0
96. Utilization of hot springs in therapeutic tourism	6 th	5(0.78%)
	7 th	1(0.70%)

The researchers noted that 43 out of 96 sustainable development concepts have not been repeated in any of the science books from the first basic to the eighth basic grade and that 13 have been listed for once in one of the science books whose content has been analyzed, which also indicates that they have been received in an unintended and irregular manner; This also indicates a lack of purpose in the minds of learners as a result of their one-time passage throughout the school year. This may be explained by the absence of a single methodology throughout the school year. This may be explained by the absence of a clear methodology in the mechanisms for incorporating the dimensions of sustainable development into the textbooks in question, or perhaps by the fact that the inclusion of their ideas and general outcomes in the broad outlines of science curricula in Jordan is ignored. These findings are parallel with the results indicated by Alofoun & Alraziqi (2017), which revealed that science authors have neglected many key issues and sub-issues for each dimension. The dimension means that there's a weakness in the order of the book and its themes. Also, Alharbi (2019) revealed that the inclusion of SDGs in science books for the middle school levels is medium.

This can also be attributed to the fact that sustainable development is one of the most visible developments in the local arena that have been absent from the content of science books since national teams of curriculum authors have not been briefed on these dimensions and indicators, or that they believe that it is useless to include students in these 6-14 age groups.

It should be noted, however, that the most frequent concepts of sustainable development were in favor of concept 7, which read "Raising awareness of the need to follow healthy habits (food & sports)" and (455) frequencies, (23.26%). This may be explained by the fact that science models focus on the subject of raising awareness of learners in basic education, by guiding them towards the need to adopt healthy habits as food and sports for bodies, perhaps because of the conviction of the parties concerned that the best solution to the challenges facing Jordan's health sector is to create a culture of awareness that will reduce the potential health risks and prevent the public health of learners by following healthy habits. In particular, as a preventive policy, there are multiple refugee crises in Jordan.

The second was concept 86, which read "Use of natural raw materials," with a repetition of 171 and a ratio of (8.74%). This may be explained by Jordan's possession of natural resources, such as phosphates, oil shale, and multiple minerals, in perfect quantities, but it requires excavation, extraction, and processing, which suggests that there is a desire to encourage learners to engage in circles that enable them to exercise their roles in experimentation, exploration, observation, discovery, documentation, and generalization to enable them to exercise those roles when they grow up, especially since Jordan is a poor country, which makes it imperative for its members to continue to discover the new raw materials and to complete their study based on the individuals and institutions concerned, such as educational institutions, the Natural Resource Authority and the Higher Council for Science and Technology.

The third was Concept 30, "Climate change disaster preparedness and adaptation," with 148 frequencies and (7.57%). This may be explained by the unprecedented changes that the world has experienced in the past decades in climate conditions and the associated disasters associated with climate change that lead to the destruction of property and homes. Climate change is perhaps one of the most prominent challenges that will be faced on Earth in the twenty-first century, whether it is associated with rising temperatures, the drought of plants, storms, floods, or forest fires. It would therefore be very useful to include such issues in science textbooks to help cope with the burden and consequences of such disasters and, nevertheless, to create awareness of the mechanisms for dealing with such disasters proactively and to reflect on the solutions proposed.

And this may be related to and explained by the need to preserve human rights concerning a safe life, particularly after the emergence of international conventions [UNHCR] linked to the protection needs of displaced persons in the disaster race and climate change, and the need for Governments in third world countries to respond to the establishment of frameworks and methods to deal with displacement due to climate change.

3.2. Results and Discussion of the Second Question

The question is "Does the degree to which sustainable development goals are included in science books differ by dimensions of sustainable development?"

To answer the question, the frequencies and percentages of each sustainable dimension were calculated as shown in Table 3.

Table 3. Frequency and Percentage of Sustainable Development Dimensions (Social, Ecological and Economic Dimension)

Dimension	Inclusion Level																Total	%	Rank
	1st		2nd		3rd		4th		5th		6th		7th		8th				
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%			
Social Dimension	54		105		91		88		39		261		3		4		645	32.98	2
Ecological Dimension	59		23		98		37		216		186		94		52		765	39.11	1
Economic Dimension	33		54		9		84		112		195		45		14		546	27.91	3
Total	146		182		198		209		367		642		142		70		1956		

The researchers noted from Table 3 that the areas of sustainable development most commonly included in the science books for grades first-eighth grade were in favor of the environmental dimension, which was ranked number one, with a frequency of 765 and a percentage of (39.11%), this may be explained by the new understanding that has taken place in the local arena, which is linked to developments that confirm a relationship between our continued existence in life and the challenges posed by the environmental dimension, especially after the emergence of industrial activities and developments carried out by humans, away from the language of reason, causing serious damage to the environmental balance.

This may also be explained by the prevailing fear for the future of future generations as a result of the increased risks to the environment, which makes it necessary for those generations to be made aware of some irresponsible behavioral practices vis-à-vis the biosphere in which they live, causing them to develop a range of negative behaviors that they are accustomed to as young as they are, indicating the transmission and habit of such practices as adults.

This may also be due to the desire to enable generations to understand sustainable development in the environmental dimension by referring to some serious phenomena, including the expansion of the ozone hole, acid rain, and the increase in ultraviolet radiation and other hazards that require students to be aware of and participate in finding appropriate solutions.

While the economic dimension has been ranked last as the least frequently included in science books at 546 frequencies and (27.91%), this may be explained by the challenges facing Jordan as one of the developing countries facing challenges associated with sustainable development in the economic sphere, which requires different forms of concern to improve the economic life of individuals. These findings corroborated Alharbi's (2021) findings, which suggested rethinking the necessity for the balanced inclusion of sustainable development subjects in curricula.. The same findings of Rieckmann (2018) who explores the relationship between SDG 4 (Quality Education) and the other SDGs, emphasizing the importance of addressing all goals in an integrated manner.

This can also be attributed to the specific nature of Jordan, which suffers from economic difficulties linked to poverty, the creation of employment opportunities and the incubation of the largest number of refugees, its lack of economic resources, and its budget and debt deficits, which create the economic dimension and solutions in the latter area. This may be explained by the limited and effective steps taken in economic reform programs and the lack of reflection on the situation of individuals..

As Sterling (2019) suggests, these findings highlight the urgent need to integrate SDGs into educational curricula. Although Sterling advocates for SDG integration, his critique focuses on how it's done, stressing the importance of transformative learning and systemic change over superficial additions. His concern is with effective implementation, not the principle of SDG inclusion.

Ultimately, this research demonstrates that curricula disproportionately focus on environmental SDGs, with climate action as a prime example, at the expense of social and economic dimensions like

gender equality and reduced inequalities. Therefore, it is imperative to adopt a more equitable and comprehensive strategy for integrating all SDGs.

3.3. Results and Discussion of the Third Question

The third question is: “Does the degree to which sustainable development goals are included in the science textbooks vary by class?”

To answer the question, the frequencies and percentages for the main subject and sub-subjects were calculated in the content of science books for the levels from 1st to 8th grade, as in Table 4.

Table 4. Frequencies and Percentages For the Degree of Inclusion of SDGs by Grade

Grade	Frequency	Percentage	Rank
Science book for sixth grade	642	%32.82	1
Science book for Fifth grade	367	%18.76	2
Science book for Fourth grade	209	%10.69	3
Science book for Third grade	198	%10.12	4
Science book for Second grade	182	%9.30	5
Science book for First grade	146	%7.46	6
Science book for Seventh grade	142	%7.26	7
Science book for Eighth grade	70	%3.58	8
Total	1956		

Meditation on the order of inclusion of sustainable development in textbooks from the first grade to the eighth grade, based on their iterations, which came from above; (The science book for the sixth grade, next to the science book for the fifth grade, followed by the science book for the fourth grade, then the science book for the third grade, afterward the science book for the second grade, then the science book for the first grade, thereafter the science book for the seventh grade, and the last least included in sustainable development concepts came in favor of the science book for the eighth grade). The above confirms the absence of a systematic and cumulative mechanism in providing students with these concepts. These findings are in line with the results of Mohammadnia and Moghadam (2019) which show that the concepts of sustainability are well-represented in English textbooks. However, the findings imply that such themes should be distributed more evenly across the series. The teacher’s role as a facilitator in fostering discussions around such topics is also emphasized.

The researchers from the table also noted that the most comprehensive science book on sustainable development is in favor of the sixth-grade science book. This is probably explained by the nature of the Book of Science for students at this age, which contains scientific concepts far from the chemical and physical specialties and thus allows the provision of selected forms and dimensions of sustainable development to learners. While the results indicated that the lowest concepts of sustainable development were included in the science books of the eighth basic grade, which were last ranked, with a frequency of (70) and (3.58%), this may be explained by the absence of perceptions among national teams of science curriculum composition to include sustainable development; This reflects the absence of binding mentors for the authors of the book in question for the eighth grade and the lack of general learning outcomes associated with sustainable development.

Although the science textbooks for basic grades (1st, 2nd, 4th, 5th, and 7th) are new approaches and are expected to keep pace with the requirements and developments of the times, they do not adequately include sustainable development goals. They were the lowest books on record. This underscores the absence of sustainable development goals from the minds of curriculum authors and the Development Committee and disregards the responsibility of individuals to contribute to sustainable development through the curriculum by gaining the knowledge, skills, and attitudes needed to reduce irresponsible practices that impede development in its various areas. In agreement with the findings of Nketsia et al. (2020) which support a call for revisions to ensure that the four main themes in SDG 4 – quality, inclusiveness, equity, and lifelong learning – are properly addressed in the curriculum in order to encourage inclusive education practices and values. Moreover, UNESCO provides a comprehensive overview of

Education for Sustainable Development (ESD) and its connection to the SDGs. It emphasizes the crucial role of education in achieving the SDGs and offers guidance on integrating them into curricula. Preparing students for a sustainable future means equipping them with the skills, values, and mindsets needed to confront complex challenges. Integrating the SDGs into the curriculum is fundamental to this process.

4. CONCLUSION

By analyzing the science textbooks for 1st grade to 8th grade in terms of sustainable development, and even though not all issues of sustainable development are equally integrated with science curricula as a result of this study, it is clear that not all topics of sustainable development are similarly embedded in science curricula. Science textbooks primarily focused on the environmental aspects of sustainable development, aligning strongly with related Sustainable Development Goals. However, crucial areas like gender equality and quality education were entirely missing from the content. Moreover, according to the study's findings, the sixth-grade science book has the highest inclusion of SDGs. While the last with the fewest SDGs was in favor of an eighth-grade novel.

Education Achievement Responsibility for Education Sustainable development is a shared responsibility. It's not individual, it's not responsible for it. Ministries of Education or Higher Education only, but also collective responsibility includes all interested parties, scientific bodies and institutions research centers, and civil society organizations and experts and the private sector and the media.

Therefore, Transitioning and focusing curricula toward the Sustainable Development Goals, as well as the work of policymakers and curriculum development committees, will raise awareness of the importance of the SDGs among future generations and acquire the skills, knowledge, and trends necessary to achieve these goals which lead to sustainable practices that preserve natural resources for future generations. Education for Sustainable Development (ESD), informed by Systems Thinking Theory, promotes a practical understanding of how social, economic, and environmental systems interact. It equips learners to analyze complex problems holistically, anticipate the ripple effects of their actions, and make choices that consider long-term consequences.

A comprehensive policy in education aimed at achieving sustainable development is essential, because continued economic, social and environmental bleeding will make future conditions more difficult for Jordan's generations.

Despite Jordan's challenges in terms of sustainable development, we believe in the Jordanian people's ability to overcome those challenges and build a better future for future generations by including sustainable development goals in curricula beginning at the very early levels of education, ensuring generations' understanding of the goals. By integrating SDGs into the curriculum, educators can empower students to become informed, engaged, and responsible citizens who are prepared to contribute to a sustainable future.

4.1. Recommendations and Future Studies

- Redirecting science curricula to sustainable development; could be by framing science investigations around real-world SDG challenges, engaging students in longer-term projects that address SDG-related problems, or using real-world examples of scientific advancements and their impact on achieving the SDGs, or engaging students in analyzing data-related to SDG indicators.
- Organize school-wide events, such as assemblies, film screenings, or exhibitions, to raise awareness about the SDGs among teachers, students, and the wider community.
- Scientists and professionals actively involved in SDG-related endeavors should be invited to address students regarding their work and the contributions of science toward the realization of these goals.
- Conduct workshops and training sessions for teachers specifically focused on the SDGs.
- Longitudinal studies are suggested to assess the long-term impact of SDG-integrated curricula on students' knowledge, attitudes, behaviors, and skills related to sustainable development. How do these changes manifest in their lives after they leave school?

4.2. Limitations

This study examined science textbooks published in Arabic from 2014 to 2020, which are representative of those used in Jordanian governorate schools and play a crucial role in formal science education.

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Research Ethics. The authors confirm that all research procedures were performed in accordance with ethical guidelines and applicable laws and institutional regulations.

Data Availability Statement. The science books used in this analysis (first, second, fourth, fifth, and seventh-grade books published in 2020; third-grade books published in 2014; sixth-grade books published in 2015; and eighth-grade books published in 2016). All data can be obtained from the corresponding author.

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REFERENCES

- Abdurahman, A. (2007). *Human Development and Obstacles to Sustainable Development in the Arab World, Human Development and Its Impact on Sustainable Development*, Arab Organization for Administrative Development, Cairo.
- Alharbi, A. (2021). Content Analysis of Social Studies and Citizenship textbooks of the Middle Stage in the Light of Sustainable development perspectives Included in the Saudi Vision 2020. *Journal of Education, Cairo*, 3(189), 96-145.
- Alharbi, M. & Aljabr, N. (2019). Content Analysis of Science Text Books in Intermediate Stage in Saudi Arabia according to Sustainable Development Dimensions. *MECSI*, 17 (September), 2-27.
- Alofoun, N. & Alraziqi, W. (2017). Science book second grade content analysis according to the Dimensions of Sustainable Development. *Journal of Educational and Psychological Researches*, 14(52), 255-280
- Didham, R. J. (2012). *Education for sustainable development country status reports: An evaluation of national implementation during the UN Decade of Education for Sustainable Development (2005-2014) in East and Southeast Asia*. Institute for Global Environmental Strategies.
- Donano, R. (2003). *Environmental Economy and Sustainable Development*, National Agricultural Policy Centre, Ministry of Agriculture and Agrarian Reform in collaboration with the Food and Agriculture Organization of the United Nations, Damascus, p52.
- Falahi, O. (2015). Sustainable development between capital accumulation in the North and the expansion of poverty in the South. *Journal of Economic and Facilitation Sciences*, 3, 1-20.
- Frank Dominique .(2005) . jalons pour une histoir de la nation de développement durable »,monde en développement, 33(129), 25.
- Hakim, A. (2018). Analysis of the content of social and national studies for the second intermediate grade in the light of the Y project to redirect the curriculum towards sustainable development and citizenship development. Research presented for the *Second International Scientific Congress "Contemporary Education and Citizenship"*. Jordan Society for Social and National Education, Amman, Jordan.
- Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, 18, 66-67.
- Ilshafe', M. (2008). Concept and Content of Local Development and Its Overall Role in Overall Development, Arab *Economic Research Journal*, 43, 156.
- Jimenez, J. D., Lerch, J., & Bromley, P. (2017). Education for global citizenship and sustainable development in social science textbooks. *European Journal of Education*, 52(4), 460-476.
- Khan, Z., & Khanam, F., (2016). Transaction of Science Curriculum towards Sustainable Development, Education as a driver for Sustainable Development, 4, 33-65.
- Landorf, H., Doscher, S., & Rocco, T. (2008). Education for sustainable human development: Towards a definition. *Theory and Research in Education*, 6(2), 221-236.

- Miqdadi, O. (2017). Sustainable development and its future in Jordan. Retrieved from <https://www.ammonnews.net/article/325228> in 7th July 2021
- Mirsawi, F. (2015). Educational treatment of sustainable development through curricula and textbooks: First Year Baccalaureate Science Model. *International Interdisciplinary Journal of Education*, 1(1650), 1-9.
- Mohammadnia, Z., & Moghadam, F. D. (2019). Textbooks as resources for education for sustainable development: A content analysis. *Journal of Teacher Education for Sustainability*, 21(1), 103-114.
- Naser, M. (2009). Sustainable Development and Challenges in Algeria. *Arab Economic Research Journal*, 46, 108.
- Nketsia, W., Opoku, M. P., Saloviita, T., & Tracey, D. (2020). Teacher Educators' and Teacher Trainees' Perspective on Teacher Training for Sustainable Development. *Journal of Teacher Education for Sustainability*, 22(1).
- Rieckmann, M. (2018). Sustainable Development Goals and Quality Education: Exploring the Interlinkages. *Journal of Education for Sustainable Development*, 12(2), 163-181.
- Salite, I., Fjodorova, I., Iliško, D., Ivanova, O., & Meihami, H. (2020). JTES for Sustainable Development: An Action Research Environment for the Development and Sustainable Future of the Journal Identity. *Journal of Teacher Education for Sustainability*, 22(1), 1-5. <https://doi.org/10.2478/jtes-2020-0001>
- Sterling, S. (2019). Integrating the Sustainable Development Goals into Education: A Review of the Literature. *Journal of Education for Sustainable Development*, 13(2), 107-124.
- Svalfors, U. (2017). Education for sustainable development and multidimensional implementation: A study of implementations of sustainable development in education with the curriculum of upper secondary school in Sweden as an example. *Discourse and Communication for Sustainable Development*, 8(2), 114-126.
- Tatlıoğlu, E. (2019). *Analysis of science curriculum and textbooks in terms of sustainable development goals: A case study* (Master's thesis).
- Taweel, F. (2013). *Environmental education and its role in sustainable development*, Doctorate Dissertation, University of Mohammad Khedir, Baskara.
- UNESCO (2005b). *Promotion of a Global Partnership for the UN Decade of Education for Sustainable Development*; brief of the International Implementation Scheme for DESD. UNESCO.
- UNESCO. (2017). *Education for Sustainable Development Goals: Learning for the 21st Century*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000247754>
- United Nations Educational, Scientific and Cultural Organization (2015). UNESCO Global Education Forum (The Incheon Declaration and Framework for Action to Achieve the Fourth Goal of the Sustainable Development Goals, a vision for education by 2030). Incheon, South Korea.
- United Nations Environment Programme. "Sustainability." Accessed July 20, 2020
- United Nations General Assembly. (1992). *Agenda 21: The United nations programme of action from Rio*. Rio de Janeiro, Brazil.