HOW DO TEACHERS SUPPORT SUSTAINABLE DEVELOPMENT IN MODERN DIDACTIC PROCESS?

Anna MRÓZ

Pedagogical University of Cracow; anna.mroz@up.krakow.pl, ORCID: 0000-0002-9109-1395

Abstract: Sustainable development, in all of its aspects, is possible to be achieved only thanks to properly planned and effectively implemented formal, informal and non-formal education. In this context, what teachers know about sustainable development, to what extend they know its assumptions and demands, and how they implement these assumptions in their everyday school practice is extremely important. I will present the results of research concerning teachers' knowledge regarding education for sustainable development, the didactic methods and forms which they apply while implementing the didactic process for sustainable development.

Keywords: education for sustainable development; teaching and learning for sustainability; modern didactic process.

1. Introduction

Sustainable development (SD) is a development model that meets the needs of all people living in the world as well as those of the subsequent generations (UNESCO, 2017). Sustainable development means striving for harmony in the fields of economy, environment and social development (Bentham et al., 2015). More recently, resource limitations and the resultant disruptions to natural cycles (Bates et al., 2008) have led to major human tragedies, such as negative impact on human health and well-being (Pimentel et al., 2007), poverty and malnutrition (Hecht et al., 2012), and social system disruptions (Wilkinson, & Pickett, 2009). As Hecht et al. stressed (2012), the challenges are multidisciplinary, immense and complex. It is widely believed that the model of sustainable development is the only one that will allow the contemporary and subsequent generations to develop in a way that does not threaten the existence of the Earth's ecosystems. Sustainable development is primarily a social justice project focusing on equitable development aimed at meeting human needs while still recognising that the preservation of natural resources is necessary to fulfill these needs. (Thatcher, 2014).

It is widely believed that sustainable development requires properly planned and effectively implemented education (Cambers et al., 2008). Since its scope covers all young people, education has a huge social impact. Thanks to education, it is possible to achieve the desired social goals, such as those supporting the pursuit of sustainable development. Through its impact, school education, by means of implementing educational goals, supports students' development so that in their personal and professional life they can responsibly implement the postulates of sustainable development. Therefore, education is an important factor in all dimensions of social development. It means that the implementation of educational assumptions for sustainable development is a priority for the entire society – in Poland, Europe and the world.

In the presented text, the aim was to diagnose and describe the ways to develop competences defined as key to sustainable development and the level of teachers' knowledge regarding the assumptions of education for sustainable development. I assumed that the implementation of the UNESCO postulates regarding sustainable development in relation to education comprises the shaping of the following competences of students: creativity, cooperation, critical thinking, development design, flexible adaptation to changes, anticipatory thinking by teachers working with youth. These competences should be developed by teachers by means of using specific methods and didactic forms. Teachers of general subjects from schools located in Lesser Poland participated in the study carried out in the nomothetic paradigm. The method used was a survey.

2. Theoretical background

Education for sustainable development implies equality for all learners, striving for empowerment and student autonomy (Bertschy, Künzli, Lehmann, 2013). According to the postulates of experts, teachers who work in accordance with the paradigm of education for sustainable development should implement problematic and active didactic methods developing students' competences, especially critical thinking and empathy. The didactic forms should also be chosen consciously by teachers in order to allow their students to develop freely and shape the skills which will become the basis of competence (Corney, Reid, 2007). Teachers should care for the well-being of their students, but also provide them with opportunities to leave the comfort zone, which leads to development. Education for sustainable development is called holistic because it covers all education entities and all educational levels. In addition, ESD is not associated with a specific school subject, but should be implemented within each one of them.

Education for sustainable development is commonly understood as education that encourages changes in knowledge, skills, values, and attitudes aimed at creating a society that is more sustainable and just for all people. ESD aims at empowering and equipping the present

and future generations with means to meet their needs with the use of a balanced and integrated approach to the economic, social, and environmental dimensions of sustainable development (Frisk, Larson, 2011; Mróz, Ocetkiewicz, Walotek-Ściańska, 2018).

Education for sustainable future is a huge challenge for education systems. It requires the following questions to be addressed: how can we better understand the complexity of our world? How are the problems of today's world interrelated and what do they mean to the people who are attempting to solve them? What kind of world do we want in the future? Does this vision fit within the systems sustaining the life on Earth? How can we reconcile the requirements of economy, societies, and the environment? The idea of ESD consists in becoming committed to achieve balance between social and economic well-being, and between culture and tradition as well as the protection of natural resources. ESD emphasises the need to respect human dignity, honor diversity and protect the natural environment and natural resources on our planet (Education for Sustainable Development, 2017; Jutvik, Liepina, 2007; Mróz, Ocetkiewicz, Walotek-Ściańska, 2018; Koperna, 2018).

In education for sustainable development, the teacher is an active promoter of change. He or she acts outside of school, engaging students in activities carried out for the benefit of the local community, out of concern for the general good, in accordance with the assumptions of equivalent development. The teacher is also a translator of a complex, diverse, and multi-voice culture; he or she explains the sources, meanings and potential consequences of different phenomena, explains the possible choices that arise in individual and unique ways and advance the development of identity and suggest ways of dealing with struggles in a multicultural world.

The effect of properly planned and implemented education for sustainable development is the competence of students. Many sets of competences, called 'key competences for sustainable development', have been created. Although the concepts of the sets of key competences for sustainable development have been developed by different researchers or research teams at different times and in different places, certain trends and common points can be observed (Barth et al., 2007; Barth, Rieckmann, 2012). All sets contain competences enabling people to cooperate for a better present and future, with respect for others; having those competences means having the ability to respond to changes, taking autonomous and honest actions (Barth et al., 2007; Barth, Rieckmann, 2012; De Haan, 2007a, 2007b, 2010).

In order to enable students to acquire these competences within the frames of formal education, teachers should use appropriate educational methods and forms. A didactic method is – according to Wincenty Okoń (2003) – a way of educating students, changing their personality and teaching and mainly means organising rational learning process. The teacher plays a double role: he is a guide through the world of values and goals as well as an organizer of the teaching-learning process. According to the definition proposed by Wincenty Okoń (2003, p. 202), a didactic method is "a tried and tested system of teacher and student activities, implemented consciously to bring about assumed changes in the personality of the students".

The Greek term "methodos" means the "way of reaching the truth" (Bereźnicki, 2011). An accurate and clear definition of didactic method was proposed by Bolesław Niemierko (2008) who understood the method as "a way of managing learning".

A classification of teaching methods that responds to the needs of modern times was developed by Wincenty Okoń (2003) who developed the concept of comprehensive education. The effect of comprehensive teaching-learning was harmonious development of the student. According to Okoń, the methods can be divided into:

- methods of providing knowledge – the teacher provides students with knowledge, and they passively acquire it. The level of students' knowledge is later evaluated. Examples: lecture, description, talk;
- methods based on problem-solving – the student is active and the teacher – guide – watches over their work, showing them the direction. To solve the problem, student works alone or in a group. Examples: classical problem method, didactic discussion, educational project, didactic games, brainstorming. The group also includes activating methods (e.g. Creating and defining notions, joint problem solving, cooperation work, methods for developing creative thinking);
- exposing methods – methods which expose attitudes, values (and aesthetic). Examples: drama, film, theater, exhibition;
- practical methods – they develop students' psycho-motor skills.

The methods used by the teacher as well as types of classes, referred to as forms of education organisation, to a large extent determine the effectiveness of the didactic process, and thus – the achievement of the intended didactic aims. Education techniques costitute an important condition for the success of the teaching-learning process as they clearly specify the conditions for its implementation. According to W. Okoń, didactic forms are the organisational element of education, which, unlike teaching methods, concerns the way teachers and students work. Didactic forms include the external conditions of education; therefore, they constitute a system of external conditions of a personal and factual nature, which has an impact on the course and properties of the teaching and learning process.

As Czesław Kupisiewicz (2000) notes, didactic methods answer the question of how to teach in specific conditions, while didactic forms indicate how to organise work in accordance with the person, place and time of education as well as its purpose. There are many divisions of the forms of teaching – learning. They are based on the following criteria:

- the number of people (students) participating in the teaching - learning process;
- the place where a teaching-learning process is taking place;
- the time when the teaching-leaning moment is taking place; (Bereźnicki, 2011).

In the context of implementing the assumptions of education for sustainable development, teachers' knowledge in the area is extremely important. Teachers should have a vision and be aware of their roles in educating students in terms of achieving sustainability. As UNESCO experts say: *To create a more sustainable world and to engage with sustainability-related issues as*

described in the SDGs, individuals must become sustainability change-makers. They require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development. Education, therefore, is crucial for the achievement of sustainable development (UNESCO, 2017).

Knowledge of the principles of education for sustainable development obliges teachers to integrate key ESD topics into their curricula and apply mainly problem-solving and activating methods in their teaching, in which knowledge is constructed by learners (not handed out by teacher and passively absorbed by students) (Serafín, Dostál, Havelka, 2015).

3. Methodological Assumptions of the Research

The study was carried out in a quantitative (nomothetic) paradigm (Babbie, 2013).

The aim of the research was exploratory and descriptive. The subject of the study comprised: (1) teachers' knowledge in the field of education for sustainable development, (2) didactic methods which teachers declare to be applying in order to develop key competences for sustainable development, (3) didactic forms that teachers declare to use key competences for sustainable development. For the purposes of the study, I adopted the following classification of key competences for sustainable development:

- critical thinking,
- anticipatory thinkig,
- cooperation in heterogenous group,
- dynamic adaptation to changes,
- development planning,
- creativity and ability to innovation.

Before starting the research, I set the following main question: *How do teachers support the development of key competences for sustainable development among students*?

In order to answer the research question, posed as comprehensively as possible, I formulated specific questions:

1) What is the level of teachers' knowledge in the field of education for sustainable development?
2) Which didactic methods are teachers declaring to be using in order to support the development of students' competences for SD?
3) Which didactic forms are teachers declaring to be using in order to support the development of students' competences for SD?

As already mentioned, I chose the survey method as appropriate for achieving the research objective. The technique used was a survey, and the tool - a survey questionnaire developed for the purposes of the study. The questionnaire consisted of two parts. In the first part teachers

were asked about the didactic methods and forms they used to develop students' key competences for SD. The second part of the questionnaire was a 20-question single-choice test of knowledge about education for sustainable development.

Three hundred and thirty-seven teachers of general subjects from schools located in Lesser Poland participated in the study. The teachers were employed at lower secondary schools (gymnasium) and upper secondary schools (high school). In order to collect the research data, convenience sampling [30] was applied in accordance with the following criterion: the consent of the participants to take part in the survey. The statistical and demographic data of the teachers who participated in the survey are presented in Table 1.

Table 1.
Statistical and demographic data of the teachers who participated in the survey

School location	N	%
Village	128	37.98
Small town	136	40.36
Big city	68	20.18
N/A	5	1.48
School level	**N**	**%**
Lower secondary	177	52.52
Upper secondary	149	44.21
N/A	11	3.26
Years of employment	**N**	**%**
0–5 years	36	10.68
6–10 years	64	18.99
11–15 years	85	25.22
16–20 years	102	30.10
21 years and more	50	15.0
Degree of professional promotion	**N**	**%**
Trainee	13	3.86
Contractual teacher	45	13.35
Appointed teacher	82	24.33
Chartered teacher	196	58.16
Subject taught	**N**	**%**
Polish language	60	17.80
Human and social sciences (civil knowledge, history, knowledge about culture, entrepreneurship)	67	19.88
Foreign languages	74	21.96
Mathematics	36	10.68
Science and natural sciences (biology, chemistry, physics, geography, education to family life)	86	25.52
Information and technical subjects(ITC, technics)	9	2.67
Physical education	1	0.30
Arts (music, visual arts)	3	0.89
NS	1	0.30
Total	**337**	**100%**

4. Results of the research

Teachers' knowledge regarding the assumptions of education for sustainable development

In order to effectively design the teaching-learning process in accordance with the European assumptions of the concept of education for sustainable development, and thus support harmonious development of the student – among others by shaping and developing key competences for the future – teachers should have appropriate knowledge in the field. In order to effectively implement education for the future, teachers must know the goals and main assumptions of the concept of sustainable development. In addition, they should know the law obliging teachers to include relevant issues in the school teaching-learning process by choosing didactic methods and forms that will help students develop in a harmonious way, acquire appropriate attitudes towards the natural environment and learn about the interdependences between economy, social life, and the natural environment.

The surveyed teachers were asked to complete a hidden knowledge test, the results of which allowed me to learn about the scope of knowledge of the respondents regarding education of students in the field of sustainable development. The test consisted of 20 closed questions, with the possibility of selecting only one out of 4 answers (single-choice test). The questions included in the test were formulated on the basis of training materials for teachers available on the websites of UNESCO and OECD, the Ministry of the Environment, Ministry of National Education and in popular publications concerning education for sustainable development. Test results were grouped on the basis of the following key: very high level of knowledge – 20-18 points; high score – 17-14 points; average score – 13-11; low score of 10-7 points; very low score – below 6 points. None of the respondents obtained the maximum number of points. The average for the whole sample was 9.61, while the median and modal were 10. Twelve teachers obtained a very high result; high score – 39 teachers; average score – 73 teachers; low level – 136 teachers, very low level – 67 teachers. The number of correct answers was added for each respondent. The results are presented in Figure 1.
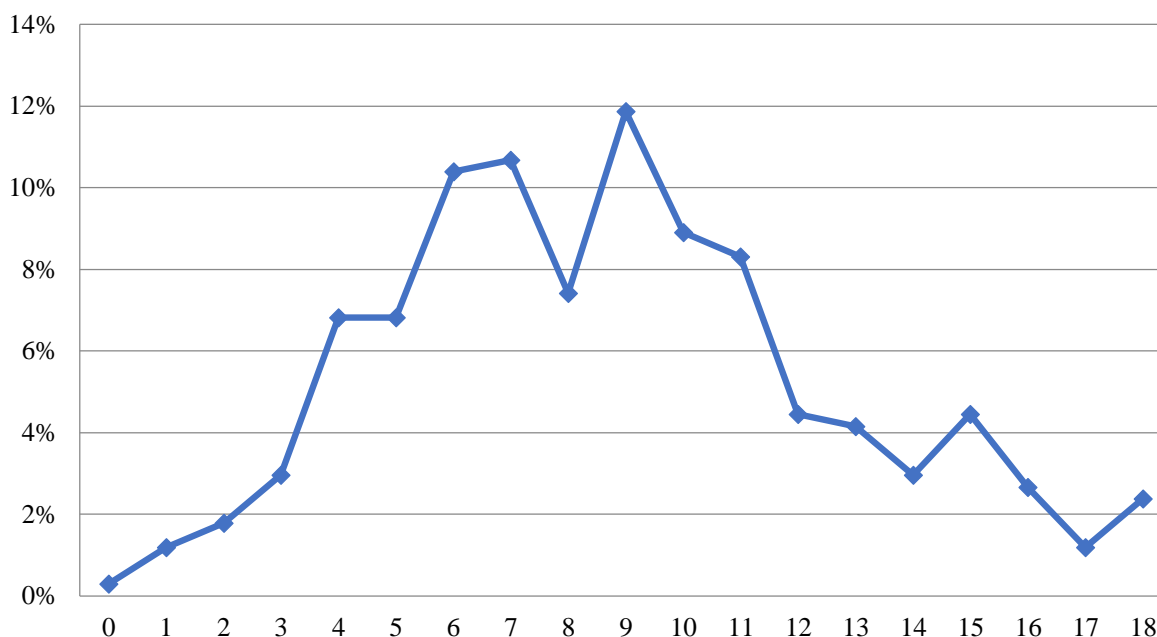
Figure 1. Teachers' results in the test – knowledge about the issues related to ESD.

Statistical analysis of the test results suggests that the higher the seniority, and – as a result – the degree of career advancement, the greater the teacher's knowledge about the assumptions of education for sustainable development. In addition, the best results were obtained by teachers of Polish, foreign languages as well as humanities and social sciences (other than Polish). Although education for sustainable development is often confused with environmental education or eco-education, which may result from higher awareness of science teachers in the field (because sustainable environmental development is discussed more often than the two other fields), biology and geography teachers, physics and chemistry scored lower than teachers of native language or humanities and social subjects teachers. Among the teachers who obtained the highest test result were: 4 Polish language teachers (two of them work in a small town, one in the country and one in a large city; all are qualified teachers), 3 historians (two from a small town, one from the country; two qualified and one appointed teacher) and 5 foreign language teachers (three from a small town, two from a large city; three appointed and two qualified teachers). The test result does not depend on the place where a given teacher works, their sex the type of school they work at.

The vast majority of teachers surveyed are of the opinion that the concept of education for sustainable development is a new initiative, formulated after 2010 (69.44% of responses). In turn, slightly more than a quarter of the respondents aptly noticed that this concept dates back to the early 1990s (in 1992, the UNESCO Summit in Rio de Janeiro and the Agenda 21 programming document defining education for sustainable development as a priority social activity was created for a harmonious future).

The task which was most difficult for the teachers was to set education goals for sustainable development and the role of the teacher designing sustainable didactic process. Teachers indicated that the main goal of education for sustainable development is to convince students

to protect the environment (almost 41% of the responses). Moreover, a lot of respondents indicated the assumptions presented in Jacques Delors' Report – "Learning: the treasure within" – as the basis of the concept of education for sustainable development (over 76% of the responses). The respondents often confused education for sustainable development with environmental education – (nearly 36% of the respondents) and global education (about 28.5% of them).

Teachers associate education for sustainable development primarily with environmental protection – 51.37% of the respondents believe that environmental education is a priority for ESD, and children and young people are encouraged to care about the environment it through various school and out-of-school initiatives, while 45.4 % think that within the framework of sustainable teaching process, topics related to ecology should be included in the curricula of school subjects, including humanities. None of the surveyed teachers indicated system thinking as a crucial skill in education for sustainable development, although it is the basic premise of the concept of harmonious development (perception of the world as a complex system of interdependence).

It is worrying that in the process of sustainable education almost a half of the surveyed teachers (45.1%) take media with a grain of salt - as tools that changed people's lifestyle, which is associated with adverse changes in the behavior of young people. Only a quarter of the respondents (25.22%) indicated that media - when used correctly - can improve the quality of education as well as the quality of human life.

Slightly over 40% (44.22%) of the respondents aptly indicated internal balance, harmony, effective cooperation in a group, coexistence with the environment, the use of civilisation's information resources as the outcome of the teaching-learning process in accordance with the postulate of UNESCO experts promoting education for sustainable development. In turn, one fifth (20.18%) of the surveyed teachers considers respect for the natural environment, cooperation of all people for the benefit of the local environment and intergenerational cooperation to be the outcome of the process of teaching in accordance with the principles of sustainable development.

Only one-third of the respondents (31.19%) correctly defined the role of the teacher in education for sustainable development as the person who emphasises the school environment, shows students activities and problems associated with the the local environment. Over 48% (48.10%) of the respondents believe that transferring knowledge about the principles of sustainable development is a task of the teacher. It is worth noting that the transfer of knowledge is associated with the transmissive teaching model in which the associative course dominates (methods of providing knowledge). Therefore, the high number of respondents selecting this answer should be worrying. Most of the teachers participating in the study correctly identified the key issues for sustainable development that should be included in the curricula of each subject at the 3rd and 4th stage of education (55.78% of correct answers).

They also easily indicated that education for sustainable development is associated with sciences, natural and humanities, and, therefore, should be implemented in all school subjects (76.29% of correct indications).

Didactic methods used by teachers in the aim to support the development of students' competences for SD

Brainstorming is the method most commonly used by the respondents in order to shape their students' ability of **critical thinking**. It is used by almost a half of the respondents (46%) and 35% of them use it very often. Methods which are used quite often also include text work (19% of the respondents use it very often), formal lecture (very often used by 17.8%), curriculum discussion (very often used by 16.9% of the respondents), problem-focused lecture (very often used by 16.3% of the respondents), traditional problem method (very often used by 15.1% of the respondents) and practical classes (very often 15.1% of the respondents). The methods which are used least often include planning methods and techniques, the laboratory method, Webquest and performing arts. Less than 4% of the respondents indicated them.

In summary, it can be stated that in order to create critical thinking among students, teachers prefer the traditional teaching methods rather than the group of problematic methods and methods of providing knowledge, but do not use the methods of activating, displaying and modern teaching, such as Webquest or mental map. They also avoid projects – carried out both individually and in groups. In addition, they do not implement educational projects that can be aimed at developing students' critical thinking. The analysis of research results made it possible to observe that the choice of the methods applied to shape this competence does not depend on teacher's place of work, the type of school at which they teach, their seniority or degree of career advancement.

In order to develop **anticipatory thinking** in their students, teachers most often use brainstorming and the traditional problem method. During the research, no statistically significant relationship between the methods used to develop anticipatory thinking and other variables (sex, education level, school location, length of service and degree of professional promotion) was found.

While developing cooperation skills in a heterogeneous group, integration methods (very often used by 23.4% of the respondents) and cooperation-based methods (very often used by almost 22% of them) are used most often.

The other methods which were very frequently indicated by the teachers comprised brainstorming (18.1%) and group projects (17.8%), followed by joint decision-making methods (12.2%). The methods used least frequently to shape this skill were portfolio/e-portfolio, measurement, evaluation methods, exhibition/exhibition as well as diagnostic methods and techniques.

Among the respondents, the brainstorming method was also popular with regard to the shaping of the competence of working in a heterogeneous group – in each group of teachers it was used often by more than 15% of the respondents. It is worth noting that this is not a method that engages a group as a whole – personal beliefs, ideas, suggestions etc. are taken into account.

In terms of shaping critical thinking and forward thinking, teachers indicated the activation methods very rarely or did not indicate them at all. Methods such as Webquest, e-portfolio, mental map, metaplan are not used by teachers either or are used sporadically.

Planning development is among the competences less frequently shaped by the surveyed teachers. However, it should be remembered that comprehensive development of student's personality and preparation for lifelong learning (implementation of self-education) are the goals of general education in Poland. They cannot be carried out if students are not competent in planning development. Among the methods applied to shape the competence, the most commonly indicated ones were the methods of developing creative thinking. Among the surveyed teachers, 13.4% applied them in their practice very often. The second most commonly used method was brainstorming, which was often applied by every tenth respondent. Methods such as individual projects, planning methods and techniques, SWOT analysis and subject exercises were also applied relatively often. The methods least frequently applied in order to shape the competence were performance art, integration methods and the guiding text method.

When shaping the competence of **creativity and innovation**, teachers most often apply methods that develop creative thinking and brainstorming. The former was applied very often by 30.3% of the respondents, and the latter - by almost 22%. Other methods applied frequently in order to shape students' creativity and innovation were the methods of creative problem solving (11.6%), drama (10.7%) and individual project (10.1%).

The least popular methods in this category were the Guiding text method as well as diagnostic methods and techniques.

The **ability to dynamically adapt to changes** was most often shaped by brainstorming and case method. Each of them was applied very often by every tenth teacher in the area. In terms of the frequency of application, methods developing creative thinking came in third (8.6%). On the other hand, the method applied least frequently was cover text and exhibition or exhibition. Table 2 presents teachers' indications of the methods applied by them in order to develop specific competences.

Table 2.

Teachers' indications of the methods applied by them in order to develop key competences for SD

Didactic method	critical thinking	anti-cipatory thinking	cooperation in hetero-geneous group	develop-ment planning	creativity and ability to innovation	dynamic adaptation to changes
Description	3.26%	2.67%	2.67%	2.67%	1.19%	1.48%
Story	3.86%	5.34%	2.67%	2.08%	.89%	1.78%
Talk	17.80%	8.61%	9.50%	6.23%	1.19%	5.34%
Formal lecture	8.61%	2.37%	3.56%	3.56%	.89%	4.45%
Problem-focused lecture	16.32%	6.23%	3.26%	5.34%	2.08%	3.26%
Explanation	5.64%	5.04%	7.42%	5.93%	1.19%	7.72%
Text work	18.99%	8.01%	9.50%	2.97%	3.86%	2.37%
Traditional problem method	15.13%	12.17%	4.45%	5.04%	7.72%	5.64%
Brainstorming	35.01%	13.35%	18.10%	10.09%	21.96%	10.68%
Case method	5.93%	6.82%	3.56%	4.45%	4.75%	10.09%
Simulation	3.86%	8.31%	2.37%	2.08%	4.45%	6.82%
Enactment	2.67%	2.67%	2.37%	.89%	7.72%	2.97%
Curriculum discussion	16.91%	6.53%	7.12%	3.56%	7.12%	2.67%
Research method	5.04%	5.34%	.59%	1.48%	4.75%	2.37%
Drama	3.56%	2.37%	3.56%	2.37%	10.68%	3.26%
Performing arts	0.00%	0.00%	2.37%	.30%	2.97%	1.19%
Exhibition	.30%	.59%	.59%	.89%	2.37%	.30%
Display/film	5.04%	3.26%	2.37%	1.19%	3.26%	2.37%
Practical classes	15.13%	8.61%	9.20%	7.72%	7.42%	7.42%
Laboratory method	2.97%	3.26%	1.78%	2.08%	4.45%	.89%
Measurement	.89%	1.78%	0.00%	2.67%	.89%	1.48%
Guiding text method	2.37%	2.08%	.59%	1.19%	0.00%	.30%
Individual project	4.45%	5.04%	2.08%	7.42%	10.09%	4.75%
Group project	2.67%	2.97%	17.80%	5.04%	8.61%	4.45%
Integration methods	0.89%	1.19%	23.44%	.89%	0.89%	2.08%
Creative problem solving	8.90%	5.93%	5.93%	4.15%	11.57%	4.75%
Planning methods and techniques	1.78%	9.20%	.89%	8.90%	0.89%	1.78%
Hierarchisation methods	3.26%	2.97%	2.67%	3.86%	1.48%	2.08%
Evaluation methods	2.37%	4.15%	1.48%	5.34%	0.30%	3.56%
Cooperation-based methods	3.86%	2.37%	21.96%	5.64%	1.19%	4.15%
Joint decision-making	1.48%	2.97%	12.17%	2.37%	2.67%	4.75%
Creating and defining notions	3.86%	1.19%	0.30%	3.26%	5.34%	2.97%
Diagnostic methods and techniques	4.15%	2.37%	0.89%	4.15%	0.00%	2.08%
Creative thinking development	7.42%	6.23%	3.86%	13.35%	30.27%	8.61%
Webquest	0.59%	0.00%	0.00%	1.19%	1.78%	1.19%
Portfolio/E-portfolio	0.00%	0.30%	0.59%	5.93%	2.37%	.89%
SWOT analysis	4.15%	8.61%	1.78%	8.01%	2.08%	4.75%
Mindmap	6.82%	4.45%	2.97%	4.15%	5.04%	4.75%
Educational project	2.67%	3.56%	7.12%	4.75%	7.12%	2.67%
Metaplan	2.67%	2.97%	3.56%	2.67%	2.67%	2.37%

Didactic forms applied by teachers in order to support the development of students' competences for SD

The didactic forms most commonly applied to shape **critical thinking** are individual and group work. Individual work was often applied by 38.3% of the surveyed teachers. In addition, the teachers least frequently responded that they never apply this form. Group work was very often used by 31.5% of the respondents. Homework was the third most used form – 26.4% of the surveyed teachers often use it to develop critical thinking. One-fifth of the surveyed teachers very often developed critical thinking through extracurricular activities.

Among all forms of education, individual work was most commonly applied to develop anticipatory thinking – 29.4% of the respondents applied it very often. Similarly to the shaping of critical thinking, the second most commonly applied method was group work (23.7%). In this regard, the least frequently applied method was laboratory work. Almost two-thirds of the respondents dis not apply it.

In order to shape the competences of **cooperation in a heterogeneous group**, the most commonly selected method was - as could have been predicted - group work. As many as 69.1% of the respondents applied it very often. However, less than 9% of the respondents did not apply it.

Analysis of the data collected during the study revealed some correlations. Collective teaching as a form of shaping the competence of cooperation in a heterogeneous group depends on such variables as: level of education, seniority and level of career advancement and the location of school. Most often, the form is applied by teachers working at middle schools located in the country. The application of this form correlates with the least work experience (0-5 years), and thus - the lowest degree of career advancement (trainee).

With regard to the competence of **planning development**, the most commonly applied didactic method is individual work – very often applied by 22.3% of the respondents. Other forms are used less frequently. However, laboratory work is used least often – one-third of the respondents use it with varied frequency.

To shape students' **creativity and innovation**, teachers most often choose individual work and group work. The former is used very often by 43.6% of the respondents, and the latter – by 37.1% of the teachers who took part in the study. Homework is also a relatively popular form, often used by almost 30% of the respondents.

The analysis of research results allowed us to determine the relationship between the forms of work applied in order to develop the competence and the distinguished variables. Group work is most often used to develop students' creativity and innovation by teachers with longer experience (over 16 years) and higher level of career advancement (qualified teachers). It is more often used by teachers working at schools located in large cities.

To shape the development planning competence, the surveyed teachers most often chose group work – 21.1% of the surveyed teachers indicated it as applied very frequently. They also applied individual work and trips relatively often. Among the respondents, 19.3% and 18.7% apply them.

Table 3.
Teachers' indications of the didactic forms they use to develop key competences for SD

Didactic form	critical thinking	anticipatory thinking	cooperation in heterogeneous group	development planning	creativity and ability to innovation	dynamic adaptation to changes
individual work	38,28%	29,38%	8,90%	22,26%	43,62%	19,29%
group work	31,45%	23,74%	69,14%	16,62%	37,09%	21,07%
Collective teaching	18,69%	19,58%	27,00%	13,06%	18,69%	15,13%
Homework	26,41%	15,43%	7,12%	10,68%	29,97%	10,09%
Trips	9,79%	14,54%	29,67%	8,61%	15,13%	18,69%
Outdoor activities	7,72%	11,28%	23,44%	5,34%	13,65%	13,06%
laboratory work	7,12%	9,50%	9,79%	6,82%	12,17%	7,12%
extracurricular activities	21,66%	17,51%	20,47%	20,47%	28,78%	18,69%

5. Conclusion

Sustainable development is a great challenge for the modern societies. It may be achieved only through properly planned education. It should be clear that teachers have to support harmonious development of their students and care for sustainable development in three dimensions: environmental, economic, and social.

The aim of the text was to present a diagnosis and description of the ways of developing key competences associated with sustainability indicated by the teachers who took part in the study. By using the research method in order to collect an appropriate number of responses, the research goal was achieved.

Analysis of research results concerning teachers from Lesser Poland shows that teachers are well prepared well for the role they are to play in promoting a sustainable future. Teachers' knowledge in the field of education for sustainable development, its assumptions and postulates, is not sufficient. Although they try to develop key competences for sustainable development, they do not always use appropriate methods, and didactic forms in particular. They usually use only a few of more than forty well-known didactics methods. We must remember that competences are acquired through action, therefore it is necessary to activate students and teach them how to solve problems. In the future, students will have to solve problems that we cannot identify today. Research shows that teachers use problem-solving methods too rarely. In addition, they do not apply didactic forms that force students to be independent outside of school. Teachers must realize their extremely important role in transforming the modern world into a sustainable future. They need to be supported in this process, for example by organizing various forms of training, such as seminars and lectures, and by issuing appropriate publications.

References

1. Babbie, E. (2013). *The practice of social research*. Belmont: Wadsworth Cengage Learning.
2. Barth, M., Godemann, J., Rieckmann, M., Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education, 8(4)*.
3. Barth, M., Rieckmann, M. (2012). Academic staff development as a catalyst for curriculum change towards education for sustainable development: an output perspective. *Journal of Cleaner Production, 26(1)*.
4. Bates, B.C., Kundzewicz, Z.W., Wu, S., & Palutikof, J.P. (Eds.) (2008). *Climate change and water*. Technical Paper of the Intergovernmental Panel on Climate Change. Geneva: IPCC Secretariat.
5. Bentham, H., Sinnes, A., Gjøtterud, S. (2015). A Teacher Education for Sustainable Development System: An Institutional Responsibility. *International Journal of Higher Education, 4, 4*.
6. Bereźnicki, F. (2007). *Podstawy dydaktyki*. Kraków: Impuls.
7. Bertschy, F., Künzli, Ch., Lehmann, M. (2013). Teachers' Competencies for the Implementation of Educational Offers in the Field of Education for Sustainable Development. *Sustainability, 5,* 5067-5080.
8. Cambers, G., Chapman, G., Diamond, P., Down, L., Griffith, A.D., Wiltshire, W. (2008). *Teachers' Guide for Education for Sustainable Development*. Santiago.
9. Corney, G., Reid, A. (2007). Student teachers' learning about subject matter and pedagogy in education for sustainable development. *Environmental Education Research, 13*.
10. De Haan, G. (2007a). *Guide: Education for Sustainable Development at Secondary Level. Justifications, Competences, Learning Opportunities. Compiled by the Transfer-21 Programme's 'Quality and Competences' working group*. Berlin.
11. De Haan, G. (2007b). The BLK 21' programme in Germany: a Gestaltungskompetenz-based model for education for sustainable development. *Environmental Education Research, 12*.
12. De Haan, G. (2010). The Development of ESD-Related Competencies in Supportive Institutional Frameworks. *International Review of Education, 56(2-3)*.
13. Frisk, E., Larson, K.L. (2011). Educating for Sustainability: Competencies & Practices for Transformative Action. *Journal of Sustainable Education, 2*.
14. Hecht, A.D., Fiksel, J., Fulton, S.C., Yosie, T.F., Hawkins, N.C. et al. (2012). Creating the future we want. *Sustainability: Science Practice & Policy, 8*, 62-75.
15. Jutvik, G.; Liepina, I. (Eds.) (2007). *Education for Change: A Handbook for Teaching and Learning Sustainable Development*. Riga, Latvia: Gsndrs.

16. Koperna, P. (2018). Edukacja dla zrównoważonego rozwoju w przedszkolu na przykładzie ekologicznego koła zainteresowań. *Aura, 11*.

17. Kupisiewicz, Cz. (2000). *Dydaktyka ogólna*, Warszawa: PWN.

18. Niemierko, B (2008). *Kształcenie szkolne. Podręcznik skutecznej dydaktyki.* Warszawa: PWN.

19. Okoń, W. (2003) *Wprowadzenie do dydaktyki ogólnej.* Warszawa: PWN.

20. Pimentel, D., Cooperstein, S., Randell, H., Filiberto, D., Sorrentino, S. et al. (2007). Ecology of increasing diseases: population growth and environmental degradation. *Human Ecology, 35*, 653-668.

21. Serafín, Č., Dostál, J., Havelka, M. (2015). Inquiry-Based Instruction in The Context of Constructivism. *Procedia – Social and Behavioral Sciences, 186*.

22. Thatcher, A. (2014). Theoretical definitions and models of sustainable development that apply to human factors and ergonomics. In: O. Broberg, N. Fallentin, P. Hasle, P.L. Jensen, A. Kabel, M.E. Larsen, T. Weller (Eds.). *Human factors in organizational design and management.* XI Nordic Ergonomics Society Annual Conference, 46.

23. UNESCO (2017). Education for Sustainable Development: Learning Objectives. Paris, France: United Nations Educational, Scientific and Cultural Organization.

24. Wilkinson, R., & Pickett, K. (2009). *The spirit level: why greater equality makes societies stronger.* New York: Bloomsbury.