Sustainable development principles integration into educational curricula: implications and prospects

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ABSTRACT: Education has a critical role in shaping a society capable of sustainable development. The Sustainable Development Goals (Global Goals), adopted by the UN in 2015, provide for the implementation of an ambitious plan to overcome key problems of humanity by 2030. Achieving the Goals requires balancing economic, social, and environmental components. Therefore, the implementation of the basic principles of sustainable development (SD) in education for the effective development of humanity is an urgent problem, both theoretically and practically. After all, it is thanks to education that a person's personality, social ties, understanding of himself and his place in society are formed, and personal and professional realization takes place. The article aims to highlight theoretical scientific developments related to the issues of SD and its specifics in the educational sphere, as well as practical steps related to the implementation of the goals and principles of SD by integrating them into the educational process and educational programs. The object of the study was scientific works related to sustainable development, documents that contain a description and interpretation of the SD concept, its necessity and ways of implementation. Attention is focused on practical cases, in particular on the example of Great Britain and Germany. The choice of countries is due, firstly, to their long-standing educational traditions, secondly, to the implementation of SD at the state level, covering all spheres of society, which is what SD requires, and thirdly, to the importance of these countries for Ukraine in the course of the Russian-Ukrainian war. The methodological basis of research consists of the methods of literature analysis, the method of analysis and synthesis, the structural-functional method, and case studies. In many countries of the world, starting in 2015, a global transformation process has begun in educational institutions at all levels of education in accordance with the Sustainable Development Goals and taking into account local traditions, human resources, technical and technological capabilities and national policies. Examples of successful implementation of SD principles in the educational sphere, in particular, by integrating the SD goals and objectives into educational programs and their practical implementation, combining theoretical knowledge and practical cases, are Great Britain and Germany. An important condition for achieving the goals of SD is state policy. In particular, in Great Britain and Germany, relevant strategies and platforms have been developed; active international cooperation is underway; innovative methods of learning and teaching are being introduced; state, business structures, civil society organizations, etc., are being involved. Among the general challenges, one can single out: systematicity in the transformation of education, its understanding not as a form of passive transfer and acquisition of knowledge, but its construction and creative use to solve problems; integration of education into all spheres of society; interaction between the educational environment, authorities, civil society, at the individual level; development of critical thinking skills, environmental awareness, social responsibility; availability of a sufficient number of teachers who would themselves be bright carriers of sustainable development values and its relays for education seekers; support from relevant authorities and material, technical, technological and financial support; a systematic approach to planning, implementing and monitoring all forms of education; motivation of education seekers to an active life position, the desire to live in a democratic society and an environmentally safe world; interdisciplinary approaches in combining academic disciplines. Given the situation in geopolitics, it can be stated that it is evidently difficult to achieve the Sustainable Development Goals by 2030, as originally planned. However, humanity currently has no alternative; therefore, the transition to SD philosophy in accordance with its goals and principles in the field of education remains one of the conditions for the survival of humanity at this stage of development.

Keywords: environmental education; critical thinking; education for sustainable development; educational program; training of future teachers; social responsibility; sustainable development.

Integração dos princípios do desenvolvimento sustentável nos programas de ensino: implicações e perspectivas

RESUMO: A educação desempenha um papel fundamental na formação de uma sociedade capaz de alcançar um desenvolvimento sustentável. Os Objectivos de Desenvolvimento Sustentável (Objectivos Globais), adoptados pela ONU em 2015, prevêem a implementação de um plano ambicioso para ultrapassar os principais problemas da humanidade até 2030. A consecução dos Objectivos exige um equilíbrio entre as componentes económica, social e ambiental. Por conseguinte, a aplicação dos princípios básicos do desenvolvimento sustentável (DS) na educação para o desenvolvimento efetivo da humanidade é um problema urgente, tanto teórico como prático. Afinal, é graças à educação que se forma a personalidade de uma pessoa, os seus laços sociais, a compreensão de si própria e do seu lugar na sociedade, e se realiza pessoal e profissionalmente. O artigo tem como objetivo destacar os desenvolvimentos científicos teóricos relacionados com as questões do DS e as suas especificidades na esfera educativa, bem como os passos práticos relacionados com a implementação dos objectivos e princípios do DS, integrando-os no processo educativo e nos programas educativos. O objeto de estudo foram trabalhos científicos relacionados com o desenvolvimento sustentável, documentos que contêm uma descrição e interpretação do conceito de DS, a sua necessidade e formas de implementação. A atenção centra-se em casos práticos, em particular no exemplo da Grã-Bretanha e da Alemanha. A escolha dos países deve-se, em primeiro lugar, às suas tradições educativas de longa data, em segundo lugar, à implementação do DS a nível estatal, abrangendo todas as esferas da sociedade, que é o que o DS exige, em terceiro lugar, à importância destes países para a Ucrânia no decurso da guerra russo-ucraniana. A base metodológica da investigação é constituída pelos métodos de análise da literatura, o método de análise e síntese, o método estrutural-funcional e os estudos de caso. Em muitos países do mundo, a partir de 2015, iniciou-se um processo de transformação global nas instituições educativas de todos os níveis de ensino, de acordo com os Objectivos de Desenvolvimento Sustentável e tendo em conta as tradições locais, os recursos humanos, as capacidades técnicas e tecnológicas e as políticas nacionais. Exemplos de implementação bem sucedida dos princípios do DS na esfera educacional, em particular, através da integração das metas e objectivos do DS nos programas educacionais e da sua implementação prática, combinando conhecimento teórico e casos práticos, são a Grã-Bretanha e a Alemanha. Uma condição importante para alcançar os objectivos do DS é a política do Estado. Em particular, na Grã-Bretanha e na Alemanha, foram desenvolvidas estratégias e plataformas relevantes; está em curso uma cooperação internacional ativa; estão a ser introduzidos métodos inovadores de aprendizagem e ensino; estão a ser envolvidos o Estado, as estruturas empresariais, as organizações da sociedade civil, etc. Entre os desafios gerais, podemos destacar: a sistematicidade na transformação da educação, a sua compreensão não como uma forma de transferência e aquisição passiva de conhecimentos, mas a sua construção e utilização criativa para resolver problemas; a integração da educação em todas as esferas da sociedade; a interação entre o ambiente educativo, as autoridades, a sociedade civil, a nível individual; o desenvolvimento de capacidades de pensamento crítico, de consciência ambiental, de responsabilidade social; disponibilidade de um número suficiente de professores que sejam, eles próprios, portadores brilhantes dos valores do desenvolvimento sustentável e dos seus efeitos para os que procuram educação; apoio das autoridades competentes e apoio material, técnico, tecnológico e financeiro; uma abordagem sistemática do planeamento, da aplicação e do acompanhamento de todas as formas de educação; motivação dos que procuram educação para uma posição de vida ativa, o desejo de viver numa sociedade democrática e num mundo ambientalmente seguro; abordagens interdisciplinares na combinação de disciplinas académicas. Tendo em conta a situação geopolítica, pode afirmar-se que é evidentemente difícil atingir os objectivos de desenvolvimento sustentável até 2030, como inicialmente previsto. No entanto, a humanidade não tem atualmente qualquer alternativa, pelo que a transição para a filosofia do DS, de acordo com os seus objectivos e princípios no domínio da educação, continua a ser uma das condições para a sobrevivência da humanidade nesta fase de desenvolvimento.

Palavras-chave: educação ambiental; pensamento crítico; educação para o desenvolvimento sustentável; programa educativo; formação de futuros professores; responsabilidade social; desenvolvimento sustentável.

1. INTRODUCTION

In September 2015, the UN adopted the Sustainable Development Goals (Global Goals) (17 Goals to Transform Our World n.d.). This is a plan adopted by 193 UN members for the next 15 years, i.e., they are designed to be implemented by 2030. The main areas of work are aimed at overcoming poverty, combating inequality and protecting our planet (of particular concern is climate change). Within the areas, 17 sustainable development goals have been formulated, which demonstrate what humanity is striving for to improve its lives and the environment: "end poverty, end hunger, good health, quality education, gender equality, clean water..." (17 Sustainable Development Goals, n.d.).

The Sustainable Development Goals Summit was held in New York on September 18-19, 2023. It marked the beginning of a new phase in achieving the Sustainable Development Goals (SDGs) and outlined the political vector of transformations to achieve them (2023 SDG Summit n.d.). In particular, the Summit resolution confirmed the fundamental goals of SD and the balance of its three constituents: economic, social, and environmental, and emphasized the need to take into account the interests and rights of all people, with an emphasis on ensuring gender equality and empowering all women and girls. The resolution also noted that the prospects for achieving the SDGs by 2030 are at risk either due to too slow progress or even a setback

compared to 2015 (Resolution adopted by the General Assembly 2023). This further exacerbates the problem of integrating the sustainable development (SD) principles into educational programs. After all, education is key in shaping future generations, the future of society, the paradigm and vectors of its functioning and development. Currently, the digital divide remains tangible both between generations and among different countries. Also, demographic changes, migration, armed conflicts, natural disasters, climate change, and acute social and economic crises in many countries are serious challenges to the SDGs' implementation.

2. LITERATURE REVIEW

The integration of SD principles into educational programs currently remains one of the leading topics of scientific research related to both theoretical and practical aspects of educational development. Discussions on the need for conceptual development of umbrella programs for the development of humanity in the landscape of globalization and the growing role of technology in all spheres of life have been actively underway since the 1970s. For a balanced and effective solution to the pressing problems of humanity and outlining the prospects for further development, economic, social and environmental vectors of research have been combined (BAC, 2008; MAKHROUT; AIT HBIBI, 2023),

In order to successfully integrate SD principles into educational programs, it is necessary to understand the theoretical and conceptual foundations of SD and take into account practical experience. Therefore, research and consideration of these aspects are especially significant for our article. In particular, these are the works "Education for sustainable development toolkit" (MCKEOWN, 2002), "Transforming education to achieve sustainable development goals - 2030: a new pedagogical paradigm" (VNUKOVA; SOTSKA, 2023). Several publications devoted to various comparative research projects and large-scale evaluations of education to improve teaching and education in the world are posted on the website of the International Association of National Research Institutions, State Research Institutions, Scientists and Analysts. Those who work on the study and improvement of education in the world – IEA (International Association for the Evaluation of Educational Achievement). The materials and research results are freely available, which allowed us to use them to prepare this article (IEA (International Association for the Evaluation of Educational Achievement, n.d.).

The attention of researchers is focused on the topic of integrating education into the system of sustainable development as a component of the entire socio-humanitarian spectrum of social problems and on the development of education in the context of SD (O'FLAHERTY; LIDDY, 2017; GROSSECK et al., 2019; CHALMETA et al., 2020). Research focused on individual aspects of implementing sustainable development principles into educational programs, with an emphasis on problems or difficulties that arise in the process of such integration, is gaining increasing importance. Or, conversely, some researchers prefer to focus on the achievements and prospects of SD for education and education for SD (DLOUHÁ; POSPÍŠILOVÁ, 2017; SINAKOU et al., 2018; DACKO et al., 2021; ABO-KHALIL, 2024).

There are also a number of studies devoted to the consideration of the issues of our article using the example of Ukraine. In particular, we note the article "Advancing ESD in Ukraine: From awareness to orientation towards long-term thinking and societal needs", in which a group of scientists considered the integration of sustainable development principles into educational programs in Ukraine in engineering specialties through the prism of the peculiarities of Ukrainian society that directly affect educational programs (KORDAS et al., 2013). Scientists also highlight the problems, status and prospects of achieving sustainable development goals through education at its various stages, from changing the paradigm of a society of excessive consumption to conscious consumption and to practical cases of implementing educational projects related to training personnel for the education of the future in Ukraine (KORENEVA, 2018; BRATANICH et al., 2020; DUH et al., 2021; KARPAN, 2021; RADKEVYCH, 2024; SOKHAN et al., 2024).

For the transition towards SD and the readiness of society for it, a necessary condition, among other things, is the readiness of teachers themselves to implement such a model of education and their understanding of the philosophy and practical significance of sustainable development for current and future generations. Therefore, research devoted to the study of these aspects of the issue does not lose its relevance (RAO, 2014; MRÓZ et al., 2018; BEECKEN, 2022).

3. METHODS

In preparation for the article, we applied the method of literature analysis. This allowed us to conduct a comprehensive review of scientific developments related to the research issues. Indeed, given the planetary scale of the problem of sustainable development and the integration of the SD principles and goals into the educational process, long-term theoretical discussions have taken place and continue both at the UN and UNESCO levels, at the level of national and federal governments, local communities, and in academic institutions and institutions. Therefore, studying the formation, development and transformation of theoretical and practical approaches to the implementation of the SD principles in education is a necessary condition for understanding the challenges and prospects that arise in the process of transforming the educational process.

The method of analysis and synthesis was also applied, which helped to focus on the diversity of approaches to understanding sustainable development and the role of education in this long-term, promising process. The structural-functional method is necessary for formulating the logic of presenting the material and forming approaches to analyzing the available material. Using a case study, we will consider the integration of SD principles into educational programs in the UK and Germany from the formation of a relevant state strategy to practical implementation in educational institutions. Logical analysis, the transition from the general to the specific, helped to consider the history of the formation of the principles and goals of SD, to formulate the challenges that arise in the process of practical implementation of the goals and objectives of SD in the educational process, and also to formulate conclusions for the article.

4. RESULTS

Since 2015, when the UN promulgated the SDGs as a global project for human development, educational institutions in many countries have begun integrating these

goals into their educational programs, in line with the requirements and needs of the time, relying on human resources and technical and technological capabilities.

We have reviewed the websites of a number of educational institutions in the UK and Germany, examining their educational offerings that consider the SD goals and offer their theoretical and practical implementation for the student audience in their educational programs. In our opinion, the selected countries, the UK and Germany, are good examples for Ukraine, given their economic potential and overall influence in geopolitical processes, as well as their role in supporting Ukraine in the Russian-Ukrainian war. For

convenience, we have systematized the results obtained in the form of Table 1.

In addition to theoretical courses, students undergo volunteer internships to study the social and cultural domains of different professions (Widening Occupation Weeks (WOW)), study global goals through city problems, as well as using fiction, geography, media, and English. Students also work in teams on integrated weekly projects, solving social and environmental problems. Thus, they acquire both professional competencies and form interdisciplinary approaches to understanding SD (Education for Sustainable Development: curriculum and pedagogy, n.d.).

Table 1. Integration of SDGs into educational programs in the UK.
Tabela 1. Integração dos ODS em programas educacionais no Reino Unido.

Country	Educational institution	Educational programs	SDGs in the curriculum
Great Britain	UWE Bristol University of the West of England, Bristol	Master's Program "Sustainable Development in Practice"	An interdisciplinary programme consisting of modules taught across three UWE Bristol colleges; emphasis on environmental, business and policy issues
Great Britain	UWE Bristol University of the West of England, Bristol	Bachelor's Program in Architecture and Environmental Engineering	A multidisciplinary program that allows studying architecture, design, environmental physics, ecological systems in buildings, and the efficient use of energy and materials
Great Britain	UWE Bristol University of the West of England, Bristol	Bachelor's Program in Sociology	Critical engagement with models of a sustainable future, from global to urban and local
Great Britain	UWE Bristol University of the West of England, Bristol	Module Sustainable Engineering for Global Challenges	Awareness of major global problems facing society, communities and organizations, as well as potential engineering solutions.
Great Britain	UWE Bristol University of the West of England, Bristol	Module "International Law"	Broad comprehension of the institutional origins of international law, controversies and problems that arise during its implementation
Great Britain	UWE Bristol University of the West of England, Bristol	Postgraduate education in law	Modules on globalization and law, international environmental law, and law relating to sustainable development issues
Great Britain	UWE Bristol University of the West of England, Bristol	Bachelor's Program in Computer Science	Working with IT services on the carbon footprint of digitalization, working with civil society organizations to solve IT problems, and developing air quality data
Great Britain	UWE Bristol University of the West of England, Bristol	Taxation modules in accounting and finance training courses	Studying the behavioral role of taxation, environmental incentives, and the equity of taxation systems domestically and internationally
Great Britain	UWE Bristol University of the West of England, Bristol	Bachelor's Program in Illustration	Ethnographic themes, gender issues, sustainable development and ecology – for creating visual narratives

Source: developed by the authors based on: MSc Sustainable Development in Practice at UWE (2012); Education for Sustainable Development: curriculum and pedagogy (n.d.).
Fonte: desenvolvido pelos autores com base em: Mestrado em Desenvolvimento Sustentável na Prática na UWE (2012); Educação para o Desenvolvimento Sustentável: currículo e pedagogia (s.d.).

Regarding the change in approaches to education taking into account SDGs, in the UK, from December 20, 2023, the consultation document "Sustainability and climate change: a strategy for the education and children's services systems" was updated as a strategy (hereinafter referred to as the Strategy) applicable to the Department for Education (DfE) and all its structures (early and school education, out-of-school education, higher education, social care for children) (Sustainability and climate change: a strategy for the education and children's services systems, 2023). The main emphasis in the Strategy is on the environmental components of education, in particular, on the policy of interaction of SD social and environmental aspects. The Strategy outlines four key goals that should be achieved by 2030:
  1. Accelerating economic growth.
  2. Encouraging innovation.
  3. Creating new and good jobs
     Increasing the level of education.

Achieving these goals is possible by developing knowledge and skills in adults and children for life in a green economy (HORBACH et al., 2024). The implementation of key goals should take place, according to the Strategy:
1. Education through training and practical experience to prepare young people for a world undergoing serious climate change.
2. Substantial reduction, or net zero (Khrebet, 2020), in educational institutions at different levels; stimulating innovation at the legislative level and enabling opportunities for children and youth to participate in the net zero transition in practice.
3. Adaptation of educational institutions to climate change (DUKH et al., 2021).
4. Creating a better environment for future generations by increasing biodiversity (Biodiversity and the 2030 Agenda for Sustainable Development, Technical Note, 2016), as well as improving air quality, expanding access to and connection with nature in educational institutions.

As for the "German Sustainable Development Strategy", it is a national-level program for the implementation of the SDGs by 2030. Germany first adopted its "National Sustainable Development Strategy" (DNS) in 2002 and has improved it every four years (hereinafter - Strategy). Since 2016, it has been based on the 2030 Agenda (Transforming our world: the 2030 Agenda for Sustainable Development, 2015). The Strategy provides for the implementation of its provisions at the national level, but adjustments can be made at the federal level due to the specific situation.

Among the priority goals for Germany, there are:
1. Eliminating poverty everywhere, in all its forms.
2. Eliminate hunger; ensure food security, achieve improvement of nutrition; encourage sustainable agriculture.
3. Ensuring health and promoting the well-being of people of all ages.
4. Education based on inclusivity and quality, ensuring opportunities for lifelong learning for all.
5. Gender equality and empowerment of women and girls.
6. Access to water and sanitation.
7. Access to reliable and most recent energy sources
8. Consistent, equitable, and sustainable economic growth; productive employment and decent work for everybody.
9. Support for innovation, inclusive and sustainable industrialization, and resilient infrastructure.
10. Reduction of inequality within and between countries.
11. Safety and inclusiveness of settlements; their sustainable and stable development.
12. Patterns of sustainable consumption and production.
13. Urgent measures to combat climate change and its consequences.
14. Conservation and rational use of all water resources.
15. Stop the loss of biodiversity by preserving, restoring, and using terrestrial ecosystems sustainably.
16. Promote shaping peaceful and inclusive communities; give access to justice for everyone; and establish transparent, responsible, and relevant institutions.
17. Global Partnership for Sustainable Development (Indikatoren der UN-Nachhaltigkeitsziele n.d.).

At the educational level, since 2015, the German Federal Ministry of Education and Research (BMBF) has been coordinating the implementation of UNESCO's Education for Sustainable Development (ESD) programmes in Germany. The main goal is to ensure the structural integration of ESD in all educational areas. For this purpose, a corresponding National Platform NP ESD was established in 2015. The National Platform NP ESD includes 45 representatives from national, federal, local, scientific institutions, business structures and civil society institutions. The platform also includes the chairs and co-chairs of the ESD forums, representatives of the youth forum "youpaN" and partner forums. (Nationale Plattform BNE (NP BNE) n.d.), On 20 June 2017, the National Platform NP ESD adopted the National Action Plan (NAP ESD) for Education for Sustainable Development. The plan envisages the structural consolidation of the 130 goals of the National Action Plan and 349 specific recommendations in the German educational landscape in individual educational sectors (Nationaler Aktionsplan n.d.). The German version of the implementation of the SDGs in the educational arena prioritizes the development of conversation skills and orientation knowledge, creative and critical thinking, and holistic learning while taking religious orientation and cultural values into consideration (Bildung für nachhaltige Entwicklung bis 2030 n.d.).

The integration of the SDGs into educational programs in Germany is based on two levels: the level of knowledge and the level of skills and competencies. They are designed to form:
– Basic knowledge for solving key social problems.
– Teach how to recognize problems and find your approaches to solving them (design competence).
– Rely on historically formed connections with environmental education, international educational norms, humanistic principles, and intercultural education.
– To shape conscious consumption and democratic norms of coexistence (Bildung für nachhaltige Entwicklung bis 2030 n.d.; KYSELOVA, 2019).

Currently, five priority areas of activity have been identified for promoting education for SD (Table 2).

One should note that the integration of SDGs into the German education system is part of a comprehensive policy of the federal government, the main priorities of which are: prosperity, growth, fairness, protection of the climate and energy reserves, cooperation at the European and global levels, security in Germany and the world, modernization of the state and society, a safe and democratic society, humanity and order (Schwerpunkte der Bundesregierung, n.d.).

Among the challenges that arise when transitioning to sustainable development in the education system, researchers most often identify the following (CIEPIELA et al. 2022; RAO 2014; SINGLETON 2024; EGANA DEL SOL 2020; VNUKOVA; SOTSKA 2023; SOKHAN et al. 2024; KHMELEVSKA 2018):
1. Understanding education not as a form of transferring information and knowledge, but as a process of active construction of knowledge in social groups, along with the development of necessary skills and the formation of a value system.
2. Such knowledge cannot be isolated from society and the environment; therefore, interaction between educational communities and local communities and authorities is necessary.
3. Individual responsibility for oneself and one's actions, deeds and their consequences (critical thinking, collection, analysis and interpretation of data, formulation of questions and the ability to analyze problems faced by a person, community, state).
4. Support from national and regional governments and authorities (development of education for sustainable development should be included in the system of public policy).
5. A systematic approach to planning, implementing and monitoring all forms of education.
6. Reorganization of existing educational programs: improving the skills of teachers, introducing innovative approaches in the educational process.
7. Motivating students to take an active life position, the desire to live in a democratic society and an environmentally safe world.
8. Interdisciplinary approaches in combining academic disciplines.
9. Training of relevant administrative personnel.
10. Understanding global problems and local problems in a global context; analysing these problems, their origins and predicting possible solutions.

334

11. Creating an environment focused on the learner through the mediation of a teacher.
12. Group interaction during the educational process; practical tasks and their solutions.
13. Ethics of sustainable development as the core of teaching and practice (values of social justice and democratic values, the pursuit of peace, ecological integrity, respect for nature and resources, care for them).

14. Creating an environment focused on the learner through the mediation of a teacher.
15. Group interaction during the educational process; practical tasks and their solutions.
16. Ethics of sustainable development as the core of learning and practice (values of social justice and democratic values, the pursuit of peace, ecological integrity, respect for nature and resources, care for them).

Table 2. Priority areas of activity for promoting ESD in Germany.
Tabela 2. Áreas prioritárias de atuação para a promoção da EDS na Alemanha.

No. p p	Field of activity	Main points
1.	Political support for ESD	Federal and state ministries and education authorities are obliged to implement ESD as a cross-cutting task. Municipalities have a particular responsibility to initiate ESD networks, as they can bring together relevant local actors.
2.	Holistic systemic transformation of the learning and teaching environment	There are several ways that ESD is included in the federal states' curricula and educational strategies. There remains a need to develop strategies and concepts that will enable ESD to be more effectively implemented in educational practice. Quality criteria and indicators should be developed based on current didactic and psychological findings in education. Existing indicators, such as those of the German Sustainability Code, should be incorporated and improved.
3.	Developing the potential of teachers and mentors	Integrate ESD into the training and continuing education of teachers and trainers: Teachers, educators and trainers are key stakeholders in the implementation of ESD. The development of ESD competences should be structurally embedded in education, professional training and continuing education.
4.	Youth empowerment and mobilization	Participation and engagement are essential elements of a holistic transformation of teaching and learning environments. This includes school leaders, teachers, students, parents, municipalities and civil society representatives. Youth participation is also a specific goal.
5.	Promoting SD at the local level	OSR in municipalities, non-formal and informal learning.

Source: compiled according to: Bildung für nachhaltige Entwicklung bis 2030 (n.d.); Nationale Auszeichnung – Bildung für nachhaltige Entwicklung (n.d.); Vom Projekt zur Struktur. Projekte, Maaschen und Kommunen der UN-Dekade "Bildung für nachhaltige Entwicklung" (n.d.).
Fonte: compilado de acordo com: Bildung für nachhaltige Entwicklung bis 2030 (n.d.); Nationale Auszeichnung – Bildung für nachhaltige Entwicklung (n.d.); Do projeto para a estrutura. Projekte, Maaschen und Kommunen der UN-Dekade "Bildung für nachhaltige Entwicklung" (n.d.).

335

Given the current situation in the world, the further prospects of sustainable development raise a number of doubts about its pace and expected results. However, its necessity remains undeniable and the need to accept the ethics of sustainable development as a necessary condition for the survival of humanity as a species and as a social structure. The most effective means of confronting challenges remains education, because what the world will be like tomorrow is decided today, thanks to research, inventions, innovations and adaptation models.

5. DISCUSSION

In the context of global socio-political, economic, social, demographic and cultural transformations, the issue of adaptation to rapid changes is becoming increasingly important both at the national and individual levels. We are witnesses, creators and participants of the rapid transition from industrial to post-industrial and digital society, which is fundamentally changing the usual structure of all social institutions (CHAKRABORTY et al., 2024; Innovative learning technologies in the context of modernization of modern education, 2022). Therefore, it is important to find effective strategies and models for the most effective and painless transition to an unprecedented form of social life in human history, in particular through education, its forms and methods of teaching (LAURIE et al., 2016; EGANA DEL SOL, 2020; MCKEOWN; DOWN, 2022).

Sustainable development is understood not only as a way of understanding the world, but also as a search for and use of opportunities to save it. In practice, sustainable development is studied in the interaction of economy, environment, politics and culture. The key aspects are their impact on well-being, social integration and environmental sustainability (BAIJU, 2007; STRANGE; BAYLE, 2008; SCHERER et al., 2018). The necessary components of sustainable development are socio-psychological factors, which are critical for designing successful tactics and policy vectors intended at creating a society that is compassionate, accountable, and sustainable (AHARKOV et al., 2024; SEMENETS-ORLOVA et al., 2022). Among such factors: social norms and values, behavioral patterns, stereotypes, empathy, prejudice, communications, political factors, psychological comfort and barriers, motivation for development, identity, education and training (ANDREWS, 2017; STRÜBEL et al., 2023; PRANDELLI et al., 2024).

Comprehension of the causes and effects of environmental issues, social inequality, and the financial needs of SD all demonstrate the high relevance of education and training in the development of a conscious approach to sustainable development. Raising awareness, being involved in decision-making, and activating positive emotions are some psychological tactics for overcoming opposition to changes in sustainable behaviours. Encouraging a sustainable lifestyle motivates people to improve their habits and consumption while balancing present and future requirements. That is, there are two vectors related to education in the modern world: *education about sustainable development* and *education for sustainable development.* Generally speaking, the goal of sustainable development education is to improve the quality of life for present and future generations.

To do this, people must be equipped with the knowledge and skills necessary for lifelong learning in order to solve their environmental, economic, and social problems (MCKEOWN; NOLET 2013, p. 9).

Thus, there is a need for interdisciplinary approaches in education, studying a wide range of subjects related to economic development, education, health, climate change, energy systems, biodiversity, and urbanization. Of particular importance is the "system-forming role of the educational sphere about the information society, < … > education becomes one of the main tools for preventing and minimizing risks of sociogenic and natural origin" (KARPAN, 2021, p. 37), It is education that is crucial for achieving the goals of sustainable development. This leads to the need for appropriate training of teachers for all educational areas. In order for future generations of people to be able to live in a rapidly changing world and influence the processes in it, the knowledge and competence of teachers are key to restructuring educational processes and forming a qualitatively new pedagogical paradigm and vectors and outcomes of education. In this context, the implementation of the principles of SD in educational programs at each stage of education is crucial (CHALMETA et al., 2020; VORONINA et al., 2024).

Knowledge of the principles of ESD allows teachers to solve several tasks:
− -integrate the fundamental topics of sustainable development education into educational programs using a project format and problem-based and creative teaching methods;
− construct knowledge, rather than passively providing information while passively absorbing it;
− use media in the educational process;
− form ecological thinking and understanding of social justice as one of the key pillars of SD (RAO 2014, p. 32).

To prepare humanity for rapid changes and radical transformations in all spheres of life and changes in the climate and ecological situation on the planet, it is necessary not only to carry out large-scale changes in approaches to education, but also to have the appropriate human resources and material and technical support, and, no less importantly, a philosophical understanding of changes, their necessity and possible consequences.

6. CONCLUSIONS

The function of education is to prepare a person for individual development in society, so that they can find their purpose in life and take a worthy place in the social hierarchy. Education for SD is designed to prepare a person at different stages of his life for constructive and effective interaction with society and the environment, to teach him to understand the causes and origins of problems, to formulate tasks and overcome challenges through the effective use of technology, critical thinking, environmental approaches and democratic values.

Sustainable development is a long-term goal of humanity. Therefore, the transformation of the education system requires a comprehensive approach: from international legislative norms to the implementation of sustainable development tasks at the community level in all spheres of society and individual understanding and responsibility. Modern challenges related to natural resource management

and the need for education for sustainable development require a comprehensive approach. Humanity has already passed the stage of theoretical justification of the need for sustainable development, and its understanding of the specifics in different countries of the world. Currently, the education system is faced with the problem of integrating the principles and goals of SD into educational programs at all stages of the educational process and with the design of formal, non-formal, and informal education, as well as lifelong learning.

Reforming educational programs by the goals and principles of SD can occur in different ways and on different scales. This depends on the specific country and field of knowledge. It is important to take into account the interrelationship between the social, economic and environmental components of modern education. It is also necessary to take into account the diversity of cultures, biodiversity, the desire for peace, social justice, the availability of resources and energy sources. Environmental education is fundamental to achieve success in understanding by humans and communities the complexity of the interaction of the cultural and natural environment for the preservation of humanity as a species and in general the preservation and restoration of our planet, a common home for all.

An interdisciplinary approach is essential for integrating sustainable development goals and principles into educational programs, taking into account local educational traditions and technical and technological capabilities. The challenge remains to provide appropriate personnel pedagogical, administrative, and managerial.

Without a balanced state policy in the field of education, it is extremely difficult and unpromising to ensure an effective transition to a new pedagogical paradigm. Therefore, taking into account the experience of countries where such political decisions have practical implementation is one of the effective methods of integrating the SD goals and principles into all forms of education as a crucially necessary component of harmonious socio-political, economic, social and individual development.

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339