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# General Education School: Process of Eutrophication

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**Anotation.** A general education school has been facing numerous problems: learning outcomes of school students have been deteriorating, the quality of its activity has been doubted, etc. It remains unclear if the school is still stuck in the past and if it is ready to answer the future needs and expectations. The changes caused by the fourth industrial revolution in the society as well as at school are inevitable. It appears that the school activity (educational in particular) may become inefficient and swampy due to external impact (anthropogenic factors). Therefore, the article analyses the school as a system revealing its similarity to the eco-system simultaneously emphasising its features. The emergence of school as a swamp (one of eco-systems) is shown. To achieve this goal the process of eutrophication is analysed.

It is emphasised that eutrophication of every eco-system is unique not excluding that of school. Moreover, its results are not well-defined either: processes may change due to internal and external factors, transformations, etc. Three phases (*oligotrophic*, *mesotrophic* or *eutrophic ones*) distinguished in eutrophication of water bodies are analysed emphasising their similarities with the processes and transformations occurring at school. Attention is also drawn to the possibilities of managing this process (laying more emphasis on the school culture and development of school model that meets the needs and expectations of future). Taking into account the fact that all the features of eutrophication possess their certain specificities and are interrelated, it is essential to identify processes and transformations occurring at school. This will contribute to establishing the beginning of eutrophication or its certain phase already as well as reasons for eutrophication and its vectors of movement. This will make it possible to control the process targeting at the future perspective.

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**Keywords:** *school, ecosystem, eutrophication, school of the future.*

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## Introduction

Nowadays ecology has become the focus of debates more and more often linking it with various areas of society's life. Speaking about ecology sometimes seems to be trendy but it is not always meaningful as nature, with a human being as its integral part, is a complex creation, which reminds of lace, where everything is interrelated. And it is understandable because the flora as well as the fauna need substances, energy and others. Their groups are also interrelated. None of living organisms or their groups can exist independently from the environment. All the organisms, both the plants and the animals, require energy and food substances from the environment and all the kinds of living organisms influence each other co-existing. And this does not exclude a human being. Not to destroy this interaction while introducing changes, it is necessary to acquire understanding of ecology as a science of relations and interactions of living organisms, their links with the surrounding environment. Thus, the Greek words "oikos" and "logos" mean the study of houses or dwelling (habitats). Without going into the science of ecology in depth, I would like to draw the attention to the term of community change, which is well-known among ecologists. Communities are born, then they develop, get mature and they sometimes even die. This process is significantly affected by human activities.

## Interfaces between Eco-system and School

Nature is inhabited by organisms that are interrelated (let us remember food chains). They are also affected by inanimate nature and vice versa. If the reference is made to a system (Gr. *systema* – composition; compound), it is obvious that it consists of elements, whereas the latter contain components, which interact with each other. In other words, changes in one element or even its component has influence on other structural derivations within the system. Moreover, numerous changes or a radical (essential) one may distort or even destroy the system. Such a system approach will be followed in this article (for more details see Targamadzè, 1999).

The eco-system is also a complex of mutually related animate and inanimate nature, where circulation of substances and energy occurs and which has to be functionally stable. This also applies to the system of education: it comprises several systems (early childhood education, general education, higher education, vocational education and others), possesses specific relations with systems, their elements as well as components (graduates from general education schools enter higher education institutions, vocational training centres, etc.; a school of general education consists of certain elements (primary, basic and secondary education) and each element has two components: formal and non-formal education). Taking into account the allusion to the eco-system and the variety of eco-systems, it is necessary to choose one

eco-system because it will make understanding of the possible coherence within the system and outside it as well as evolution of the system more simple. The analysis of various eco-systems and comparison of their transformations with the changes occurring in the Lithuanian education system allow making the allusion to a bog or to the process of bog formation. This allusion will be discussed further in the article.

Undoubtedly the school has been investigated from different perspectives and applying various methodological approaches (for example, Helmke, 2015; Siebold, 2004 and others have done that from the pedagogical aspect, Aramavičiūtė, 2016; Grincevičienė et al., 2019 etc. – from the value-based perspective). Moreover, it is necessary to consider the observation of S. Chitpin, C. W. Evers (2019, p. 432): “because schools as organizations are seen as complex contexts for understanding decision-making in education, in general they must accommodate the epistemic constraints that support claims of bounded rationality.” It is complicated to investigate the school because it is a tangle of structures and functions, etc., which has to function harmoniously and to retain a balanced growth. It is possible that attempts to analyse the school from the position of ecological system applying a systemic approach can lead to a different view towards the school and enable to transform certain insights into an innovative and renewable system.

Approaching the school from the position of ecological system, one can observe the aspect of transition to eutrophication: a present traditional school was born in the industrial age, whereas the 21st century is mainly associated with rapid technological developments, an increasing flow of information and data, a new generation of digital natives, etc. In this context the thought of L. Floridi (2018, p. 12) that resistance to the influence of old ideas is not an easy task as there can hardly be a better strategy without a better understanding has to be taken into account. Therefore, the question arises: hasn't the present school moved from the stage of maturation to that of breakdown? Isn't it going through the process of eutrophication? If the answer is yes, what stage of eutrophication it is in at present and what features of each stage can be identified? How to address them and create a school that satisfies the requirements of the 21st century?

Therefore, a general education school from the perspective of eutrophication was chosen as a research object because the aim of this article is to reveal the transformation of general education as a possible process of bog formation showing the stages of this process. To achieve the set goal not only the analysis of scholarly literature and documents but also the method of analogy was used.

*The concept of general education school as a system.* The school is part of general education system. This allows stating that features of the education system have to be reflected in it. They were comprehensively analysed by the author of the article in 1995, where the system of education is described as a specific social system (for

more information see Targamadzė, 1995). These characteristics will be considered searching for the analogy with ecosystem:

- **large** (consisting of systems of general education, higher education, vocational education and others),
- **complex** (consisting of separate models: secondary general education, higher education, special education and others),
- **live** (people function in the system and in separate institutions),
- **open** (interacting with cultural, legal, social and other environments),
- **dynamic** (changing in time),
- **probabilistic** (forecasting of development is possible),
- **organic** (reacting to the environmental influences and/or changes in a flexible way) or **mechanic** (without flexibility).

Taking into consideration the interaction of all the living organisms within the eco-system and with inanimate nature for an accumulative function, it becomes obvious that this is not only a large, complex and live system but also the one of an open character because it is subject to interaction with the environment around the eco-system. Undoubtedly, it is also dynamic as it involves changes in the course of time and its flexibility in the context of interaction with the environment, which surrounds the eco-system, is inevitable. The influence of certain factors can also be forecast from the perspective of possible changes or transformations (pollution has impact on the flora and fauna, etc.). In this context it is necessary to draw attention to the fact, that some features, for example, self-regulation, are also characteristic of an eco-system. According to C. Crețu (2016, p. 11), “innovation eco-systems are self-organising systems but evolve through an interaction between top-down policy choices and bottom-up creative forces”. C. Crețu (2016, p. 11). C. Crețu draws attention to innovation eco-systems, which can be characterised as very much comparable: “It takes human ingenuity, a pioneer’s spirit and a real long term vision to fully exploit their potential. The shift towards a knowledge-based economy requires taking risks, connecting the actors of the quadruple helix – citizens, businesses, administrations and academia, and being constantly on the cutting edge of innovation” (ibidem). It is understandable that a school should become an innovative system, which contains the features of innovation eco-system indicated by C. Crețu. And this means that it is still supposed to be distinguished by its self-recovery and creation as well as sustainability (in the case of Lithuania it acquires importance because the school has undergone numerous forced changes, e.g. profiled instruction, etc.).

The above-mentioned features will not be elaborated on further because distinction of these features alone allows stating that the allusion of school to the eco-system is not erroneous.

It should be remembered that being a social system, the school also has own specificities. This opens the possibility of combining interactions of an institution

and an individual: in the social system an institution assumes its role in the society (we usually refer to it as to a mission but in this context a slightly different aspect is meant, which determines its role or its performance or non-performance) and own institutional expectations. An individual functions in the social system. He or she is a personality with own potential, expectations and, of course, needs. Certain social behaviour is formed under their interaction, which can have positive and negative features in the mind of society.

It should be noted that each system has its own mission, vision, structure and performs respective functions, etc. It is understandable that the school is an organisation, i.e. a product of social system. Therefore, there cannot be a stringent conformity between the school and eco-system. Moreover, it is necessary to agree with the remark from D. L. Duke (2019, p. 29) that “to state the obvious, that schools are organizations, is not to render a conclusion, but to open a discussion that can go in many directions”.

Thus, in the school, just like in the eco-system, there exist links of elements (pupils' parliament, teachers' council, forms, councils of schools, etc.), their components (pupils' parliament – pupils of different forms, teachers' councils – methodological commissions, etc.), interaction with environment (finances, politics, legal acts, etc.). Both in the eco-system and at school all the elements have to interact in a coherent way. They require a link with the environment because substances, energy and others are needed. The elements of both systems interact with each other and with the environment, accumulating energy that is needed for functioning of the system. Negative external impacts or mutations of elements can unbalance the system or destroy it. Several indicated structural and functional similarities of systems presuppose a thought that the school may be also approached from the perspective of eco-system. Therefore, the allusion of the eco-system to a school as a system is possible.

*Discussing the link between the school and the process of eutrophication.* The question arises: what eco-system can the school be compared to? This is not such a simple question and there is no one simple answer to it. However, taking into account the fact that a general education school is frequently considered to be mired (a tendency of stagnation of pupils' learning outcomes, encountered educational problems, etc.) and that the school is forced to perform non-characteristic functions: for example, the system of tenure remuneration of teachers introduced in 2018 and undergoing improvement not only failed to fulfil promises of politicians and decision-makers but also made teachers calculate their activities, turned them into accountants and the system appeared to be not adequate to the specifics of teachers' pedagogical activity and its scope. These and other observations (general education curricular are eclectic, overladen and frequently do not comply with the maturity examination tasks, incoherent evaluation of maturity work, etc.) create allusion to eutrophication – the school undergoes changes mainly because of external influences. Firstly, it is necessary

to understand the concept of eutrophication, which derived from the Greek word “well-nourished, enriched” and to perceive that eutrophication refers to a change in ecosystem, which is caused by the excessive presence of chemical nutrients. Attempts are made to search for analogues with “overfeeding” of the school and possibilities for managing the process of eutrophication at school as well as directing the process towards creation of the Good School. According to T. I. Kutjavina (Кутявина, 2017, p. 9) “eutrophication is an increase in biological productivity of water objects, which is accumulation of biological elements resulted in by the influence of factors of anthropogenic or natural processes”. It is also emphasised that lately a considerable attention has been allocated to the negative influence of anthropogenic factors (ibidem).

Eutrophication of every eco-system is unique and that of school is not an exception. Moreover, its result is not always clear either: processes can change due to internal and external factors, transformations and others. It is important to understand the phases of eutrophication: for example, three of such phases in water bodies can be distinguished: *oligotrophic*, *mesotrophic* or *eutrophic ones* (Кутявина, 2017, p. 15). *Oligotrophic* state is a primary state after formation of a lake or any other water body, which is rich in dissolved oxygen but low in chemical substances necessary for plants (nitrogen and phosphorus in particular. This results in low diversity of lake species and its productivity. In the mesotrophic stage decomposing organic substances settle at the bottom of the lake. Later deposits return to the surface water layers and are used by organisms conducting photosynthesis, the productivity and diversity tend to increase. The productivity of the lake in the eutrophic stage considerably strengthens and this leads to consumption of all available oxygen, the fauna and flora start to deteriorate, anaerobic bacteria multiplication is stimulated. The latter involve in splitting organic substances emitting hydrogen sulphide. In the course of time, the water body turns into a swamp. Searching for the analogy between the stages of eutrophication and a general education school, it is possible to note that in the stage of school formation, when its mission is discussed, its vision is developed as well as a strategic plan for its implementation, the productivity is usually not high because there is a shortage of various resources, insufficient experience of teachers and other staff members but there is enough oxygen for breathing (enthusiasm, collaboration, etc.). Later various activities start to appear, which are not always efficient and/or well-targeted and/or their results settle at the bottom although certain processes or results also float to the surface. All this is gets more and more active, there appear people who work productively, the range of activities and results gets broader and the school community introduces more varied activities and establishing more varied goals (a transition to the mesotrophic phase). After that the productivity of community activity gets even stronger – the variety of activities does not always satisfy the whole community. Group interests start to emerge and quite often various

assessments (both internal and external ones) have positive as well as negative impact on community. Dissatisfaction with the school activity (with that of school administration in particular after the introduction of the system of tenure remuneration of teachers) starts to increase, dissatisfaction gets stronger, microclimate deteriorates and collaboration in the community becomes fragmentary. The abundance of tasks leads to failure to complete them all because separate people of their groups stop seeing their meaningfulness. This brings the school to eutrophic phase, when the school turns into a swamp.

*Insights into management of eutrophication at school.* Management of eutrophication is a necessary condition that prevents this process from getting stronger or even from starting or accelerating. There exist several ways but two will be discussed below.

One of them is enhancement of school culture on the basis of mutual agreements. The deep layer of culture contains joint agreements, which are formed on the value basis; mutual agreements are important for another lever of culture (overlapping values). Norms and rules are built up on these values. The last level refers to observable culture. All the levels interact with each other and are supposed to be coherent. Thus, all the levels of organization culture analysis, such as observable culture, overlapped values and mutual agreements (Shemerhorn, Hunt, & Osborn, 1994, p. 427), have to be consistent and serve for implementation of the school mission and the related objectives.

This compliance is of particular importance because school culture is a medium, where the organisational processes occur. It has to be favourable for activity of school community just as school climate. Otherwise, disturbances may occur, school activity may be disrupted and processes of eutrophication may start. Thus, school culture improvement and choice of appropriate type of culture is an antidote for eutrophication.

Another driver in this process is a common goal to create a school for children, which addresses the 21st century objectives. It is necessary to note that “OECD Education 2030 project has identified three further categories of competencies, the “Transformative Competencies”, that together address the growing need for young people to be innovative, responsible and aware:

- Creating new value (“To prepare for 2030, people should be able to think creatively, develop new products and services, new jobs, new processes and methods, new ways of thinking and living, new enterprises, new sectors, new business models and new social models. Increasingly, innovation springs not from individuals thinking and working alone, but through cooperation and collaboration with others to draw on existing knowledge to create new knowledge. The constructs that underpin the competency include adaptability, creativity, curiosity and open-mindedness.”) (OECD, 2018, p. 5).



- Reconciling tensions and dilemmas (“To be prepared for the future, individuals have to learn to think and act in a more integrated way, taking into account the interconnections and inter-relations between contradictory or incompatible ideas, logics and positions, from both short- and long-term perspectives. In other words, they have to learn to be systems thinkers.”) (OECD, 2018, p. 5).
- Taking responsibility (“Dealing with novelty, change, diversity and ambiguity assumes that individuals can think for themselves and work with others. Equally, creativity and problem-solving require the capacity to consider the future consequences of one’s actions, to evaluate risk and reward, and to accept accountability for the products of one’s work. This suggests a sense of responsibility, and moral and intellectual maturity, with which a person can reflect upon and evaluate his or her actions in light of his or her experiences, and personal and societal goals, what they have been taught and told, and what is right or wrong.”) (OECD, 2018, p. 6).

Undoubtedly the milestones provided for by OECD are of high importance and relate to both humanist values and balanced growth. They are also outlined in the Lithuanian national documents (for example, the *Good School* Conception, 2015). However, it is equally important to identify the school models and their conceptual framework during the fourth industrial revolution.

## Scenarios for General School

To achieve the above-mentioned, three general education scenarios, which were suggested by M. Newby as early as 2005, are analysed:

- Scenario 1: education everywhere (“Schools fell into disrepute in the early decades of the twenty-first century because they couldn’t adequately tailor-make learning experiences for each child individually and were failing to prepare people for a knowledge economy. School became de-institutionalised and in most cases dismantled, the buildings often used for other things.”) (Newby, 2005, pp. 255–256);
- Scenario 2: gifts, actually (“In fact, this became a part of their mission. Yes – schools, at least, were still places to which people went to be together for a purpose, and a good purpose, too! And as schools began to recognise that they could, in some way, advocate the virtues and benefits of collaboration and the group rather than (or perhaps as well as) individualism and personal enterprise, they began to succeed in unexpected ways. Parents began to feel the loss of something, and started to recognise the school as the place where they might recover it. Thus encouraged, schools went out and won back their constituencies, and they did it by offering to become the most effective bulwark against social fragmentation and a values crisis.”) (Newby, 2005, p. 258);



- Scenario 3: the education marketplace (“Increasingly, however, some smaller producers are looking vulnerable these days, and we are beginning to see stupendously good edusoft programmes which are being used in schools in many different countries. Multinational companies can, of course, bring massive resources to making these wonderful products. From the pupil’s perspective, each learning event seems made for them alone and works at their own pace, though in fact individualised versions of the same product are being sold all over the globe and being used by millions of pupils.”) (Newby, 2005, p. 260).
- Another possible scenario could be about a school, which is distinguished by an abundant supply of possibilities for pupil’s learning. Considering the fact that pupils are digital natives and that artificial intelligence is able to perform more and more functions, the school should be detached from a physical location and dominance of the teacher in the teaching process.

The teacher or another person has to become an assistant and a guide in the process of pupil’s learning. Various learning possibilities may be modelled: for example, in primary forms (in mobile groups to be more specific) direct pedagogical interaction could prevail employing artificial intelligence and virtual environment possibilities and organising learning in various settings (in a certain building, nature, museums at home, etc.). In senior forms a wider variety of learning forms can be introduced more often employing artificial intelligence, virtual environment (learning platforms, social networks, learning packages, etc. in particular), establishing conditions for getting assistance from a teacher as a consultant, a guide, etc. Undoubtedly, well-defined learning outcomes should be set and conditions for testing, evaluating and self-evaluating achievement of the aforesaid outcomes should be created. A form of fully individual learning is also possible, when learning packages are prepared, learning outcomes are checked and professionally evaluated. Professionals provide recommendations how to improve learning outcomes.

Various scenarios and forms of school are possible. It is particularly important to be well aware of the outcomes, which are traditionally referred to as competences, and to choose appropriate scenarios for their achievement creating alternatives to the existing industrial school that will be attractive to school learners and will be successful pursuing the set learning outcomes.

## Conclusions

The school is a system that functions within the system of education and interacting with the environment. Therefore, it is influenced by the factors of the school itself, the whole educational system and environment. Their impact can be of positive, negative or even neutral character and for this reason the influence of some factors

has to be neutralised or even eliminated, or, on the opposite, enhanced seeking to accumulate the potential necessary for improvement of school and to empower it.

The features of the educational system are also typical of the school, which presuppose its similarities with an eco-system. Evaluating the current state of school, the allusion to eutrophication, with its three phases (oligotrophic, mesotrophic or eutrophic ones), is possible. All phases have their own specifics and are interrelated. After identification of processes and transformations at school, it is important to establish the beginning of eutrophication or even its stage, depth, scope, reasons, vectors of movement and to control this process, diverting processes and changes occurring at school to development of the school or any other potential opportunity for learning that is capable of answering (un)predictable future needs and opportunities.

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## Bendrojo ugdymo mokykla: eutrofikacijos procesas

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### Santrauka

Bendrojo ugdymo mokykla nestokoja problemų – menkėja nemažos dalies mokinių mokymosi pasiekimai, jos veiklos kokybė kelia abejonių ir pan. Lieka neaišku, ar ji nėra įstrigusi praeityje ir ar atliepia ateities poreikius bei lūkesčius, juk dėl ketvirtosios pramonės revoliucijos poveikio pokyčiai visuomenėje, tad ir mokykloje, neišvengiami. Susidaro įspūdis, kad mokyklos veikla (ypač ugdomoji) dėl didelio išorės poveikio (antropogeninių veiksmų) darosi neefektyvi, ji klimpsta. Tad straipsnyje mokykla nagrinėjama kaip sistema, parodant jos ir ekosistemos panašumą, akcentuojant jos požymius. Atskleidžiama mokyklos kaip vienos iš ekosistemų – pelkės – galimas atsiradimas. Straipsnyje nagrinėjama eutrofikacija.

Akcentuojama, kad kiekvienos ekosistemos eutrofikacija yra savita, tad ir mokyklos taip pat. Be to, ne visada aiškus ir jos rezultatas – procesai gali keistis dėl vidinių ir išorinių veiksmų, kismų ir t. t. Tuo tikslu nagrinėjami vandens telkinių pelkėjime išskiriami trys etapai: oligotropija, mezotropija ir eutropija, akcentuojant jų panašumus su mokykloje vykstančiais vyksmais ir kismais. Taip pat atkreipiamas dėmesys į šio proceso suvaldymo galimybes (daugiau akcentuojant mokyklos kultūrą ir mokyklos modelio, atliepančio ateities poreikius ir lūkesčius, kūrimą). Turint omenyje, kad kiekvienas eutrofikacijos etapų pasižymi tam tikru savitumu ir yra tarpusavyje susiję, dera, identifikavus mokyklos vyksmus ir kismus, nustatyti eutrofikacijos proceso pradžią ar jau net etapą, jo gylį, aprėptį, kilimo priežastis, judėjimo vektorius ir šį procesą suvaldyti, nukreipiant mokyklos vyksmus ir kismus į mokyklos ar kitos potencialios galimybės, atliepančios ateities (ne)prognozuojamus poreikius ir galimybes, mokymuisi kūrimą.

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**Esminiai žodžiai:** mokykla, ekosistema, eutrofikacija, ateities mokykla.

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