

According to this analysis we have concluded that:

The teachers think that the most important factor during the grading period is the student's invested effort; The teachers think that the less important factor during the grading period is comparison with other subjects' grades;

At the same time, Villamero's results show that the teachers use different grading strategies with the special needs students. These strategies are based on factors that the teachers have recognized the necessity that we should find grading practices that are relevant and that respond to these students' needs.

If we find grading in the classroom for the key factor in improving the studying process for all the students equally there is a real necessity all the teachers to be educated properly about assessing and grading practices.

The results we obtained highlight certain points of interest for future and further research regarding assessment and grading by teachers with a specific focus on students with special educational needs.

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## ECOLOGICAL RESEARCH AND EDUCATION FOR SUSTAINABLE DEVELOPMENT OF THE MUNICIPALITIES

**Abstract:** Environmental research is the basis for protecting the environment from the uncontrolled creation of landfills for industrial waste of various nature, especially from waste containing phosphogypsum and radio nuclides.

The integral environment is composed of the two subsystems, ecosphere and geosphere whose formation and transformation is not with human participation, but the technosphere as their subsystem is transformed by man. All three subsystems are closely related to the socio-economic environment. The technosphere is divided into two subsystems: production (industry, agriculture) and social (education, health, security, defense, judiciary, etc.).

In the development of the ecosystem, the relations between the structure and the function are especially important, not only where things are located but also what is happening there.

The circular flow with the circulation of chemical elements covers both living and non-living part of ecosystems and such cycles in ecology are known as biogeochemical cycles.

The development of specific education policies for sustainable development seems to lag behind the rate at which the education sector integrates the overall agenda for Sustainable Development Education in national education policies.

From the researches made for the impact of the uncontrolled creation of landfills, the need to establish a system in education should be seen where ecology should be studied in all segments of the school subjects that are taught.

The experience so far shows that educated citizens are likely to recognize and adopt new practices and technologies for environmental protection, which will meet the goals of sustainable development of municipalities that represent a clear vision for a sustainable future and a new era of business.

**Keywords:** Ecology, Education, Landfill, Sustainable development, Phosphogypsum

## Introduction

The term ecology has existed since 1866 when it was defined as the science of studying the relationships between plant and animal organisms in which they enter into direct or indirect interrelationships. With continuous research over the years, ecology is defined by different definitions, e.g. (Stanković: 1961) defines ecology as a biological discipline, (Kovacs, 1975) defines the subject of ecology as an independent scientific discipline. From these two definitions it can be concluded that: Ecology is a part of biological science that examines the laws of the very complex interactions of the abiotic and biotic components of the environment (Mulev: 2003).

There is a growing interest in this scientific discipline and its importance today due to the growing disorders of various nature in the environment.

From the numerous points of contact that this science has with several scientific fields, from the complexity in the study of problems arises its interdisciplinary character.

For the mentioned reasons, in the field of ecology, besides biologists, agronomists, forestry engineers, medics, chemists, technologists and experts from other fields are also included.

The link between ecology, education and sustainable development requires the use of risk assessment and life cycle assessment methods in order to assist in life cycle improvement decisions. The aim is also to imply that methods such as risk assessment and life cycle assessment, if used individually, can provide only a limited amount of information. Therefore, additional methods are needed for economic and social well-being in order to complement these methods, and that is the concept of sustainable development. The environment is in the service of human present and future needs that are defined by the rules of the laws of nature. Ignoring or deviating from those laws, the entire global system is in danger, and the results will be devastating for the entire planet, including human well-being and economic prosperity.

Education has an important function in every society. Because of the importance of education, every government wants to define its concept and content, for each individual to accept the value and norms of the system. Therefore, the state provides funding for education.

Through education, feelings of one's own culture, respect for principles and solidarity are also developed; the consciousness and point of view of the individual are shaped, when it comes to processes in society and the system of the government. All education systems are based on knowledge of the history of society. The institutionalization of education, despite the fact that based on the adoption of a set of rules and social values, is reflected in the knowledge and skills that the individual masters in the training process. A strong education system changes the structure of society, the family and the profession.

Experience suggests that educated citizens are likely to be more inclined to recognize and adopt new practices and technologies that will help them and their communities thrive. With education, those citizens will be positioned to build and maintain energy infrastructure that will sustain their countries for a long time.

Environmental education programs are also crucial to significant progress in many national and regional efforts to fight climate change and protect aquatic, air and terrestrial ecosystems. But that kind of education can reach its full potential only when a critical mass of the inhabitants of a country or region has the basic learning skills that come with primary and secondary education. With the advent of Planet Earth, neither man nor technology had the power to harm biodiversity. But with the increase of needs, the improvement of technology, the growth of the population and the activities of man, that connection is broken and the survival of nature and humanity is endangered on a daily basis. Unforeseen changes occur in the atmosphere, soils, water, between humans, plants and animals.

Sustainable development goals are a clear vision for a sustainable future and will create a new era for businesses. The leadership in turning these goals into drivers of sustainable business is the Global Compact. International organizations, formed by sovereign states, have laid the foundation for sustainable development in the Declaration of Environment and Development. The United Nations Environmental Program (UNEP) has continued its environmental activities, such as the 1980 World Conservation Strategy. This new human development strategy is developed through an understanding of the conditional link between the three Economic and Social Benefits and Environmental Benefits that are priorities for the world. Taking urgent action to combat climate change and its impacts, sustainable water use, restore and promote the sustainable use and management of terrestrial ecosystems by stopping reverse land degradation contributes to stopping biodiversity loss and protecting planet Earth.

Our environment works on our present and future needs defined by the rules of the laws of nature. If we deviate from those laws, the whole global system will suffer, and with it the support of life, including human well-being and economic activity. In order to achieve balance in this whole global system, as well as to effectively achieve sustainable development in a municipality as an important part of that system, several strategies will have to be considered and a series of methods developed to achieve the desired results. The two strategies available to municipalities are education and politics. The plan for implementation of the sustainable development of the municipality, on the other hand, will have to use the available methods for development of the best option of action (Callow: 2009).

For many years, sustainable development has been the focus of governments, environmentalists, industry, economists and other entities of the social public. There is no natural or social science discipline that does not rely on sustainable development. All socio-economic life is based on this concept. Rapid technological development and the overall dynamics of the needs for modern living can threaten the survival of humanity and the planet in general if we continue with the unsustainable way of acting/developing human activities.

Experience and scientific research show that sustainable development is not at all simple and it seeks to change the view of the world and the future of humanity in general. There has been considerable debate about how to achieve this; improved environmental conditions without sacrificing current economic benefits.

Uncontrolled dumping and hazardous and toxic substances are risks caused by human activities that have a major impact on the global environment. In order to assist in these debates, environmental experts from all sectors develop methods for preserving the environment (e.g. risk assessment, life cycle assessment, environmental impact assessment, environmental policies, etc.), which is a huge step forward in uniting environmental perceptions in a range of possible actions.

These methods provide excellent mechanisms for understanding and managing activity-related risks.

Risk assessment/management is increasingly used to assess the potential impact of new hazardous substances on the environment.

Although these methods seem powerful, they do not balance the needs for improving the environment given the economy and social duty. Therefore, improving the environment has so far been a classic: ongoing economic considerations (such as the cost of capital to implement the improvement) or ongoing social issues.

What is needed is a concept and, ultimately, a process that will assist society in making decisions taking into account the balance of environmental needs, economic realities and social aspirations – the concept of sustainable development.

Sustainable development is a concept that seeks to combine the importance of environmental protection with a healthy economy and social duty.

But sustainable development is different from the term sustainability despite their frequent use as synonyms. Because sustainability is a state, and sustainable development is a process from which we aim at the ideal state.

The Constitution of Macedonia, as the highest legal and political act, guarantees the right of every citizen to a healthy environment but also the obligations to preserve and promote it. The Constitution contains the basic principles of sustainable development, where, among other things, it is established that the citizens of Macedonia are responsible to future generations for the rich cultural heritage. Furthermore, the Constitution stipulates that the state should ensure economic well-being and social justice for all citizens.

In this sense, the Constitution speaks of social and economic rights, as well as the right to a healthy environment. It determines the other elements of sustainable development, namely the right to work, free choice of employment, the right to social security and social security, the right to education and the right to health care. Undoubtedly, the Constitution of Macedonia emphasizes the importance of the many elements of sustainable development. Thereby, in the Constitution some elements are determined in a direct way, while others are determined in an indirect way, but, in any case, the vision of the Constitution is clear, which is aimed at the numerous elements of sustainable development.

Macedonia, as a candidate country for full membership in the European Union, strives to meet the criteria for approximation with the elements of sustainable development which are contained in several laws. The Law on Environment, in the part that regulates the basic principles of environmental protection, establishes the principle of sustainable development, as one of the basic principles of the environment. The Law on Nature Protection, in the part that defines the basic goals of the Law, determines the principle of sustainable use of natural resources, in the interest of the current and future development. The use of natural resources should be done so as not to lead to significant damage to parts of nature and as little as possible disturbance of the natural balance (Sapuric: 2010).

Sustainability and sustainable development are based on several principles: Principle of sustainability, Principle of precaution, Principle of prevention, Principle “Polluter pays”, Principle of proximity.

The principle of sustainability is “To meet the needs of a healthy environment, as well as the social and economic needs of current generations, without compromising the rights of future generations to meet their own needs, when undertaking any activity or performing any activity, the rational and sustainable use of natural resources must be taken into account.”

The precautionary principle refers to the management of unknown risk, where impacts can affect larger areas or spread over a long period of time. The consequences of carelessness indicate a precautionary action that is anticipatory (predictive) or preventive.

The principle of prevention means taking action to protect the environment at an earlier stage, meaning avoiding the damage rather than repairing it when it occurs is better to prevent than to

cure. Prevention applied for example in industrial processes is better in terms of design and material selection decisions than retrospective risk management of poorly designed or problematic materials.

The “polluter pays” principle suggests that all waste producers should be legally and financially responsible for safe handling, environmentally safe disposal and creating a habit of producing as little waste as possible. This principle encompasses many approaches to charging for pollution and is a principle for the slow uptake of currently non-market costs that do not arise from the environment and society into organizational decision-making.

The Law on Environment of the Republic of Macedonia, in the principle “the polluter pays” emphasizes that the polluter is obliged to reimburse the costs for eliminating the danger of environmental pollution, to bear the costs of remediation and to pay fair compensation for the damage caused to the environment, as well as to bring the environment, as far as possible, in a state as before damage.

The principle of proximity is risk management and says that the treatment and disposal of waste should be as close as possible to the place of production, as far as it is technically and environmentally possible. This would mean avoiding the excessive costs and risks associated with transportation.

In addition to the principles, the models of sustainability and sustainable development also play an important role. The challenge for sustainable development is to identify the commercial decisions, local actions and global policies that embody the essential principles of survival. These decisions will undoubtedly vary substantially and culturally, but the foundations in common clear principles are fundamental. The saying, “Think globally, act locally!” Is often used because global action or local thinking is also important. There are countless models of sustainable development that are of great help in the implementation of local decisions within larger units (e.g. Circles of balls and cycle, Russian doll, model of three circles, Leaving an ecological trace).

What they all have in common is that the economy, society and ecology are the basic postulates for sustainable development where the conditions for sustainability coincide when the decisions are in the central zone where the ecological, social and economic characteristics are located (Brady: 2009).

Switching to implementing the principles, processes and methods of sustainable development will require commitment and education at all levels of the organization.

Unlike other methods that take into account only one problem of the needs of the environment or even scientific problems of the environment, the approach of sustainable development unites and balances the needs of the environment with the needs of economic and social duty of the municipality. This approach integrates all parts of the decision-making process and improves the overall process efficiency. The sustainable development approach helps a municipality gain control of its own destiny. Often in the field of environment, municipalities are reactive to government rules and never seem to have the ability to plan for the future effectively.

Sustainable development encourages both short-term and long-term work, enabling municipalities to influence the direction of this problem and ultimately get out of the reactive way of working.

Thinking about sustainable development is a natural evolution of society’s needs to balance a growing set of priorities.

This approach is a tendency that is inevitable for every modern municipality.

Accepting sustainable development does not require economic balance; on the contrary, the municipalities that will accept the axiom of sustainable development should actually improve their economic situation by balancing these problems.

The thinking process has the power to preserve existing and create new jobs, to influence the direction of technological development and finally to improve the competitive position of organizations.

Sustainable development is a new, scientific way of thinking that provides a useful framework for working in collaboration with various sectors (e.g. NGOs, industry, government institutions and academics). This transformation within a municipality helps to develop a new and more effective language between disciplines, helps to recognize gaps in knowledge and information, and supports innovative solutions to problems.

More importantly, sustainable development helps to identify economic, social and environmental problems related to municipal activities or plans and helps to identify and implement long-term solutions.

Finally, embracing and implementing sustainable development creates a moral uplift for citizens and the business community. With such a vision, the economy, citizens and the local community can have the same goal of economic, environmental and social stability and improvement.

Components of sustainable development are environmental protection, a healthy economy and social duty.

Environmental protection occurs as a result of the approaches, systems and methods used to identify, implement and maintain environmental improvement in relation to any activity. In the environmental component, the interest is focused on human health and the depletion of natural resources.

For example, the risks to the environment or human health associated with discharge of hazardous substances and/or consumption of materials.

Considering the fact that the uncontrolled creation of landfills with hazardous industrial waste (such as phosphogypsum and radio nuclides) which with their radiation, in addition to endangering the environment, have harmful radiation to humans and other living organisms, without control and preventive action can have catastrophic consequences.

The Earth's population is constantly exposed to various types of ionizing radiation. According to the origin, radiation sources are divided into natural and artificial. Exposure to artificial sources is the result of their application in: medical purposes (diagnostics and therapy), industry or radio nuclides present in the environment as a result of nuclear tests and the Chernobyl nuclear accident of the last century. Based on a number of studies, it has been proven that the largest contribution in the total population exposure originated in nature. In the group of natural sources are cosmic and terrestrial radiations. The dose received by man during one year of external cosmic radiation in the open is mainly a constant value for a given space (depending on altitude) and is much lower than the dose derived from terrestrial radioactivity (UNSCEAR: 2000). The research in Veles found higher values of the measured specific activities than the natural ones, proven by their comparison with the results published by previous studies made in the Republic of Macedonia. The mean values of the measured total alpha and beta specific activities in phosphogypsum are higher than the corresponding mean activities published for soil samples in the vicinity of Veles. There are a number of studies in the literature that have examined the content of radio nuclides in phosphogypsum and its application.

Further research on the effects of the landfill on the environment is recommended. Based on a number of scientific studies published in the literature, it is possible to apply phosphogypsum in construction and agriculture. As a result of the research, rapid reactions for waste processing for useful purposes are inevitable, which will be in favor of the economy but also in favor of environmental protection (Jancev: 2022).

Due to the more frequent appeal from nature, the environmental researches are more frequent, the results of which are inevitably necessary for the institutions, the municipalities, the state as well as on the planet Earth.

In the field of education, the government and the municipality first determine the target group of the educational program. Possible focal areas are voters/citizens, consumers, employees, teachers, students, the mass media, interest leaders and any practitioner of sustainable development in

general (i.e. in the private sector, management, designers, engineers, finance, manufacturing, procurement, human resources etc.). Once the target group has been identified, the program content will need to be adapted for a specific audience. The educational message should be followed by action that is already recognizable to the audience (for example, to put sustainable development as a natural extension of the current interest in recycling). Further consideration will be given to teacher training programs, the use of practical examples and the introduction of sustainable development education into the curriculum for all levels, through thematic conferences, etc. Which ever way is chosen for the educational program, the importance of this dimension in achieving sustainable development should be recognized.

Successful implementation of sustainable development requires a detailed strategy in education in both the public and private sectors. Efforts should be made to increase the understanding of the actions to be taken and the examples of sustainable development through many mechanisms: to teach teachers; to influence thought leaders and to establish forums in order to educate citizens through the mass media to obtain information.

This information and insights will provide opportunities for interaction with all stakeholders (e.g. government, municipalities, NGOs) to ensure that future policies and guidelines are based on a scholarly understanding of the overall environmental, economic and social impacts in relation to the proposed policy. This function of education then becomes an important external link for the municipality.

Its role in the future will be not only internal communication and education but also developing processes for proactive external communication.

In order to be able to implement the sustainable development program, it is important to identify the need to implement it. To identify the needs for the development of programs and strategies, environmental research, prevention, planning of priorities, long-term plans and action to achieve long-term goals for sustainable development of the municipality are inevitable. As a municipality progresses in implementing sustainable development, the lack of data will become more apparent.

Several important principles need to be considered in developing data collection efforts and making them available:

1. Researches with transparency of data collection methods (by preserving the confidentiality of data in accordance with legal regulations).
2. Development of minimum standards for research data quality.
3. Development of goals and data quality indicators.
4. General guidelines for data size and database management systems.

The conceptual framework for quality of life cycle assessment data provides additional principles and guidelines. The existence and access to data for researchers can be one of the biggest obstacles to sustainable development. Multiple sector groups should make efforts to establish a process and guidelines on how to most effectively achieve data quality in the research cycle.

Aspects of the social welfare component of sustainable development require significant development. Social criteria are considered essential for decision makers.

However, it is necessary to develop and integrate the measurement parameters for social welfare that can be used in relation to the parameters for environmental protection and a healthy economy.

In the end, however, a decision will be made, in any situation, whether it is a simple or complex case. Often the decision is made based on the criteria of the final decision maker (Municipal Council). Therefore, the development of acceptable assessment techniques is very important to ensure better decisions and that they can be accepted by all stakeholders.

The conceptual framework for quality of life cycle assessment data provides additional principles and guidelines. The existence and access to data for many researchers can be one of the biggest obstacles to sustainable development. Multiple sector groups need to make efforts to establish a process and guidelines on how to achieve data quality in the most efficient way.

The purpose of environmental research is to propose frameworks in which the methods and the Sustainable Development Plan can be applied, which provides a system for efficient implementation of procedures in order to continuously improve the quality of the environment, healthy economy and social welfare of individuals and of society, which leads to long-term sustainable success of municipalities and society.

Municipalities that have integrated the policy of sustainable development in all aspects of their actions will become superior compared to other municipalities of the same type and that are their contemporaries.

There are many methods needed to implement a sustainable development strategy.

Methods in environmental research such as risk assessment and life cycle assessment will provide useful information about local environmental risks as well as possible global impacts. But no single method gives all the answers. Life cycle assessment provides the researcher with information on categories of global impacts, such as climate change and the consumption of natural resources.

Risk assessment gives the risks associated with the production and use of hazardous substances. Risk assessments are often performed locally or regionally, while life cycle assessments are performed at a more global level.

Although there is no formula for success, several recommendations come to the surface, it should be started immediately, to appoint a team with a responsible person, to pay attention to the sources, commitment from all citizens, continuous improvement and regular and open communication.

The end result will be that the municipality will be prosperous which will reduce its financial obligations to the environment and ensure long-term healthy economy and social responsibility. For governments, this means more efficient use of funds; for individuals, this means a consistent quality of life; and for companies, this means a competitive advantage and an improved image of the organization and its products.

## Conclusion

The purpose of this paper is to emphasize the need for environmental research as key values in education for sustainable development of municipalities that are part of social life, to propose and prepare applicable frameworks in which the methods and the Sustainable Development Plan can be applied, which will provide a system for efficient implementation of procedures to achieve the goal of continuing education, to improve the quality of the environment, healthy economy, welfare of citizens and the community, which will contribute to the long-term sustainable success of municipalities and the society.

By setting up and operating the triangle Environmental Research – Education – Developed Municipality, the benefits will result in safe environment – prosperity – welfare of the population.

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