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Science Education as a Response to the Needs of the Modern Open "Education for Everyone" System

Anna Czyż

Doctor of Philosophy in Pedagogy, Pedagogical University of Cracow (Cracow, Poland)
E-mail: annaczyz@up.krakow.pl
https://orcid.org/0000-0002-6145-8061

Denys Svyrydenko

Doctor of Philosophical Sciences, Associate Professor, National Pedagogical Dragomanov University (Kyiv, Ukraine)
E-mail: denis_sviridenko@ukr.net
https://orcid.org/0000-0001-6126-1747

The aim of this work is to analyze the suitability of Science Education in teaching pupils with different educational needs. In the open education, the most important is to understand that the effectiveness of education has an influence on preparing for the job, finding a place on the labor market in accordance with the possibilities and predispositions, but also taking up professional activity, moving away from the help of others and the state. The article presents information on the inclusive trend in modern education. Attention is paid to the positions of the pupils, in particular, the disabled ones, and the teachers whose attitudes, specifics of work, appropriate methods and ways of passing knowledge, skills and competencies appear to be a real impact on the prospective adult life of foster children. The need to introduce far-reaching changes in the modern education system has been presented.

Keywords: inclusion, science education, disability, diversity, teacher, education system.

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Introduction

The second decade of the 21st century brought significant changes in the understanding of education and the development of educational systems in the world. New trends in education — opened systems — have made it more accessible to social diversity. In school,

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pupils are educated hand in hand, they are able-bodied and disabled, have different origins, culture, the color of the skin, gender, religion, etc. It forces changes at the approaches to teaching, goals, methods and means. Teachers must prove great knowledge, not only objective but also didactic and teaching skills, taking into account the diverse needs of common learning entities. According to modern scientific researches, teachers express their approval for the openness of system; they understand the implications of ideological changes and want to support students in acquiring knowledge, skills and competencies. In this field, however, a large gap between theory and practice is diagnosed. Teachers very often are not equipped with the appropriate knowledge and skills, they do not know the specifics of working with people who speak different languages, do not communicate verbally, and show various types of functioning disorders. For example, in research conducted in Republic of South Africa (2018) only 2 on 41 teachers of mainstream school (who took part into research study), which was open for diversity, had a professional qualification to work with such groups.[1] A similar situation was diagnosed in the Republic of Poland in 2017 [Czyż, 2018].

Considering the matter of education from the perspective of the student, it turns out that modern systems do not prepare people — especially those with disabilities to enter into adult life — adequately. They are not an attractive, important partner in the labor market. In Poland alone, the occupational passivity ratio in 2006 was 85.1% and in subsequent years, it did not change, despite the reduction of general unemployment [Osoby, 2019].

The concept of supporting teachers, at the same time, guarantees the flexibility of the inclusion system in combination with the high learning outcomes — with proper preparation for the profession, could be the science education, as an alternative to traditional learning and teaching. Considering innovative methods and resources, it allows covering the needs of the pupils better creating a friendlier environment for joint development. That is more, science education is an idea for every student who is the participant of different level of education — from nursery to the university. It easily covers the needs of diversity. Also, the change in the burden of responsibility for learning and teaching can be observed. Teachers who are spreading the theory, involving special solutions in practice. They are obligated to use the proper method and support process using innovating solution. Science education is also an idea for the extension of a teacher's work tools by changing the way of teaching with the use of modern scientific technologies, and focusing his attitude towards educational inclusion in the positive direction. Modern education of the 21st century needs modern, open to experience, expanding the horizons of knowledge of teachers.

The Idea of Inclusion at Contemporary Social and Cultural Situation

The conviction of the same value of every human being, almost to equality and respect, gave rise to social integrating and integrating movements. Their implication is the idea of social inclusion, which is also an answer to the social model of supporting individuals, which is a chance for better development and functioning of excluded people, treated marginally. The fundamental principle of inclusive schools is that all children should learn together. It is the implementation of the constitutional right to education, care and upbringing, without exposing personality to deprivation. Inclusive education creates the conditions for success for disabled children, socially maladjusted, neglected children of different origins, racial, cultural

[1] Project performed by Anna Czyż in 2018 as Visiting Post Doctoral Researcher in North-West University, Faculty of Education, Edu-HRight Research Unit, Potchefstroom, Republic of South Africa (01.11.2018 — 30.11.2018).

or religious backgrounds. It is a path leading to the transformation of educational systems. It builds a society of diversity, where the subject and its needs matter, where everyone is a necessary part of the system, conditioning its development. Inclusive education focuses on the possibilities and not limitations of the subject, removing obstacles to the individual context of needs, placed on an equal footing with the general needs [Zacharuk, 2011; Baylis, 2001]. The school that implements inclusive education bases curricula on the strengths of the juveniles, with particular emphasis on their interests and competencies, building their strength, which is the strength of the whole.

In the process of inclusion, interpersonal relations become particularly important. They determine the possibilities of development and proper functioning of individuals, shape the attitudes and self-esteem, have an impact on making choices and pursuing their own path of development. Social attitudes determine the quality of life. Scientific research proves that joint education allows better development of subjects both in the cognitive-intellectual and emotional-social spheres. Mutual support and help teach sensitivity and affect the progress in the social understanding of the phenomenon of norm and pathology. Joint learning of all children from a given area also serves able-bodied peers to tame them with differentness, teaching acceptance, tolerance and solidarity [Firkowska & Mankiewicz, 2004].

Inclusive education is not only opportunities but also challenges. It is the elimination of architectural barriers, often requiring deep renovations of classes, even complete reconstruction of buildings, equipping them with proper tools (from general utility to individual help), adapting all educational aids to the specific functioning of the one (translation of textbooks to other languages, to sign-writing, Braille, adapting their content to the capabilities of intellectual entities, taking into account the diversity of communication systems, including the use of alternative and supporting forms of resource exchange, etc). It is primarily putting the right educational goals — individual goals for each child. Inclusion is also a comprehensive preparation of teaching staff, providing knowledge, skills and competencies to educators, also taking into account the change in the process of perception of the idea itself. It is a treatment of new situations in the categories of challenges releasing causative, developing, deepening and expanding competences, not in terms of obstacles and limitations. Analyzing the educational situation in the context of the idea of educational inclusion, attention is paid to a number of requirements set for teachers and other participants in the education system. The practice of inclusion must take into account the direction of changes in social mentality and absolute departure from segregation tendencies. Although the idea of inclusion grows out of social needs — intrinsic, social context is the biggest resistance factor in the context of its implementation. That could occur to improve the functioning of school society based on the ideas of common, multi-faceted action; stigmatizing acceptance must be replaced while creating up to reality tailored to the individual needs of pupils [Zamkowska, 2004; Szumski, 2006].

The situation of People with Disabilities in the Field of Education and Professional Activity

Taking into account the educational possibilities of the social group, which is one of the most marked by segregation practices — disabled people, it is underlined that the fact of having a deficit is the largest limiting factor for development and activity. It intensifies the experience of lack of support but also limits independence. This implies poor preparation for fulfilling socio-occupational roles, lack or insufficient opportunities to acquire and improve qualifications, lack

of preparation and negative perception of disabled people in the labor market by employers. For example, as the main statistical office reports on the Polish labor market, more than a half of disabled people have only a minimum level of education — basic in this incomplete primary, lower secondary and basic vocational (basic vocational 27.8%, middle school 1.9%, basic 33.2%). Only 8.1% of disabled people without a disability has a higher education degree, post-secondary education — 1.5%, average 23.8, and 3.7% without any education. Employees with higher education have the best chance of finding employment (28.5% find employment), for comparison: in the groups of people with post-secondary and secondary vocational education the percentage of employed amounted to 19.97%, the general secondary education was 16.1%, the basic vocational grade was 17.3%, and the basic one in this incomplete and lower secondary school only 5.7% [Kukulak-Dolata & Sobocka-Szczapa, 2013].

The reasons for the low percentage of disabled people on the labor market should be sought in social constraints, including access to education, but also all the inadequacy of the selection of methods, forms and directions of education, to the psycho-physical capabilities of entities. Research shows, that about 18% of people with disabilities carry out the schooling obligation in inconsistency with the recommended form of education, and at the level of primary school, the percentage of such students reaches 45.6% [Chrzanowska, 2010]. It is an expression of deeply ineffective education − people who could live independently depend on aid institutions. In addition, the state pays for their pensions, they do not pay taxes, and they strain the economy. The countries of the European community uphold the established laws together, strive to meet the needs of people with disabilities in the field of education, including university and continuing education, try to support, enable them to acquire and improve their professional qualifications [Wojtasik, 2009]. However, as it is known, the problem of inadequacy of forms, methods, means to the educational requirements of pupils and issues prepared for their future work — vocational education is "a pain" not only in Poland but in other European Union countries too. Admittedly, the academies, universities, higher vocational schools and others of European Union institution try to support the functioning of disabled. This is mainly through the individuals primarily financial support, partially or completely reimbursement of the disabled person associated with the organization of special equipment and teaching, personal facilities to facilitate learning, personal assistant support, accommodation costs and travel.

In some countries, registration and tuition fees are also reduced, priority is given to admission to studies (e.g. Germany), ensuring that the chosen course of study is consistent primarily with the psycho-physical abilities of the subject and the medical opinion. International experience confirms that the education and work policy for people with disabilities takes into account the globalization challenges. The implemented solutions must be based on real people's capabilities, taking into account the requirements of labor markets. It is noted that the combination of opportunities, interests and market requirements as well as the education policy for people with disabilities in different countries of the world is a very difficult procedure, and in some cases almost impossible [Waddington, 2010; Høgelund, 2003].

The educational policy should, therefore, be oriented towards:

a) Modernization of education systems in line with the policy of openness and individualized teaching;
b) Moving out from stiffness and lack of flexibility in implementing program content for education for the future;
c) The inclusion of content adequate to social needs, current knowledge to the core curriculum;

d) Targeting activities according to students' predispositions at early levels of education;
e) Shaping the skills of thinking, analyzing, inference, as well as responsibility and activity in the process of education, both — the teachers and the students;
f) The use of unconventional, but effective methods and means and ways of work;
g) Developing open attitudes of teachers in the transdisciplinary model, where a high level of involvement of all team members, jointly sets, programs impacts, but also teaches cooperation and proper management of both team and process is assumed [Jerger et al., 2001; Chen & Haney, 1995; Twardowski, 2012].

Science Education as a Response to Special Teaching and Learning Needs

Science Education (SE) can be a response to the special requirements of the modern education system. It supports teachers the development of competencies and understanding the specifics of work with each student, while students provide the opportunity to acquire knowledge of skills and competence based on the most favorable methods and means. SE goes away with encyclopedism, it draws attention to the development of thinking and independent learning. Unconventional teaching aids support the processes of remembering. For example, Grzegorz Krzyśko describes how music can be used in chemistry [Krzyśko, 2014]. Renata Šulcová and other authors show the influence of didactic games on the development of chemical knowledge [Šulcová et al., 2018]. Others notice the beneficial effect of supplementing descriptions with diagrams, illustrations or using mnemotechnic in memorizing the content [Jurowski et al., 2014; Oversby, 2014].

SE idea is combining existing knowledge with acquired knowledge, using all available ways. In the context of people with disabilities, it allows to use the different methods of work and communication and directs actions to the goal of education, which is to achieve the independence of functioning. Here important is the subject — an individual, not the general. The goals are set individually; therefore, it is possible to achieve education for all participants.

The principles of SE are not strict and precise. There is not, de facto, one approved definition and understanding of Science Education. SE stays in relations with the concept of open-minded teaching and learning, using human potential and activity, his or her different competencies, based on the analysis of cognitive processes and individual differences, abolishing a rigid framework in the process of learning and teaching [Bonwell & Eison, 1991; Gardner, 1993]. SE is a holistic process in which human predispositions and interests are also important. SE directs educational activities taking into account the specifics of the changing of the world.

In SE, attention is paid on pre-defined aim supporting teachers in „(a) positioning students as knowledge builders, (b) using cultural knowledge to enrich instruction, (c) providing students with skills and opportunities to learn science" [Kolonich et al., 2018: 3]. The same authors underline five framework elements, extremely important for SE development and engagement of students and teachers in the process [Kolonich et al., 2018: 4-5]:

1. Positions students as knowledge generators.
2. Elicits, values, and leverages funds-of-knowledge.
3. Encourages the use and sharing of student language.
4. Values students' lived experiences as evidence.
5. Promotes the use of students' critical lens to solve problems.

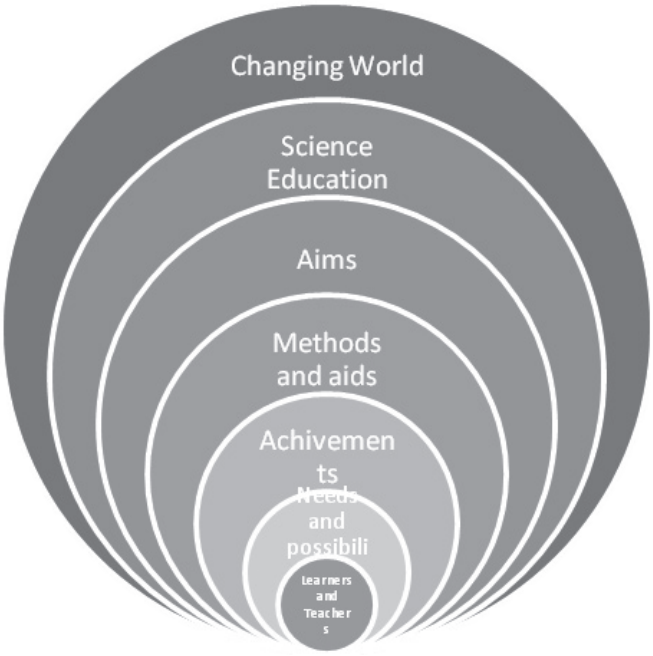


Fig. 1. Science education in relation to learners and teachers

Taking into account the idea of inclusion, the SE can be considered as a culture of teaching and learning [Bianchini, 2017].

Conclusion

Educational systems in diverse countries of the world, on the one hand, differ from each other, on the other one, have some common levels. Undoubtedly, the goal of education for the future, above the divisions, available and open to diversity — both in the subjective and objective context, combines scholars of the art of teaching.

Striving to make the learning and teaching processes and procedures more flexible, activating subjects, using the latest methods of work, but also maximizing the individualization of content, forms means to the needs of students are priorities and challenges for inclusive education. Supporting the professional development of teachers to conduct attractive educational activities to support students will to acquire theoretical knowledge and be able to use it in action, is a powerful challenge. Changing habits, moving away from theoretical methods in favor of action, customizing the prosecution is not easy. However, this is the only way to provide such education that will ensure the high quality of life for today's students, in their future. Science education concept could be comprehended as an inclusion-oriented educational strategy, which offers the educational goals coincident with the responses of contemporary social and cultural situation. In addition, it offers new fundament for interpersonal communication in the classroom, helping to actualize the principles of inclusive education.

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