

Education for Sustainable Development: A Qualitative Analytical Study on the Impact of the Jordanian Universities' Role in Supporting Innovation among University Students

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Received: December 20, 2020

Accepted: April 14, 2021

Online Published: April 20, 2021

doi:10.5430/ijhe.v10n4p268

URL: <https://doi.org/10.5430/ijhe.v10n4p268>

Abstract

This study aimed at exploring and theorizing the role of Jordanian Universities in supporting innovation among university students within the context of education for sustainable development from the point of view of Jordanian University students. For that, the researcher adopted the grounded theory methodology by Strauss and Corbin. The study was conducted at two Jordanian Universities: the University of Jordan and Philadelphia University in the academic year (2019-2020), and the study population consisted of students from the two universities. The researcher chose (300) students from both genders from different faculties and academic years. By applying the grounded theory, the study concluded that the key category that emerged after analyzing the student's responses describing the impact of the Jordanian Universities' role in supporting innovation among university students for educational sustainable development is the emphasis on the need for developing proper University innovation ecosystems in their educational systems. Also, the respondents- through online interviews - have emphasized this concept of proper University innovation ecosystems. The key category of this study found that positive and negative impacts could result from applying or neglecting to apply this concept, which generated behaviors toward the concept, which could be considered as the phenomena in the current research.

Keywords: education, sustainable development, Jordanian Universities, innovation

1. Introduction

To achieve sustainable development through technological solutions and political systems; we need to change our mindsets and behaviors, which requires a comprehensive evaluation of the quality of education and learning for sustainable development at all levels and in all social systems. The main goal of the education systems for sustainable development is to enable meeting the current and future global challenges constructively and creatively, and in creating more resilient sustainable societies (Rieckmann, 2017).

With its multiple concepts; sustainable development can be summarized in the process that results as an increase of life chances for individuals without a decrease in the life chances of others, or in enabling today's man to have a better life and to achieve better well-being, social justice, and safety while preserving the rights of the future man (Harris, 2000).

The beginning was in the Earth Summit held in Brazil (Rio de Janeiro) in 1992, UNESCO acknowledged the use of science, education, public awareness development, and training for sustainable development, and then UNESCO called for establishing an international committee for dealing with the concept of education in its broadest sense, from pre-school education to higher education through school education (Leal Filho, Manolas & Pace, 2015).

All international reports and conferences have aimed to ensure education for sustainable development through education that enables learners to acquire the necessary techniques, skills, values, and knowledge to ensure sustainable development, as well as education that includes a lifelong learning perspective, and has its return, whether for humans or societies (Leicht, Heiss & Byun, 2018).

In September 2015, the Member States of the United Nations formally adopted in New York, during their conference on sustainable development, the 2030 Agenda for Sustainable Development. This plan includes 17 goals, including a new global goal in the field of education (Goal 4 of the Sustainable Development Goals), which is “**Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all**”, combined with seven

targets and three indicators for implementation. Defining this goal was a result of an intensive consultative process conducted by the Member States, with the participation of civil society, educators, trade unions, bilateral agencies, regional organizations, international organizations, private sector, and research institutions (Frey & MacNaughton, 2016).

Higher education institutions play an important role in achieving the 2030 Sustainable Development Goals. Higher education institutions are specifically mentioned in the framework of the fourth goal of the Sustainable Development Goals regarding the quality and the inclusiveness of education, but their impact extends to all the goals through teaching and learning processes, research outputs, and initiatives undertaken by students. Higher education institutions contribute to social, environmental, and economic development as being one of the most important incubators for ideas and solutions to global problems (Owens, 2017).

Education in Jordan in general, and higher education in particular, is the path to sustainable development, and the universities' outputs are the inputs of the sustainable development processes; within the framework of the fourth goal of the sustainable development goals, which are related to the quality and the comprehensiveness of education, indicating that its impact extends to include all the sustainable development goals, through the transformation processes that generate knowledge and technologies, and from a teacher-centered educational system to a learner-centered educational system (Elrehail, Emeagwali, Alsaad & Alzghoul, 2018).

And since innovation stimulates productivity, inclusive economic growth, sustainable development, and contributes to finding solutions to social, economic, and environmental challenges, especially in Jordan; an integrated approach in higher education must be based on innovation, which has diversified its forms and models since the beginning of the economic globalization and the information & communication revolution in the last century. This is presented in the mission of the Ministry of Higher Education and Scientific Research in Jordan in achieving sustainable development by developing an integrated educational system based on innovation.

2. Problem Statement

Universities around the world are considered the generators of knowledge and the centers of the civilized progress of nations, and they are playing an unprecedented role of great importance in terms of innovation (Thorp & Goldstein, 2013). Innovation is about creating new knowledge or applying old knowledge in new ways. In this context, the Jordanian universities are keeping pace with technical progress in trying to adopt policies that serve the idea of shifting towards innovation by offering advanced programs in the field of education and curricula, as well as developing legislations with the Ministry of Higher Education and Scientific Research, to support innovation at all levels. Therefore, the researcher adopted the qualitative analytical methodology for theorizing the impact of the Jordanian Universities' role in supporting innovation among university students within the context of education for sustainable development by attempting to answer the study question: What is the grounded base theory that governs the Jordanian Universities' role in supporting innovation among university students within the context of education for sustainable development?

3. Objectives of the Study

Innovation supports shifting towards the learner-centered educational system. Thus, this study is trying to explore the Jordanian Universities' role in supporting innovation among university students within the context of education for sustainable development from the point of view of the students of the Jordanian Universities. And the study aims at:

- Determining the role that Jordanian universities play in developing and investing in innovation.
- Exploring the direct role of the Jordanian universities in developing the human resource capabilities for achieving the development of innovative students' capabilities.
- Investigating the role of the universities' curricula and non-curricula activities in providing students with knowledge that can develop their innovative capabilities.

4. Literature Review

Sustainable development is a comprehensive model for the United Nations, the concept of sustainable development was described in the Brundtland Commission 1987 report as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs; and sustainability is a model of thinking about the future that takes into account environmental, social and economic considerations in the pursuit of development and improvement of the quality of life (Redclift, 2005).

To reorient education towards sustainable development, educational institutions must explore the required knowledge, questions, visions, capabilities, and values that are at the core of sustainable development for each of the

three elements of sustainability; environment, society, and economy to integrate them into the curriculum. The educational community also needs to decide which of the many issues that are related to sustainability will become part of the curriculum (e.g., climate change, equity, poverty) and rationally, the effort of reorienting education based on the local or national sustainability goals (Rieckmann, 2018).

The pedagogy related to education for sustainable development stimulates students to analyze, think critically and make decisions, and it works on stimulating innovation and imagining the future alternatives, working towards a positive change that helps students develop a sense of social justice and self-efficacy as members of the society. Universities have a leading role in defining the trends through which future generations learn how to address the complexity of sustainable development; universities also prepare highly qualified graduates who can satisfy all the needs of human activities. It also provides opportunities for higher education and lifelong learning (sustainability). It also contributes to the advancement, enrichment, and dissemination of knowledge through research, in addition to providing societies with the specialized expertise needed to help in the field of cultural, social, and economic development (Adomßent, Fischer, Godemann, Herzig, Otte,

Rieckmann & Timm, 2014).

The university is the educational institution with its developmental goal; it can understand and respond to the interrelationships between various systems and all segments of the society by determining options and adjusting paths under the supervision of intellectual and academic energies to provide strategic services to restore the balance between needs and goals, as part of the state's policy aimed at developing and directing youth towards the future. Universities also have a role in supporting innovation, which is a fundamental role assigned to universities through curricula and training workshops that support creative thinking and innovation, as well as through entrepreneurship incubators that help transform these ideas into products and service projects (Sharples, Roock, Ferguson, Gaved, Herodotou, Koh, & Wong, 2016).

5. Methods and Procedures

5.1 Study Methodology

For subjective interpretation of the content of the interviews text data as a research method; the qualitative analysis can be referred to as a process of identifying and then coding themes into patterns through a systematic classification (Hsieh & Shannon, 2005, p. 1278). Besides that, it is “a method for describing the meaning of qualitative material systematically”. Therefore, the researcher has adopted the grounded theory methodology by Strauss and Corbin (1990, 1998).

5.2 Study Population and Sample

The study population consisted of all the students in the two Jordanian universities: the University of Jordan and Philadelphia University in the academic year (2019-2020); and the researcher conducted the study on a sample of (300) students; as a representative sample size with different faculties, gender, and academic year.

5.3 Characteristics of the Study Sample

Data in table 1 show the distributions of the study sample by faculty, gender, and academic year.

Table 1. Study sample characteristics

	Variables	Frequencies	Percentages
Gender	Male	136	45.6%
	Female	164	54.4%
Faculty	Scientific	112	37.4%
	Humanitarian	188	62.6%
Academic year level	First-year	61	20.4%
	Second-year	89	29.6%
	Third-year	70	23.3%
	Fourth-year	80	26.7%

5.4 Interview Questions

All the interview questions were based on an open-ended approach, and the questions are:

1. How would you describe the idea that the teaching methods in the university support the concept of innovation to achieve sustainable development?

2. How would you describe the idea that the curricula taught at the university support the concept of innovation to achieve sustainable development?
3. How would you describe the idea that the non-curricula activities in the university support the concept of innovation to achieve sustainable development?
4. In what way or ways do you think that the university supports the concept of scientific research among students to encourage them to innovate?
5. As a student, how would you describe your constructive contributions to initiate ideas that could support the concept of innovation to achieve sustainable development of the educational system?
6. What could be the positive sides of the university that do support the concept of innovation to achieve sustainable development?
7. What could be the negative sides of the university that do not support the concept of innovation to achieve sustainable development?

5.5 The Coding Process

By using grounded theory procedures; data were collected suggesting that for a standard grounded theory research; 20 to 30 interviews should be executed, which will cover the categories that emerge during analysis as a sum. The accumulated data in the four phases will differ upon the purpose and the strategies of the data collection. By using (NVivo 11), the data analysis of this study was completed to face trustworthiness, rigorosity, and quality. The data collection four-stage strategy is summarized in Table 2.

Table 2. Data Collection Four Phases

Phase	Coding	Purpose	Respondents
One	Open	For advanced analysis; Categorizing codes	60 individuals, and 40 in Focus groups
Two	Axial	Specifying and connecting codes to generate themes	60 individuals, and 40 in Focus groups
Three	Selective	Generating the paradigm model	50 in Focus groups
Four	Selective	Until saturated; testing, certifying, and explaining the paradigm model	50 in Focus groups

5.6 Study Analysis

The obtained 29 preliminary codes from the interview sessions are shown in table 3; as each code is representing a significant topic of discussion related to the impact of the Jordanian Universities' role in supporting innovation among university students. Therefore, the researcher concluded that the codes were saturated by both the focus groups and individual interviews that were necessary to understand the phenomenon of the impact of the Jordanian Universities' role in supporting innovation among university students after similar codes emerging during the interviews.

Table 3. Initial Categories and Codes in Phase one and two

Categories	Codes
Knowledge background	1 University innovation ecosystems
	2 Innovation knowledge exchanges
	3 Understanding the inner dynamics of knowledge economy
	4 The need for new organizational processes
	5 Universities' ability to build and improve their research methodologies
	6 Knowledge-based capital
	7 Universities' ability to build and improve their teaching methods
	8 Interactions between Universities' students and economic actors
	9 Legislations supporting the innovation ecosystems
Interactions	10 Linking education to the goals of sustainable development

	11	Innovation linked to developing supportive curricula
	12	Teaching method development
	13	Scientific research is the cornerstone
	14	Encouraging creative thinking
	15	Networking with companies
	16	Economic growth
	17	Long-life Sustainable education development
Phenomenon: Positive sides	18	Advanced social ecosystems
	19	Social justice
	20	Generating knowledge
	21	Unbalanced Sustainable development
Phenomenon: Negative sides	22	Social injustice
	23	Poor social ecosystems
	24	Weak economy
	25	Traditional education
	26	Failure to achieve any success in the sustainable development goals
Consequences	27	Underdeveloped societies
	28	Economy collapse
	29	The collapse of the educational system

6 Results and Discussion

6.1 Study Paradigm Model

By utilizing NVivo 11 the paradigm model in figure 1 is generated as a result of codes and themes linked together. These concepts’ relationships are established based on the validation process in the third and the fourth phases of the selective data analysis rigorously.

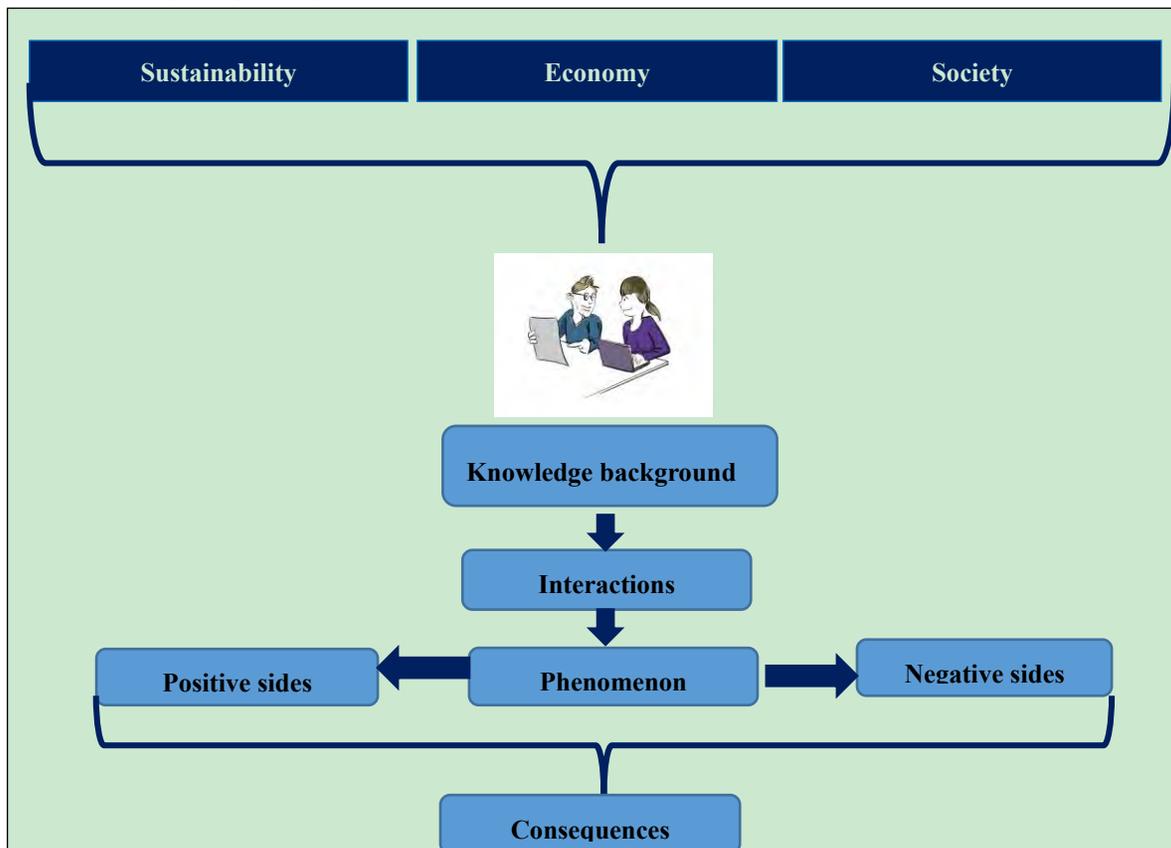


Figure 1. The Paradigm Model

6.2 Codes into Themes

Percentages of codes into themes frequencies of the study sample answers upon the study sample characteristics as distributed by gender (males and females) and faculty stream (scientific and humanitarian), and table 4 shows these percentages.

Table 4. Percentages of codes into themes frequencies of the study sample answers upon the study sample characteristics

Codes into themes Knowledge background	Percentages			
	Gender		Faculty	
	Male	Female	Scientific	Humanitarian
University innovation ecosystems	41%	43%	45%	41%
Innovation knowledge exchanges	29%	30%	44%	49%
Understanding the inner dynamics of the knowledge economy	33%	27%	38%	41%
The need for new organizational processes	18%	30%	44%	43%
Universities' ability to build and improve their research methodologies	27%	29%	51%	40%
Knowledge-based capital	32%	31%	32%	39%
Universities' ability to build and improve their teaching methods	25%	26%	45%	41%
Interactions between Universities' students and economic actors	28%	37%	31%	28%

Codes into themes Interactions	Percentages			
	Gender		Faculty	
	Male	Female	Scientific	Humanitarian
Legislations supporting the innovation ecosystems	51%	56%	66%	52%
Linking education to the goals of sustainable development	49%	55%	48%	41%
Innovation linked to developing supportive curricula	34%	33%	41%	39%
Teaching method development	53%	54%	49%	43%
Scientific research is the cornerstone	59%	61%	74%	55%
Encouraging creative thinking	41%	40%	48%	39%
Networking with companies	33%	31%	40%	32%

Codes into themes Phenomenon: Positive sides	Percentages			
	Gender		Faculty	
	Male	Female	Scientific	Humanitarian
Economic growth	62%	71%	59%	64%
Long-life Sustainable education development	53%	52%	49%	50%
Advanced social ecosystems	44%	45%	50%	48%
Social justice	67%	68%	57%	60%
Generating knowledge	54%	55%	63%	51%

Codes into themes Phenomenon: Negative sides	Percentages			
	Gender		Faculty	
	Male	Female	Scientific	Humanitarian

Unbalanced Sustainable development	36%	39%	41%	40%
Social injustice	54%	56%	50%	52%
Poor social ecosystems	44%	48%	41%	47%
Weak economy	59%	62%	54%	62%
Traditional education	45%	38%	46%	33%

Consequences	Percentages			
	Gender		Faculty	
	Male	Female	Scientific	Humanitarian
Failure to achieve any success in the sustainable development goals	44%	51%	50%	47%
Underdeveloped societies	55%	61%	49%	48%
Economy collapse	37%	43%	44%	39%
The collapse of the educational system	54%	61%	52%	55%

6.3 Intersections with Sustainable Development

Based on the paradigm model above; data showed that there are many intersections between sustainable development and the ideas presented in the study sample responses, and these intersections can be divided into clusters; with each cluster representing the networking connections of the ideas generated by the codes turned into themes in the four phases of the data collection.

6.3.1 Cluster One: Education for Sustainable Development with Economics

Data in figure 2 show the cluster interrelationships between education for sustainable development and the economy.

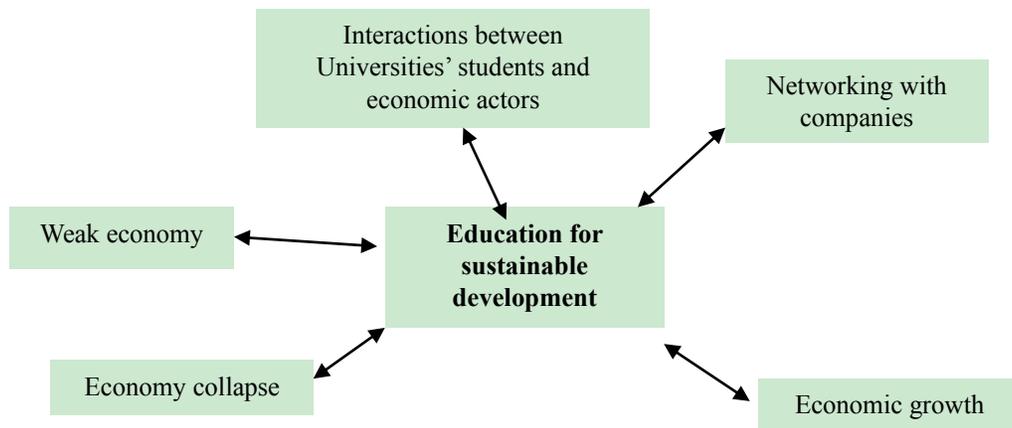


Figure 2. Cluster interrelationships between education for sustainable development and economy

Data in figure 3 also show that the linking percentages between education for sustainable development and economy.

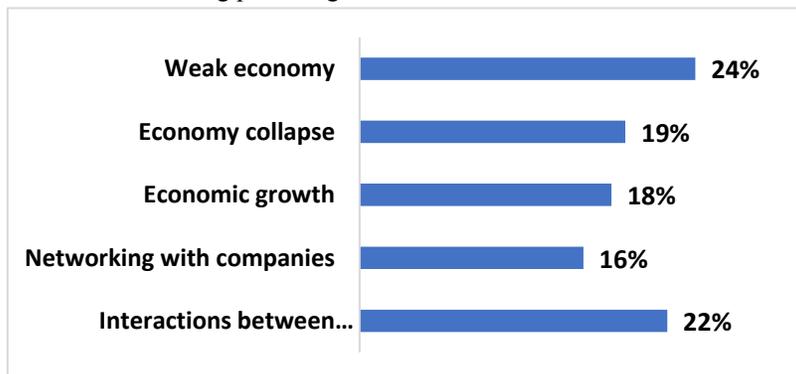


Figure 3. Cluster linking percentages between education for sustainable development and economy

The highest percentage is for the (Weak economy) concept; reflecting that if universities and higher education institutions do not link the educational processes with the fundamentals of the national economy and its objectives for individuals, groups and the state as a whole, then this will lead to the weakness of the country's economy.

6.3.2 Cluster two: Education for Sustainable Development with Knowledge

Data in figure 4 show the cluster interrelationships between education for sustainable development and knowledge.

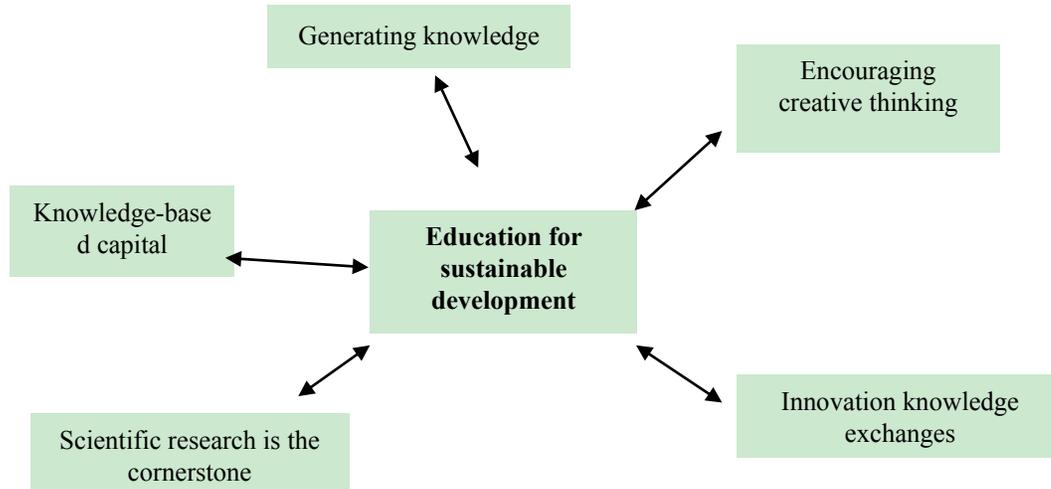


Figure 4. Cluster interrelationships between education for sustainable development and knowledge

Data in figure 5 also shows the linking percentages between education for sustainable development and knowledge.

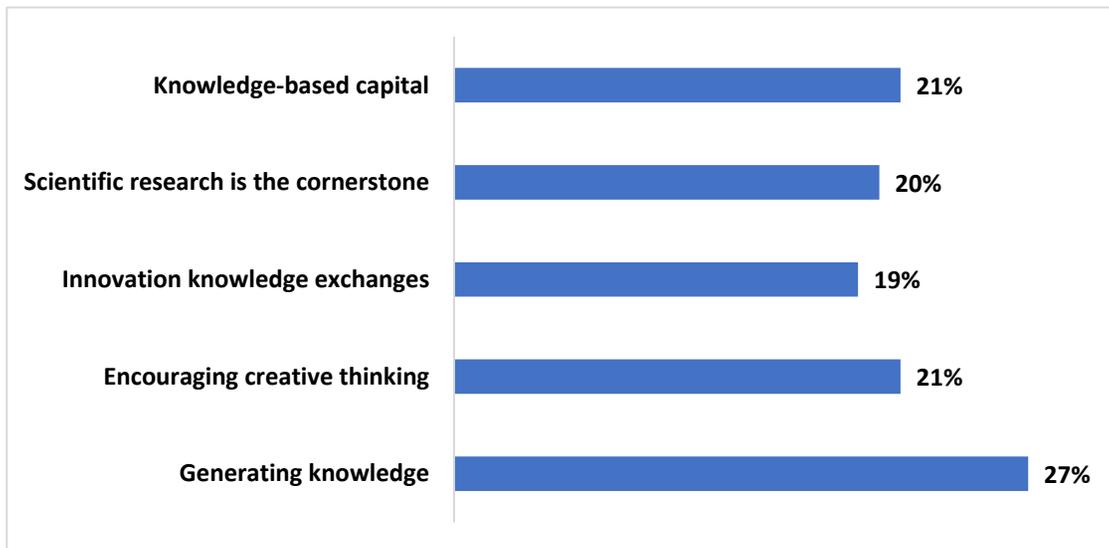


Figure 5. Cluster linking percentages between education for sustainable development and knowledge

The highest percentage is for the (Generating knowledge) concept; reflecting that if universities and higher education institutions do link the educational process with knowledge, that will generate the appropriate knowledge for sustainability.

6.3.3 Cluster Three: Education for Sustainable Development with Society

Data in figure 5 show the cluster interrelationships between education for sustainable development and society.

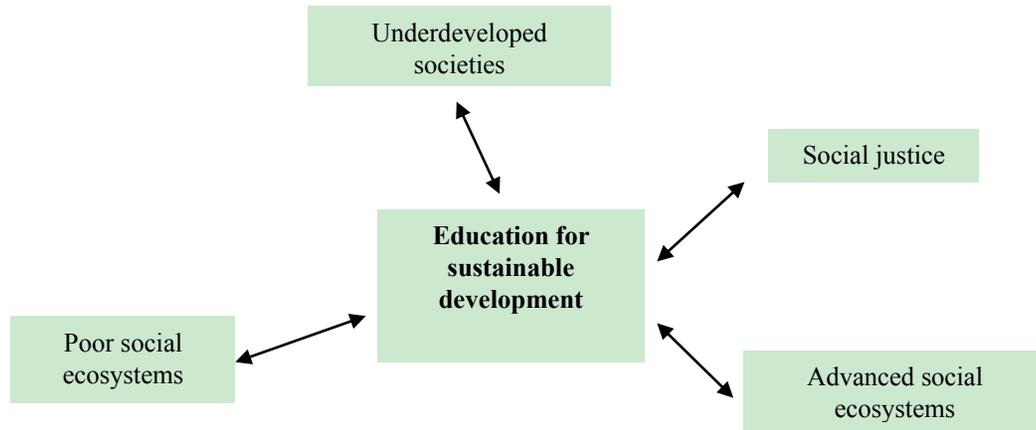


Figure 6. Cluster interrelationships between education for sustainable development and society
 Data in figure 7 also show that the linking percentages between education for sustainable development and society.

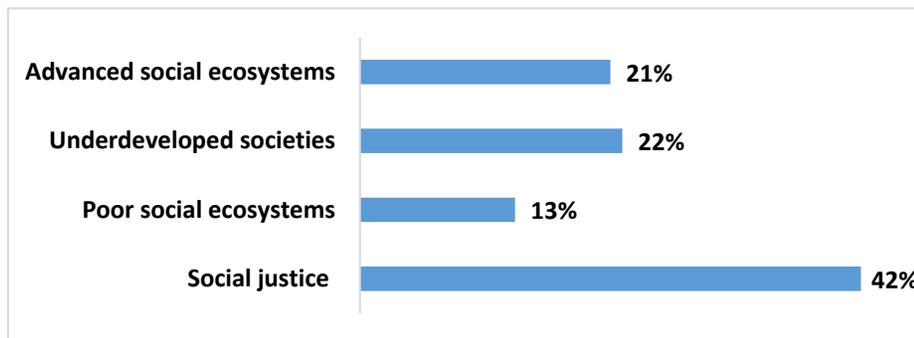


Figure 7. Cluster linking percentages between education for sustainable development and society
 The highest percentage is for the (Social justice) concept; reflecting that if universities and higher education institutions do link the educational process with the social dimensions and their goals will lead to social justice.

6.3.4 Cluster Four: Education for Sustainable Development with Innovation

Data in figure 8 show the cluster interrelationships between education for sustainable development and innovation.



Figure 8. Cluster interrelationships between education for sustainable development and innovation
 Data in table 5 show the opposites if (if not) applied.

Table 5. Opposites if (if not) applied

Theme	Opposites if applied
University innovation ecosystems	A clear vision of innovation ecosystems at universities
Legislations supporting the innovation ecosystems	Easier implementation of innovation ecosystems at universities
As consequences of not adopting a clear innovation ecosystem	- Unbalanced Sustainable development - Failure to achieve any success in the sustainable development goals
As a direct result of adopting a clear innovation ecosystem	Long-life Sustainable education development
For adopting a clear innovation ecosystem	There is a need for new organizational processes

Data in table 5 show that for adopting a clear innovation ecosystem; the appropriate legislations supporting the innovation ecosystems must be adopted first, besides the need of adopting new organizational processes.

6.3.5 Cluster Five: Education for Sustainable Development with the Educational System

Data in figure 9 show the cluster interrelationships between education for sustainable development and the educational system.

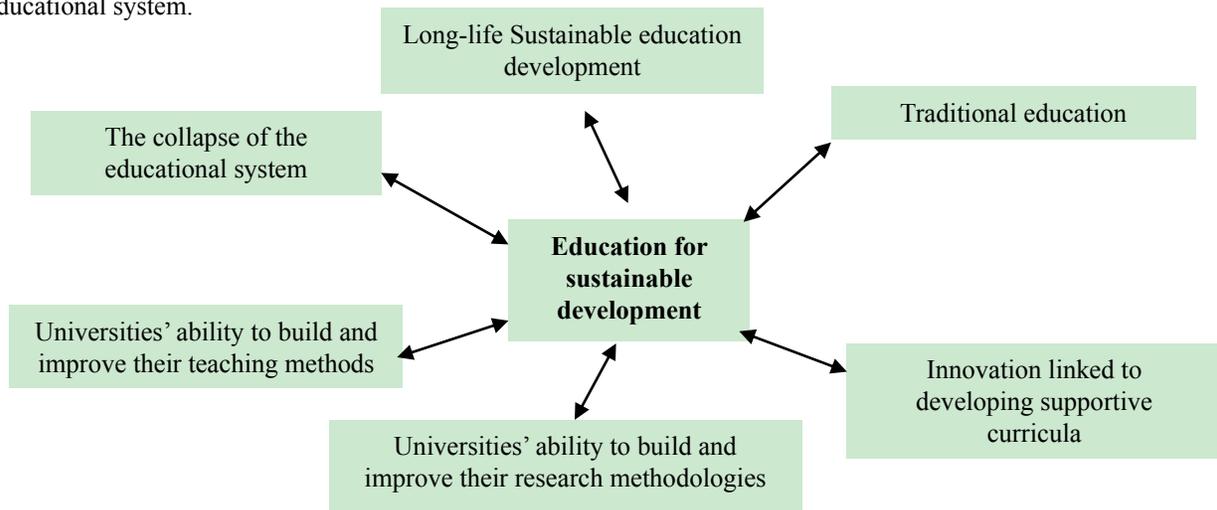


Figure 9. Cluster interrelationships between education for sustainable development and the educational system

Data in table 6 show the opposites if (if not) applied.

Table 6. Opposites if (if not) applied

Theme	Opposites if applied
Universities' ability to build and improve their research methodologies	Long-life Sustainable education development
Universities' ability to build and improve their teaching methods	Long-life Sustainable education development
Innovation linked to developing supportive curricula	Long-life Sustainable education development
Traditional education	The collapse of the educational system

Data in table 6 show that in the case of that universities improved their ability to build and improve their research methodologies, their teaching methods, and linking innovation with developed supportive curricula; this will lead to long-life sustainable education development.

7. Conclusions

By utilizing NVivo 11, the paradigm model in figure 1 is generated as a result of codes and themes linked together. These concepts' relationships are established based on the validation process in the third and fourth phases of the rigorously selective data analysis.

This model includes knowledge background and interactions of the impact of the Jordanian Universities' role in supporting innovation among university students for an educational sustainable development, positive and negative sides, and the consequences according to respondents' answers. The effectiveness of the grounded theory through the methodology of the qualitative research, by constructing ideas which are the data grounded under investigation, and the way how the theoretical concepts are associated to existing. The research findings have indicated that the respondents' expressions have authenticated the presented theoretical categories, and investigating the flexibility of the research, then by promoting respondents to express their words upon their insights; forming unique outcomes. Thus, the researcher found that the credible and validated hypothesis is to be put forward as the confirmed grounded theory hypothesis. However, it was the phrase of proper "University innovation ecosystems" as a probable key category that led to the validation of the suggested hypothesis. Therefore, the key category is the respondents describing the impact of the Jordanian Universities' role in supporting innovation among university students for an educational sustainable development desired to get proper "University innovation ecosystems" over their educational systems. Progressively, the respondents accomplished their use of online communication have established this concept of proper "University innovation ecosystems". This key category has thus generated behaviors that caused negative and positive impacts on the students, which could be regarded as the phenomena in the current research.

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