FORUM PEDAGOGICZNE

2022, 13, 2: 367–380
p-ISSN 2083-6325; e-ISSN 2449-7142
DOI http://doi.org/10.21697/fp.2022.2.27

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LEARNING ABOUT LEARNING AS AN ESSENTIAL ELEMENT OF HIGH-QUALITY EDUCATION

UCZENIE, JAK NALEŻY SIĘ UCZYĆ JAKO NIEZBĘDNY ELEMENT WYSOKIEJ JAKOŚCI KSZTAŁCENIA

Streszczenie: W artykule zwrócono uwagę na zagadnienie efektywności kształcenia oraz podnoszenia jej jakości, nawiązując do założeń 4. Celu Zrównoważonego Rozwoju. Uznano, że obecnie dużo uwagi poświęca się wdrażaniu narzędzi edukacyjnych usprawniających nauczanie, szkoleniom nauczycieli czy zapewnianiu właściwej infrastruktury. Niewiele czasu przeznacza się natomiast na uczenie uczniów stosowania skutecznych metod uczenia się. W tekście przywołano badania z zakresu podejmowanych praktyk podczas uczenia się. W ostatniej części zaproponowano modele podnoszenia jakości kształcenia poprzez wzmacnianie komponentu „uczenia się" uwzględniającego określone zmienne, bezpośrednio i pośrednio wpływające na przyswajanie wiedzy i umiejętności.

Słowa kluczowe: uczenie, jak należy się uczyć, jakość edukacji, 4. Cel Zrównoważonego Rozwoju, model podnoszenia jakości edukacji.

Abstract: This article highlights the issue of educational efficiency and enhancing the quality of education, referring to Sustainable Development Goal 4. It has been recognized that much attention is now being paid to implementing educational tools to improve teaching, teacher training, or the provision of appropriate infrastructure. In contrast, little space is dedicated to teaching students to use effective learning methods. The text cites research on the range of practices undertaken during learning. The final section proposes models for enhancing the quality of education by strengthening the "learning" component that takes into account specific variables that directly and indirectly affect the acquisition of knowledge and skills.

Keywords: learning about learning, quality education, SDG 4, model of enhancing the quality of education.

Introduction

Included in the issue of high-quality education is the concept of educational efficiency. Educational effectiveness itself belongs to the research category of general didactics, which deals with "(...) the teaching and learning process, the conditions under which it takes place and the effects, i.e. the results" (Kupisiewicz 1996). Educational efficiency is not a clear-cut concept. As Rafał Wawer points out, at the end of the twentieth century, it was considered to enhance the learning process quality, and only in the twenty-first century has scientific research in this area been expanded (Wawer 2021). Continuing the previous research directions in the field of educational effectiveness, the features of the educational process were analyzed in terms of learning outcomes, i.e. knowledge, skills, abilities, interests, habits, fulfillment of set tasks and educational goals, etc. However, additional space has emerged for research on educational effectiveness in aspects including such issues as the student's individual development, including cognitive abilities, thinking processes, interests, cognitive independence, and learning styles. Efficiency issues can also be related to the benefits achieved through educational processes, which then affects the assessment of the quality of education determined from an individual, economic, social perspective, etc.

In this article, the effectiveness of education will be narrowed down to the issue of learning, a vital issue for building a knowledge society and achieving SDG 4, if only in terms of the task of lifelong learning. Instead, the fundamental aim is to create a proposal for an educational model in which didactics is extended to include the learning about learning component.

Raising the quality of education as the fulfillment of the fourth goal of the Sustainable Development Agenda

The identified most pressing problems of today's world are reflected in the 17 Sustainable Development Goals included in the 2030 Agenda for Sustainable Development. The document is a development plan for the world, currently still for the next eight years. To a certain extent, it implies an algorithmized program of activities proposed in specific tasks assigned to objectives. Their implementation means carrying out pro-social tasks, and developing an inclusive and knowledgeable society while simultaneously developing the economy and protecting the environment.

One of the objectives is to guarantee quality education for all and promote lifelong learning (Goal 4). It was recognized that quality education is the basis for improving people's lives and for sustainable development. At the same time, it was noticed that the reasons for the low quality of education are, among others, the lack of adequately trained teachers, poor conditions in schools, or unequal access to schools for children from rural areas (https://sdgs.un.org/goals/goal4).

The need to improve the quality of education signaled in Goal 4 is also a response to the educational crisis. It is a global problem in the modern world and is increasingly recognized in the Polish education system (Klimski 2018).

Education has an enormous impact on human life and its quality and is an integral part of personal and social life (Kojs 2010, p. 38). An awareness of constant and unpredictable change should determine our thinking about education. It is a mistake to build on solutions developed in the past. As Przybyszewski points out, "for the first time in the history of mankind, the Enlightenment was assigned the task of preparing the individual for a type of society that does not yet exist in a changing world order" (2007, p. 79). It is, therefore, essential to be prepared to grapple with the unknown, so critical thinking and responsible engagement should be considered attributes of the modern world (Mazurkiewicz 2012, p. 7).

Education is crucial in shaping the future, human development, and solving social problems. It is, therefore, essential to invest in human capital, which would carry with it a progression in the development of knowledge, skills, competencies, and attitudes, ultimately serving the common purpose. Knowledge is the product of man, the result of his creative cognition, and gives him the ability to foresee the future and improve the world. The tool, however, is the reason which should bring man closer to the truth. It is, therefore, not just about the production of knowledge, its utilitarian perception, or pragmatic products, but about the rational management of knowledge, taking into account the preservation of the balance between the material and the non-material (Klimska 2015, p. 308).

Nowadays, much attention is paid to the quality of education to improve competencies, apply knowledge in practice, and teach problem-solving. It seeks to shape a society of permanent education, a society of knowledge. This highlights the need for proper infrastructure, modern equipment, teacher training, and the implementation of educational tools to enhance and enrich teaching. Quality education is not synonymous with achieving only these objectives. Concept 4 of the SDG omits the essential element of providing quality education through effective learning methods. Education for Sustainable Development (SDE) should not be limited to providing comprehensive education or promoting "sustainability", understood as caring for future generations. SDEs should also take into account factors that directly and indirectly affect the quality of education in terms of both teaching (the *transfer of knowledge)* and independent *learning*. In this way, we take a systemic approach to the education process by assuming that the various elements of the process are mutually determining and interdependent. Implemented selectively, they are not as meaningful and effective as their holistic practice can guarantee. In order to implement an education model framed in this way, its *learning* component needs to be strengthened.

Propitious conditions and effective methods of learning

Learning has been conceptualized as "a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning" (Ambrose et al. 2010) The aforementioned definition describes two results that are expected to occur: (1) an indirect effect (*increases the potential for* (...) *future learning*) and (2) a direct one *(increases the potential for improved performance*). Therefore, **learning about learning** meets the prerequisite of sustainable education in a twofold way. The awareness of propitious conditions for learning allows for non-learning behavior that raises the effectiveness of future study sessions. Conversely, efficient learning strategies enhance learners' skills and knowledge acquisition over a single study session. It has been recognized that neuroplasticity (structural plasticity) is a process that is "both necessary and sufficient for learning and memory" (Sweatt 2016). The evidence has been found that the neuroplasticity of an individual can be influenced by non-learning factors, as well as learning-specific actions. This chapter elaborates on non-learning conditions for effective learning and subsequently the strategies for efficient learning.

Both physical (Denis et al. 2013) and mental health (Breslau et al. 2008;, Cranford et al. 2009; Keyes et al. 2012; Thompson et al. 2013) impact learning ability. For instance, it's been shown that inadequate nutrition in the early stages of development can cause permanent impairment of mental functioning (Dani et al. 2005). Malnutrition, resulting from insufficient, excessive, or improperly balanced consumption is detrimental to learning (Parker et al. 1989). Conversely, a diet rich in protein, fat, B vitamins, iron, choline, and antioxidants has been shown to promote healthy brain functioning (Wolfe et al. 2000). Similarly, conditions like anxiety (Jadue 2001) and depression (Kessler 2012; McArdle et al. 2014) are detrimental to learning. Yet, in 2015 it was estimated that 65 pct. of young people experience symptoms of depression and 25 pct. require immediate treatment (Dymowska, Nowicka 2015). These phenomena can be mitigated. Notably, prevention interventions during which learners are taught methods of self-regulation and healthy attitudes have been shown to be effective (Durlak 1998; Lecic-Tosevski et al. 2003). Another vital factor influencing neuroplasticity is sleep. According to research, sufficient sleep enhances dendritic growth in the brain (Li et al. 2017). Moreover, sleeping has been shown to positively impact both physical and mental health (Tahmasian et al. 2020). According to a 2015 article by the US National Sleep Foundation, the recommended amount of sleep varies across age groups: preschoolers 10 to 13 hours, school-aged children 9 to 11 hours, teenagers 8 to 10 hours, and adults need 7 to 9 hours of sleep. Alas, up to 50% of children experience sleep issues, ranging from mild to severe disorders (Carter et al. 2014). It is believed that resting is a common practice among youngsters. However, studies have shown that the type of resting employed matters greatly. In a 2015 study, the learning outcomes after taking a short break consisting of (i) eyes-open idle resting, (ii) listening to music, and

(iii) playing a video game, were measured. Based on linear mixed-effects modeling it was found that playing a video game has led to a decline in task performance in comparison to the two previous resting methods (Kuschpel et al. 2015). These findings are in accord with the following theory. During a virtually idle (inactive) rest, the brain engages in what cognitive science describes as a default or diffuse mode, as opposed to a focused mode (Cabrales 2016). Interleaving study sessions with idle rests positively impacts psychosocial mental processing (Immordino-Yang et al. 2012), creative and abstract thinking (Takeuchi et al. 2012), divergent thinking, and reading comprehension (Immordino-Yang et al. 2012). The aforementioned study did not consider active rest (i.e. engaging in sports). Nevertheless, a plethora of evidence suggests that regular physical activity is of major importance for health and neuroplasticity (Vorkapic et al. 2021). Enhancing the formation of new neurons (Liu and Nusslock 2018) and preventing neuron loss (Kim et al. 2017) – both occurring in the hippocampus – are some of the benefits of a consistent exercise routine. Additionally, a range of physical and mental health benefits has been linked to physical activity (Warburton et al. 2006). Similarly, practices enhancing interoception (such as mindfulness and meditation) have been linked to improving mental health and reported well-being and to positively impacting neuroplasticity (Gibson 2019). Furthermore, the benefits of these practices overlap with tackling sleeping problems. A 4-year-long study conducted in 2012 found favorable results among 41 patients with chronic insomnia who underwent cognitive behavioral therapy or *yoga nidra* practice (Datta et al. 2021). Lowering the levels of cortisol – famously named "the stress hormone" – has led to improvement in the sleep quality of subjects. By contrast, high levels of this hormone have been correlated with impeding the functioning of memory and the development of mental disorders (Schwabe et al. 2022). It is then evident that regular physical activity and interoceptive practices lead to improvement in closely intertwined areas of memory, learning, health, and well-being of individuals. The last condition for effective learning described in this subsection is motivation resulting from learners' belief systems. When students lack the will to learn, it contributes to such phenomena as, i.e. procrastination. In 2007 Dweck's work introduced a concept of *growth* and *fixed mindsets*. These terms refer to one's belief about the nature of intelligence and abilities. If one thinks that every accomplishment is due to talent and innate abilities, that accounts for a fixed mindset. Conversely, if one believes that skills and acquired knowledge are a result of effort and a learning process, a growth mindset is observed. Studies have shown that the latter contributes positively to academic performance (Zintz 2018). Moreover, it's been demonstrated that an online intervention (lasting less than an hour) has improved grades among low-achieving secondary school students (Yeager et. al 2019). Additionally, the concept of growth and fixed mindset corresponds to a categorization of motivation as *intrinsic* and *external*. Intrinsically motivated learners study because of being virtually interested in the study contents. Externally motivated learners do so

to obtain external rewards, such as an increase in wealth. It has been found that internal motivation contributes to more in-depth learning and to more perseverance (grit) when facing difficulties (Kyndt et al. 2011). Since teachers have been shown to have a considerable impact on learners' beliefs and performance (Pope, Petek 2017) both intrinsic motivation and a growth mindset can be instilled in classroom settings.

Neuroplasticity can also be enhanced through learning-specific strategies. For instance: *planning to learn*, as a solution to the lack of motivation. Planning is a psychological tool that has been shown to increase the probability of following through with one's commitments (Oakley and Seynowski 2018). Another highly effective, and recognized for over a hundred years, strategy is *chunking*. It consists of dividing the material that is ought to be learned into smaller portions. Chunking has been shown to improve memory performance as a consequence of lowering the load of working memory (Gobet et al. 2011, Zhang and Du 2022). The subsequent strategy is referred to as *recall* or *active recall*. It is based on frequent attempts of recalling the study content. In 2012 research, Karpicke and Roediger compared rereading (a classical approach) to retrieval-based practice (recall). A single attempt of recall has doubled students' ability to retain knowledge over a long period and subsequent repetitions have amounted to a 400 pct. improvement (Karpicke 2012). In 2013 Donlosky analyzed and described ten learning strategies. The first two were said to be the most effective. The subsequent three were described as "promising". The last five were shown to be highly ineffective. The first strategy was *practice testing*. It consists of frequent self-testing of learners' knowledge. It's been shown to positively contribute to learning performance (Abbot 1909). Students who implemented this strategy before taking an exam had better results than those who haven't (McDaniel et al. 2011). The second most efficient strategy mentioned by Dunlosky was *distributed practice*. It involves spreading study sessions over time. Research has shown that, when the same total learning time was kept for both groups, the one that distributed learning regularly over time has been able to retain knowledge longer (Cepeda et al. 2006). The first strategy described as "promising" was *interleaved practice*. It involves designing a learning session in a fashion that requires learners to switch between different components of a single field. For instance, in the case of language acquisition a learner switches between studying grammar, vocabulary, and conversation practice. A study of two groups where the first one deployed *massed practice* (repeating a single concept until achieving mastery) and the second one used interleaved practice (never repeating the same problem twice) was conducted. It was found that the first group had a 90 pct. accuracy during the test on the same day, in comparison to 60 pct. of the second group. However, when the examination was conducted after a longer time, the first group's results dropped to 20 pct. accuracy while the second group was able to recall the concepts with similar accuracy (Dunlosky et al. 2013). The last two "promising" strategies are of similar nature. *Elaborative interrogation* stands for

the practice of questioning new information and seeking a rationale for every new piece of knowledge. *Self-explanation* requires learners to explain the relationship between new information and previously acquired knowledge. A study of these has shown ambiguous results. When students attempted to learn new concepts, their results were 90 pct. accurate, compared to 30 pct. of the group that didn't deploy any of these strategies (Berry 2006). However, when applied to a known problem, no difference in recall accuracy was observed. The strategies discouraged by Dunlosky due to their ineffectiveness were: text highlighting, rereading (also referred to as cramming), the use of keyword mnemonics, summarisation, and creating images to enhance text learning. They have been deemed ineffective on the basis of showing little-to-none improvement in student performance, being much more time-consuming, and/or their results not being long-lasting in comparison to more effective methods. For instance, highlighting has even been shown to be detrimental – in one study students deploying this method have drawn fewer conclusions from a history textbook than a control group. However, a notion has been made that mnemonics have been helpful in the field of language acquisition or when other methods failed.

A three-stage model of enhancing quality education

A range of conditions positively impacting neuroplasticity, alongside effective methods of self-learning has been analyzed. As a consequence, a model for implementing these concepts into different stages of public education will be proposed. The main factor differentiating between chosen stages is the autonomy of a learner and his ability to comprehend certain concepts. As a consequence, key agents in this model will be **parents**, **educators (teachers)**, and **learners**.

During pre-primary education, learners find themselves in early childhood. In these years, one undergoes significant development but is not yet an autonomous identity. Learners at this stage are completely dependent on their **parents** and educators, the first ones being the key agent in the three-stage model. Moreover, the occurrence of malnutrition and lack of physical activity in these years can have a tremendous effect on learners' future. Therefore, it is advised to create propitious conditions for neuroplasticity during this period of the learner's life, as he is unable to provide it to himself. However, providing the rationale for such actions to the learner can be omitted (or simplified), as he is not yet ready to comprehend it. Parents and educators have been shown to have a significant impact on learners' beliefs and self-esteem. Nurturing internal motivation and instilling a growth mindset will create a strong basis for learners' future learning and thriving. This can be achieved through praise based on effort (not intelligence or talent), encouraging the committing of mistakes (as the only path to learning), and discouraging self-comparison to peers (Dweck 2006). Additionally, encouraging

interoceptive practices can help children self-regulate and counteract the effects of stress and uncertainty.

During primary education, a learner is confronted with the responsibility and duty of delivering assignments and preparing for examinations. Therefore, in this phase of a learner's development (middle childhood/pre-adolescence), one is in need of effective tools for learning. It is advised to expose students to a range of methods they can employ so that they can form their own toolkit, tailored to their traits and needs. Additionally, each school subject requires different methods and is associated with different best practices of self-study. Therefore **educators** – the key agent in the second stage of the proposed model – ought to implement effective methods for learning into their teaching and present them to learners. A continuous encouragement of internal motivation and a growth mindset will synergize with the training mentioned above.

Secondary education, occurring during adolescence, is the third stage of the proposed model. During this time, **learners** pass from childhood into adulthood. As a consequence, they become independent in their thinking and acting which makes them the key agent of the last stage. Provided with propitious conditions (pre-primary education) and empowered with effective methods (primary education) for learning, they ought to be encouraged to experiment with their learning toolkit. At this stage, learners should be comprehensively informed about both mental and physical conditions for effective learning. Such awareness will empower them in their future learning and prepare them for the demanding task of acquiring higher education. Additionally, they are autonomously choosing their nutrition, sleeping hours, and free time activities. Therefore, the role of parents becomes less vital and learners must take on full responsibility for their future conditions.

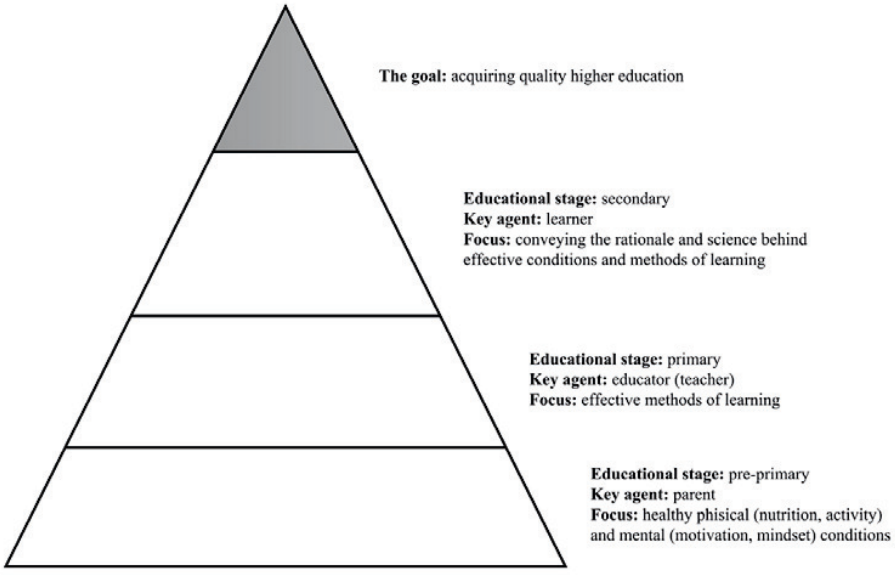

Diagram 1. Three-stage model for ensuring high-quality education

Source: own study.

The research cited above demonstrates that commonly known strategies used in the learning process can often prove ineffective. There are several variables influencing the acquisition of knowledge and skills. The proposed model illustrates their importance at different stages of student development. Bearing in mind the question of the participation of the different actors and subjects in education, broadly understood as support for the student in the educational process, with particular emphasis on the learning module, a general model of the student's educational environment can be outlined (diagram 2).

Central to this model is the pupil (learner), who can receive support at school from teachers and educators in the form of work based on effective teaching and learning methods, as well as help with learning difficulties. No less important is the student's out-of-school environment, where the learning process is genuinely influenced by parents/guardians, out-of-school educational institutions (e.g. psychological-educational counseling centers, careers advice centers), institutions offering extra-curricular activities (e.g. sports, development of interests, talents, tutoring) and contact with the natural environment. The student's closest environment – the home environment – is crucial, especially in the initial stages of formal education, during which the parent/guardian not only helps the child with their studies but has a real influence on the functioning and organization of their entire day. This is an essential moment in the implementation of a learning model extended to include elements that indirectly affect knowledge acquisition and brain fitness, such as:

- a diet rich in unsaturated fatty acids, antioxidants, complex carbohydrates, vitamins, zinc, magnesium, iron, lecithin (Ekstrand, Scheers et al. 2021),
- physical activity that reduces stress, improves the functioning of the brain, i.a. focus,

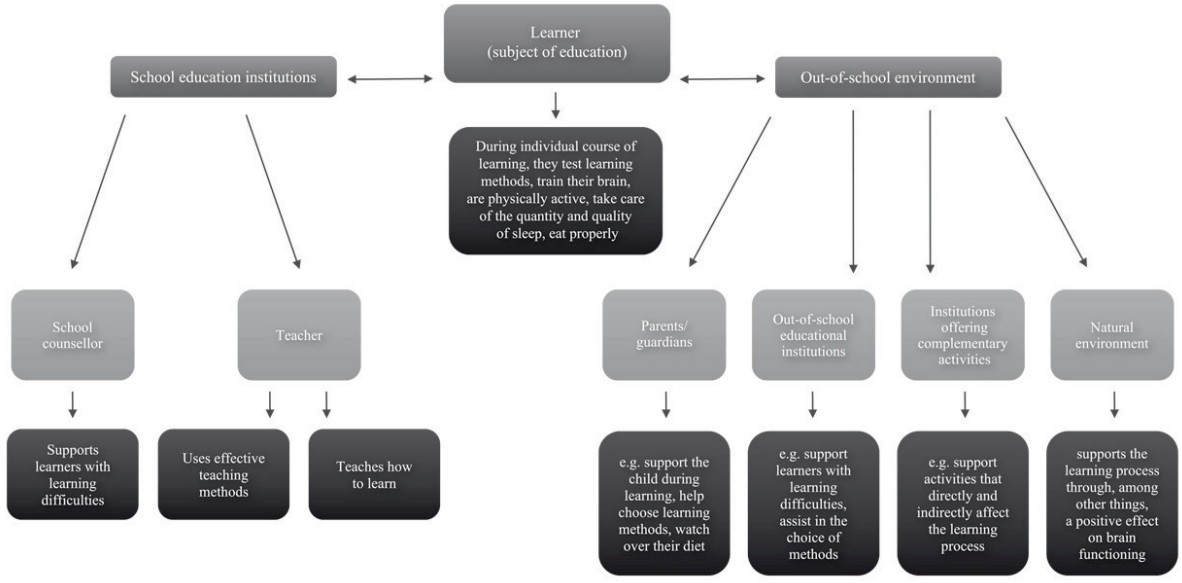

Diagram 2.

- the length and quality of sleep, which affect the degree of focus, creativity, and learning efficiency,
- being in the natural environment and communing with nature, e.g. by experiencing the forest, minimizing the effects of stress, enabling tranquillity and improving mental well-being (Klimska, Leźnicki 2021).

In addition, parents and carers can help their children to implement new learning methods, verify which are most effective for them, and, most importantly, show interest in their learning process by becoming genuinely involved in it.

Out-of-school educational institutions and institutions that offer specialized activities, movement/sports, passion-related activities, music, etc., are also crucial in the context of learning. If they are related to the development of interests, they most often bring satisfaction, and stress relief, can activate the attentional system, influence brain oxygenation, and improve the ability to focus. In the psychological-educational counseling centers, in addition to the standard forms of assistance, children have the opportunity to receive brain training using the neurofeedback method, which uses knowledge of learning at the neuronal level and supports the brain's natural potential for learning (Imperowicz-Jurczak, Jurczak 2019, p. 180).

Comprehensive consideration of the above components of the model can contribute to increasing the effectiveness of the learning process, which proves to be less effective when only selected components are considered.

Conclusion

The implementation of Sustainable Development Goal 4 involves a wide variety of tasks, ranging from ensuring access to education, eliminating gender inequalities in education, and improving the situation of learners with disabilities, to developing education for sustainable development, lifelong learning, improving educational facilities and enhancing teachers' qualifications. Providing quality education for all is also about increasing the effectiveness of learning. The research results cited in the article show that students very often use ineffective learning methods. In addition, they are often unaware that factors such as sleep, proper diet, and physical activity significantly affect brain health, thus translating into effective learning. The presented models illustrate the possibilities for parents, teachers, educators, and more broadly the school and extra-curricular environment to support students in overcoming learning difficulties, testing learning methods, and recognizing those that may be the most effective. Depending on the pupil's age, the involvement and extent of third-party support will vary, but it is crucial in the first education period. Each student should benefit from methods tailored to their characteristics and needs. Children should be aware of the factors that contribute positively to learning, faster memory, and good brain function from an early age. It is not just about memory training but about regular physical activity, proper nutrition, adequate quantity and quality of sleep, and contact with nature. The out-of-school

environment significantly impacts the learning process, so practices to support this process should be expanded to include the elements mentioned above.

In addition, teachers, parents, and caregivers have a crucial influence in shaping the child's beliefs and self-esteem, motivating them to continue their development. There is a need to move away from an approach that prioritizes the development of pupils with a high level of intelligence, above-average ability, or revealed talent to promoting an approach based on valuing pupils for their efforts. The learning process is influenced by many factors, which can positively and negatively affect the student's acquisition of knowledge and skills. The scale of the adverse phenomena that the school is currently facing (e.g. the COVID-19 pandemic, the war in Ukraine) translates into the student's functioning in the institution, the extent of support offered to them, relations with peers and teachers, as well as the emotional sphere, stress levels, motivation to learn, etc. (Kuracki, Tempczyk 2022; Paluch 2022; Dycht, Śmiechowska-Petrovskij 2021; Klimska, Klimski 2021). When aiming to improve the effectiveness of students' learning, it is therefore also worth considering aspects that might seem unrelated to learning. Improving education quality means developing students' potential to shape a society of knowledge, which, in effect, is to implement this knowledge into practice with a sense of peace, mental balance, and self-confidence, not fear, mediocrity, or uncertainty.

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