Ways to enhance sustainability skills in university education with reference To the case of Algeria (analytical study)

Fouad Ourrad[1]

[1]laboratory ofmarkets, employment, legislation and simulation in the Maghreb countries, Ain Temouchent University(Algeria), fouad.ourrad@univ-temouchent.edu.dz

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Abstract:

Generally, green jobs require green skills, which are basicallyformed from non-traditional cognitive skills and are built into formal education at the university. Therefore, sustainability education at the university is the suitable education for the production of this type of skills, simply the reason of its advantages that focus on the student. This study, aims to show the importance and elements of sustainability education, based on some pioneering experiences in some international universities.The study reached interesting results conducting the way of integrating Sustainability in the system of education, particularly the Algerian university and knowing the real situation in this case following the recently programmes used in Algeria.

Keywords: green skills, sustainability education, university.

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***Corresponding author**:Fouad Ourrad*

1. INTRODUCTION

Broadly speaking, in line with the quick environmental developments that the world is witnessing, such as climate change and global warming, are considered as the main factors that led to the necessity of pushing the trend towards green transition, through changing the behaviors' attitudes and practices of business owners, as well as formulating new environmentally friendly activities. These rapid transformations led to create several green jobs, which are distinguished from traditional jobs in terms of both quality of skills and the quality of knowledge that makes up these jobs. For example, in 2019 the green employment rate passed the total employment rate in most economies around the world. But, in Algeria and majority of the remain countries, it invested huge sums in the middle of the last decade in the development of renewable energies and some projects related to the environment. It makes it also facing the issue of searching for how to provide its green activities with green skills.

Green skills need higher levels of non-routine cognitive skills and behavioral skills, which can only be built through formal education in university seats, the reason of their characteristic of diversity and renewal.Whereas, the traditional teaching methods that are based on the systemof teaching through the lecture, standing on communicating and transferring knowledge in one direction, by excluding the student from participating in the learning process, which will reduce student's motivation level in learning, and putting him playing the role of the receiver only for information, and exclude him from exchanging ideas and from exploring real-world issues, which makes the student live (mental blocks), and affects the creative process.Moreover, even the method of continuous evaluation at the end of teaching the unit includes only knowledge-based tests that require memorization only. The method of evaluation is not effective in assessing students' sustainability competencies, and does not encourage students to explore and create.

The reason that one can say, that raising convictions have been formed about the importance of sustainability education at the university, aiming to provide green skills as well as providing business owners with green talents that are in line with their aspirations and the aspirations of decision-makers. Sustainability education has a major role in achieving compatibility between what is required and what is offered in the labor market, and keeps pace with environmental aspirations and changes in the nature of work.

This research paper, aims to identify the reality of the growth of global demand for green jobs and green skills. We also aim to highlight the components and importance of sustainability education at the university in providing the labor market with green talents, with reference to some leading global experiences and highlighting the extent of Algeria's direction in this field. Standing on this basis, this paper came to address the following issue:

•Which method is best to integrate sustainability education in the university coducting the demand for green skills ?

The following two hypothesesare suggested to answer this question:

- The growth in demand for green jobs is included by the growth in demand for green fillies.

- Comprehensive integration of sustainability into the educational system enables it to keep pace with the needs of the labor market for green skills.

In order to prove the validity of the hypotheses, we review the growth rates of demand for green skills and jobs and try to identify the best way to integrate sustainability education in the Algerian university and some of the world's leading universities.

Regarding to the previous studies, and after examining the aspects and depth of the subject, relying on the study of Margarita Pavlova & Christy Shimin Chen in 2019 from the University of Education in Hawking, China, where they touched on the principles of teaching and educational process in order to develop green foals to achieve sustainable development, and they conducted an experimental study aiming to reveal the large gap between traditional educational process and educational practices necessary for education of sustainable development. They propose a pedagogical model designed to support the development of generic green skills. It is also relied on Abdullah Al-Baridi's 2013 study on sustainability education in Arab universities, where he tried to find how to learn sustainability in higher education courses, and to develop an initial scientific model in order to contribute improving practices in our Arab world regarding sustainability education.In addition to some international reports represented in the report of the Arab Youth Council for Climate Change 2021 on the Arab Youth Guide: Practical Steps to Acquire Green Skills. And In Economic Linked report on global green skills in 2022.

So, after our review of previous works and studies, it became clear to us that there is a research immorality represented in answering the research problem, by knowing the elements of applying sustainability education at the university and how to integrate it into the educational system.

The study relied on the analytical approach, which is compatible with the nature of the data selected from the reality of the skills market and green jobs, as well as the analysis of pioneering global experiences in devoting and benefiting from sustainability education in the Algerian university. Accordingly, the research was divided into three main interlocutor:

- Growth in green jobs and increased demand for green skills.
- The importance of sustainability education, its components and most important principles.
- Applying sustainability education at the university to produce green skills.

2. Growth in green jobs and increased demand for green skills.

It is related to the quality of demand for green jobs and greening jobs, so they should be looked at in a more comprehensive way, unlike other skills, because they are characterized by renewal and diversity (Janta, Kritikos, & Clack, 2023, p. 19).

2.1 Concepts about green skills and green jobs

The ILO defines it as employment opportunities that contribute to preserving or revitalizing the environment, whether in traditional sectors such as manufacturing and construction, or in new emerging green sectors such as renewable energy and energy efficiency (Institute, 2023, p. 21)**.**

Green skills are defined as the technical skills, knowledge, values, and attitudes needed for green jobs and a sustainable economy, society, and environment. As defined by the OECD those skills needed to adapt products, services and operations to climate change and to environmental regulations (Institute, 2023, p. 02)**.** It should be noted that there are two terms related to green skills,low carbon skills and general green skills, but the commonly used one includes both terms (green skills) (Z , C S, A F , M F , & N M , 2020).

2.2 Growth in green jobs and increased demand for green skills.

The fast transformation witnessed by green employment was confirmed by several reports, like the Economic Linked report, issued in 2022 on the development of green skills at the global level, as it showed the high demand for green talent since 2017, and the rate of green employment passed the rate of total employment in most economies around the world during the year 2019, which means that the percentage of hiring workers in green jobs is greater than hiring workers in other jobs (Institute, 2023, p. 03). At the global level, green talent has also been on the rise, increasing from 9.6% in 2015 to 13.3% in 2021 (an annual growth rate of 6% and a cumulative growth rate of 38%), and workers who wish to remain in their positions will need to change 40% of their basic skills by the year 2025 (Graph, 2022, p. 07).

Accordingly, decision-makers can plan to keep pace with the development in the quality of the fastest-growing jobs, by suggesting suitable green skills in line with the fast growth of jobs. The reason that it is expected in the coming years, especially by the year 2030, to raise the pressure on the demand for green skills, as 24 million green jobs will be created over the world (International, 2022, p. 10).

As for the growing demand for green skills by businessmenas a percentage of jobs that have at least one green skill, we find in the forefront the skill of sustainability at a rate of 27.6%, as this skill is of great importance in spreading environmental awareness among employees and among business owners, while in the second place we find the skill and the occupational health and safety consultant reach about 8%, and this is due to their importance in changing production techniques in institutions, and then comes skills related to climate, renewable energies, and environmental awareness, with a demand rate of approximately 5%. Then at less than 3% for solar generation and recycling skills.

Table 1.Green skills most in demand by employers in 2021

Green skill class	Skill name	Percentage of job advertisements (among advertisements for green jobs)

sustainable development	sustainability	**27.6%**
environmental treatment	processing	**8.8%**
environmental policy	Occupational health and safety consultant	**8.6%**
Environmental systems management	the climate	**5.6%**
Renewable energy generation	Renewable energy	**5.4%**
Environmental systems management	Environmental awareness	**4.9%**
environmental audit	Environment, health and safety	**3.7%**
Renewable energy generation	solar energy	**2.6%**
environmental policy	Corporate Social Responsibility	**2.5%**
environmental treatment	Recycling	**2.1%**

Source : Institute, P, 2023, P 09 .

Considering the fastest growing green skills during the same period (2016-2021), we find the skills of environmental systems management, environmental policy and pollution reduction, i.e. the skills present in greening jobs at rates exceeding 57% and reaching 90.6%. While the weakest growth skills are related to solar energy generation and landscape management, with growth rates of approximately 50% (Graph, 2022, p. 13).

2.3 Green foals and green jobs in Algeria

Algeria has encouraged the gradual transition towards a green economy through the five-year growth program (2015-2019), which focused on renewable energies, water, waste treatment and recycling, services related to the environment and green spaces, such as the establishment of green cities among them, the city of "Boughazoul", and the development of areas for green activities, especially food industries, including in the state of TipazaThese activities will create about 1.4 million green jobs in the year 2025 (Ourrad & Zadoun, 2022). Since 2020, Algeria has begun implementing the Ecological Transition Program, which is a priority project to develop green economy activities, spread environmental entrepreneurship and create green jobs. During the year 2020, 120 young people were accompanied to embody their innovations on the ground, in addition to guiding and guiding the owners of startups in the field of green entrepreneurship. In 2021, the first incubator for green entrepreneurship was launched, which works to accompany young people carrying environmentally friendly projects and guide them in the administrative and technical aspects of their projects (Muammar , 2020, p. 334)**.**

The youthfulness and modernity of green activity in Algeria, especially with regard to renewable energies, waste management and water desalination, these promising projects require green technical skills represented in (environmental management and ecosystem, data analysis, science and technology, engineering and mathematics, teamwork ... etc.)(International, 2022, p. 11)**.**On the other hand, the process of creating green cities in Algeria, similar to the city of "Boughazoul", contains professional green skills represented in the skills of (green design leadership, management, urban planning, garden planning, energy management and finance, waste management and communication skills)(Su, Chang, & Chen, 2022, p. 291)**.**

The government has recently moved towards adopting green entrepreneurship and establishing projects within the framework of Resolution 1275 as a strategic option to accelerate green transformation and achieve economic diversification by encouraging students to break into the field of green entrepreneurship.Students must also have the skill of flexibility to confront economic changes and environmental crises, in addition to the skill of empathy to help others understand, inspire and lead them to change, and they must also be suggested with advisory skills to provide advice on green solutions, and strategic and leadership skills to enable policy makers and business managers to develop suitable incentives to create conditions conducive to cleaner production, without neglecting digital skills and learning the languages required to access global markets) (Institute, 2023, p. 06)**.**

Conducting several foreign studies,these skills are provided to confirm that university education is a fertile place to learn them, because it is characterized by the characteristic of diversity and renewal. One study showed that about 49% of green talents are formed in university seats, this is due to many sciences and disciplines received by student, while social media, civil society and the family are considered as a secondary resource for teaching green skills (International, 2022, p. 11).Accordingly the category between (24-40 years) is the one that is likely to have the possibility of acquiring green skills, which are mostly the years of graduation at the university(Janta, Kritikos, & Clack, 2023, p. 29)**.** This is what makes the university facing the challenge of teaching green skills and forming talents to keep pace with the increasing global demand. This was translated by the growth of talents with green skills in the category of workers with a baccalaureate and above, which exceeded the growth of talents with a secondary education level (from 9% in 2015 to 11% in 2021), particularly in countries such as Iceland, Slovakia, Estonia, Norway and Croatia. (Graph, 2022, p. 35)**.**

3. The importance of sustainability education, "components and most interesting principles "

In order to bypass the limitations of the existing traditional education systems, which no longer keep pace with the green transition and meet the needs of employers for green skills, it is necessary to dedicate the rules of sustainability education, by founding a stimulating learning environment that centers on students and encourages their participation in learning.

3.1 The concept of sustainability education

UNESCO defines Education for Sustainability (ES) as the acquisition and practice of knowledge, values and skills that balance the economic, social and environmental aspects of development.

And taking into account the growth and progress of the individual and society in life (Al-Baridi, 2015, p. 69) Sustainability education is characterized by:

- **Affective** focuses on values, attitudes, and behavioral tendencies
- **Cognitive** is concerned with information and facts and how to process them mentally.

Sustainability education is a pedagogical model designed to support the development of general green skills, by combining problem-based and project-based methods, to bring students into real-world environments that can increase their learning potential and better problem-solving. It is thus based on two main pillars, the first is represented in projects elicited from the local community of material value that are environmentally friendly, while the second is represented in problem-solving skills. This is why it is an integrated approach, as it combines problem-based learning, collaborative teamwork, environmental thinking and design, and stimulates innovation through a holistic and interdisciplinary approach.

- **Problem-based learning**

Problem-Based Learning (PBL) is known as an effective approach to gaining green skills, because it focuses on complex multidisciplinary problems. It also provides students with an opportunity to earn experience in addressing complex problems that they may face in their future careers. It also encourages them to communicate with the work team, as it works to develop self-learning and problem-solving abilities and increases motivation for learning.

- **Project-based learning**

Project-based learning (PBL) is a form of learning based on the theory of constructivism, which believes that students will gain a deeper understanding of educational materials through activity within a project derived from real life (a community project), so they will be able to apply knowledge through the practice of this project, and it also allows them to develop communication skills, problem-solving and teamwork. Several studies have shown the effectiveness of this type of education in acquiring green skills(Pavlova& Chen, 2019, pp. 04-06)**.**

3.2 The importance of sustainability education

The reason that Sustainability education produces green skills by pursuing learning and solving problems within community and environmental projects its important is evident . Thus, it is fundamentally different from the regular process based on a thematic project. The importance of pursuing sustainability education can be summarized in:

- Allows students to choose the subject of learning rather than taking responsibility for defining the issue only.

- Avoid falling into endless multiple analyzes of problems, without analyzing the real ones.

- It can broaden take part structure by involving stakeholders in collaborative learning rather than engaging them as advisors and thus benefiting from them in learning opportunities.

- Sustainability education allows for the adoption of an interdisciplinary education that transcends boundaries across different programmes. It dedicates the method of participation and work within the group.

- It works to transform the process of acquiring knowledge towards the application of knowledge.

- Develop students' general green skills by providing real-world learning opportunities in the classroom (Nuramalia Handayani, Ali, & Wahyudin, 2020, p. 25)**.**

3.3 Elements of sustainability education

Considering the elements of sustainability education, it takes into account five elements in the learning environment represented in:

-Sustainability environment: It requires senior management support, securing resources, cooperation and interaction.

-Sustainability:Ateaching subject that must be diverse, appropriate, related to life and profession, and culturally acceptable.

- Sustainability Learner: A learner who must be a listener, engaged, motivated, and able to cross discipline boundaries.

-Sustainability teacher: through his training in the vocational training programs at the university, an experienced teacher on sustainability motivates students to make a developmental difference in their communities.

-Sustainability skills: they can be acquired and must be diverse and applicable in all fields(Pavlova& Chen, 2019, p. 07).

4. Applying sustainability education at the university to produce green skills

The principles components of sustainability education make it the ideal educational curriculum to provide the needs of the labor market with green skills, because its starting point is based on the nature of the environmental environment, and therefore its results will be compatible with new changes in the nature of work.

4.1 Methods of integrating sustainability into education

Applying sustainability education at the university, is connected with a divergence of ideas about how to integrate it into the educational process. There are three different methods :

- **Merger by creating a new course**

This method requires allocating the sustainability course and teaching accreditation for all students. It is clear that there are great difficulties in applying this method, due to the difficulty of adopting new courses within the list of compulsory courses.

- **Partial integration of sustainability**

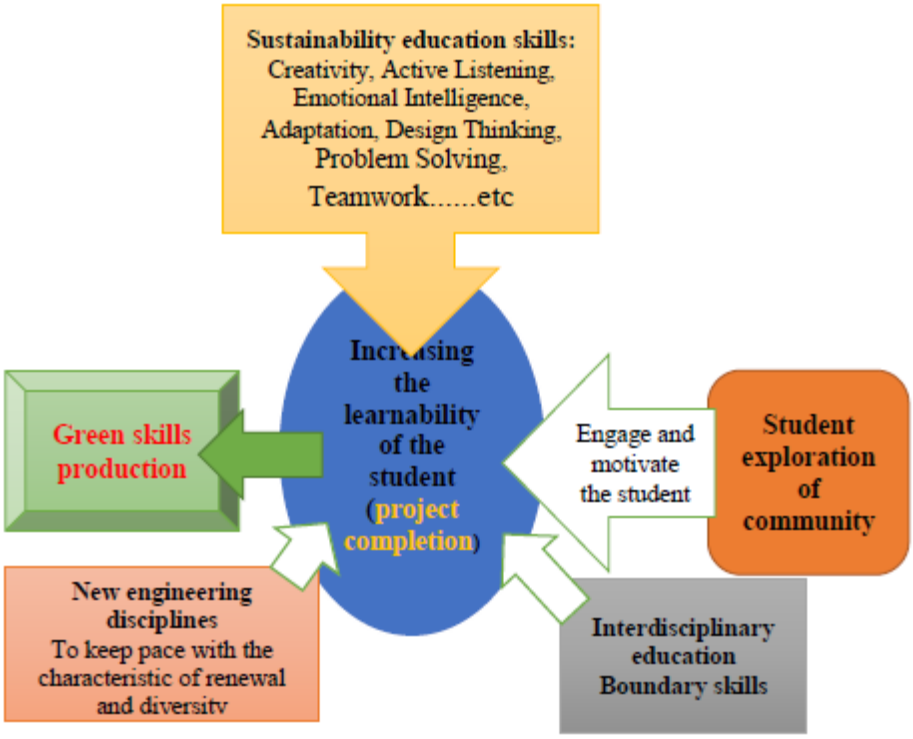
This method deals with the inclusion of sustainability topics in some academic courses that have been selected according to certain criteria, such as the suitability of the specialization and its strong relevance to sustainability, like economics, environment, labor market, business administration, law, engineering, agricultural sciences...etc. This method is done with realism and does not add new burdens to the student by studying new courses, but it deprives some students of some specializations and blocks them from opportunities to learn sustainability.

- **Adaptation of integration sustainability**

This method stands on the inclusion of sustainability topics in all courses at different levels. It is characterized by the fact that it does not require new courses, and it provides new opportunities to learn sustainability at different levels for all students at the university. However, it requires great efforts and resources to complete the merger process. It can be applied by adopting comprehensive integration at the level of college courses, not the university, in order to harmonize the scientific departments in the same college.

It is neither possible nor desirable to say about the preference for the optimal method in teaching sustainability due to the diversity of practices regarding the adoption of compulsory or elective courses or focusing on the stage of graduation or post-graduation. However, there is an applied study indicating that developed countries tend to make it compulsory with their focus on university graduation levels. Another study indicates that sustainability education in graduate programs has many advantages. This stems from the great flexibility in these programs, given the knowledge that students acquire in this phase. However, focusing on the last stage of study prevents many students from learning green skills and reduces their availability in the labor market. For this, those in charge of preparing educational policies must introduce sustainability education in all phases, while providing the appropriate environment by enabling the student to (skills of crossing boundaries, problem-solving skills, creativity, active listening, emotional intelligence, how to manage individuals, how to make decisions, how to negotiate with others, in addition to adaptive skills and design thinking...etc). In addition to teaching him new disciplines, especially in the field of environmental engineering and environmental management, and making the student the focus of the educational system and the starting point of knowledge, by involving him in education through the idea of his project, whose source is the community, and whoever is created has an incentive that enables him to keep pace with teaching and embody his project to have a financial return, on the basis of which he is evaluated instead of the assessing method through written tests.

Fig.1.Sustainability education to produce green skills



Source : prepared by the researcher

4.2 International experiences of applying sustainability education in universities

Sustainability education, has received great attention, especially in light of the environmental pressures that have imposed themselves, such as climate change, which has led to an increase in the demand for green skills in the global market. Many companies, especially in America, Japan and Malaysia, have resorted to contracting with the green student while he is on university seats in order to propose creative solutions(Pavlova& Chen, 2019, p. 04).

Stanford University in California adopted this path, as it changed the curricula and created a new scientific major entitled Bioengineering, which qualifies students to engage in life sciences and engineering. This specialization is based on integrating diverse experiences in the departments of medicine, biology and engineering. These curricula also include broad programs in green chemistry that combine chemistry, biology, and environmental sciences, in order to enable students to face real environmental problems such as: synthetic fuels, bioplastics, and toxicology, and train them to find techniques to reduce pollution levels and global warming. Through sustainability education, the university was able to focus on the skills of transcending boundaries between disciplines in order to train its students in new disciplines with the green skills necessary to meet the American green economy (countries, 2022, p. 20).

Hence, the Dutch university was also able to transcend the boundaries between disciplines, cultures, and between theory and practice, as it considered a component for building future students with green skills. To achieve this, the Dutch University has established a course on sustainability in the Master's Program in Environmental Sciences. So that students have to study it before they go to cooperative training and prepare a research graduation project with extensive reliance on the entrance of self-regulated learning, and prepare quality reports at the end of the semester (for student evaluation). The university has also developed a scientific framework that includes knowledge, attitudes, and skills in order to help students plan borders (Crossing Boundraies Skills), and this has been reflected the number of green talents graduated from Dutch universities (Ourrad & Zadoun, Greening the community in order to produce the skills of green positions and professions (international experiences), 2022).

4.3 University education and green skills in Algeria

Algeria's,orientation towards the embodiment of green activities necessitates the formation and education of green talents to meet its labor needs, for this it tended to embody the first signs of sustainability education through the partial integration of sustainability into the university educational system, by teaching some green curricula in environmental disciplines, for example in the first phase we find specializations such as (water and ocean, forest sciences, water engineering, electrotechnical and renewable energies, biology, technology and beekeeping, ocean geologists, nutrition and technology Loggia food agriculture, marine engineering, earth sciences and the universe) We also find master’s specializations (environmental health and green cities, environmental law and sustainable development, waste management, environmental and ocean sciences, renewable energies). As for the problem of integrating new disciplines, the Ministry of Higher Education and Scientific Research concluded a partnership agreement with the Ministry of Environment in 2023 in order to include new divisions and specializations in line with the needs of the environment sector and the needs of business owners and innovative projects of the necessary green skills (Environment, 2023)**.**

In order to perpetuate the requirements of sustainability education that makes the student a partner and source of the educational system, Ministerial Resolution No. 1275 was issued in September 2022, which came to give the student more weight to embody the idea of an environmental project whose source is the community or the environment surrounding the student, which involves him in the learning process and increases his motivation to transform the idea is to turn a project through an educational course in university seats, in the form of graduation notes in a master’s degree, an engineer’s degree, or a doctoral thesis (Muammar , 2020, p. 336).

Whereas, for the sustainability skills that must be taught to students in the third phases, they are still not embodied yet, and the methods of teaching traditional skills are still predominant, with the exception of some behavioral skills that were stated in Resolution No. 1419 issued on December 24, 2022, which clarifies the type of skills to be developed among third-cycle students.Throughout, these skills are found (developing intellectual capabilities, inculcating

social sense beyond students, analytical skills, developing initiatives and innovation, developing entrepreneurial spirit and leadership around students, promoting critical thinking, teaching adaptive skills, and project management skills). All these skills will generate a desire through the graduates to break into the green business world (Ourrad & Zaoui, 2023, p. 279).

While with regard to the most important element in sustainability education, which is represented in removing the boundaries between disciplines, in order to enable the student to be familiar with all aspects of the work project, such as combining engineering, economics, social sciences, and technical sciences, as an example, or combining other disciplines according to the nature of the project to be completed by the student. Algeria lacks this approach of sustainable education, with the exception of the new training course in university degrees that will be applied during the academic year 2023-2024, joining only two majors during the same academic period, (such as combining applied mathematics with digital economy or applied mathematics with science). economics or foreign languages with economics or law and political sciences with mathematics and computer science or business administration with English). Combining only two disciplines is not enough to embody environmental projects that require transcending the boundaries between many disciplines.

Through the above-mentioned narration and analysis, it can be said that the first hypothesis of the study is correct, and this became clear to us through statistics related to the growth of green jobs, which was accompanied by a faster growth in the demand for green skills, while the second hypothesis showed that there is no way to keep up with the demand, this is to enable all students to learn green skills, and to increase the flow of green talent from the university and use it to meet the needs of green activities,Therefore, the hypothesis is correct

5. CONCLUSION

By discussing in detail all the research axis, it became clear to us that there is a significant growth in green jobs and greening jobs, which led to the accelerated increase of students in green skills. The traditional educational system in universities no longer has the ability to keep pace with the change in the nature of work.

Hence, the importance of sustainability education came in light of the accelerating demand for green skills. The experience of the Dutch University and Stanford University in California, USA, had a major role in demonstrating the importance of this type of education in providing green talent to keep pace with the growing demand.

Sustainability education provides the student focusing on the educational system and the starting point of knowledge, by transforming learning from passive to active, where students investigate a problem in the real world and work to find solutions by engaging in mini-group work called (self-directed learning), and teachers play the role of expert in order to enable him to link theories with practical application and empowering him with the skills of transcending boundaries, in addition to teaching him new disciplines, especially in the field of environmental engineering and environmental management.

Algeria can move forward in this new type of education, especially in light of its orientation towards some green initiatives such as the establishment of green cities, investment in renewable energies and some other activities related to the environment and its support for green entrepreneurship. In light of these programs, the Algerian university will face the inevitability of adopting sustainability education to feed its green projects.

Following Algeria's actual dedication to sustainability education, the Algerian university must:

- Comprehensive integration of sustainability education for all students despite the difficulties that may face the process of applying it, such as the cost involved, in addition to resisting change that may occur, perhaps in faculties of engineering, given that engineering courses are of a specialized scientific nature.

- Consistently integrating new emerging disciplines such as structural biology, molecular design, engineering biology and other sciences related to biological engineering, artificial intelligence, nanotechnology, and environmental management, taking into account the diversity and renewal of green skills.

- Making the student the source of the idea and erasing education, by amending Ministerial Resolution No. 1275 issued in September 2022, which specifies the modalities for preparing a draft graduation note to obtain (a university degree, an emerging institution, a patent certificate), which focuses only on the year in which the student graduates, so the years of coducting this decision must be extended, starting from the student’s registration in university seats, who holds the idea of an environmental project derived from his environment, until he graduates from it by embodying his project on the ground. While the evaluation method is based on the extent of his progress in acquiring the necessary knowledge and skills to complete his project, throughout the stages of gradation.

- Removing the boundaries between disciplines to enable the student to acquire knowledge of all sciences and knowledge related to the work project, so that the student's educational path becomes linked to the quality of knowledge required by his project.

- Developing green skills in all phases of study, such as the most requested green technical skills represented in (environmental and ecosystem management, data analysis, science, technology, engineering and mathematics), and behavioral skills (green design, leadership, management, creativity, active listening, emotional intelligence, adaptation, Design thinking, problem solving, teamwork, communication skills, design thinking skill, entrepreneurship and creativity to prepare green projects.

All in all, it can be said that the development of green skills stands on accelerating the application of sustainability education and moving towards third and fourth generation universities, and then building smart universities according to the latest international systems in terms of courses and teaching methods.

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