The European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2020.10.03.175

ICEST 2020

International Conference on Economic and Social Trends for Sustainability of Modern Society

PROFESSIONALLY ORIENTED TERMINOLOGY DATABASES AS AN ELEMENT OF THE EDUCATIONAL PROCESS

N. O. Vasileva (a), G. R. Rybakova (b)*, L. N. Shevtsova (c)
*Corresponding author

(a) Krasnoyarsk State Agrarian University, 90, Mira Av., Krasnoyarsk, Russia, natasha.krasnoyarsk@gmail.com,
(b) Siberian Federal University, 79, Svobodny pr., Krasnoyarsk, rbkv@yandex.ru,
(c) Krasnoyarsk State Agrarian University, 90, Mira Av., Krasnoyarsk, Russia, shevtsovaln48@rambler.ru

Abstract

In this article the multidimensionality of the problem of developing a database of educational and professional knowledge is considered on the example of the professional sphere of commodity science. In achieving goals, on the one hand, we were guided by the need to create a logical framework of professionally-oriented knowledge, as concentrated as possible in the form of terms. The framework formed taking into account interdisciplinary relations with related professional fields and with general educational disciplines allows effectively implementing the knowledge gained at the university in practical activities, as well as in the transfer and development of professionally significant information in the educational process. Such a multifunctional construct is the database in MS ACCESS "Terms and concepts of the professional field". The created database is conceived as the result of both technical and educational design, which raises the question of updating the methods and ways of its formation. The involvement of the student in the process of developing and updating terminological databases in the educational process is aimed at achieving the educational goals of vocational-oriented education based on an interdisciplinary approach, at introducing the student to the professional sphere during the training process, to the realities of the digital economy, the terminological, conceptual and other databases.

Keywords: Terminology database, interdisciplinary communication, interdisciplinary approach, professional education.

https://doi.org/10.15405/epsbs.2020.10.03.175
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eISSN: 2357-1330

1. Introduction

Higher education, like the entire education system in the country, is in constant transformation, one of the reasons for which is the changed information space (Anokhin & Velichkovsky, 2011; Chernigovskaya, 2010, 2015; Feldstein, 2013; Morozov & Spiridonov, 2019; Morozova & Novikova, 2013; Verbitskaya, 2019). Despite the opinions that knowledge is losing its role in society due to the fact that it is rapidly becoming obsolete, one cannot deny the fact that any modern knowledge is based on an understanding of general laws, the logic of processes, phenomena, interdisciplinary relationships, and previous experience that takes into account mistakes and achievements. Without a knowledge base formed, it is impossible to "build" a specialist in the professional sphere, relying solely on access to volumes of new information, no matter how large these volumes are. The ability to navigate professionally relevant information, the relevant requirements of documents regulating professional activities, is one of the necessary modern competencies of any specialist. The peculiarity of a professional who has received higher education in his specialty or area is the ability to predict the consequences of decisions made, actions taken, in his intersectoral influences and interrelations - between industrial, economic, social, environmental and other components of professional activity at different levels of management.

Therefore, it is important for the educational process to form stable logical connections between the data of different sciences in the understanding of students, where the terms and definitions are the main content-filled element. The ability to not only collect them into a single database, but also to make interdisciplinary communications and interactions using software tools, will allow capturing the idea of them in the student's memory (Damasio, 2018; Dean, 2018; Chernigovskaya et al., 2016; Klementovich et al., 2016; Kryukova et al., 2017; Pervushina & Osetrin, 2017; Shenhav et al., 2017), which is especially relevant for modern trends in the prevalence of visual perception of information among the younger generation (Feldstein, 2013).

University graduates, having started their professional activities, with their knowledge, abilities and skills in working with information acquired at a university could really contribute to the formation of a knowledge economy in Russia. A characteristic feature of the knowledge economy, among others (Tyukavkin, 2014), is the building of economic interaction through formalized (explicit) knowledge. Formalized knowledge in the context under consideration implies a clearly structured, applied knowledge that can be applied in a particular area of production and, quite logically, can be represented by a combination of general and highly professional terms that provide special business communications.

2. Problem Statement

The key stages in solving the problem of the formation of the indicated competence of future specialists we consider:

- analysis of the role of the interconnectedness of knowledge of various disciplines or subjects that create a common terminological professional context based on terminology in the framework of the educational process;
- substantiation of the role of systematization of applied knowledge through terms;

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- development of databases of terms and definitions in a special educational and professional field.

2.1. The role of interdisciplinary and cross-curriculum communications in the educational process

Issues of intersubject communications in pedagogy and didactics were addressed in a fairly large number of works. Their significance for the formation of an objective idea of the content of knowledge obtained in the educational process can be found in the works of classic authors from Komensky (1982) to Vygotsky (2017) and etc.

The main message of all scientists in this regard is the emphasis on the inseparability of natural knowledge, the elements of which, although they relate to different scientific or applied fields, can never separately give an objective understanding of the considered (studied) object, but only in interconnection, in a logical sequence can be formed holistic view of it. The software technology developed by us is aimed to provide a systematic presentation (Sadovsky, 1974; Vasilieva, 2018), necessary for future professional activity, to create motivation by gradually expanding the content of some concepts through others (Bondarchuk, 2015; Novikov, 2019; Shevtsova & Vasileva, 2019; Wilson et al., 2019), to eliminate the isolation of the studied disciplines by integrating their main categories (Klochkov et al., 2019; Rybakova et al., 2015, 2017).

Applying the dichotomous approach (Vasileva, 2018) to the search for a definition of cross-curriculum communications and taking into account their multidimensional nature, it was made an attempt (Vasileva, 2018) to search for the most generalized definition of the category “cross-curriculum communications”. Bringing the formalized definition of intersubject connections to its pedagogical interpretation, this definition can be transformed to the following definition: “Interdisciplinary connections in vocational education act as dialectically characterized relations between the individual elements of its content. Their systematization should be aimed at optimizing learning outcomes depending on pedagogical tasks and the specifics of the elements of the content of education included in the system”.

The possibility and necessity of systematization is indicated by the presence of the features of the system in the content of education, where the role of elements is played by various kinds of information blocks (sections, topics, concepts, terms, etc.), and interdisciplinary connections ensure their interconnections, thereby creating the structure of this content. In this case, the systematization is called upon to create the necessary condition for the existence of the system - the ordering of the whole, in accordance with the understanding of the system according to Sadovsky (1974) as ordered by a “certain way of a multitude of interconnected elements forming some integral unity” (p. 81).

In this case, the role of cross-curriculum relationships in creating the system effect becomes clear: by creating the structure of the system through connections, they provide it with a key property of emergence when properties appear in the system that is not the usual addition of the properties inherent in its elements. And from variations in cross-curriculum communications, the properties of the system will change with the same set of elements. Thus, pedagogical goals determine the need to systematize cross-curriculum communications between elements of the content of education.

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2.2. The role of systematizing the terms of applied knowledge

In the context of the study, the degree of difference between the definitions of "cross-curriculum" and "interdisciplinary" connections can be defined as a coincidence in semantic load (in reasoning of a more generalized nature), and, under certain conditions, as a difference due to their possible interpretations (in situations where clarification and specification are required). The conceptual semantic loading of them is determined by the context vector from the point of view of the educational process (Antonov, 1969; Ambrosenko et al., 2019; Danilova, 2010; Danilchenko & Nazarova, 2016; Rostovtsev et al., 2011; Tsatsaronis et al., 2009 and others).

For vocational education, the relations arising between areas of knowledge from different scientific and practical blocks have always been of higher importance than in the study of individual disciplines devoted to one science (Rybakova et al., 2015; Schenk, 2012; Tuchkova, 2019; Verbitskaya, 2019). For higher professional education, this problem is even more relevant due to the ability to think more broadly in the educational process, taking into account more factors, with the ability to predict the results of decisions made for the future. In such training, an important aspect is the ability to navigate professionally relevant information, quickly determine its optimal volume, content and key aspects, if necessary, constantly updating the knowledge base, taking into account changes in all normative documents (Popova, 2012; Schenk, 2012; Vasileva, 2018). The modern digital space provides opportunities and potential for optimizing the work with a large amount of information (Andreeva & Ushakov, 2019; Golitsyna et al., 2016; Groot et al., 2016; Kiselev et al., 2018; Kutuzov & Kuzmenko, 2019; Lagutina et al., 2016; LeCun et al., 2015; Mai et al., 2017, 2018; Metcalfe, 2017; Pushkareva & Kalitina, 2018; Rybakova et al., 2015).

The systematization of special words serving a certain type of professional activity allows forming a logical framework of the term system for the educational process, not limited to only one specialization. The need to take into account the relations of highly specialized professionalisms with the special vocabulary of related disciplines of a different industry affiliation logically related to them is due to the combinatorial nature of the requirements for choosing the type of professional activity in educational standards: a graduate acquires, as is well known, in addition to professional competencies, also general professional and general cultural. At the same time, a built-up knowledge system should ultimately have a holistic character, and not a set of disjunct, disparate information blocks, which corresponds to the complex structure of interactions in subsequent professional activities.

2.3. Development of terminological databases of the educational and professional field

The tasks of developing a software product in the form of a conceptual and terminological base should be formulated in such a way as to create a logical framework based on cross-curriculum communications of the entire set of disciplines of the curriculum, ensuring the formation of the necessary competencies of the future professional - from linguistic and psychological-ethical to general professional and highly specialized disciplines. A separate condition for the implementation of such a product should be the opportunity to participate in the creation, improving or updating of the dictionary of students themselves as part of a research or individual work. In addition to the use of textbooks for the conceptual base being created, among sources of professionally-oriented information there should also be reference systems of

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normative documentation, online sources of official legal documents. Their involvement becomes the key to timely updating of the terminology base and related definitions of norms and restrictions.

Designing the conceptual and terminological base is based on three main aspects - technical (application of information and computer technologies); cognitive-forming (using the terms as a "concentrate of professional knowledge") and pedagogical (embedded in the educational process and the formation of the necessary competencies).

3. Research Questions

The software product developed as part of the study is a database obtained by modification of data presentation forms based on MS Excel and DBMS Access.

Its purpose is determined not only by reference functions, but is also a teaching tool, since it is assumed that students themselves participate in its formation from the beginning of training, gradually replenishing, updating its content in accordance with the development of science and changes in regulatory documents. In addition, the choice of terms and its meaningful content is associated with the definition of compliance with the requirements of the uniqueness and inadmissibility of a polysemy.

Needless to say that mastering a professional language is important, but due to the progress of the information society is clearly not enough today. The graduate is faced with the task of being able to find the required formalized knowledge, know how to maintain and update it, and generate new ones based on it. The fixation of professional knowledge, designed in the form of software, information arrays, serviced by relatively simple, affordable technologies, provides ample opportunities for creating electronic catalogs, computer databases (DB) for use in the training and educational and production process (Bogel & Upham, 2018; Masalimova et al., 2017; Tsatsaronis et al., 2009; Vasileva & Shevtsova, 2019).

The main task of the educational process on the part of the educator with the active participation of the student is to teach the latter the ability to work with such arrays, including:

- updating existing collections of terms and definitions, consistent with the current status of the normative and special terminological component of the professional field;
- promptly finding information on the desired categories in educational or professional activities, taking into account its internally consistent links with other terms, conditions or established requirements.

4. Purpose of the Study

The implementation of the tasks set in the questions is determined by the goal-setting associated with the development of the basis for the concept of creating an educational and applied database in MS Access and the verification of algorithms for the formation and modification of basic objects for the design of educational and applied knowledge bases.

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5. Research Methods

When creating databases of formalized knowledge for educators, professionals and students who do not specialize in the IT field, the software product used should be as simple and familiar as possible for the user. An important condition for their use is the presence of graphic and button forms for searching and viewing information, as well as the ability to import data from other popular office programs. These requirements are met by the popular MS Office application - Access relational database.

The stages of development and testing of the database associated with modifications to the forms of data presentation, the choice of technologies and data manipulation functions are discussed in this article. The professional terminological array under discussion intended for training in the field of "Trading in the field of food commodity research" (Vasileva & Shevtsova, 2019). The database contains 2461 terms with description and illustrations. The main part of the data was imported from MS Excel tables and finalized already in DBMS Access.

6. Findings

The MS Access database includes objects: four tables that store all the data available in the database, forms, queries, reports, macros. The logical structure of a relational database displays an information-logical model for linking four tables of the one-to-one type (Figure 1).

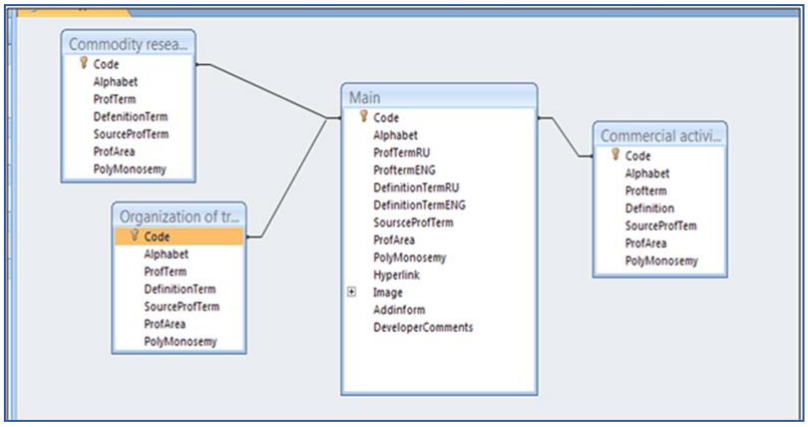

Figure 01. Logical structure of a relational database

Key database objects are hidden from the user. This facilitates the work of users, allowing them to get rid of confusion when choosing the right objects, creating optimal conditions for understanding the principle of working with the database and eliminates the risks of loss or distortion of information. The user works in the database using macros. One of the macros is called "Getting Started - Main Form", which helps get started in the database. At the same time, it can be opened without the use of macros. In the "Main form" window there are buttons that open the forms of all tables and search for data from the database.

All forms of tables can be opened in the "Tables" mode and in the "Forms" mode. The "Open Main Form" button in the "Forms" mode opens the most informative summary table, including graphic images of a number of all data.

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The database contains an active element - a text hyperlink to both a web page and elements within a specific web page. A hyperlink for each term allows getting to a verified, constantly updated source of standardized professional terms from reference and legal resources that systematically cover the current regulatory documentation. These resources and other information resources were the primary sources for hard pragmatically directed extraction of specific professional formalized knowledge. The inclusion of hyperlinks in the database is an operational tool for its timely updating by the user.

One of the types of data is a characteristic of the term - lexical polysemy or lack thereof (monosemy), which distinguishes the term from “not the term”. If the term is ambiguous, industry experts, users of the database, should either conduct a plan of expression and a content plan, or make more exact and clarify the features of the contextual environment for each polysemy case. Students can be given the educational task “To justify the preference of one of the options or to offer their own definition of the term”.

The database offers a search for information in Russian or English language alphabet and term. Alphabetical search is performed by pressing the corresponding button on the Main form (or using the Macro), where the letter of the alphabet is entered in the dialog box and as a result a list of terms is obtained.

Obtaining complete information on a specific term is possible in three ways: 1) opening the Main form in the "Form" mode allows the user to see on the screen and print full information on a specific term; 2) by filling in the "Search by term" dialog box that appears when you click the button with the corresponding name in the Main form. As a result, we obtain information on the desired term; 3) by pressing the button “Find and print the term” in the “Main table” (Figure 2).

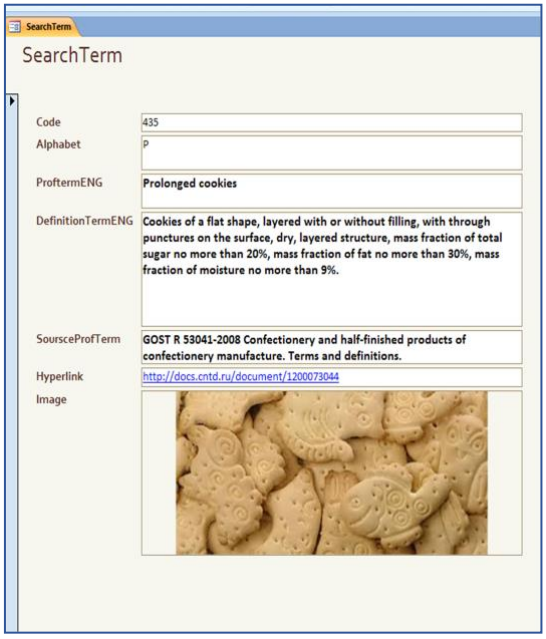

Figure 02. View the found term for printing (the Report object opens)

In the developed version of the software product, the function of adding and updating terms with the subsequent update of the table using the macro "Add to the main table" is laid down. To add images to database records, the field types Attachment and OLE Object Field are used.

To place images that can be changed while viewing records, write comments, we used the OLE Object Field type.

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Modification of the database, all changes to the structure of tables, the creation of new queries for searching and viewing information require opening more objects, the number of which the user can select.

In the process of testing and using the database in the educational process, the database tables were modified. The changes are related to the addition of a new text field “English term”, as well as “Developer Comments” fields of the MEMO type (hidden table field) to the database tables (in the Design mode, the field is entered with the name “English term” and “Concept of the term in English”), "Natural image with comments" of type OLE Object Field. The layouts of the tables were changed, and for a number of records of the “Main table” object, illustrations were replaced or double pictures were added. The constant monitoring of professional fields and the special language reflecting them, which is being intensively changed due to the saturation of foreign and new Russian concepts as a result of the development of international trade and technological innovations, is the basis for adding terms, as well as exceptions from the database for obsolete lexical units. The terms “pectin” and derivatives of the term (2018), “brown sugar” (2018), “modified fat” (2019), “distribution center” (2017), and others were introduced for the first time.

When placing an OLE object in the “Photo with Comments” field in the “Main Table”, images of objects related to the concept are saved in *.bmp* format (Paint editor). For static images of objects, the Attachment field type is selected. In this field, attached illustrations are saved with graphic extensions **.gif* and ** .jpeg*.

The main operations of data manipulation are related to the creation of queries.

One of the main advantages of relational databases is the ability to extract data from any number of relational tables. In the queries created by us, all database tables are involved. All objects of the "Reports" database are formed from the corresponding queries, and the created Forms "Search by term", "Search by alphabet (first letter)" are also based on queries. In the Query Designer to perform a data search “Search by term” and “Search by alphabet (first letter)”, we generated parametric queries. The line "Selection conditions" allows entering the names of the requested characteristics, after which a dialog box asks to enter their values.

In the developed version of the database, it is possible to enter new records through the macro “Add to the main table”, but when all basic objects are displayed, the input data can be entered and edited/viewed in forms and tables.

When designing the conceptual and terminological base on the example of commodity science as a science, in addition to the technical component, two other important aspects were taken into account:

1. cognitive and educational, associated with the formation of professional competence through the study and systematization of professional scientific terms and their visual representation, maximally concentrating formalized professional knowledge. On the example of commodity science, the development of systematization is carried out according to the product, taking into account the depth and breadth of concepts, in order to ensure a more complete realization of the goals of all subjects of interaction in pedagogical and professional conditions. Depth is expressed in the choice of grounds for the systematization of terms implemented in the database (the grounds for distinguishing classification groups). The latitude in the database is presented through the terms and definitions of professional areas related to

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commodity science (as the main science) (organization of trade, storage, commercial activity, logistics, transportation, warehousing, etc.);

2. pedagogical - the development of the database is implemented as the organization of educational and professional knowledge and is carried out during the educational process. Tasks are performed in the practical block of the discipline "Information technology in professional activities." The topic of a professionally oriented task is initially set by a specialized department, while the subject of research covers several areas from different professional fields at once. When performing the practical work “Designing the database “Terms and definitions of a professional field” in MS Access (MS Excel), in addition to the finished information product, the student receives new knowledge in the field of information and communication technologies, and design and database management skills are formed.

At the same time, professional competencies are developed and consolidated: work with sources of remote access, regulatory legal and regulatory technical documents (GOST), textbooks as sources of verified professional knowledge.

7. Conclusion

Thus, the developed concept for creating an educational and applied database in MS Access and well-developed algorithms for the formation and modification of basic objects can be transferred and used to design other educational and applied databases for various fields of knowledge. Database design and search automation approaches can also be applied by employees and entry-level students.

A terminological database, subject to certain standards and restrictions set by pedagogical, educational, and professional tasks, and formed on the basis of interdisciplinary technology, must solve a number of basic problems. The business area (expert organizations, trading enterprises and scientific organizations) receives a unified language of business communication. Teachers who developed educational publications, which from the perspective of "knowledge management" can be considered as the creators of new didactically adapted knowledge, acquire a resource that allows maintaining a single conceptual and terminological field of the discipline, regardless of the discipline adjacent to the main one, and the educational field, to build cross-curriculum communications, due to the unification of the interpretation of the basic terms of disciplines, which is significant for the student. The database of terms and definitions, performing the function of a training dictionary, is a tool that ensures the formation of professional terminological literacy of a student both for effective business communications and the quality of professional duties. This approach takes into account the student’s desire for self-actualization, an active rather than passive assimilation of knowledge. Awareness of the base designed by him, used in the educational and methodological activities of a teacher, fellow student and professional specialist forms an adequate assessment of their knowledge and skills, increased social responsibility. The skills of project activities are formed.

The database is an intangible asset related to technology, an object of intellectual property, capable of generating revenue for the organization, which forms the student’s social and economic thinking as being involved in the formation of the value of the university. The knowledge base management system, the volumes of which are constantly growing and updated, implies the lack of alternative information and communication technologies, which meets the trend towards digitalization, emphasizes their prospects.

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