Virtual Learning Environments: Modeling a New Learning Policy Strategy

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Articles

Virtual Learning Environments: Modeling a New Learning Policy Strategy

Virtualios mokymosi aplinkos: naujos mokymosi politikos strategijos modeliavimas

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Abstract: The paper examines the modelling dimension of the virtual teaching/learning environment and its implementation practices. Changing trends of the educational processes become apparent; thus, it is necessary to reflect and justify the contours of modeling the virtual educational environment. When looking for new ways of conceptualizing teaching/learning strategies, it is especially important to understand the inclusive, enabling context of the open learning spaces, to adequately assess the content elements and to predict the possible characteristics of their expression in the context of inclusive and sustainable economy. In this paper, the process of modeling the virtual learning environment is analyzed using reflexive approaches. It is stressed that the aim of the new education policy strategy is to create learning environments that enable people of different talents and interests to receive appropriate learning, adapt to different life situations and goals, and reconcile, say, formal learning and self-education. Qualitative data is presented along with both teachers' and educational experts' attitudes.

Keywords: virtual learning environment, environment modeling, new learning strategies, contexts of educational content, educational policy priorities.

Summary: Straipsnyje nagrinėjama virtualios mokymo(si) aplinkos modeliavimo dimensija ir jos įgyvendinimo praktika. Išryškėja besikeičiančios ugdymo tendencijos, todėl būtina atspindėti ir pagrįsti virtualios ugdymo aplinkos modeliavimo kontūrus. Ieškant naujų mokymo(si) strategijų konceptualizavimo būdų, ypač svarbu suvokti įtraukų, įgalinantį atvirų mokymosi erdvių kontekstą, adekvačiai įvertinti ugdymo turinio elementus ir numatyti galimas jų raiškos ypatybes įtraukiojo mokymosi kontekste. Straipsnyje refleksyviais metodais analizuojamas virtualios mokymosi aplinkos modeliavimas. Pabrėžiama, kad naujosios švietimo politikos strategijos tikslas – sukurti mokymosi aplinką, kurioje skirtingų gabumų ir pomėgių žmonės galėtų tinkamai mokytis, prisitaikyti prie skirtingų gyvenimo situacijų ir tikslų, derinti, tarkime, formalųjį mokymąsi ir saviugdą. Pateikiant kokybinius duomenis kartu pristatomi mokytojų ir švietimo ekspertų požiūriai bei vertinimas.

Keywords: virtuali mokymosi aplinka, aplinkos modeliavimas, naujos mokymosi strategijos, ugdymo turinio kontekstai, švietimo politikos prioritetai.

Introduction

The modern school moves to the logic of organization of education/ learning services, reveals new directions of expression: skills, information, knowledge, networking of learners and creation of learning values.

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Education communities moving towards the logic of organising teaching/learning services and revealing new directions of expression: skills, information, knowledge, learners' networking, and creation of learning values. The virtual teaching/learning environment (*further in the text – VLE*) is positioned as an inevitable vision that aims to put the learner at the centre of the learning process and for learning itself to be understood as a social process in which learners develop a trust-based learning culture and a personalised learning process, as well as apply different learning styles, methods, and techniques according to the purpose of the learning object. Discourse of VLE change are created and presented by politicians and education specialists who seek to identify the identity of teaching/learning environment change, define it, give it a descriptive form and communicate it in the perspective of education reform (Affouneh et al., 2020; Dhawan, 2020). Therefore, education policymakers try to see a vision of the teaching/learning environment change.

The representations of VLE change are always associated with the transformation of dominant educational paradigms. According to Dhawan (2020) and Donahoe et al. (2019) the space of social phenomenology is a conceptualised and seeks to name a study of subjective meanings and their constructs. It can be argued that this scientific article belongs to the field of *social phenomenology,* and thus seeks to explain how the change of teaching/learning environment is made meaningful in the discourse of education policymakers and in the consciousness of various social groups. The approach to social phenomenology proposed by Bourdieu is an appropriate tool because it recognises the role of everyday cognition and practical knowledge in the continuous development of a knowledge-based society (Affouneh et al., 2020; Martin, 2020). According to Mehall (2020), the state of change in the teaching/learning environment is legitimised by the definition and semantics of space. The existing logic of space always subordinates the identity of the group. By attaching to its space, a social group transforms (dynamics) and adapts (statics).

As technology and the socio-economic situation change rapidly, so do learning strategies and trajectories. Considering that during the last 10–20 years the generation and order of knowledge has changed substantially (Affouneh et al., 2020; Mehall, 2020), leading not only to new models of communication and work, but also to a new approach to learning, teaching/learning environment and competence needs (Mehall, 2020), it is important to have a clearer understanding of how teaching/learning environment opportunities may change over the period of the strategic guidelines for reform (2013–2022) in order to better advise education policymakers as Redecker et al. (2011). Thus, in order to determine how education and training policies can adequately prepare young people for life in the society of the future and also later for the needs of the market (Goczek et al., 2021), it is necessary to anticipate what competences will be important and how they will be acquired in a learner-centred VLE (Huang et al., 2020). Also making sure that EU citizens have the necessary

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skills to succeed in the labour market is key to improving economic growth and employment in the EU (EC, 2020).

Out from all this, mentioned above, comes the *definition of the scientific problem* that is related to how the VLE modelling dimension is contextualised in the processes of change in Lithuanian education policy as well as economic development and education policymaking, while enabling the learning environments to provide appropriate learning for everyone, adapt to different life situations and use the capabilities in the labour market and business development. Thus, the following problem-related *research questions* are raised: i) how the discourse of learning environment changes is perceived on the individual, business, and economic development level, ii) what are the key trends in virtual learning environment while applying new learning policy and how do they manifest in education sector?

The object of the research is the virtual learning environment while modelling a new learning policy strategy in educational organizations.

The aim is to reveal the virtual learning environment within the processes of modelling a new learning policy strategy in educational organizations.

Research objectives:

1. To reveal the theoretical approaches to the modeling of the virtual learning environment.
2. Highlight the signs of change in the virtual teaching/learning environment from the point of view of teachers in general education schools, education experts (managers), educational policy makers (specialists of the education department).

For data collection, the scientific literature analysis method (employed to reveal theoretical aspects of virtual teaching/learning environment modelling) and group interview method (adopted to reveal practical aspects of teaching/learning environment change and their expression features in the general education school sector) were used. This article draws on research in a general education school to gain a deeper insight into the information provided by research participants.

1. Literature review

New virtual learning environment modelling approaches

Based on the changing needs of current learning institutions and learning models, ICT offers a wide range of opportunities, shaping a new image of what learning will look like in the knowledge society. Virtual learning environments are an attractive and inevitable vision of learning. The article describes the main features of the vision, for the implementation of which, in addition to the basics of using ICT, new abilities will be needed. According to the vision, ICT is the main (though not the only) driving force behind the creation of virtual learning environments.

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But these environments are not unattended, computer-generated spaces. Leadership and communication remain critical, but the role of teachers and educators is changing. This vision aims to put the student at the center of learning, and to understand learning as a social process, during which learners create their own learning process. VLEs can take many forms, but they all share these common characteristics.

There is a growing perception in Europe that learning in a fully digitalised (networked) knowledge society will be fundamentally different from today's learning. The development of information and communications technologies (ICTs), together with other socio-economic and demographic changes, not only opens up new learning opportunities, but also leads to the need for new skills and knowledge for work, education, training, self-development, and participation in society (Affouneh et al., 2020; Dhawan, 2020; Donahoe et al., 2019; Mehall, 2020). The perception of learning in a fully digitalised (networked) knowledge society will be fundamentally different from today's situation in Europe and globally (Goczek et al., 2021; Lv et al., 2017). The development of information and communications technologies (ICTs), together with other socio-economic and demographic changes, not only opens up new learning opportunities, but also (Affouneh et al., 2020; Dhawan, 2020; Donahoe et al., 2019; Mehall, 2020) leads to the need for new skills and knowledge for work, education, training, self-development, and participation in society. The process of modelling a virtual teaching/learning environment is based on a vision in which *digital literacy* is defined as the acquisition of the skills necessary to participate in these virtual learning environments. Learning to use ICT tools is certainly part of that, but other higher cognitive skills are also needed to facilitate participation in virtual learning environments in all respects. Skills to search, evaluate, manage, and use information and digital resources are essential for working and learning in a digital environment. This includes the ability to systematise knowledge according to personal choice and to use tools to form systems that track and update relevant information. However, in the network knowledge society, *communication with other people* is also considered a value, and the skills gained from such communication are becoming increasingly important (Ala-Mutka, 2008). In fact, all these skills are becoming an essential part of the digital literacy that must be acquired. Thus, by constantly gaining experience through participating in ICT-based virtual teaching/learning environments with other learners and mentors, these skills are developed and become part of the lifelong learning process (Huang et al., 2020). VLE enable the learning of both aspects of digital literacy.

Policymakers and other stakeholders generally agree that Europe needs to make fundamental changes in education and training to implement such important policy goals as, for example, the goals of *competitiveness, economic growth, employment and more sustainable social cohesion* set out in the Lisbon Strategy (Tapio, 2004) (ES 2000; E&T 2010). The importance of education for people's well-being throughout all stages of

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their lives is beyond any doubt. At the economic level, individuals with higher levels of education tend to enjoy higher employment rates and income levels. What is more, all the indicators suggest that in the years to come, the role of education will be even more important. The challenges posed by technological change and globalisation have a profound effect on the educational model (Milovantseva, Earle, Heymann, 2018).

The main discussion is how to adapt these new requirements to formal education and training in Europe and to relate to the economic development and businesses also with a focus on entrepreneurship (Goczek et al., 2021; Hanushek & Woessmann, 2020). It is recognised that significant progress remains to be made in implementing important changes in education and training to accelerate the development of the knowledge society (Donahoe et al., 2019; Mehall, 2020). The contribution of learning to people's liberation, social advancement and self-expression is also significant. Achieving learning goals, such as developing *social skills and critical thinking, learning to share and collaborate* is becoming increasingly important (Ala-Mutka, 2008). As the role and meaning of information and knowledge in the knowledge society are different, the vision of what knowledge and skills people must have and how they must acquire them must also change. Knowing where to find certain information, who can access different sources and why is becoming increasingly important in a network society. Social skills and "relationship capital" are part of digital literacy required to live and work in a knowledge economy that is becoming increasingly evident due to the rapid development of "web 2.0" or social computer applications (Dhawan, 2020; Mehall, 2020; Huang et al., 2020).

VLE as personal digital environments. Every learner (and every teacher, educator, tutor) has a personal digital virtual learning environment where all the learning resources particular learner needs are available at any time and on a variety of devices and media. When it comes to the future of eLearning, mobility, flexibility, and scalability are key factors to providing managers with a sustainable and successful training solution. Learners want access to resources and courses on their own time, in their own space, with content that's engaging and memorable. Learning management systems (LMS) must include mobile application and integrate with existing solutions to help streamline processes and create organized, effective training programs (*The Open LMS*[1] *, 2020*). A personal virtual learning environment is a virtual desk where everything is personalised and easily accessible. The personal environment allows different abilities and "partial identities" to be shown to different groups of people, while at the same time maintaining a safe and personal environment in the digital world (Daskala & Maghiros, 2007; Martin, 2020).

VLE can take many forms, but they all have the following features in common: VLE prioritise not the knowledge accumulation but individuality, personal creativity and innovation in the learning process (Cipresso et al., 2018; Klopfer, 2013; Savanevičiene et al., 2008).

VLE as connecting and social virtual environments. For learning to become a social phenomenon, virtual learning environments bring

together community, interrelationships, and communication. In these environments, a variety of actors – teachers, students, learning institutions and developers of learning programmes, as well as family members, friends, colleagues, and other peers – meet and interact to teach/learn or share experiences. Virtual learning environments are supported by a variety of synchronous and asynchronous communication channels, but learners, members of the same group, and teachers can also meet in the physical world (Martin, 2020; Mehall, 2020; Huang et al., 2020).

VLE as trust-based virtual environments. The key thing that connects learners and teachers is trust. The accuracy and reliability of the knowledge conveyed is important, as is the openness of personal expression and thinking. Learning communities connect the knowledge and experience of many people (Ala-Mutka, 2008). Validation and accumulation of knowledge in alternative social trust-based environments complements and compensates for the diminished importance of authority, proximity, and face-to-face meetings (Donahoe et al., 2019; Mehall, 2020). Private personal virtual environments allow for the protection of sensitive information, while public personal virtual environments, together with a certification system, demonstrate the competence of individuals offering consultations.

VLE as stimulating and engaging environments. A personalised personal digital environment and flexible learning methods provide valuable opportunities to develop *appropriate and stimulating learning plans* best suitable for a specific individual. Learning is related to objectives and goals that demonstrate and validate the learner's level of knowledge and skills (Martin, 2020). Through multimedia, learning resources become enjoyable, and the connection facilitates social and non-formal learning approaches that are engaging and link learning to positive emotional aspects.

VLE as knowledge management systems. Nowadays, when it is easier than ever to keep in touch with someone through various means of communication, learning does not necessarily mean acquiring knowledge. Instead, it often means finding and managing the knowledge or aids needed to perform tasks. Linking personal virtual learning environments allows for the formation and management of interpersonal and inter-institutional knowledge. Thus, virtual learning environments enhance personal knowledge and work by offering and providing easy access to other relevant individuals and their public virtual learning environments.

VLE as inclusive environments. The last and most important feature of modelling a virtual learning environment is the ability to engage. Virtual learning environments do not single out any individual. They are open to people of all ages, with different backgrounds, from different cultures, speaking different languages, regardless of disability or other complications (Ala-Mutka, 2008). The social communication aspect, trust-based systems, and the ability to create a certain learning

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environment for people with less learning and ICT experience allow for individuals to easily join such virtual environments.

Strategy modeling process for VLE

Learning design. The main challenge is to create learning opportunities that enable people of different abilities and interests to receive appropriate learning, to adapt to different personal situations and goals, and to balance, say, formal learning with self-education. Flexible ICT-based learning environments enable situational learning (Lave & Wenger, 1991) that links learning to context. However, this is only possible if learning content, processes and support systems are designed to ensure such openness and freedom. Training teachers, counselors, and/or educators is especially important, because their role in the learning process is changing. On the one hand, school principals must not only support such an approach, but also create the necessary atmosphere and form an attitude towards an innovative and open-to-change learning environment.

The structure of the learning environment. Making learning resources and processes more open is a challenge for educational systems and institutions. In applying the latest methods of open learning, it is very important to enable educational organizations to collaborate and be open (e.g., make educational resources available) both within the organizations themselves and with other organizations. It is extremely difficult to change educational systems. In principle, people and institutions are no strangers to change, but change and innovative learning often run counter to prevailing interests and the established institutional order. When implementing changes, the entire learning system and all related participants must participate in all stages: representatives of the education system, educators, teachers, and their institutions; students and their families; organizations, employees and employers, technology, and content providers; policy makers and government institutions.

Inclusion. The main task of the vision is to make learning environments accessible to all. Basic access to and ability to use computers and communication tools is a prerequisite for more advanced users. The so-called innovation dilemma (Rogers, 1995) states that only privileged and well-informed individuals reap the benefits of technological innovation, while those who do not have such conditions fall further behind. skills and less participation in lifelong learning.

2. Research methodology

The context of the research and selection of participants

A qualitative research strategy was chosen for the research. The aim is to make certain insights that are distinguished from the point of view of the people involved in the educational process. A semi-structured

interview method was chosen for the research (Denzin, Lincoln, 2017). During public consultations and seminars, education experts (N=10), teachers (N=100) and education policymakers (N=10) were interviewed. When discussing the topic of virtual teaching/learning environment modelling, the use of group interaction effect provided new qualitative features of the interviews. Just when conducting qualitative research, the aim is to reveal the entirety of the researched phenomenon in its usual context, therefore the space of qualitative research is often every day, ordinary life with various types of activities and social interactions taking place in it (Gaižauskaitė, Valavičienė, 2016). The basis of this qualitative interview are open-ended questions, to which it is expected to receive as broad, detailed, and open answers as possible, formulated and presented by the research participant himself, reflecting his perspective (Gaižauskaitė, Valavičienė, 2016; Bryman, 2014). Focus group interviews were conducted through a planned discussion and interview with a small group of people, conducted by a moderator. The participants are sampled from the study population. The aim is to obtain knowledge of the participant's considerations and ideas on a specific topic. The method is feasible in illuminating the variation of viewpoints held in a population (Denzin, Lincoln, 2017).

In addition, *concept maps* were created, reflecting the main changes in learning strategies and the response of learning systems to the challenges. Concept maps are a graphical tool that is used to visualize meaningful relationships among concepts. It's used as a knowledge representation tool, meaning they basically represent the knowledge structure that we humans store in our minds about a certain topic (Moon, Hoffman et al., 2011). Both simple and complex concept maps consist of two things: concepts and relationships among them. Besides, concept mapping is a general method that can be used to help any individual or group to describe their ideas about some topic in a pictorial form.

The research was conducted in May 2021. Results of the research help to identify certain relevant aspects that are expected to be explored in future work.

Research ethics

This study observed the guidelines in the Code of Ethics, which respect and protect the rights of all research participants. These were informed about the aims of the study and that all data gathered would be treated anonymously and confidentially. Then, they were given an interview questionnaire. Participants were assured that their participation was voluntary, and that all data gathered would be treated anonymously, as well as the constructive feedback, which was also applied in this survey. The following ethical principles were complied with when conducting the research: 1) principle of respect for person's privacy, i.e., the research participant had the right to decide how much the researcher should or should not know about one, and how much information to reveal. The surveyed participant was given an opportunity to not answer research

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questions and terminate the conversation if feeling uncomfortable, 2) confidentiality and anonymity (the research participants were explained that information on the research participants and materials being dealt with are accessible to the researcher only. The information of the research participants was depersonalised and coded); 3) goodwill (the data of the interview analysis were used for the scientific research only); and 5) the principle of justice (the informants took part in the research voluntarily, approved by their consent form).

3. Results

The same could be said about most educational concepts – the more valuable a concept, the weaker its boundaries as a term can withstand the reflections of different directions (paradigms) of educational philosophy (Kuhn, 2003). Working with such concepts is very necessary, if one wants not only to reflect social consciousness, but to effect its change. Looking at how the concept of learning/learning environment is used today, two different but equally likely trends in its development are clearly visible. *The first of them* (characteristic of public discourse) is the aspiration to use the concept of learning environment when examining educational (learning) processes, to describe both the environment organized and realized by the teacher, and the environment in which learners learn.

During the practical workshops, *concept maps* were drawn up, reflecting the main changes in learning strategies and the response of learning systems to the challenges posed. Although each of the jointly created visions has its own clear emphases and scopes, together they form a detailed diverse and changing model of expression, where technological trends and socio-economic dynamics affect teaching/learning strategies and perspectives of their expression. As a result, there is a need to reflect on fundamental changes in the learning environment. The evaluations and attitudes of the teachers who participated in the study about the changes in the learning environment are revealed through the logograph presented below (see Figure 1).

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Fig. 1.

Logographic of teachers' attitudes towards changes in the learning environment.

During group interviews, all participants are involved as much as possible. After asking the question, the opinion of those who wish to speak is heard, and all individuals involved in the research are encouraged to speak, with appropriate supportive questions, usually focused on the responsibilities and experience of the respondents. Qualitative research of virtual learning environment modelling allowed to reveal the dynamics, expectations, and attitudes of educational entities towards the virtual learning environment.

Teachers. insights into the change of the teaching-learning environment. During the qualitative research, teachers were asked to indicate changes in school education. The collected responses were grouped into categories (clusters), each of which had subcategories (topics).

The main changes are contextualised in the field of learning process optimisation (Table 1).

Table 1

Contexts for changes in the learning process

Category	Subcategory	Contextual learning
Changes in the learning process	Learning objectives	'Promoting values, respect, diversity [...]'; 'Learning "how" instead of "what"'; 'A new balance between content and competences' [...]; 'Learning about one's own culture and the culture of others [...]'
	Learning methods	'[...] task-based learning'; '[...] learning by doing'; '[...] interactive learning'; '[...] understanding of a subject matter, not just receiving of information [...]'; '[...] practical, not just abstract, learning'
	Learning roles	'[...] reduced hierarchy'; '[...] students develop their knowledge individually, under the guidance of a teacher'; '[...] teachers are moderators'; '[...] teachers are not the owners of information'
	Learner-centred learning	'[...] learning is more individual'; '[...] greater account is taken of individual progress'; '[...] constructive learning'; '[...] specially adapted for pupils'.
	Learning spaces	'[...] a high-tech environment'; '[...] ICT employed everywhere, not just at school'; '[...] mobile technologies'; '[...] iPads given for every learner', '[...] learning should be open to the public'
	Learning links	'[...] global learning'; '[...] involving the local community'

Upon comparing the results of the research with the main goals, it is possible to determine which goal should be the focus of education policy to change the situation by 2022 and achieve the expected result of learning quality. In the *Strategic Framework for Education* (Council of the European Union, 2021), one of the measures for ensuring the efficiency and coherence of the development of the quality of the learning process emphasises that the quality of the learning process is based on a learner-centred approach (e.g., '[...] *learning is more individual*'; '[...] *greater*

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account is taken of individual progress'), a vision of multidimensional social interaction (e.g., '[...] *global learning*'; '[...] *involving the local community*'), and principles of social justice, inclusion and access to education. Therefore, learning becomes the most important and should be at the very centre when thinking about the quality of education (Donahoe et al., 2019). Inputs, processes, environments, and outcomes work together and stimulate learning. Two levels have been distinguished: the internal level of the learner operating in the learning environment (e.g., '[...] *students develop their knowledge individually, under the guidance of a teacher*') and the external level - the level of the education system that creates and supports the learning experience (e.g., '*Learning .how. instead of .what*''; '*A new balance between content and competences*' [...]; '*Learning about one.s own culture and the culture of others* [...]). In this environmental model, elements of training organisation are perceived as learner centred.

At the learner level, teaching/learning material and tools should respond to changes in the world, and the learning-related needs of modern society and the individual. Therefore, teachers: 1) integrate the more active learning methods: *Learning became more active, the focus was on learning by doing, by experience. At the same time, it became more public-spirited and based more on collaboration and evidence, where each student constructed their knowledge and performed practical and other tasks while communicating with others. A learner-centred approach to learning became prevalent, considering the individual needs and progress of each student. In support of this change, the traditional roles of teachers and students are changing teachers have become moderators and tutors (mentors), while students form personalised knowledge and knowledge gained through collaboration*; 2) review learning targets: *More constructive active learning ways resulted a changed balance of knowledge and skills and the appearance of new competences. In a world full of information, knowing .how. has become more important than knowing .what.. In addition, values such as cultural acceptance and diversity, tolerance, respect, and responsibility became important in the learning field*; 3) create new learning environments and contexts: *Along with changing learning goals and ways to achieve them,* new learning environments *and their links with different contexts have emerged. Learning is supported by* flexible and dynamic virtual environments *and* a wide range of tools and applications *that facilitate individual and collaboration-based learning within and outside the school, and in links with a variety of contexts. No more physical or virtual barriers. Learning environments became more holistic, are motivating, public-spirited, and connected to the local community and the global society.*

In the second phase of the public consultation, teachers were asked to identify what key competences students will need to acquire. It is noteworthy that all the competences currently described as key in Europe have been mentioned as important for the future learning environment, thus confirming their continued importance and relevance. However, in their discussions and suggestions, the participants in the qualitative research analysed and improved the current composition of

key competences, pointing out how competences can be changed to better meet the needs of the future. *For example, digital literacy competences have been complemented by a proposal to include new communication models such as a permanent online presence and an agreement to use different means of communication in parallel (Web 2.0, digital identity management).*

To sum up teachers' preferences when it comes to the contexts of changes in the learning process, it can be observed that with the rapid increase in the flow of new information and the development of technology, it becomes important to look for new ways of learning based on multifaceted abilities.

The characteristics defining the learning environment and the social aspects of its functioning are the following: artifacts – the learning environment is a product of human (students, teachers) activity; structured activity – the implementation of goals and objectives indicates the existence of a structure and control mechanism that ensures the achievement of goals and objectives; formal boundaries – the learning environment has its own boundaries, contours, which are often determined by people's agreement (see Figure 2).
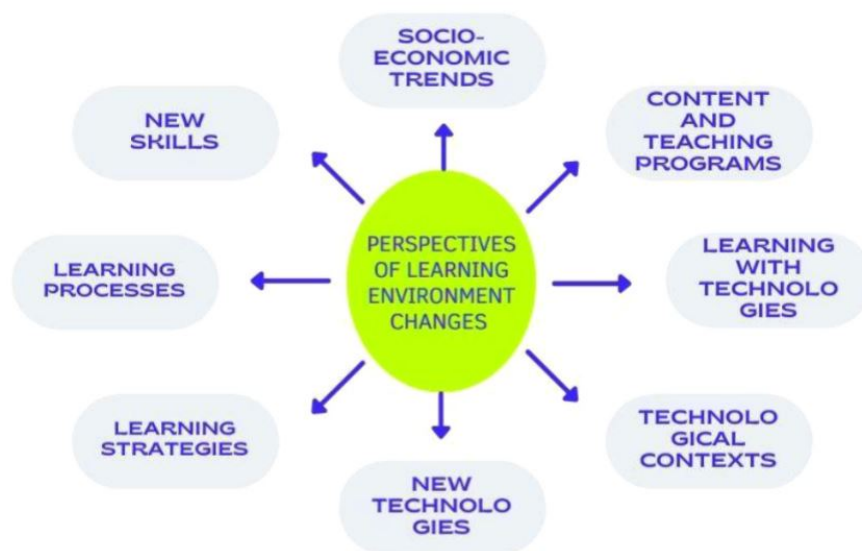
Fig. 2.
Logographic of experts' views on changes in the learning environment.

Insights of education experts (school heads) (N = 10) about changes in the teaching/learning environment. The targeted discussion provided insights about current and future trends and their impact on learning. The main changes are contextualised *in the field of the national learning system* (Table 2). When comparing the findings of the experts with those of the teachers who were asked to focus on *school education* rather than on the overall big picture of changes in communities, many general aspects of the analysis can be noticed. Both groups of experts and teachers emphasise that *technological change* will be an important factor affecting the learning environment change. At the heart of the maps of both concepts, the following have been identified: *changes in learning strategies*

and approaches (new emerging competences, *assessment procedures with a focus on skills and attitudes rather than fact and knowledge*; learning strategies, *that make the learner central to the learning process*; personalised learning approaches, *tailored to individual learning needs and goals*; dominance of collaboration-based learning processes, *that also change student-teacher relationships*, and new learning environments integrated into life and work processes).

Education experts have modelled a picture of a rapidly changing world, where *integration, collaboration, coordination, and personalisation are key strategies* for citizens to acquire the skills and attitudes needed for active participation in society. In addition, experts said that education and training institutions have become learning communities working with employers to identify skills needs and tailor learning information to the individual needs of each student. Thus, the desirable future of the teaching/learning environment, as described by experts, is a learning perspective in which everyone has access to many freely available opportunities that flexibly respond to the learner's learning needs and preferences.

Insights of education policymakers (specialists of the municipal education department) about the change of the teaching/learning environment. The main changes are contextualised *in the field of systemic educational change* (Table 3).

Table 2.
Contexts for changes in the learning system

Category	Subcategory	Contextual learning
Changes in the learning system	Socio-economic trends (Lifelong learning)	[ ] Increasing importance of lifelong learning, but also the aspiration of institutions'; [ ] Balance between primary education and training, and lifelong learning'; [ ] More reliance on lifelong learning'; [ ] Personal lifelong learning becomes an advantage'; [ ] New ways of learning will emerge, tailored to future skills-related needs in line with the needs of the labour market'
	Learning processes and strategies: assessment, personalisation	[ ] there will be more research-based learning, the development, testing, and continual improvement of personal theories'; [ ] new models of assessment especially of formative assessment'; [ ] personalisation of learning strategies'; [ ] Are unnecessary skills and expertise required from students when learning'; [ ] holistic learning management'; [ ] learning in project teams.
	New skills: collaboration	[ ] Learning from peers will be part of the learning process'; [ ] the market will decide what we will need to learn than of knowledge about our cultural heritage'; [ ] The need to learn how to educate oneself'; [ ] need for multiple skills (multidisciplinary and 'do-it-yourself' practices)'; [ ] problem-solving and adaptation skills'; [ ] focus on knowledge creation'; [ ] skills development takes precedence over knowledge'.
	The science of educating oneself	[ ] To integrate, test and continuously improve'; [ ] teachers will be more involved in team training activities'; [ ] leadership-based learning'.
	New strategies and technologies	[ ] privacy artificial intelligence'
	Learning with technology	[ ] High-quality digital learning environments'; [ ] Learning without having physical classrooms'; [ ] Augmented reality and innovative modelling'; [ ] learning motivation will be based on social networks'; [ ] mobile tools will be a substitute for learning and memory'; [ ] mobile tools support learning'
	Content and education programs	[ ] The content and environment of learning will change'; [ ] [ ] A proportionately growing knowledge base'.

Like teachers and experts, policymakers have also emphasised that *technology is one of the main drivers of change in learning.* They also argued that *personalisation and collaboration-based learning processes will become prevalent,* and that teachers and students will be able to *design their learning processes* to be better *adapted* to individual needs *on the one hand* and to societal change on the other. Accordingly, it is emphasised that while the current set of key competences will remain important in the future, competences will place more emphasis on skills and attitudes that will be acquired and complemented through lifelong learning, rather than on knowledge. According to policymakers, as a general trend, *learning will respond to the needs of the labour market* and *will be better aligned with curriculum*, content and learning objectives. The market should also be more involved in shaping and redesigning the learning programme to facilitate the

Table 3

Contexts of systemic changes in education

Category	Subcategory	Contextual learning
Contexts of systemic changes in education	Institutions	'[...] *more integrated into the world*'; '[...] *accessible to the needs of pupils and society*'; '[...] *the boundaries of formal and non-formal learning are exceeded*'
	New skills	'[...] *technological, digital literacy skills*'
	Compatibility of education and training with labour market objectives	'[...] *matching programmes to the needs of the labour market*'; '[...] *improving the transition from training to the labour market*'; '[...] *employees are more involved in education and training*'.
	Technologies	'[...] *ICT will be commonplace and integrated into the education program*'.
	Challenges	'[...] *Implementation gap*'; '[...] *to respond to technological and demographic change*'.

transition from education and training to the labour sector. In general, education and *training institutions will need to become more transparent and accountable*, open to the public and to the needs of learners. Non-formal learning activities will need to be better recognised. According to policymakers, the key challenge for education and learning in the future will be bridging the current 'implementation gap' and putting into practice what has long been recognised as necessary and subject to change (Dhawan, 2020; Mehall, 2020). This is thought to be particularly difficult to do in the face of expected or sustained budget cuts and further changes in technology and the demographic situation. Obstacles that prevent taking on promising learning strategies, such as new ethical issues arising from privacy or a lack of adequate and targeted teacher training, also need to be properly addressed for change to take place.

Discussion

The accumulated preferences of teachers, experts and policymakers were combined and analyzed. To depict the structure of the emergent data, the method of multivariate scales and hierarchical cluster analysis were applied. As the experts sorted the statements, each statement was positioned on the concept map, reflecting its proximity or distance from other statements. Analyzing the content of various groups (clusters), four common directions have been identified. The first group of clusters emphasizes the changes expected in formal education and training. Experts emphasized that in this sense institutions will change to become enablers and connectors in the globalized education market. Informally acquired skills will be better recognized and integrated into qualification systems. According to these cluster groups, it can also be seen that

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the responsibility for the acquisition of competences will move from the institutional level to the individual level. According to the general trend expressed in the second group of clusters, teachers will work more as mentors, pursuing learning strategies focused on individual and professional needs and responding to individual priorities and needs (Affouneh et al., 2020; Donahoe et al., 2019; Mehall, 2020). At the very center of the concept maps is the lifelong learning cluster. It indicates not only that it will occupy a central place in the future of learning, but also that this cluster unites all other clusters. According to experts, this means that many of the expected changes in learning strategies and methods are related to the fact that in the future, skills and competences will be acquired through lifelong learning. ICT plays an important role in future-oriented learning. While the statements in all groups reflect changing patterns of learning as a result of the opportunities offered by ICT (Martin, 2020; Mehall, 2020), there are three groups that clearly demonstrate how the emerging technology conditions the emergence of new learning strategies.

Some of the expected changes stand out as particularly important: the nature of learning will become more learner-oriented, individual and societal; personalized and tailored learning opportunities will meet individual needs; innovative pedagogical concepts will be developed and implemented, aiming, for example, at experiential or immersive learning and social and cognitive processes; formal educational institutions will need to respond flexibly and dynamically to changes and offer learning opportunities integrated into everyday life; education and training must become accessible and possible for all citizens. One of the most striking and important findings of the study is the impact of ICT on future learning strategies and trajectories.

Conclusions

When analysing the content of various groups (clusters), four general directions were identified.

The first group of clusters emphasises the changes expected in formal education and learning. The experts stressed that in this sense, institutions will change to become empowering and interconnected in a global education and labour market. Informally acquired competences and skills are to be better recognised and integrated into qualifications systems. These cluster groups also show that the responsibility for acquiring competences and skills will shift from the institutional responsibility level to individual.

At the very heart of the concept maps is a *lifelong learning cluster*. Said concepts show not only that this cluster will be in a central role in the future of learning, but also that it brings all other clusters together. According to experts, this means that many of the expected changes in learning strategies and practices and ways are related to the fact that in the future, skills and competences will be acquired through lifelong learning.

ICT takes significant position in the way that learning will take place in the future. While the statements in all groups reflect learning models that are changing due to the opportunities provided by ICT, there are three groups that clearly show how emerging technology will condition the emergence of new learning strategies. Some of the expected changes stand out as particularly important: the nature and focus of learning become more learner-centred, both on the individual and societal levels; learning opportunities due to personalisation and being tailor-made meet the individual needs; innovative pedagogical concepts based on what was previously mentioned will be developed and implemented, for example through experiential or inclusive learning, and social and cognitive processes will meet the needs of economic change; formal education institutions will respond flexibly and dynamically to the market and individual needs through integrating the learning environment into everyday life; education and training will be available and accessible to all citizens and in this way respond to the needs of the market and individual career changes.

The consequence of the changed patterns of communication and interaction will be that interpersonal skills (communication, collaboration, overcoming difficulties and collaboration skills) will become more important. Self-determination, resilience, experimentation, risk-taking, creativity and entrepreneurship will become key competences for people to actively manage their personal and professional skills and find their way in an interconnected maze of interactions.

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Notes

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