Changes in Knowledge Representation and Student – learning Content Interaction in Digital Environment*

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Abstract

Learning activities in the modern digital environment reflect the diversity and functionality of human-machine interaction and overlap innovative presenting knowledge models. Digital intelligent learning resources are focused on high levels of student cognitive activity and innovative developmental potential. The new qualities of such learning activities are instrumentality, adaptability, interacting with conceptualised and visualised knowledge.

Effective combinations of traditional and advanced presenting content methods in digital educational resources make provision for training differentiation, student's motivation support, and addressing personal preferences. Shaping of demanded cognitive skills and digital competencies become possible if the student is involved in the personal knowledge construction, aware of advanced learning goals, priorities, and capabilities of interaction with digital learning content.

Keywords: *digitalisation of the learning environment, educational resources, learning content, digital competence, learning content design*

1 Introduction

Digitalisation of the educational environment leads to changes in the learning process. To organize educational activities, an important role is played by digital educational resources operating in a variety of information systems. Educational resources of the developing digital environment have significant features: they reflect new trends of knowledge society, as well as promising educational priorities related to the personalisation of the learning process and digital competencies shaping. This generates a need for new approaches in digital learning content design. Due to various multimedia technologies and intelligent algorithms automating information processes, key changes relate to ways and structures of knowledge representation in human-machine systems. The problem contains not only the insufficient distribution of "non-classical" educational content structures and promising interactive technologies but also the insufficient educators' and students' readiness to interact effectively with new knowledge structures using new digital tools.

2 Development

2.1 Changes in resource requirements in the digital learning environment

Any educational resource represents a certain content structure and provides definite possibilities for interacting with learning content. In the first stages, the "digitization" of traditional educational resources took place, with the preservation of "knowledge" paradigm capabilities. In digital implementations, they were enriched with interactive and multimedia functions that provide usability, but do not change the way to acquire knowledge.

Promising society development trends, education should reflect, today are largely targeted to the construction of a knowledge society and digital economy. Both of these trends are based on the rapid progress of information technology, the exponential quantitative growth of available information and the generation of new knowledge. In education, knowledge reproductive priorities are replaced by goals related to the ability to acquire and operate knowledge personally and purposefully in solving various problems.

The education and self-education today are not limited to a certain set of textbooks and teaching aids. The UNESCO report "Towards knowledge societies" [Towards knowledge societies, 2005] stresses the expanding of public knowledge space, associated primarily with the spread of ICT and the Internet. The openness, richness, and connectivity of the knowledge space define new requirements for extracting knowledge human activity. Skills to search and identify information, its critical assessment, analysis, processing and inclusion in the personal knowledge base are of great importance. Since an information overload does not ensure an increase in personal knowledge, the digital resources mission focuses on new knowledge organization to provide society demanded learning outcomes.

The modern knowledge space represents a network organization and opens up the possibility to integrate educational, scientific, cultural, and informative content [Phillips et al., 2017]. The personal nonlinear trajectories in complexly organized knowledge are impossible without analytical skills and a critical content approach. Students don't get such skills by default but gradually develop them supported by the appropriate design of educational resources. Accordingly, in the learning process, tasks should be set to encourage a person not only to consume knowledge but also to be actively involved in the current knowledge processes in an information environment. Consequently, the learning content didactic methods are changing defining the new design of digital educational resources [Xie et al., 2018].

An essential feature that distinguishes the student's interaction with digital educational resources is an instrumentality, i.e. the ability to carry out active actions with digital learning content using a variety of digital tools. These actions support both the active student's knowledge constructing and shaping of new cognitive competencies.

Thus, the new requirements for digital educational environment resources correlate with the knowledge coverage, knowledge organization (knowledge structures), and the instrumental interaction with digital learning content.

2.2 Organization of knowledge and training activities in interpersonal educational interaction

New digital resources design approaches do not reject the reliable traditional didactic experience. This experience is undergoing new understanding, enrichment, and transformation, taking into account the new informational realities and the new demands for education.

The explanatory and illustrative teaching approach in classroom practices are based on consistent, linear knowledge presentation, supplemented by visual and practical techniques. Students' independent work, organized with textbooks, is also mainly based on the explanatory principle. In traditional textbooks, the well-known methods for student's orientation in a linear learning text, visualization, attention, perception management, and activation (questions, tasks and etc.) are im-

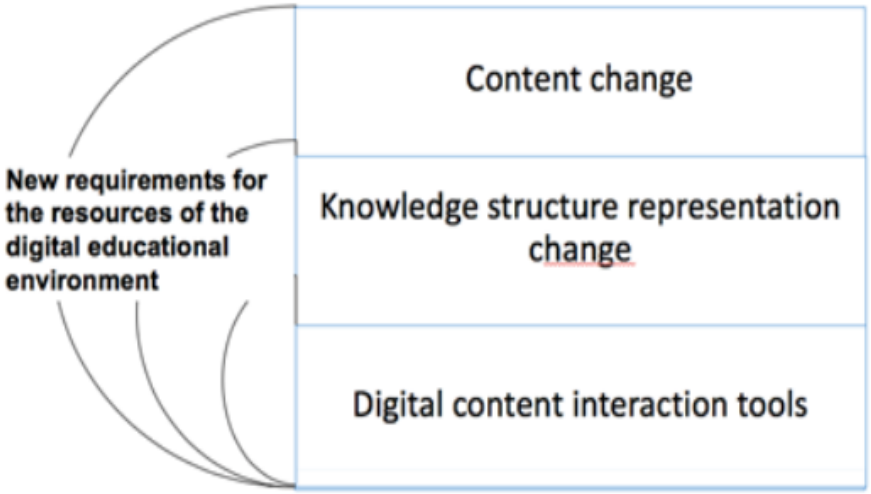

Figure 1: New requirements for the resources of the digital educational environment

plemented. Student's cognitive actions are mostly planned by the teacher: perception (listening, reading), the predetermined cognitive procedures, summarising notes). The structure of knowledge is mainly linear-thematic.

It can be concluded that the classical methods of transmitting social experience based on a consistent, narrative, explanatory and illustrative way of presenting learning content, represent a passive form of the student-learning content interaction, i.e., the active person in presenting educational information is the teacher.

2.3 Changes in interaction with knowledge in human-computer systems

The learning environment is changing, human-computer systems are playing an increasingly important role. Student's interactions with digital learning content are carried out mainly in an individual mode, at the request of the user. Computer technologies expand the range of user's actions with digital learning content [Bando et al., 2017].

Direct transfer of traditional didactic approaches to the digital environment is not effective enough as it does not take into account the potential of computer technologies for organizing knowledge and ensuring the variability of learning behavior in an educational environment. Consequently, it's required to explore new ways of knowledge representation and student's cognitive activities in human-computer systems.

Addressing the priorities of individualised flexible knowledge management in an open information environment, it is helpful to explore progressing instrumental opportunities for student's active interaction with learning resources, especially in terms of stimulating the various cognitive student's activity. V. Davydov asserted that not always the assimilation of knowledge and skills educates a creatively thinking person, developing the human mind, and personality [Davydov, 1996].

Different types of digital learning content provide the learner with a specific possibility, due to principles of structuring, granulating information, and the algorithmisation of human-content interaction.

Digital learning resources transformation stages. We distinguish three transformation stages of digital learning resources design (concerning the classical book structures). Transformations are

carried out in various ways of knowledge formalization in computer systems, integrating presenting content methods, and algorithmisation of learner's interactions with digital content. By knowledge formalisation, we mean the representation of knowledge using semiotic systems. Algorithmisation of interaction with the digital learning content implies a arrangement of the student's actions with the digital content to achieve the result.

The closest to the classical book digital learning content organisation stage is notionally named the level of "usability transformation". Knowledge transferred to the digital environment with insignificant transformations in structure, but with enrichment in usability (integration of information sources, hypertext, multimedia representations of learning objects). The information granulation and interaction algorithms are explanation logic and screen display subordinated. A significant advantage is the student's ability to navigate and control the digital content. The learner's interaction method is mainly aimed at perception, subjective reflection of educational information.

The second stage is conventionally denoted as the stage of the "open information base" in the digital learning environment. It is characterised by a variety of information sources and knowledge structures. Digital learning content is granular with multiple connections with the external information environments and is open for active instrumental transformations by students using a variety of digital tools (software). It expands the range of learning goals, in particular, in the frame of cognitive activity. The student's interaction with learning content terns more algorithmic. We mean the interactivity of student's actions broadly, including in this concept both programmed human-computer dialogue, and various software tools applications providing flexible student's abilities to manage learning content. We denote this interaction method as "interactive instrumental" [Noskova & Pavlova, 2019]. The third stage of digital learning resources transformation provides automated learner's interactions with digital learning content. This is the stage of "intelligent digital resource base". Modern intelligent systems integrate knowledge storage and dissemination methods in natural and formal language, text, graphic, audiovisual, multimedia modes. They allow the learner to involve extensive arrays of educational, scientific, experimental information to receive automated feedback and analysis. Learner avoid manual actions searching relevant and actual learning content. He solves learning tasks and professionally significant problems on a high intelligent level. The student considered a multi-factor cognitive system interacting with the complex, redundant information system [Xie et al., 2018][et al., 2019].

Information, extracted by the student from the knowledge base following personal requests and preferences, can be used for solving problems with variable gains in performance. Instrumental solving problem actions can be focused on the development of certain personal intellectual abilities. Such digital educational resources design approach significantly changes the nature of learning activities and we name it "intelligent transformation" [Noskova & Pavlova, 2019].

Let's explore each of these stages in terms of knowledge structure and ways to interact with the learning content of the digital educational environment.

Empowering classical knowledge structures in a digital environment. Currently the majority of digital learning resources are based on narrative-written social experience transferring (texts of hypertext textbooks, video lectures, commented presentations, etc.). They replicate prior educational practices, but have undoubted advantages in terms of enrichment of visual aids, and interactive functions. Digital multimedia resources integrate diverse content presentation modes. The educational context can be enriched by digital media publications, scientific information (online scientific databases, Internet conferences, forums), artistic-figurative elements (theater, music, cinema, visual arts, etc.), and professional communities' discourse. The emotional-sensual sphere is more involved in the cognitive process.

Interactivity is the leading distinguishing quality of digital multimedia resources. It activates student's interaction with the educational content, supports various types of learning actions: selecting actual content, observing static and dynamic objects, automated self-control, context-sensitive

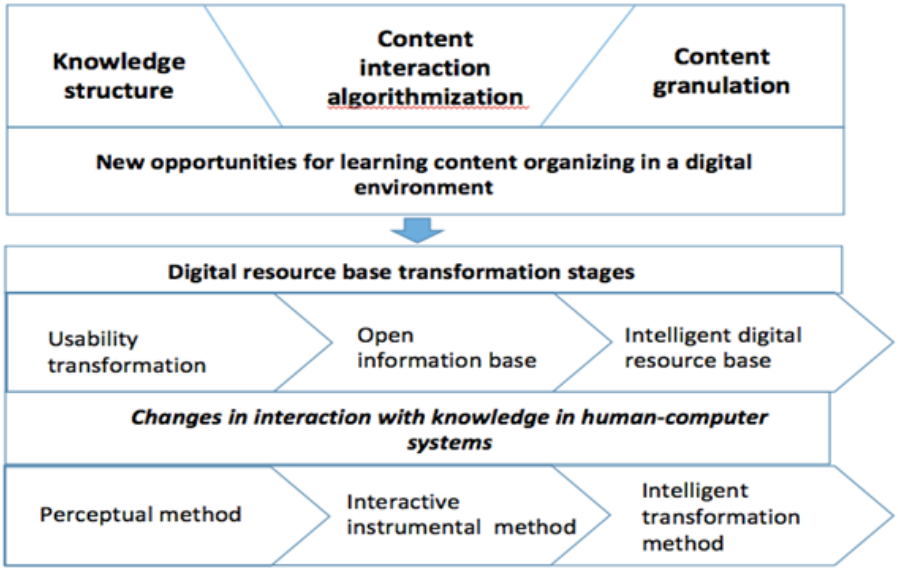

Figure 2: New opportunities for digital learning content organizing and digital resource base transformation stages

help, and so on. Hypertext represents the transition from linear sequences to "discretised" texts, based on effective organisation of semantic autonomous content blocks, organized considering screen information perceiving peculiarities. The optimal duration of a video lecture is determined by the specifics of perception of discrete dynamic sequences.

Hypertextual knowledge structures are open (the content and structure of knowledge can be changed and expanded). Applying a hypertext learning resource, the student's activity can be aimed both at studying the proposed knowledge sequences and at expanding digital learning content, supplementing it with critically selected information. Thus, students acquire opportunities to extend the learning context, to evolve aspiration to get the current state of knowledge and to utilize the most reliable and relevant information (publications in authoritative scientific databases, professional network communities, etc.). In consequence of automated text translation, the information in foreign languages becomes available in the learning process.

But the hypertext learning content, enriched with multimedia and external information sources, is not a sufficient condition for significant transformations of traditional student interaction with knowledge. Learning activity is predominantly focused on the search, selection, study, assimilation of structured content. The expansion of the possibilities of interaction with non-linearly structured content is associated with free navigation, a detailed study of images and multimedia objects (video clips, interactive animations, computer models), automated control and self-control. Such interaction allows a person to shape individual routes in accordance with the accepted goals. Sufficient hypertext branching and content saturation allow us to take into account students interests and preferences. However, these routes are still largely subordinate to the logic and hierarchical structure of the proposed content. The predominant student interaction with the digital learning resource is aimed at knowledge acquisition and shaping primary skills for it's application. But such learning resources not much contribute to flexible personal learning and thinking skills that are of great importance with respect to effective activity in the knowledge society.

Alternative representing knowledge structures in the digital environment. High levels of learning content interactivity are associated with great extension of student's actions with digital components. At the same time, principles of knowledge discretisation are changing. New knowledge

structures gain ground, and accordingly appear new ways to organize learning and cognitive activities and new possibilities to formulate learning tasks and solve learning problems.

The student's interaction with digital learning content acquires a personalised activity, i.e. learner activity is associated with the transformation of information to be assimilated. Digital learning content is intended to be personally changed, linked with other resources, and be expanded and detailed in the process of solving problems. Digital tools make it possible to obtain new, personalised information objects that demonstrate not only effective knowledge mastering, but also knowledge deepening and expanding manifesting motivation, interdisciplinary links, and interpretation competencies.

Highly interactive information structures predominantly have a network organization, use automation tools for interaction with extensive information arrays. They function as an information environment in which the student independently chooses action methods to achieve learning goals and find a response to his preferences and motivations. Active scientific search and testing of intelligent systems, virtual, hybrid, augmented reality, and semantic networks in education are in progress. But the role and significance of such technologies is not essential in mass pedagogical practice.

Methods to formalize and organize knowledge are mainly based on the modern theory of large systems or complex systems [Roth & Thom, 2010]. Differentiated formalising knowledge methods include: natural language description (procedures and word processing operations), lexicographical description (dictionary idea, encyclopedias), thesaurus description (logical and Intuitively, hypertext, ontology, information retrieval qualifier), the formal language (logic models, calculation, algorithms).

Natural language descriptions are the most common in information sequences. But with an exponential increase in information volumes and information technologies progress, they form the basis for the functioning of intelligent automated systems for analyzing and processing text data, systems with natural-language interfaces. The lexicographic knowledge description is highly formalised, while the thesaurus knowledge description in information systems determines the knowledge flexibility as openness, integration, multi-input, granularity, customisation.

Information technologies based on knowledge formal-language descriptions open up fundamentally new automated functions by procedures determining basic elements, sets, syntax rules, axioms, and knowledge extraction semantic rules. In modern intelligent systems, the most common ways of representing knowledge are ontologies, semantic networks, frames, products [Gavrilova et al, 2016]. The ontological organization of knowledge is a finite set of concepts of a subject domain, united by a variety of relations between concepts and many interpretation functions defined between concepts. The structures of discrete knowledge are united by connections, which can be either unambiguous or diverse, dynamic. Frames and frame networks serve operating knowledge representation units with description details changing according to the current situation. That is of great importance for non-permanent knowledge areas. Such methods of learning content representation in digital environment allow a person to interact not only with large volumes of information and data but also to receive the results of automated intelligent processed knowledge (based on formalisation, organisation and analysis methods). Intelligent knowledge extraction is applicable for solving complex learning problems and research tasks.

We see that digital knowledge structures and knowledge formalisation methods indicated above, are not intended for ready-made knowledge reproduction and assimilation. Intelligent knowledge bases, although they require new skills, support new cognitive activities not based on sequential knowledge perception, requiring divergent thinking in various situations and interpretations, that is important for advanced professional competencies. For effective students' knowledge management, conceptual learning object links and relationships are of essential importance. Complex ideas and problems are usually difficult to convey in linear text. The knowledge structure visualisation opens up new ways to reveal the causes and goals of knowledge relationships in the studied problems context.

2.4 The critical role of knowledge representation and conceptualisation models in shaping students' learning, thinking skills, and digital competencies

The main problem of modern teaching practice is the method to organize active personal learning and cognitive activities based on various information structures implemented in a digital environment. This activity should be flexible both concerning students' information preferences and knowledge management in the process of solving learning tasks. In a personalized learning process, the student not only accepts the goals of solving educational problems but also individually defines and transforms them following personal meanings, capabilities, preferences. He determines the ways to achieve an educational result, plans his actions, selects resources and suitable tools, runs communication.

To demonstrate the multidimensional role of advanced knowledge representation and conceptualisation in digital learning resources we apply the Guildford's model. Guildford identified three basic intelligence factor groups as a result of classification per three autonomous variables in information processing. These variables are: the information content, intelligent information processing operations, and information processing results. Content variables presuppose images, symbols or formal signs, semantics (conceptual information), and behavior (information reflecting motives, needs, moods, thoughts, attitudes, etc.). Information processing variables cover cognition (detection, recognition, awareness, understanding of information), memory, ability to convergent and divergent thinking, ability to evaluate information. The information processing results comprise items of information, allocation of information classes (ability to classify), setting unit relations, objects relations, systematization, designing integral content networks, conversion, modification, reformulation, as well as implication (conclusions beyond the framework of the available information) [Edwards, 1969].

The flexibility and functionality of information structures and content models (figurative, symbolic, semantic, behavioral) in digital learning resources promotes setting personal learning objectives and personalised learning activities. Traditional sequential knowledge mastering is inefficient if learning content presented as a hypermedia semantic network. Flexible information structures serve to set multilevel learning tasks: for analysis, defining classes, relationships, systems. The productive knowledge application in the learning process contributes to creative problems solving in new and nontypical situations. It is essential to provide a variety of intelligent student's actions applying digital learning tools. D.P. Guildford identifies operations affecting shaping cognitive functions, memory, divergent and convergent thinking, ability to evaluate. In particular, the convergent thinking evolvement associated with information actions focused on comparison, generalization, classification, categorisation, abstraction, analysis of information and knowledge, as well as the synthesis of specific information structures and objects [Guildford, 1965]. The divergent thinking criteria involve a complex of integrity and systematicity, criticality, flexibility, reflectivity in assessment, productivity, and the ability to generate innovative ideas [Dryazgunov, 2003]. The main advantages of the network, ontological knowledge representation and the conceptual knowledge visualisation are versatility and suitability. Consequently, such digital resources provide a flexible basis for learning in an evolutive context. M.A. Holodnaya associates this kind of learning to going beyond the system, finding or creating a new product, searching for new solutions [Holodnaya & Gel'fman, 2016].

In this respect, learning tasks promoting productive students activity, utilising ontologies or semantic networks representing subject area or problem domain, can give a significant contribution to students' competencies shaping. Tasks focused on deeper learning, interpretation, and heuristic applying knowledge in various contexts, present the learning outcomes shift from knowledge assimilation to the constructing personal knowledge structures, and ability to apply knowledge to complex questions. Such opportunities and learning goals are adequate to the students' competencies highly demanded in progressing digital economy and knowledge society. Advanced formalisation and conceptualisation knowledge methods in digital learning resources should not be fragmentary. Students' appropriate skills and competencies acquisition requires a systematic transformation of the digital learning environment.

Moreover, digital competencies comprise not only the ability to apply automated knowledge interaction software tools and information systems, but also an understanding of their operation principles, and the knowledge structures. The innovativeness of human interaction with knowledge in a digital environment should be perceived. Applying future-oriented knowledge models and gaining new experience, students come closer to modern intelligent technologies comprehension such as machine translation and text analysers, semantic search, and recommender systems. New operational framework of learning activities is straightly associated with new knowledge representation and conceptualisation models. Conditions ensuring effective interaction with knowledge in a digital environment is a component of high-quality training.

2.5 Tools for productive interaction with knowledge in a digital environment

One of the meaningful educational goals is the active student position shaping concerning the available information resources. This position implies the perception of educational, cultural, professional sources of information, not only as a means for specific learning tasks but also as personal progress means that ensures success and competitiveness in the modern society. Human interaction with a rich and heterogeneous information environment is facilitated by digital tools for searching, extracting, automated translation, processing and presenting in various formats information and knowledge. Digital tools practices expand the range of educational goals: enhance students' ability to acquire knowledge personally, support various attitudes, and own position working out pragmatic, research, and professional tasks.

Accordingly, digital learning resources are not a passive information component of a digital educational environment. They considered as the information basis of active and productive learning activities, involving knowledge from a variety of sources, encouraged by digital tools with high information action freedom, for example, modeling tools, semantic textual models, conceptual visual models, computer simulations. Semantic textual models and user-driven ontology mapping tools support collaborative activities in finding correspondences between concepts in two or more knowledge areas. Mind mapping and organizational chart tools allow student to structure knowledge, highlight supporting concepts, model the relationships, and contribute to the intuitive misconceptions identifying and the creative ideas generation. The objectives of an active, productive instrumental student interaction with the redundant and diverse resources of a modern digital educational environment is the suitable knowledge discovery, its inclusion in personal knowledge set, and new significant and situationally relevant knowledge synthesis. Such objectives are adequate to the potential of the digital educational environment in which the student, being active, not only consumes available resources but also designs personal digital information space.

Conclusion

Learning activities in the modern digital environment overlap the potential of resources providing traditional knowledge structures and innovative formalising and presenting knowledge. Traditional knowledge structures in digital mode obtain significant advantages in terms of content integration, "usability", and customisation. The variety of productive interaction digital tools enable developing learning tasks based on digital information structures openness (the possibility of learning content restructuring, transcoding, expansion, etc.).

Digital resources implementations in intelligent systems concepts have innovative developmental potential as they are focused on high levels of student's cognitive activity and motivation contexts. Digital knowledge formalisation, network, ontological knowledge structures, and visual conceptualisation support fundamentally new learning practices. The new qualities of such learning activities are adaptability, the ability to operate with significant information collections, interacting with self-learning systems, and apply formalized knowledge to solve poorly formalized tasks.

Situations of an effective combination of traditional and advanced presenting and organising content methods in digital educational resources are determined by many factors, as knowledge area specificity, training level, learning tasks, student motivation, and personal preferences. Demanded cognitive skills and digital competencies shaping becomes possible if the student is involved in the personal knowledge construction, aware of advanced learning goals, priorities, and capabilities of instrumental interaction with educational resources.

With all the diversity and functionality of modern human-machine interaction, not all classes of learning problems can be solved, applying even sufficiently flexible and adaptive knowledge representation methods. First of all, this refers to tasks associated with students' values and personality cultivation. Traditional narrative technologies, technologies based on interpersonal interaction, are still more effective.

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References

[Towards knowledge societies, 2005] UNESCO report "Towards knowledge societies". UNESDOC. Digital library. URL:https://unesdoc.unesco.org/ark:/48223/pf0000141843_rus

[Phillips et al., 2017] Phillips F., Ching-Ying Y., Tahir Hameed, Akhdary M. (2017) The knowledge society's origins and current trajectory // International Journal of Innovation Studies, Vol. 1, Issue3, 2017, Pp. 175-191. DOI: https://doi.org/10.1016/j.ijis.2017.08.001.

[Xie et al., 2018] Xie K., Tosto G., Chen S., Vongkulluksn V.(2018) A systematic review of design and technology components of educational digital resources // Computers & Education, Vol.127, 2018, Pp. 90-106. DOI: https://doi.org/10.1016/j.compedu.2018.08.011.

[Bando et al., 2017] Bando R., Gallego F, Gertler P., Fonseca D.(2017) Books or laptops? The effect of shifting from printed to digital delivery of educational content on learning // Economics of Education Review, Vol.61, 2017, Pp. 162-173. DOI: https://doi.org/10.1016/j.econedurev.2017.07.005.

[Davydov, 1996] Davydov V.V.(1996) Teoriya razvivayushchego obucheniya.– M.:INTOR, 1996. P.230 (In Rus) == Давыдов В.В. Теория развивающего обучения. – М. Интор, 1996. 230с.

[Noskova & Pavlova, 2019] Noskova T.N., Pavlova T.B.(2019) Vzaimodejstvie s cifrovymi resursami: produktivnost' obrazovatel'noj deyatel'nosti // Chelovek i obrazovanie.- 2019.-No 3 (60), S. 44-50 (In Rus) == Носкова Т.Н., Павлова Т.Б. Взаимодействие с цифровыми ресурсами: продуктивность образовательной деятельности //Человек и образование. - 2019.-No 3 (60), С. 44-50

[Xie et al., 2019] Xie H., Chu H., Hwang G., Wang C.(2019) Trends and development in technology-enhanced adaptive/personalized learning: A systematic review of journal publications from 2007 to 2017 // Computers & Education, Vol.140, 2019. DOI: https://doi.org/10.1016/j.compedu.2019.103599

[Roth & Thom, 2010] Roth W.-M., Thom J.(2010) Curriculum and Complex Systems Theory. In: International Encyclopedia of Education (Third Edition). Editor(s): Penelope Peterson, Eva Baker, Barry McGaw, Elsevier, 2010. Pp. 481-487. DOI:https://doi.org/10.1016/B978-0-08-044894-7.00084-1 .

[Gavrilova et al, 2016] Gavrilova T.A., Kudryavcev D.V., Muromcev D.I.(2016) Inzheneriya znanij. Modeli i metody. SPb, Lan', 2016. – 324 s. (In Rus) == Гаврилова Т.А., Кудряшов Д.В., Муромцев Д.И. Инженерия знаний. Модели и методы. СПб. Изд-во «Лань», 2016. – 324 с.

[Edwards, 1969] Edwards, R. (1969). Guilford's Structure of Intellect Model: Its Relevance for the Teacher Preparation Curriculum. Curriculum Theory Network, (3), Pp. 47-64. DOI:10.2307/1179339

[Guildford, 1965] Guildford J.(1965) Tri storony intellekta. In: Psihologiya myshleniya. Pod redakciej. M. Matyushkina. M .: Progress, 1965. S. 433 – 456. (In Rus) == Дж. Гилфорд. Три стороны интеллекта. Психология мышления. Сборник переводов под ред. А.М. Матюшкина. М. Прогресс, 1965. С. 433 – 456

[Dryazgunov, 2003] Dryazgunov K.V. Formirovanie divergentnogo myshleniya starsheklassnikov na urokah obshchestvoznaniya // Obrazovanie i obshchestvo. 2003. No 1. S. 132–140. (In Rus) == Дрязгунов К.В. Формирование дивергентного мышления старшеклассников на уроках обществознания // Образование и общество. 2003. No 1. С. 132–140.

[Holodnaya & Gel'fman, 2016] Holodnaya M.A., Gel'fman E.G.(2016) Razvivayushchie uchebnye teksty kak sredstvo intellektual'nogo vospitaniya uchashchihsya. M.: Izd-vo "Institut psihologii RAN", 2016. – 200 s. (In Rus) == Холодная М.А., Гельфман Э.Г. Развивающие учебные тексты как средство интеллектуального воспитания учащихся. М.: Изд-во "Институт психологии РАН", 2016. – 200 с.