



SPOŁECZEŃSTWO  
EDUKACJA  
JĘZYK

Tom 15/2022, ss. 23-36  
ISSN 2353-1266  
e-ISSN 2449-7983  
DOI: 10.19251/sej/2022.15(2)  
[www.sej.mazowiecka.edu.pl](http://www.sej.mazowiecka.edu.pl)

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### **Alicja Walosik**

Faculty of Exact and Natural Sciences,  
KEN Pedagogical University in Krakow,  
Orcid: 0000-0002-5772-7978

### **Ilona Żeber-Dzikowska**

Faculty of Pedagogy and Psychology,  
Jan Kochanowski University in Kielce

### **Kinga Wierzbicka**

Małopolskie Teacher Training Center, Kraków

## **DISTANCE LEARNING IN THE LIGHT OF RESEARCH – NEW CHALLENGES FOR SCHOOL PRACTICE**

### **NAUKA NA ODLEGŁOŚĆ W ŚWIETLE BADAŃ – NOWE WYZWANIA DLA PRAKTYKI SZKOLNEJ**

#### **Abstrakt**

Aktualna sytuacja w Polsce zobligowała nauczycieli do sięgnięcia po narzędzia do pracy zdalnej. Takie rozwiązania postawiły przed nauczycielami i uczniami nowe zadania i wyzwania, którym należało sprostać. Nauka online wymaga

#### **Abstract**

The current situation in Poland has obligated teachers to use tools for remote work. Such solutions presented teachers and students with new tasks and challenges that had to be met. Online learning requires a completely different

specyficznej metodyki pracy z uczniami oraz innych typów zadań i aktywności. Nauczyciel powinien przyjąć rolę tutora i mentora, który w odpowiedni sposób umie zmotywować i zainspirować uczniów do samodzielnego zaangażowania i pogłębiania wiedzy, co zapewni skuteczną naukę zdalną.

Celem badań przeprowadzonych w okresie od stycznia do marca 2021 roku wśród 50 nauczycieli biologii województwa małopolskiego była diagnoza funkcjonowania kształcenia zdalnego w szkole, w nowej rzeczywistości szkolnej oraz wyzwań, które zostały postawione przed szkołami, nauczycielami, rodzicami, a przede wszystkim uczniami. Wśród ankietowanych badano m.in. formy i metody nauczania realizowane podczas prowadzenia zajęć, stopień wykorzystywania materiałów znalezionych w Internecie i wykonanych przez nauczyciela.

Wyniki badań ukazały szereg problemów natury logistycznej i sprzętowej, problemów związanych z poziomem przygotowania nauczycieli do prawidłowego przebiegu edukacji zdalnej w szkole, dostosowaniem metod i technik nauczania i uczenia się, monitorowaniem i weryfikowaniem postępów ucznia, a także budowaniem wzajemnych relacji pomiędzy nauczycielem i uczniem.

#### SŁOWA KLUCZOWE

edukacja zdalna, metody, formy, techniki, narzędzia pracy zdalnej

methodology, work planning and different types of tasks and activities. The teacher should assume the role of a tutor and mentor who can motivate and inspire students to engage and deepen their knowledge on their own, which will ensure effective distance learning.

The aim of the research carried out in the period from January to March 2021 among 50 biology teachers from the Małopolskie Voivodeship was to diagnose the functioning of remote education at school, in the new school reality and the challenges that were faced by schools, teachers, parents and, above all, students. Among the respondents were investigated, the forms and methods of teaching during lessons, as well as the degree of use of materials found on the Internet and made by the teacher.

The results of the research showed a number of logistical and hardware problems, problems related to the level of teachers' preparation for the proper conduct of remote education at school, adapting teaching and learning methods and techniques, monitoring and verifying student progress, as well as building relations between the teacher and the student.

#### KEYWORDS

distance learning, methods, forms, techniques, tools of remote work.

## 1. Introduction

The 21st century surprises us with the pace and quality of changes in the functioning of school, the organization of educational process, the strategy of learning biology, and the role of the teacher in the process of supporting the multilateral development of students. The problem lies in understanding and implementing what is called modern education, a competent teacher of the digital age dominated by modern information technologies, computers, multimedia and the Internet.

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We live in difficult and unpredictable times. The whole world is struggling with the COVID-19 epidemic. The current situation in Poland has obligated many teachers to use tools for remote work, which today involves a number of important questions about the essence, quality and effectiveness of remote education as well as the content and importance of the student's key skills. Many of us have fear, frustration, uncertainty about the future - what will our world look like after the epidemic? How will we live, work and learn? The only certainty is that the world as we know it will not come back, and the traditionally understood education has also passed away with it.

It is not easy to answer how to ensure that distance education in the pandemic era is attractive, interesting and meets the expectations. A very important role in this process is assigned to such education, which aims to develop an attitude of respect and responsibility, where an important role is played by the teacher and the appropriate selection of methods and forms of teaching made by him, leading to the student's involvement and awakening in them a sense of responsibility and security.

## **2. Literature review / Background**

Research shows that the use of ICT in the teaching process can transform the learning environment in the classroom from a teacher-dominated learning environment to the one in which the student is in the center. William James' statement - "the most characteristic and specific quality of conscious critical thinking is expressed in solving tasks and performing exercises" - quotes George Polya, the creator of modern heuristics (Polya, 1975), emphasizing that problem solving is the essence of active learning and the most characteristic feature of human activity, and that this skill is one of the basic effects of the teaching process (Skurzyński, 1996). The digital space begins to play an increasingly important role in the daily relationship between the teacher and the student. It also determines the quality and type of these interactions, it affects the learning-teaching process itself, as well as the everyday way of life. Thus, the teacher in the online environment has an additional task: he/she becomes not only the architect of the student's knowledge, but also of the learning and teaching space (Barabasz 2016). In such a constructivist classroom, students collaborate more often, have more opportunities to make choices, and play a more active role in their own learning process (Mize and Gibbons, 2000; Page, 2002; Waxman et al., 2002). Effective use of ICT not only improves the learning process, understanding of didactic content and school achievements, but also motivates students to learn, encourages collaborative learning and helps to develop the ability to think critically and solve problems (Schacter and Fagnano, 1999). New technologies allow teachers to differentiate teaching methods more effectively, providing a wider range of educational strategies targeting different learning styles, and make teachers aware of how to effectively use available, dynamically developing tools to enrich students' learning experiences and develop their critical thinking skills. The synthesis of research results by the organization McREL - American

Educational Association shows that the learning process of students at risk is influenced by such features of computer-assisted learning as motivation, the possibility of frequent and quick feedback, individualization of the learning process by adapting to the needs of students, independence of students providing a multisensory learning environment (images, sounds, symbols) (Barley et al., 2002).

The American Educational Research Association, McRel, helps schools to increase the effectiveness of teaching and learning and achieve significantly better learning outcomes by analyzing and adapting the curriculum to students' standards and level, and creating a learning environment conducive to learning. To create an enabling learning environment, teachers motivate students and guide their learning by helping them understand requirements, providing regular feedback on progress made, and ensuring that they are able to learn challenging curriculum content and acquire complex skills (Pitler et al., 2015)

Proper selection of tasks and solving them develops creativity and shapes the ability to analyze, conclude and adopt an active attitude towards problems.

By giving students opportunities to share and discuss ideas and develop collaborative skills, teachers encourage students to actively participate in their own learning process.

For the student to understand the content of the curriculum, strategies must be implemented to help students relate their newly acquired knowledge to what they have already learned. These strategies make it easier for teachers to use students' prior knowledge as a basis for introducing new information. In order to assimilate and relate new messages, students need to understand, organize and remember them.

Understanding is a dynamic thought process. Students recall information they already have, put forward and check hypotheses, correct misconceptions, fill in missing knowledge and identify incomprehensible fragments. From this perspective, the situation forcing remote education in which we find ourselves is quite a challenge, because the conditions prevailing here are an obvious limitation. You should take care of relationships and ties with students by talking about behavior during a pandemic in a manner appropriate to the age, abilities and needs of students around three levels, regarding facts and beliefs: what is our opinion about the pandemic, how do we perceive our situation, what we think about ourselves in this situation and our feelings: how we feel during a pandemic, what we fear and what brings us relief ( Bilicki, 2020). This is a chance to spot something that sometimes misses our daily routine.) The teacher should try to design the course of the didactic process in such a way that the time spent at the monitor was varied as much as possible with various activities (Kaczmarzyk, 2020).

The observations, experiences and exercises recommended by the teacher to the students should not require activity related to the exploration of resources on the web. Sound recording, analysis of a fragment of a text or execution of instructions in accordance with the instructions for exercises will be much more beneficial for the student.

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E-learning covers all forms of supporting the learning process with information and communication technologies.

The most popular form of distance learning is e-learning, i.e. distance learning with the use of Internet technologies. Along with the development of mobile devices, m-learning is developing quite dynamically, as learning with the use of devices such as: smartphones, tablets, and mobile devices. The implementation of distance learning methodology increases the quality and attractiveness of biological education.

The goals of education developed for the implementation of biological education at the level of primary and secondary schools are closely related to acquiring knowledge, skills and social competences using such teaching methods as: case studies, moderated discussions, solving problem tasks, practicing teamwork skills. Achieving the assumed educational goals requires from students active participation in classes, independent study of the literature on the subject, or performing exercises and design works. The methodology of distance learning finds particular application in supporting the learning process in the field of student's own work.

There is a belief that it is best to teach remotely in real time (online meetings). However, it is also very good to prepare materials and plan effective non-simultaneous teaching (sending materials for analysis).

Research conducted by Professor John Hattie (2015) determines the effectiveness of the method of assigning homework to students. Asynchronous teaching often occurs as assigning students work to be done, therefore the concept of "visible learning" introduced by the author is very accurate - not only is it easy to remember, but also easy to interpret, and thus put into practice in school. It signals the shift of attention from the teaching process to the learning process, which is crucial for contemporary education, and creates a place for the concept of feedback that is recognized as a very important concept.

Hattie analyzes the effectiveness of various teaching methods and interventions. On his scale, an intervention that has a score greater than 0.4 is worth using.

The use of homework has an index of 0.4, but it varies according to the level of school: for secondary schools it is 0.5, but for primary schools it is close to zero and is minus 0.08.

It is not easy to indicate how to teach the issues in the age of a pandemic. Great opportunities are offered by working with the method of an educational project, which, especially during remote work, also develops communication skills, the ability to resolve conflicts and creativity. It is worth trying to introduce students to the world of values and cooperation. The basis of education in the era of a pandemic is to adjust the pace of improving digital competences, wider use of Internet resources and various communication tools in the implementation of the content of the general education core curriculum. The educational usefulness and attractiveness of the tools supporting the teaching process result from the basic features of information and communication technology, which include not only the ability to process, collect and visualize information, but also the ability to transmit it and interactivity (Pyżalski,

2020). In this respect, the Internet is an invaluable tool and the use of its resources in the process of transferring and acquiring knowledge. It can be a means of communication and a source of information for both the teacher and the student. Debates, discussions, WebQuest and various types of analyzes and reports used in remote education, for which it is worth using a spreadsheet and tools for visualization and data presentation (e.g. presentations, presentations (prezi.com, 2020), infographics (www.canva.com, 2020) also offer great opportunities in teaching (Cieśla, 2020). It seems important to pay more attention to the individualisation of work with students and the activation of students. Students should be involved in problem-solving activities by participating in various types of pro-ecological campaigns that promote a healthy lifestyle and sustainable development. Both WebQuest and the project should concern problems related to the local community and lead to obtaining a specific product. This can be, for example, a social initiative project, a land development project, a waste disposal site project, an environmental report, a public opinion poll report, a diagnostic survey, etc. You can use any web design tool (e.g. Google Sites (e.g. sites.google.com, 2020), a WebQuest generator (ii.uwb.edu.pl/generator, 2020) (Cieśla, 2020).

Work should be done to make students open to work with the use of multimedia tools. Remote work can inspire students to self-control and independence. It cannot be achieved without the cooperation of teachers, mutual help and good cooperation with parents.

How to teach? For example, using e-textbooks. Teachers and students have access to e-textbooks and e-materials for most issues at all stages of education, as well as additional teaching resources for specific subjects, including educational films and audiobooks. So everything that has so far played a marginal role. Warto również skorzystać z linków do materiałów edukacyjnych. Scientific research does not provide evidence that synchronous learning leads to better student engagement and learning outcomes than asynchronous learning, it is the most effective way to integrate interpersonal interaction into online learning, it is highly beneficial and paves the way for effective classroom management and helps students deal with the emotional effects of a pandemic. It is therefore necessary to pay attention to the fact that the age and development of students has a profound influence on their ability to choose the correct way of learning online (Anthony D. and Marshall T., 2020). One of the main benefits of asynchronous online learning is that it provides greater flexibility, allowing students to set their own schedule and work at their own pace. In many ways, asynchronous online learning is similar to homework (Anthony D. and Marshall T. 2020, Sochacka, 2021).

Distance learning requires skills that allow students to plan, pursue goals, solve problems, and be creative. Most importantly, these skills develop in childhood and adolescence.

It is also worth paying attention to the skills of the students. Contrary to the fact that successive generations grow up surrounded by modern technologies, this does not translate into their ability to use knowledge during online classes. According to the report of the PISA study (Program for the International Assessment of Students' Skills)

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(2015 and 2016), the aim of which was to assess the skills of students aged 15 and over, Polish students have problems with the use of ICT.

The use of a variety of educational tools that engage different senses and guarantee interactivity is at the heart of distance learning (Ostrowska and Sterna 2015).

Why skills are so important today?

Skills are among the key factors influencing the standard of living in the 21st century. Today, resources of appropriately shaped skills play a special role in social development. The current changes resulting from globalization, technological development, increased migration, and urbanization determine the set of skills that determine success in social life and on the labor market. These include primarily digital skills in terms of readiness to learn, critical thinking, problem solving, teamwork, or adaptation to new conditions.

In 2019, the Ministry of National Education published the text of the Integrated Skills Strategy, the aim of which is to create opportunities and conditions for the development of skills necessary to achieve a high quality of life. The implementation of this goal is based on several priority areas, including raising the level of key skills in children, adolescents and adults, developing and disseminating a learning culture focused on active and continuous development of skills (Zintegrowana Strategia Umiejętności 2030, 2019).

Today, the key competences for lifelong learning, essential for self-fulfillment and personal development, are extremely important, as they represent the dynamic combination of knowledge, skills and attitudes that learners must develop.

They include, among others competences in the selection and creation of information in the mother tongue and foreign languages, mathematical, natural and digital skills, as well as social competences (European Commission, 2018; europa.eu, 2020).

In this context, the question arises: *what competences a teacher should have to meet the teaching tasks of the 21st century.*

These include competences directly related to the course of interaction between the teacher and the student in remote education, presenting the content in the form of problems to be solved, which requires, in addition to a well-established methodology of distance learning, also creative abilities, as well as the ability to clearly communicate and enforce school requirements as well as substantive and emotional support student in their implementation. From the document of the Integrated Skills Strategy (2019), important issues emerged regarding equipping pupils and students with skills, thus increasing their educational activity and striving to develop a culture of lifelong learning.

### 3. The research project

The research was mainly quantitative and was carried out using the diagnostic survey method using an individual anonymous online survey. In order to collect the

data, questionnaires for biology teachers were used. The study included 50 primary school biology teachers in the Małopolskie Voivodeship. Although the study focused mainly on the method of implementing distance learning, it also included questions related to the wider context of this form of teaching - learning. The main aim of the research was to identify the didactic process during the pandemic. In the area of research interest there were primarily issues related to distance education, but they were significantly expanded to include other important issues relating to the functioning of the respondents in the private sphere, their mental health (including issues related to the use of information and communication technologies) and social.

## 4. Results

The most numerous group of respondents (33%) were teachers with more than 15 years of experience in the profession. Two groups of 27% are people with 6-10 years and 0-5 years of experience. The least numerous group (13%) were teachers with 11-15 years of experience. 77% of the respondents are teachers working in a primary school. Due to the subject taught, the largest group consisted of teachers of biology and chemistry. 77% are teachers with a university degree in biology.

Before starting distance learning, teachers stated that their level of preparation was poor (27%) and average (35%). Currently, during the course of the classes, the level of preparation has increased significantly (47% - good, 49% - very good) (Fig.1).

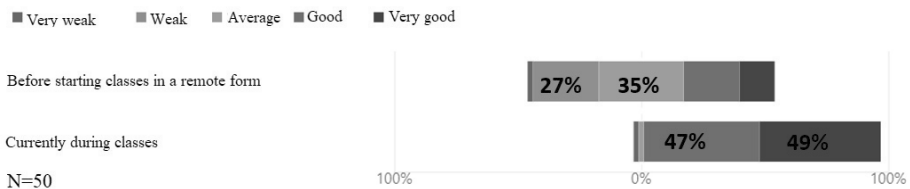


Fig.1. The level of the Teacher's preparation for conducting classes carried out remotely

The time to prepare the proposal of didactic solutions per one lesson in remote teaching, compared to full-time teaching, was twice as long for 55% of the respondents. The preparation time was three times longer and the same was 22.5%.

The degree of use of materials found on the Internet by teachers in classroom teaching was as follows: 41% - very often, 35% - sometimes. On the other hand, in distance learning, it increased significantly by 25% - always, and by 47% - very often. The materials made by the teacher were more often used in classroom teaching (always - 25%, very often - 47%), and in distance learning: 47% - very often, 25% - sometimes.

During distance learning, there was a great variety of ways to conduct classes. Multimedia presentations were most often made available to students (49% - often, 31%

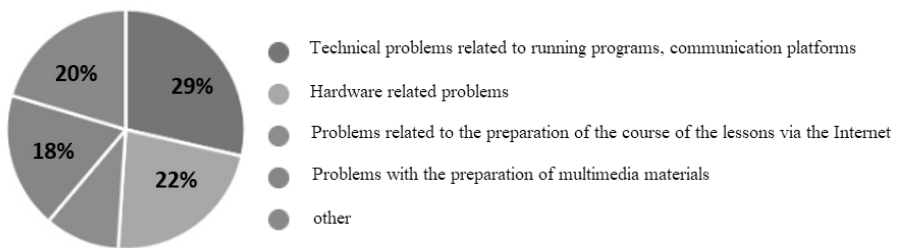


- very often). Very often (25%) and often (55%) teachers carried out tests, quizzes and tasks. The platforms and applications provided by publishing houses were also popular (37% - often, 27% - sometimes). Very often (43%) individual online consultations were carried out with the student. Consultation with a student using instant messaging (eg Messenger) - rarely (25%), often (25%). Asynchronous remote classes were rare (67%), sometimes (27%). Tasks for students to do independently at home were asked sometimes (45%) and rarely (33%). On-line tasks performed by students, e.g. on the platform, were sent frequently (29%), sometimes (45%), rarely (20%). Teaching materials were rarely (45%) or sometimes (31%) provided by e-mail.

During remote classes, the teacher used Microsoft Teams (always - 37%, very often - 22%) and Google Classroom / Google Meet (always - 33%) among communication platforms. 41% of respondents have never used Facebook / Messenger, 39% Zoom, 80% AnyMeeting, 71% - Moodle. During the classes, Google Drive was used very often (27%), Onedrive (14%).

When preparing for classes and during distance learning, the most popular were a laptop (still - 86%), a printer (often - 27%, still - 22%), a scanner (often - 33%, still - 18%). Teachers used the computer to a lesser extent (never - 69%, tablet - 47%).

The main problems that arose with the new way of teaching concerned the ability of some students to access computer equipment and Internet access at home, or in the case of large families, limited computer access. Most students (82%) encountered technical difficulties while participating in remote classes. The biggest problems with the preparation and conducting of classes resulted from the launch of programs and communication platforms (29%). Hardware problems during distance learning were reported by 22% of respondents. On the other hand, other causes occurring to a lesser extent are: problems with the preparation of multimedia materials and teaching aids (18%) and with the preparation of the course of the lesson (11%) (Fig.2).



N=50

Fig.2. The causes of problems related to the preparation and conduct of classes

The common forms and methods of teaching used during lessons in remote classes were: films (76%), discussion (67%), lecture (55%), observations (53%), experiences (43%), working with text (43%), reverse lesson (35%), other (39%). However, group work was rarely used (33%) (Fig. 3).

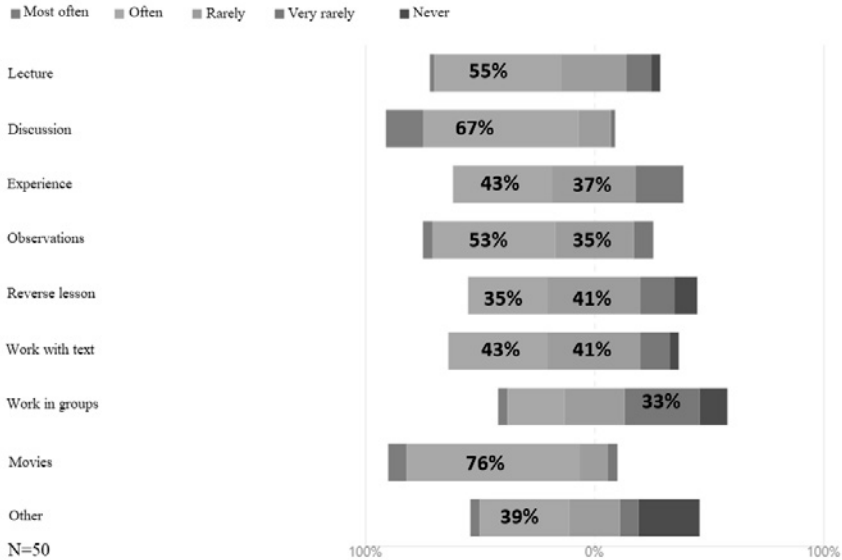


Fig.3. Forms and methods of teaching during remote lessons

Most teachers during distance learning, as many as 78%, used gamification during lessons. In turn, according to the respondents, remote learning caused a decrease in the level of students' interest in the subject during classes.

Open-ended questions were also used in the survey. One of them was the proposal of additional forms of work with students that can be carried out remotely. Below are the statements:

- educational projects,
- biological circles, interest circles,
- preparation for competitions and exams,
- extracurricular activities,
- consultations on observations and experiments performed by students,
- consultations regarding field work and breeding,
- consultation with parents,
- consultations in student groups,
- online after-school meetings - reading books, watching movies together, etc.

## 5. Conclusions

The pandemic surprised all students, teachers and parents. Overnight, there was a need to face completely new, unknown problems, e.g. how to implement a program

in a new reality? how to adapt didactics taking into account the individual needs of students? how to convince students to make more intellectual effort?

It should also be taken into account that teachers of different ages were prepared to a different degree to master and use modern information and communication technology. However, they rose to the occasion, proved to everyone that they are open-minded and creative, that they have open minds and, despite the under-financing and diminishing the rank of the profession, are able to meet any challenge. The teachers ensured the implementation of the teaching process in a manner adapted to the students' abilities. The conducted research allowed us to be sure that remote education is the tool that comprehensively responds to new challenges. Regardless of the nature of the classes, the type of lessons (exercises, teaching lessons), the general rule should be the maximum activation of students. Students often have cameras turned off (personal reasons, problems with the Internet), rarely use the chat function or other forms of direct communication. Classes take too long for the teacher to control the group with which the contact consists in observing the icons with the initials of their participants.

A more advantageous situation is when the lessons consist of thematic modules, e.g. 30 minutes each, in which you work in smaller teams and report the results to the rest of the group. Hybrid forms of education can be introduced, i.e. synchronous and asynchronous forms.

Summing up, remote learning has contributed to the increase in teachers' digital competences, as shown by the results of research by the Faculty of Pedagogy of the University of Warsaw (Plebańska and others 2020) regarding digital tools used during online lessons, learning new programs, applications, modifying methods and forms of work. Pyżalski (2020) and Cieśla (2020) think similarly, confirming the usefulness of information and communication technology tools supporting the didactic process.

The results of our research indicate that among students the interest in biological problems has decreased, despite the increased time for teachers to prepare proposals for teaching solutions per one lesson in remote teaching, compared to stationary teaching.

A similar opinion is expressed by students of secondary schools (who attend schools in the Mazowieckie and Małopolskie Voivodeships) on the effectiveness of remote education and the development of their interests. The vast majority of students have a negative opinion on this topic. Similarly, students assess the motivating function of such activities, the level of which decreased significantly during on-line lessons (Plebańska et al. 2020). A factor that could influence the involvement of students in distance learning is the attractiveness of the materials and resources they use when operating in virtual reality. It turns out that the materials most often shared by teachers are materials that they develop themselves or send their pupils links to ready-made materials on the Internet. Sometimes the participants of the study also received links to multimedia presentations, videos or other interactive exercises (Plebańska et al. 2020).

However, attention should be paid to the extremely important fact that the educational process cannot ignore the development of the emotional sphere. The situation of isolation, prolonged lack of contact with peers may negatively affect not

only the well-being of young people, but also the effectiveness of their work. The most important task of the teacher-educator is to coordinate the interaction between the teacher and students and to maintain relations between peers, therefore it is necessary to provide time for mutual contacts in the weekly timetable (Witkowski, 2020).

Remote learning is a discipline we all learn. It is similar with the organization of distance learning - we do not have experience or proven solutions in this area. However, it can be said that thanks to distance learning during the pandemic, new didactic solutions were created, which will certainly remain used regardless of the course of the teaching process in a remote or stationary form.

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**Information about Authors:**

Dr hab. Alicja Walosik – profesor Uniwersytetu Pedagogicznego im. Komisji Edukacji Narodowej w Krakowie. Jest biologiem – dydaktykiem biologii. Jej badania naukowe koncentrują się w obszarze nauk przyrodniczych m.in. wokół tematyki związanej z edukacją ekologiczną i środowiskową. Publikacje obejmują problemy dydaktyki biologii, przyrody i ochrony środowiska na wszystkich szczeblach kształcenia przyrodniczego i biologicznego.

**Kontakt:**

e-mail: [alicja.walosik@up.krakow.pl](mailto:alicja.walosik@up.krakow.pl)

Dr hab. Ilona Żeber-Dzikowska – profesor Uniwersytetu Jana Kochanowskiego w Kielcach. Wicedyrektor ds. ogólnych Uniwersytetu Jana Kochanowskiego w Kielcach, Wydziału Pedagogiki i Psychologii Instytut Pedagogiki. Zajmuje się współczesnymi problemami nauk pedagogicznych, społecznych, biologicznych i środowiskowych, zrównoważonego rozwoju, lokalnymi działaniami środowiskowo-edukacyjnymi wśród szerokiego spektrum wiekowego dzieci, młodzieży i dorosłych. Ponadto w przestrzeni jej zainteresowań jest problematyka badawcza obejmująca zagadnienia z metodyki nauczania, dydaktyki biologii i ochrony środowiska oraz przyrody na różnych etapach kształcenia. Autorka książek, programów i wykładowca studiów podyplomowych dla nauczycieli z przyrody i biologii. Zainteresowania z obszaru nauk społecznych, w zakresie badań dotyczących bezpieczeństwa człowieka w aspekcie zdrowotnym, środowiskowym, itp. oraz ujęciem nowych obszarów wolności i zniewolenia człowieka. Przewodnicząca Ogólnopolskiej Sekcji Dydaktyki Biologii Polskiego Towarzystwa Przyrodniczego im. Kopernika. Członek Zarządu Głównego Polskiego Towarzystwa Przyrodników im. Kopernika przy Uniwersytecie Jagiellońskim w Krakowie. Honorowy członek Rady Programowej Europejskiego Centrum Kształcenia Ustawicznego i Multimedialnego Uniwersytetu Pedagogicznego w Krakowie – ECKUM.

**Kontakt:**

e-mail: [ilzebdzik@ujk.edu.pl](mailto:ilzebdzik@ujk.edu.pl)

Dr Kinga Wierzbicka – doradca metodyczny ds. biologii i przyrody szkół podstawowych: powiat krakowski i Miasto Kraków, doktor nauk biologicznych, nauczyciel przyrody, biologii, fizyki i chemii w SP nr 135 w Krakowie. Nauczyciel Uniwersytetu Dzieci, przewodniczący zespołu matematyczno-przyrodniczego, egzaminator OKE, autorka publikacji z zakresu ekologii i dydaktyki biologii.

**Kontakt:**

e-mail: [k.wierzbicka@mcdn.edu.pl](mailto:k.wierzbicka@mcdn.edu.pl)