

Web-oriented encyclopedic edition as a tool for dissemination of verified knowledge in the field of education

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Abstract. The article deals with the problem of creating a Ukrainian web-oriented encyclopedia to support terminology of education and psychology. The project is designed by the Institute for Digitization of Education of the National Academy of Educational Sciences of Ukraine (IDE NAES of Ukraine). The initial stages of the “Ukrainian Electronic Encyclopedia of Education” implementation procedure were presented. The structure of the encyclopedia website, its software platform, functionality, a search toolkit, articles typology, thematic sections, authors’ team, and target audience were described. The authors analyzed the principal reference resources regarding encyclopedic editions (Corpus of Ukrainian Encyclopedias, Electronic library of the NAES of Ukraine, V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine, and ScienceDirect). A review of international scientific publications was carried out. The problem of open use the verified, scientific, and succinctly presented content is revealed. It is emphasized the need for technical and technological implementation of the following capabilities: content uploading, editing, and enhancing support; coordinated work of the international scientific authors’ team; open access anytime and anywhere for many users; search functions by various parameters on the site, etc.

Keywords: conceptual apparatus of education and psychology, encyclopedic edition, informational analytical and search reference system, Ukrainian Electronic Encyclopedia of Education

1. Introduction

The problem statement. The “Ukraine’s Recovery Plan”¹ declares a wide range of measures for reliable economic growth. Its “Development of the Education System” section focuses on innovative projects in the field of digital content and the integration of science into the educational process.

Since Ukraine received the status of a candidate for EU membership, the realization of the priorities of harmonization with Europe standards is of particular importance (European Higher Education Area and European Research Area (ERA)).

The “Roadmap for Ukraine’s Integration into the European Research Area (ERA-UA)”² in

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¹Ukraine Recovery Plan. URL: <https://recovery.gov.ua/en>

²On the approval of the road map for the integration of the scientific and innovative system of Ukraine into the European research space. Order of the Ministry of Education and Science of Ukraine No. 167 of February 10, 2021.

priority 5a “Knowledge Transfer and Open Innovation” aims domestic science at the introduction of open innovation policy mechanisms and tools, as well as the spread of the use of the scientific research results. Priority 5b “Open Science and Digital Innovations” actualizes the implementation of open science policy during all stages of scientific research.

The exponential growth of scientific data in the 21st century contributed to significant changes in the interpretation of established concepts, their periodic clarification, and the emergence of new terminology. Deep analysis and improvement of the terminology are carried out in pedagogical and psychological research as well.

The conceptual apparatus of science is a dynamic formation that constantly changes beside the vocabulary of the field of use but remains poorer than objective reality, as it reflects only a certain level of knowledge. In our opinion, the development and consistency of the basic terms remains an urgent problem, especially at the new stage of internationalization [13].

International, intercultural, and global dimensions are three terms used as a triad. We consider the internationalization of Ukrainian education and science as a process of implementation of the best international and intercultural practices into the education purposes and functions.

The general standard of the open science international framework was agreed upon in the recommendations of UNESCO [23]. Investments in human resources, training, education, digital literacy, and the development of the open science potential were identified as one of the main tasks. It is indicative that almost a third part of the mentioned document is devoted to the “open science” definition.

The UNESCO Universal Periodic Review (UPR) [24] recommendations declare the importance of harmonizing terminology. Countries are strongly encouraged to review existing legislation, particularly overly broad and vague legal terminology that may limit freedom of expression in ways inconsistent with international human rights law. This is one of the nine key positions of the document.

Recognizing the important role of UNESCO in the field of information and communication technologies, we consider it appropriate to mention the UNESCO Recommendation on Open Educational Resources. The document [9] emphasizes that expanding access should be accompanied by measures to improve the quality and relevance of education and training. It is necessary to provide those who need it with appropriate resources on a fair basis.

International recommendations to the member states of the UN begin with the definition of basic concepts. The common understanding and the further progressive movement of education and science without these concepts are impossible.

In 2019, the term “open educational resources” was adopted as *educational, methodological, and research materials in any format and on any medium that is in the public domain or subject to copyright protection but has an open license that allows free access, reuse, processing, adaptation, and secondary distribution by others*. Stakeholders include teachers, educators, students, government bodies, parents, educational institutions, support staff of educational institutions, teachers of pedagogical educational institutions, persons responsible for the development of policy in the field of education, cultural institutions (such as libraries, archives, and museums) and their users, ICT infrastructure providers, scientists, research institutions, etc.

The definition of the conceptual apparatus is a mandatory stage of scientific research. This

thesis does not need proof and can be illustrated by many examples. In our opinion, the creation, maintenance, and development of web-oriented encyclopedia is a way for the popularization of science, the dissemination of scientific knowledge, and the involvement of citizens in scientific, technical, and innovative activities.

Analysis of recent studies and publications. Representation of knowledge in encyclopedic editions is an actual problem that is being investigated quite actively in certain thematic fields. For example, Hungarian researchers Boda and Tóth [4] presented a model of a three-dimensional virtual library. At the initial stage, English translations of certain biographies and mythological literary works were selected. In the following step, the database content was improved by various verbal and multimedia objects (encyclopedic articles, selected web pages, illustrative images, tables, etc.). Next, the links between the relevant database elements were processed. It was extremely important for the effective presentation of the knowledge of the library's contents. These stages are quite universal and allow you to answer the following questions: (1) how to add, change, and improve the content in the future; (2) what technologies and digital tools are intended for this.

Creating an encyclopedia is a collective effort. Digital transformation has significantly affected the organization of this process. Writing, editing, storage, and user access to content, as well as communication between authors and editorial teams, take place in digital networks.

In this context, it is expedient to mention the example of creating an encyclopedia at the level of a teacher-student audience [2]. Such an international project started in 2018 and was dedicated to designing of open electronic encyclopedia of plane curves. The section moderators of the encyclopedia were scientists who formulated problems in matrix articles. The participants of the project were Bulgarian, Kazakh, and Russian student teams, who tried to solve the tasks and write the articles. School teachers assumed the function of mentors. Such experience of an international team coordinated work could only be acquired in the digital era.

Encyclopedia of Rare Disease Annotation for Precision Medicine, eRAM³ is an original combination of open access, a noble goal, a useful project, and technological solutions. This encyclopedic resource was created by a group of biologists, bioinformaticians, and software engineers. eRAM contains information about the mechanism of occurrence of rare diseases, helps clinicians make accurate diagnostic and therapeutic decisions. The site provides an opportunity for patients to apply for effective consultation and free diagnostic services for relevant diseases, as well as contains a feedback form for questions. The developers popularize science by creating the eRAM infrastructure and going to update the content by involving a large community of researchers.

Using an online encyclopedia could be an example of integrating technology into the educational process. The scientific literature deals with the successful experience of its use as an interesting and meaningful learning environment, in particular:

- as a means of teaching natural science in elementary school [16];
- as a means of developing the cooperation and creative thinking skills of students who participate in writing Wiki articles [21], as well as formation of their academic writing skills [11];
- as a pedagogical tool in foreign languages translation classes [25], etc.

³eRAM: encyclopedia of Rare Disease Annotation for Precision Medicine. URL: <https://recovery.gov.ua/en>

Zhelezniak and Ishchenko [26] investigated the use of online encyclopedias as a component of the educational environment. They reviewed the 14 encyclopedic editions dedicated to the nature, history, culture, and notable figures of the USA. These editions' websites contain didactic materials for teachers and multimedia materials adapted for schoolchildren or students. Online encyclopedia projects created by university teams provide professional authors, high-quality and objective reviewing, as well as the active use of these editions in the educational process.

Pedagogical education has become a much larger field of research than learning or teaching. The Oxford Encyclopedia of Global Perspectives on Teacher Education encourages scholars to learn from each other regardless of differences of opinion, as well as encourages educators to create collaborative approaches to merging theory and practice. The review [10] emphasizes the uniqueness and importance of publications that offer the reader a wide selection of views on pedagogical education. The content consists of combined or updated articles in the field of pedagogical education, as well as newly created ones. We are impressed by the dichotomies of Gao [10]: between theoretical and practical works, between canonical and new works, and between regional and international perspectives. We consider it necessary to use this aspect when filling in the content of our encyclopedia.

A Croatian research team (Bubaš, Čizmešija and Hrustek [5]) has studied the student's behavior in searching for information. Researches pay attention to the fact that the use of library services and traditional printed resources are becoming less and less popular. The Internet is usually the first (and sometimes the one) means of data search for students. The findings suggest that Facebook is the most frequently used communication channel for academic information search because it includes connecting with other people for help. However, students tend to use other available communication channels such as WhatsApp, Viber, Skype, e-mail, text messages, and voice calls to mobile phones.

Free Internet encyclopedia Wikipedia is traditionally considered the most popular online educational resource that allows students to find the necessary minimum of various scientific information without studying additional literature. Free access to editing Wikipedia reduces the quality of a significant number of its articles (insufficient completeness of the text, poor structure of the material, frequent factual errors, or lack of sources). Its use significantly simplifies the perception of new knowledge and leads to misinformation.

The number of studies on the Wikipedia use has increased. For example, Kalaf-Hughes and Cravens [12] explored how using Wikipedia could increase women's self-efficacy and bridge the gender gap prevalent in open-access resources.

Spanish researchers Tarango, González-Quñones and Barragán-Perea [22] identified the features of Wikipedia as scientific communication and educational system. In their opinion, Wikipedia should be considered only as a formal means of information dissemination and scientific communication, serving all fields of knowledge. Despite constant criticism of the scientific information dissemination on Wikipedia, its use for academic purposes has increased significantly at all educational levels, at least as an element of the initial search. The possibility of constant editing and improvement of content are considered positive factors.

The article "Wikipedia in Health Professional Schools: from an Opponent to an Ally" [18] deals with the experience of including Wiki editing in official curricula. A positive impact on students and strengthening their ability to evaluate science-based content were observed. Wikipedia articles, accessed by millions of people, are being improved. As teachers, we were

interested in learning about the experience of including Wikipedia editing tasks in the training of future doctors.

We believe that such successful initiatives could be implemented in other educational fields as well. We found confirmation of this opinion in the presentation of the “Learning with Wikipedia” project results [20]. Students and teachers at the University of Padova were involved in the creation and expansion of encyclopedic articles on various subject topics. The online encyclopedia has turned from a “container” for open educational resources into a real educational environment, organized according to certain rules and procedures, able to stimulate teachers to apply open educational practices, to join a social process that benefits the entire community.

The modern encyclopedic resources we consider as e-infrastructure that can contribute to the development of any scientific field and educational discipline. The analysis of the publication on the encyclopedic topic in scientometric and abstract databases states that such studies are presented in the field of Computer Science, Information Science, Library Science, Social Sciences, Language, Communication and Culture, Mathematics, Engineering, and Education [7].

There is a single Ukrainian printed encyclopedic edition containing modern scientifically reliable interpretations of the pedagogical and psychological terminology – “Encyclopedia of Education” [15]. However, the martial law in Ukraine and the COVID-19 pandemic [14] actualized the problem of educators, psychologists, scientists, degree holders, methodologists, educators, teachers, students, management personnel of educational institutions, and employees of education and science administration bodies access to traditional sources of knowledge. As a result, there is a need to solve the problem of providing expertly verified reference products to a wide range of users who lost this opportunity because of military operations.

The research goal is to determine the general characteristics of the “Ukrainian Electronic Encyclopedia of Education” as a project to support the terminology of education and psychology.

2. The results and discussion

2.1. The resources of formation, systematization, and unification of the terminology

The six-hundred-year history of the use of encyclopedia editions, the popularity of online encyclopedias, and their continuous improvement testify to the actuality of this direction of scientific research in the digital age.

It should be noted that the problem of openness in the use of scientifically verified content had recently been actualized in [7]. We emphasized the need for open access to terminology of scientific research in [8].

Elsevier is considered a leading open-access publisher. It cooperates with the research community to expand the possibilities of open science by supporting researchers in discovering, storing, sharing, and making effective use of research data. ScienceDirect is one of Elsevier’s largest online collections of published scientific research. It has attracted our attention in the Major Reference Works section. First, we support the opinion that the conceptual apparatus is the source of the evidence base of scientific research and a point of understanding for scientific teams. Second, researchers need an authoritative source of fundamental knowledge when conducting both interdisciplinary research and exploring a new subject area.

Major Reference Works (as of 09/18/22) lists 245 titles dating from 1982. Each paper is written by leading specialists from various scientific fields and countries, reviewed and proofread by experts and section editors according to strict standards. However, these books have different levels of presentation complexity, depth, accessibility and are aimed at different audiences. 149 of them (61%) are encyclopedias in various fields of science.

The portfolio of reference works covers 18 fields, including Psychology and Social Sciences. The analysis of the publication list states that the social sciences are poorly represented (e.g. International Encyclopedia of the Social & Behavioral Sciences. Encyclopedia of Social Measurement).

We found only one publication in the field of Education/Pedagogy – International Encyclopedia of Education [19]. This publication has print and online versions, provides search functionality through the ScienceDirect platform, provides access to many users anytime, anywhere, as well as includes multimedia content (audio and video files) with links to relevant sources for further study. We took this ideology as a basis when designing the *Ukrainian Electronic Encyclopedia of Education* [6].

Content classification is the subject of our separate research and criticism. Table 1 presents the subject classifications of the International Encyclopedia of Education and the Ukrainian Electronic Encyclopedia of Education. Thematic sections are modularly presented, in consolidated units whose sequence is determined by us.

The absence of a certain category in the table does not mean the absence of articles on the relevant topic, but only indicates other principles of classification and traditions of different educational systems.

The National Academy of Educational Sciences of Ukraine (NAES of Ukraine) plays a leading role in the formation and unification of the conceptual apparatus of pedagogy and psychology. The main tasks of this organization are theoretical and methodological support for the development of the education system, its comprehensive scientific support and research work, as well as the integration of national educational and scientific systems into the international educational and research space.

Electronic Library of NAES of Ukraine (<https://lib.iitta.gov.ua>) is a distributed information environment of integrated educational and scientific academic resources that enables the accumulation, storage, and open access of electronic document collections through global data transmission networks. It provides full-text online access to 5 glossaries, 25 dictionaries, 1 thesaurus, 21 reference books, and 3 dictionary-reference books compiled by scientists of the Academy as well as individual articles of the printed “Encyclopedia of Education” (2021) deposited by the authors.

The funds of the *V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine* (<http://dnpb.gov.ua/ua>) currently contain an array of information on reference literature in the field of education. During the search for the “encyclopedia” term in the title, 114 print editions were found, but no full-text online edition.

The bibliographic online index *Corpus of Ukrainian Encyclopedias* (<https://corpus.encyclopedia.kyiv.ua/index>) is compiled by the Institute of Encyclopedic Research of the National Academy of Sciences of Ukraine. As of September 2022, it contains information on 424 national encyclopedias, encyclopedic dictionaries, and reference books. 253 editions are professional, 134 regional, 16 personal, 11 general, and 11 children’s (figure 1).

Table 1
Subject Classification. Comparison.

International Encyclopedia of Education	Ukrainian Electronic Encyclopedia of Education
Early Childhood Care and Education	Education – Pre-school education
Primary and Secondary Education	Education – Primary education
	Education – Secondary education
Higher Education	Education – Higher Education
Education of Professionals	
Vocational Education	Education – Vocational education
Adult Education	Education – Education throughout life
Teacher Education	Education – Postgraduate education
Leadership and Management	Education – Management of education
-	Education – Subjects of educational activity
Education of Children with Special Needs	-
Demography and Social Change	-
Comparative Education	Education – General concepts, processes, and phenomena of education
Curriculum Development	
Economics of Education	
Learning and Cognition	
Educational Assessment	
Educational Measurement	
National Systems of Education	
Philosophy of Education	
-	Psychology – General concepts, processes, and phenomena of psychology
-	Psychology – General Psychology
-	Psychology – Psychology of development
-	Psychology – Pedagogical psychology
-	Psychology – Special psychology
-	Psychology – Historical psychology
-	Psychology – Social psychology
-	Psychology – Political psychology
-	Psychology – Gender psychology
-	Psychology – Humanistic psychology
-	Psychology – Psychology of work
-	Psychology – Subjects of psychological activity
Technology and Learning	Digitization
Quantitative and Qualitative Approaches to Research	Science – Partial problems of research activity in the field of education
Education Research Methodology: Quantitative Methods and Research	
-	Science (general concepts, processes, phenomena, and partial problems of scientific research activity in the field of education and psychology, subjects of scientific activity, scientific schools, and types of scientific works)
International Organizations in Education	Organizations (educational institutions of all levels, scientific institutions, state institutions in the education system, libraries, research networks and centers, laboratories, international associations and public organizations, societies, and foundations)
-	Personalities (teachers, psychologists, scientists, state, and public figures)
-	Documents (laws, regulations, orders, resolutions, decisions, orders, provisions, standards, concepts, programs)
-	Editions (professional journals, popular scientific publications, reference publications, monographs, and collections)
-	Events (congresses, symposia, forums, conferences, scientific seminars, pedagogical readings, round tables, exhibitions, etc.)

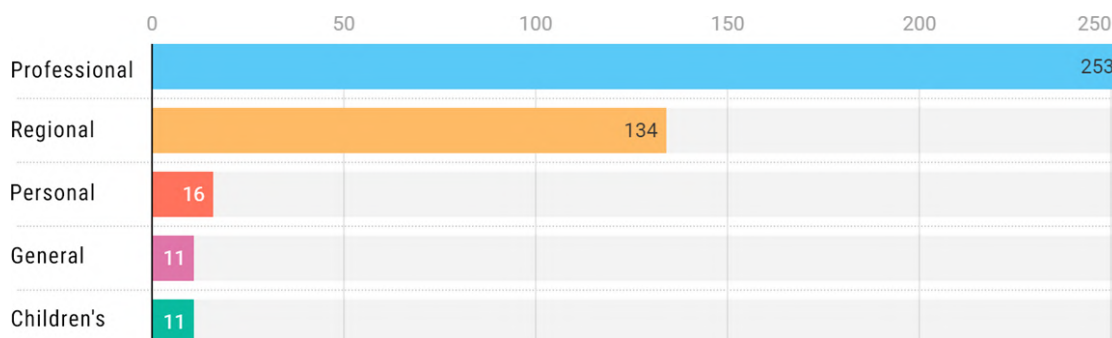


Figure 1: The number of Ukrainian encyclopedic editions in the bibliographic online index *Corpus of Ukrainian Encyclopedias* [7].

Regarding the edition format, 402 encyclopedias have a paper version, 118 printed editions are digitized in PDF or DjVu format, and 31 printed editions have an online version in the form of a website or a webpage. 19 samples are web-oriented online projects developed from scratch without a printed version (figure 2).

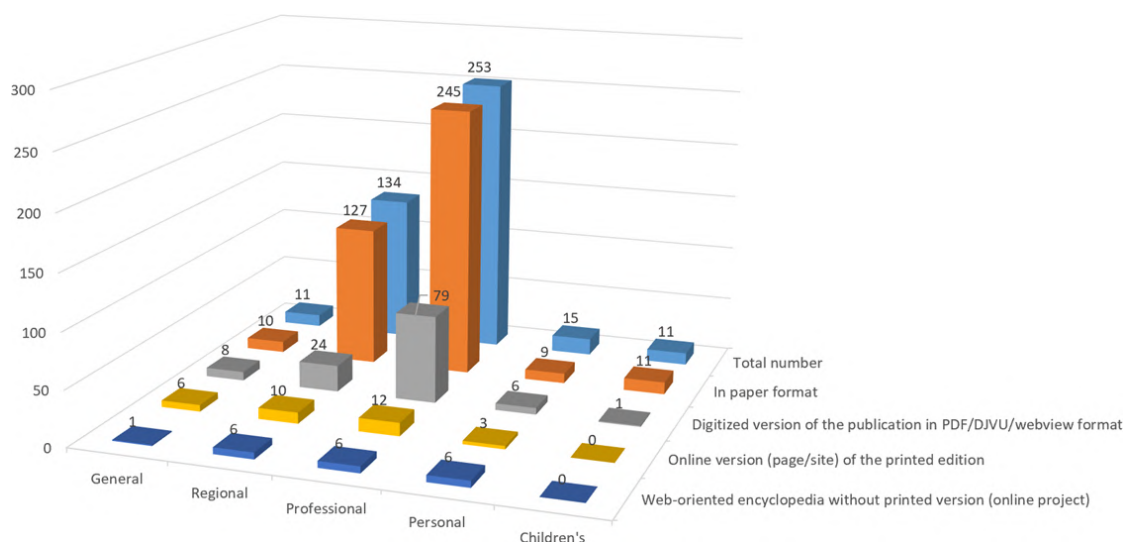


Figure 2: Statistics of Ukrainian encyclopedic editions by types and format of presentation.

The field of education and pedagogy is represented by nine printed encyclopedias: 2 of them are available online in PDF/DjVu format, and one has a website dedicated to the project *Shevchenko Scientific Society* (<http://encyclopedia.com.ua>).

2.2. Ukrainian Encyclopedic Project to support the terminology of education

A preliminary analysis of the theory and the samples of electronic encyclopedias revealed that there is no professional digital reference system in the field of education of Ukraine. Such a

system could contain freely available scientifically reliable and modern interpretations of the terminology of pedagogy and psychology.

In 2021, the Institute for Digitization of Education of the National Academy of Educational Sciences of Ukraine (IDE NAES of Ukraine)⁴ started the creation of the information-analytical and search reference system *Ukrainian Electronic Encyclopedia of Education* (UEEE). It will ensure the formation, systematization, unification, and updating of the conceptual and terminological apparatus of pedagogy and psychology (figure 3).

The target audience of the *Ukrainian Electronic Encyclopedia of Education* is Ukrainian and foreign readership: scientists, graduate students, doctoral students, educators, teachers, students, practical psychologists, heads of educational institutions, and employees of education and science administration bodies.

The structure of the encyclopedia site provides a gallery of thematic sections, registration and login block, a search toolkit, and the ability to change the interface language, as well as bookmarks:

- “*About us*” – the basic information about goals, participants, the regulatory and legal basis of functioning, the evolution of project creation, and expected results;
- “*Alphabet A-Z*” – the index of articles in Cyrillic and Latin alphabets;
- “*Authors*” – the alphabetical index by surnames of authors;
- “*Contacts*” – the information about the IDE NAES of Ukraine, telephone number, address, website, e-mail, work schedule, and feedback form.

Separate sections contain information about the editors, privacy policy, provisions on open access, conflict of interest and plagiarism prevention, educational materials for users, and frequently asked questions.

The project will be implemented as a Wiki resource based on the MediaWiki software platform. Due to the support of this software by a wide user community, there is an opportunity to expand and customize the functionality of the encyclopedic project by connecting a significant number of plugins. In particular, the use of the Semantic MediaWiki plugin allows organizing the conceptual and terminological apparatus of the encyclopedia as a distributed knowledge base.

Semantic Wiki is a common environment for the development of educational content, so it's a relevant topic for scientific research. Maresca et al. [17] describe the prospects and the potential benefits of Semantic Wiki use for educational applications and knowledge management. The main feature of this kind of Wiki is the built-in technology of the semantic website, as well as the preserved classic Wiki interaction model.

Since their inception, Semantic Wikis have attracted the attention of e-learning specialists. In particular, the use of such systems in the educational process as well as in the creation and reuse of content was investigated [3]. Semantic Wiki is valuable tools to support learning activities for many reasons: (1) the process of semantic annotation encourages the making of knowledge; (2) Semantic Wikis provide opportunities for teachers and students to exchange perspectives; (3) Semantic Wiki platforms have strengths in the content management process; (4) the semantic content of the Wiki could be used to implement more complex learning objects that further

⁴Official website of the institution. URL: <https://iitlt.gov.ua>

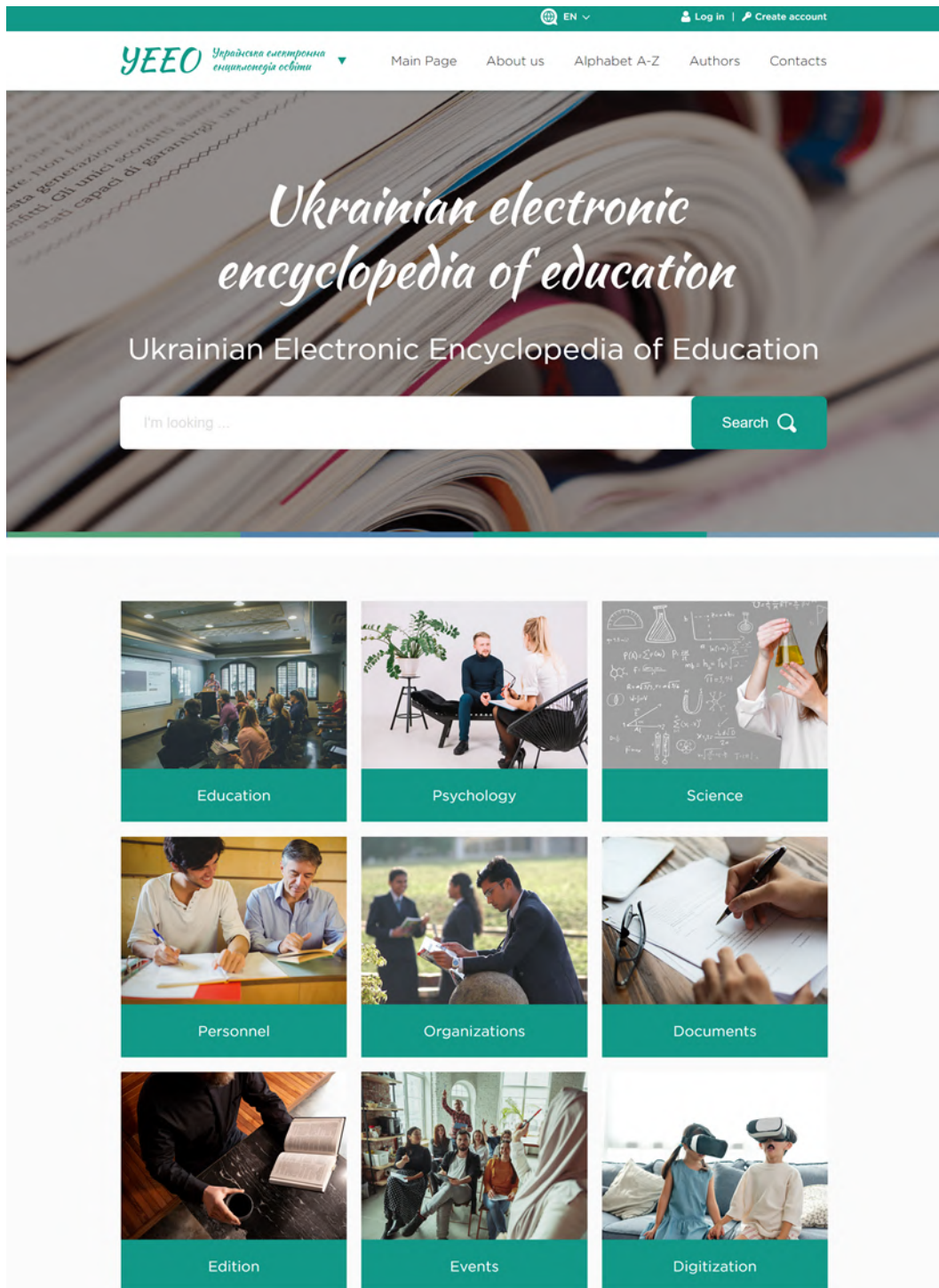


Figure 3: The homepage of the *Ukrainian Electronic Encyclopedia of Education*.

annotated by standardized knowledge models; (5) Semantic Wikis use standardized languages and models defined by the W3C to ensure interoperability.

Semantic Wiki systems should not be considered only as a solution for educational purposes. They support collaboration during the design and development of educational content as well as allow for an increase in cognitive and metacognitive knowledge and skills, caused by the process of creating and sharing conceptual networks.

There are the following reasons for the selection of Wiki technology [1]:

- the software is free;
- there is a possibility of deployment both in the local network and on the Web;
- allows developers to add new materials and edit existing content without using additional software;
- does not require special knowledge from users;
- the content changes appear immediately and could be reverted to previous versions;
- a simplified markup language allows you to visually design the structure of the text and integrate multimedia content (images, audio, video);
- a flexible system for distinguishing user rights to platform administration and content access;
- joint editing of content by users who have the appropriate access;
- supporting users' distributed work;
- installing a wide range of plugins for the extension of system functions.

The *Ukrainian Electronic Encyclopedia of Education* functionality provides users with defined roles (reader, editor, section editor, administrator) as well as the ability to read, download, describe, review, and edit encyclopedia articles. Additionally, the user can create his collections of articles and propose a new term (or edit existing ones) to the editors.

Users will be able to search for articles by:

- *the keywords* – by the article title or by its initial letters through the search bar on the main page;
- *a thematic section* – by categories and subcategories in thematic sections through the gallery on the main page;
- *an alphabetical and numerical index* – through the main menu tab.

The typology of UEEO articles includes review articles, reference articles, definition articles, and link articles. According to the object of description, the materials of the encyclopedia are also divided into biographical articles, articles about the institution, articles about normative documents, articles about editions, articles about events and activities, articles about scientific schools, articles about awards and honors, articles about digital technologies and electronic resources, etc.

The encyclopedia content is formed according to the following thematic sections:

1. *Education*: articles that describe general concepts, processes, phenomena of education or its partial problems by directions “Preschool education”, “Primary education”, “Secondary

- education”, “Vocational education”, “Higher education”, “Postgraduate education”, “Education throughout life”, “Management of education”, as well as issues related to subjects of educational activity.
2. *Psychology*: articles that describe general concepts, processes, phenomena of psychology or its partial problems in the areas of “General psychology”, “Psychology of development”, “Pedagogical psychology”, “Special psychology”, “Historical psychology”, “Social psychology”, “Political psychology”, “Gender psychology”, “Humanistic psychology”, “Labor psychology”, as well as issues related to subjects of psychological activity.
 3. *Science*: articles that describe general concepts, processes, phenomena, and partial problems of scientific research in the field of education and psychology, as well as subjects of scientific activity, scientific schools, types of scientific works, etc.
 4. *Personalities*: biographical articles about outstanding teachers, psychologists, scientists, and state and public figures in the field of education and psychology.
 5. *Organizations*: the articles about educational institutions of all levels, scientific institutions, state institutions in the education system, libraries, research networks and centers, laboratories, international associations and public organizations, societies, and foundations.
 6. *Documents*: articles that describe the main regulatory documents in the field of education and psychology: laws, regulatory acts, orders, resolutions, decisions, orders, provisions, standards, concepts, and programs.
 7. *Editions*: information about leading professional journals, popular scientific publications, reference publications, significant monographs, and collections of scientific works in the field of education and psychology.
 8. *Events*: information about educational congresses, symposia, forums, conferences, scientific seminars, pedagogical readings, round tables, exhibitions, etc.
 9. *Digitization*: media content, electronic educational resources, basic data on digital technologies supporting scientific activity, educational management, and psychology.

The authors of UEEO are specialists from the National Academy of Educational Sciences of Ukraine. Leading experts in the field of pedagogy and psychology, members of the joint scientific research laboratories, and scientific-pedagogical employees of higher pedagogical education institutions of Ukraine are invited to write and edit articles. Furthermore, it is planned to attract potential foreign specialists in the field of pedagogy and psychology from European universities and research institutions.

At the initial stage of the encyclopedia’s operation, the filling of electronic articles will be carried out according to the principle of centralized entry of documents. Only a specific group of specialists of the IDE NAES of Ukraine will have permission to enter documents (editors). The public editing of encyclopedic articles by a wide audience of users is not provided for.

The procedure of the *Ukrainian Electronic Encyclopedia of Education* implementation is a multi-level process. It provides solving many technical, organizational, regulatory, and socio-psychological tasks. The UEEO project is planned to be implemented during the stages presented in figure 4.

Currently, the specialists of the IDE NAES of Ukraine have designed the structure of the website, carried out its program coding, developed typical article templates, as well as guidelines



Figure 4: Stages of the *Ukrainian Electronic Encyclopedia of Education* creation.

for different groups of users. To test the website, the appropriate content were uploaded. Furthermore, it is planned to switch to distributed uploading of new content by thematic section editors.

3. Conclusions and prospects for further research

Encyclopedias are a way of providing the most complete overview of a certain scientific field, which should outline its fundamental knowledge. The encyclopedia should be dynamic, technologically suitable for current scientific updates, suitable for use as a learning resource, and support methodology at the level of conceptual apparatus. There is an urgent need to develop a professional digital encyclopedia that contains scientifically reliable and modern interpretations of Ukrainian pedagogical and psychological terminology.

It is impossible to realize scientific research activity without a clear definition and improvement of the conceptual apparatus. Support and development of web-oriented encyclopedic projects is a modern tool for the popularization of science, dissemination of scientific knowledge, and involvement of citizens in scientific, technical, and innovative activities. The analysis of recent research publications identified the following current trends in this area:

1. The use of information and communication networks has a significant impact on the behavior of modern students in the search for data, since they, to a large extent, rely on Internet search engines. They rarely use advanced search strategies. Their “instant” approach to finding information causes low quality and reliability of the result.
2. Creating an encyclopedia is a collective effort that could unite international teams in the digital era.
3. Using an online encyclopedia is an example of technology integration in the educational process. The electronic encyclopedic resource and the appropriate organization of the educational process could become a component of the digital educational and scientific environment of the educational institution.
4. Applying Wiki technologies to create educational content is a popular university task. They could be a common environment for the development the cognitive and metacognitive knowledge and skills.
5. It is important to consider the possibility of constant editing and improvement of the online encyclopedia content during the designing or choosing the software.
6. The *Ukrainian Electronic Encyclopedia of Education* project will be implemented as a Wiki resource based on the MediaWiki software platform. Semantic MediaWiki will allow organizing the conceptual and terminological apparatus of education as a distributed knowledge base.

7. The UEEE will have a powerful effect on continuous modernization and technological improvement of the educational content, as well as contribute to raising its level in Ukraine and popularizing the most modern knowledge among the public. The problem of providing the educational process with high-quality educational materials can be partially solved. The institutes can use encyclopedic resources in creating modern online educational programs, updating educational materials, conducting video lectures, etc. On the other hand, the integration of various multimedia content (virtual museums, 3D tours, audiobooks), photo galleries and iconographic materials (photo documents, illustrations), and video materials (documentaries) into the articles' text will encourage pupils and students to deepen scientific research through visualization, completeness, and availability of the presentation.

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