The Universal Decimal Classification in the Organization of Knowledge: Representing the Concept of Ethics

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Abstract: Training in knowledge organization (KO) involves an understanding of theories for the construction, maintenance, use, and evaluation of logical documentary languages. Teaching these KO concepts in LIS programs are related basically to accessing documents and retrieving their intellectual content. This study focuses on access to documents and exploring the ethical theme in all its dimensions as applied to the teaching of an undergraduate discipline as part of a Bachelor of Library Science degree offered at the Federal University of Minas Gerais (UFMG). As a methodology, a Project-based Pedagogy strategy is used in the teaching of a discipline called "Classification Systems: UDC" for students to classify a documentary resource from a collection on ethics. The teaching of bibliographic classification requires students to learn how to use the mechanisms available to form a notation as well as to use a syntax schema (tables) appropriately. Students also learn to determine a place for the document in the collection, considering the knowledge represented in the collection as a whole. Altogether, such a practice can help students to understand the theory underlying a classification system. The results show that the students were able to understand the basic concepts of knowledge organization. The students were also able to observe that the elements of the different tables of a classification tool are essential mechanisms for the organization of knowledge in other contexts, especially for specific purposes.

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1.0 Introduction

Knowledge organization (KO) consists in sorting, classifying, indexing, and cataloging [what? texts, documents?]. Dahlberg (2006) reports that this requires learning ways of structuring concepts according to their properties (inheritance elements) and applying these concepts to classes ordered by their values (subject content). Hjørland (2003), in his turn, states that knowledge organization is closely connected to a cognitive organization, as conceptual systems and theories, and to the social organization of knowledge, in the form of representations of disciplinary expertise.

In Brazil, education in Library Science considers the teaching concepts in knowledge organization in relation to two essential functions. The first function concerns retrieving the documents' intellectual content, with the indexing process being its main element, while the second one refers to document access, with cataloging and bibliographic classification as the main processes.

Silveira (2015) points out that teaching bibliographic classification systems has always been a practice in all the Brazilian Library Science courses. According to the author, the first Brazilian course on Library Science was implemented in 1911 by the National Library of Brazil. It was the first Library Science course in Latin America and the third

in the world. The first class of this course began in 1915 and already offered a discipline for teaching the use of bibliographic classification systems.

Learning to use bibliographic classification systems requires an understanding of the theory(ies) (or philosophy) behind such systems. It also requires knowing how to use the mechanisms available in the tool to form a notation, using the syntax schema (tables) appropriately. According to Langridge (2006), the task of teaching notions of knowledge organization using a bibliographic classification presupposes that the student can identify the information elements in the document. These elements must meet the institution's interests and the target audience's information needs. The author clarifies that only a well-done representation makes it possible for the user to know all the subjects and informational resources available in the institution. Besides, the user will be able to understand the relationships they establish because each classification of a new information resource is related to what already exists in the collection.

This article presents the application of a teaching-learning strategy called Project-based Pedagogy in a discipline of the Library Science course offered at the Federal University of Minas Gerais (UFMG), which aims to teach the use of the Universal Decimal Classification (UDC) system. In addition, a collection of documents is formed with ethics themes in their most diverse dimensions to classify using UDC.

This article consists of seven sections, including this introductory part. Section 2, "Contextualizing the ethics dimensions" elucidates the different dimensions of the theme of ethics. Section 3, entitled "Contextualizing the Project-based Pedagogy" presents the core elements of a teaching-learning strategy based on projects. Section 4, "Characterizing the UDC", explores the UDC system and its syntax mechanisms. Section 5, "The Bachelor of Library Science degree at UFMG", presents the nature of our undergraduate degree in Library Science, focusing on the discipline "Classification Systems: UDC" as offered at the School of Information Science (ECI/UFMG). Section 6, "Methodology", presents the methodological procedures adopted in the teaching of the discipline. Section 7, "Results", presents and discusses the results. Finally, Section 8 shows the conclusions based on the results achieved throughout the study.

2.0 Contextualizing the ethics dimensions

Ethics and moral concepts are closely related and sometimes considered equivalent. However, Cotrim (2002) understands that in the field of philosophy, they are distinct concepts. To this author, this discussion is conceptual and also a terminological approach. Originally the Greek word *éthos* (with a long 'e' meaning the property of character) was used to translate the Roman word *mores*, which gave rise to the word moral - hence, perhaps, the ambiguity. Cotrim (2002) goes on to explain that later the Greek word *ethos* (with a short 'e', meaning custom) gave rise to the word ethics. The two terms – ethics and morals – have in common that they refer to issues related to human behavior.

La Taille (2006) points out that there is a conventional difference between these two concepts. The sense of morality is related to the observed social phenomenon, and the purpose of ethics relates to the philosophical or scientific reflection on social phenomena. La Taille (2006, 29) argues that each concept answers different questions by referring to various dimensions of human life. For example, morality answers the question "How should I act?". On the other hand, ethical reflection must answer another question: "What kind of life do I want to live?".

Based on this premise, we realize that ethics refers to human actions that occur in everyday life. In these moments, it is necessary to distinguish between right and wrong, good and evil, virtue and vice, justice and crime. So, ethics depends on value judgments, which are a subject influenced by prejudices, public opinion, personal interests, emotions, and our freedom of choice. For this reason, ethics is embedded in social relations, closely linked to morality, establishing concrete norms of conduct.

Socrates was one of the first philosophers to reflect on the issue of ethics around the 5th century B.C. According to Valls (1994), Socrates did not accept the separation between individual and collective interests (of society), which began to take effect during the crisis of Athenian democracy. The author reports that the strand advocated by Socrates is called ethical rationalism because reason should be the basis of moral norms and customs. Before the reflections of the philosopher Socrates, morality and legality were intertwined, and there was no discussion or reflection on ethics.

Valls (1994) explains that Aristotle's reflections brought ethics into the field of everyday life, where it remains today. Thus, the author emphasizes that individuals are not pure because they have conflicting behaviors, with acts that sometimes are for good and sometimes for evil. In this sense, ethics is part of the human experience and linked to practice in the Aristotelian strand. Aristotelian ethics is teleological (has a purpose) and eudaimonic (oriented towards happiness).

Ferreira Neto (2015) mentions that there are generally four main dimensions of ethics, namely: metaethical, prescriptive (or normative), descriptive (or comparative), and applied.

1) Metaethics deals with the meaning of ethical concepts in different situations, trying to understand the right and wrong of morality itself. The previous questions make us realize whether an action is good or bad. Ferreira Neto

(2015) highlights three main theories of metaethics: naturalism, non-naturalism, and universal prescriptivism (*a priori* morality). He also states two schools of thought in this dimension: non-cognitivism (non-realists, based on moral knowledge) and cognitivism (realists, based on facts).

2) Normative (or prescriptive) ethics studies the ethical beliefs that guide individuals to behave in society. It also analyzes the norms of behavior that promote justice and injustice. Ferreira Neto (2015) points out that in this dimension, the following stand out: a) deontological ethics and b) teleological ethics. Deontology believes that there are standards of a universal nature (honesty, disinterestedness, decency), including the ideas of Immanuel Kant, who believes in the universality of norms and the principle of reciprocity; we also have moral absolutism, which believes that there are absolute norms, regardless of circumstances. There is also the theory of natural rights, which holds that there are fundamental inherent rights (the right to life, liberty, and property are inalienable), and the theory of divine command, which assumes that one is justified if God has ordained it as right and that it should be undertaken as a responsibility. Teleological ethics advocates ethical virtue, arguing that ethics is compatible with particular ideal virtues (truth, honesty, courage, generosity, compassion, etc.) because they allow for the full development of humanity (Reps: Plato, Socrates, Aristotle, Epicurus, Stuart Mill, Bentham, Hare, Singer, Thomas Aquinas, among others). Teleological ethics believes that there are morally correct actions (altruism, asceticism, hedonism, utilitarianism, etc.), taking the view of consequentialism theory (acts that focus on positive consequences) and utilitarian hedonism (maximizing the pleasure of those affected by the action).
3) Descriptive ethics is at the less intellectual end of the ethical spectrum. It is an empirical study of people's moral ideas based on law, fact, and convention. It investigates the history and development of ethics and records taboo standards, norms, or conventions. The author states that it is a part of social science, not human morality. It involves the analysis of pragmatic elements in a practical world, such as ethical codes that establish rules and regulations for society, informal theories of etiquette, legal and arbitration practices, and decisions made by ordinary people without the support or advice of an expert.
4) Applied ethics is concerned with everyday life and diverse work environments. It involves the analysis of specific moral dilemmas in both private and public life, including moral judgments. It uses conceptual tools from metaethics and normative ethics to examine controversial issues such as abortion, infanticide, animal rights, environmental issues, homosexuality, bioethics, military ethics, public service ethics, capital punishment, weapons, nuclear devices, etc. It requires a philosophical perspective rather than a technical interpretation. Some of the normative principles most commonly used in applied ethics are consequentialist utility (social and personal); paternalism (duty to protect); harm (duty not to cause); benevolence (duty to help); legality; honesty; justice (recognition of rights); autonomy (recognition of freedom); and person rights (to life, information, privacy, freedom of speech, and safety).

Ferreira Neto (2015) mentions that an individual's actions when faced with a situation or task are related to the ideas that permeate their thinking. Therefore, personal ideologies determine the ethical principles individuals adopt when facing the different circumstances in which they are involved throughout their lives.

3.0 Contextualizing the Project-based Pedagogy

Leite e Mendez (2000) states that Project-based Pedagogy is a teaching-learning strategy that enables content creation guided by the prior definition of objectives. It is an active learning methodology founded on project-based learning (PBL). PBL proposes a practical activity as an essential tool for learning. The aim is to encourage students to learn autonomously and actively based on current problems and situations. In this teaching strategy, the learning process is centered on the student, who actively participates and is responsible for constructing knowledge. The project begins with discussing goals and objectives and assigning tasks to create a final product or artifact.

Hernández (1998) reports that the main characteristic of the Project-based Pedagogy strategy is its intentionality. The definition of intention involves a prior agreement between the students and the teacher. The project is flexible because it can be reformulated according to the problems that arise:

The function of the project is to promote the creation of strategies for organizing school knowledge in terms of: 1) the treatment of information and 2) the relationship between the different contents around problems or hypotheses that facilitate students to build knowledge, to transform the information coming from the different disciplinary knowledge into their own knowledge (Hernández 1998, 61).

In addition, Hernández (1998) states that this strategy is not new; it originates with J. Dewey (1859-1952) and William H. Kilpatrick (1871-1965) in the 20th century. Finally, Hernández (1998) mentions that this strategy is part of the progressive educational movement in the United States, supported by an open education, in which the student is the agent of his learning.

The contemporary world requires a professional who can act critically and contribute to society by solving its

problems. Project-based Pedagogy allows the development of such competencies so that the student can act in a participative and constructive way as a citizen. Moreover, this strategy allows the student to learn more actively, negotiating and making decisions in the project group. This strategy provides (1) conceptual, attitudinal, and procedural learning, such as forming a critical sense; (2) respect, responsibility, autonomy, and cooperation; (3) socio-emotional skills; (4) enjoyment of learning; and (5) problem-solving skills.

Costa (2022, 3) writes that "the proposal of projects come up with to change the student's attitude during the class. The student must become an active being who conceives, prepares, and carries out his work. The teacher's role is to guide, suggest ideas, and help when necessary". Schön (2000, p. 79) adds that "the paradox of learning a truly new skill is this: a student cannot initially understand what he needs to know; he can only learn it by educating himself, and he can only educate himself by beginning to do what he does not yet understand". Project-based Pedagogy meets these premises because it offers different ways of learning.

Ventura (2002) explains that the theoretical foundations of Project-based Pedagogy include four basic concepts: representation, identity, negotiation, and network. The first theoretical concept is representation, which has a fundamental social dimension. We need to know what ideas are embedded in our thoughts. This representation guides individuals where they have to name something, act in different situations, and interpret the world. Ventura (2002, p. 39) states that our world is full of "objects, people, facts, and ideas" that are shared with those "from whom we draw, sometimes in a convergent way, sometimes in a conflicting way, but always to understand, manage, confront and perhaps transform".

The second concept is identity, which results from the various socialization processes in which an individual is involved. This identity is constructed and reformulated throughout life in personal, professional, and institutional relationships (family, school, companies, etc.). It is also built in the educational sphere, linked to the acquired knowledge and skills, which require recognition. The strategy of pedagogy of projects offers a favorable environment for constructing identities.

The third concept is negotiation, which takes place, for example, in the meetings held to develop the project. In these meetings, information gathered may be concurrent or conflicting. In the meetings, the opinions and positions of the group members are negotiated until an agreement, a consensus, is reached. This interaction process seeks a consensual solution to the problem under analysis. It is an essential concept in teamwork because it is through negotiation and agreement that social relationships and bonds are created.

The fourth and final concept is the network, which formalizes the culture of learning. This concept replaces the system paradigm, which is closed in on itself. The essence is to create conditions for people involved in the project to share information and knowledge. It is a suitable environment for people to meet in convergence. In this environment, creating solutions and innovations is possible based on relationships of mutual help between people and organizations. For example, an academic project would be searching for information with specialists in the subject, object, or phenomenon proposed in the project.

In applying the Project-based Pedagogy strategy, the teacher is the mediator. Valente (2000, 4) mentions that "in developing the project, the teacher can work with different types of knowledge that are intertwined and represented in terms of three constructs: (1) problem-solving procedures and strategies, (2) disciplinary concepts, and (3) techniques and concepts about learning". From this perspective, the student learns by clarifying his doubts with the teacher, researching, and building a bridge between previous and new knowledge. From the learning point of view, the student resignifies the earlier concepts and connects them to the new disciplinary knowledge he has learned.

4.0 Characterizing the UDC system

Documentation as a technical field originates with the contributions of Paul Marie Ghislain Otlet (1868-1944), who is considered the precursor of this area. It was conceived during the increase in written production due to the Industrial Revolution (inventions, discoveries, and creations). At that time, the document was no longer limited to a single book but anything with a probative value documenting something. Hence, he began with the idea of creating a Universal Documentation Network, with a centralization of the work of an organization that would be accessible to all to share knowledge. In his book *Traité de Documentation* published in 1934, Otlet summarized around 40 years of reflection on the organization of knowledge and related topics, which is today his intellectual legacy for the area.

Thus, the conception of the UDC system took place during the Industrial Revolution. Otlet teamed up with Henri La Fontaine (1854-1943) and created the *Répertoire Bibliographique Universel* (RBU), whose ideal was to compile all recorded knowledge worldwide. The International Institute of Bibliography (IIB) was created in 1895 to manage the RBU under *Palais Mondial*. The idea was that all nations would do the cataloging work in their national libraries collaboratively for the RBU. However, several countries have failed to do their share of the work, causing delays. This fact has resulted in failures in publishing the repertoire.

The purpose of developing the UDC system was to compile and order all of the world's documentation, which could be cataloged in a single directory. The publications would be grouped and made accessible, becoming the universal heritage of humanity. At that time, libraries were con-

cerned only with author catalogs, and Otlet felt the necessity to include a classification structure in the documentation records. According to Guarido (2010), Otlet and La Fontaine thought that knowledge should be done methodically and systematically, using a logic in which the authors were arranged alphabetically and the subjects or themes or topics would be organized systematically. With this, they hoped to avoid the dispersion of subjects and authors.

Otlet and Henri La Fontaine developed the UDC system inspired by the American system, the Dewey Decimal Classification (DDC), created by Melville Louis Kossuth Dewey (1851-1931). Initially, Dewey authorized the modification of the UDC system; however, he did not allow such changes to be incorporated into his system. Otlet and La Fontaine proposed content and form changes by introducing auxiliary tables with relational elements. Unfortunately, the content changes weakened the system's North American orientation, which did not suit Dewey's plans for the system. The first complete edition of the UDC system was published in French between 1904-1907 under the title *Manuel du Répertoire Bibliographique Universel*, with about 33,000 classes and 38,000 entries in the alphabetical index.

The scheme continued to expand but was interrupted by the First World War (1914-1918). After that, the work progressed toward a second French edition, published from 1927 to 1933 under the *Classification Decimale Universelle*. This new edition became the master version from 1933 to 1993. Frits Donker Duyvis reviewed and expanded this edition's science and technology sections. Finally, the third edition, the first German version, was published from 1934 to 1951, with about 140,000 subdivisions, and was contributed by Carl Walther.

The IIB became the International Institute for Documentation (IID) in 1931, headquartered in The Hague, Netherlands. The IID became the *Federation Internationale de Documentation* (FID) in 1937. Finally, in 1988, it adopted its current name, International Federation for Information and Documentation (retaining the acronym FID). In 1992, the recent UDC Consortium (UDCC) was formed for financial security, management, and maintenance of the system, to ensure the future of the UDC. In 1993, the UDCC created a 60,000-record database, the Master Reference File (MRF), which today gives the authoritative statement for the content of the UDC. Since August 1949, the changes authorized in the system have been made available in Extensions and Corrections to the UDC, now published annually in English, the official language of the Consortium.

Guarido (2010) states that in Brazil, the library of the Oswaldo Cruz Institute was one of the first institutions to use the UDC system, which occurred in 1909. The author reports that in 1937 it was the turn of the Library of the Ministry of Foreign Affairs to use a simplified version of the UDC system. In 1958, the Brazilian Commission of UDC was created, attached to the Brazilian Institute of Bibliography and Documentation (IBBD), today called the Brazilian Institute of Information in Science and Technology (IBICT). Guarido (2010) mentions that the Commission prepared the first edition in Brazilian Portuguese of the UDC system, a version that was published by IBICT in 1976 (Guarido 2010).

Regarding its main characteristics, the UDC is a general and encyclopedic classification system with a decimal logic, consisting of concepts hierarchically structured in ten major classes and their subdivisions. The 4th Class has been vacant since the 1960s, waiting to be completed in a reformulation of the system. The UDC system has a mixed notation (number and symbol) and can adapt to the classification needs of different institutions. This flexibility occurs because the notations can be formed by codes from the main tables and supplemented by codes from the common and special auxiliary tables. Common auxiliary tables can express relationships between subjects and indicate recurring characteristics (applicable to all main tables), and some of them can be used alone. Special auxiliaries only repeat in specific classes and apply to a limited number of main tables. Auxiliary tables allow inserting elements (numbers, punctuation, and symbols) to combine different classes.

Using elements from tables of common relational auxiliary allows syntactic procedures that multiply the possibilities of combinations. This peculiarity makes it a semi-analytical-synthetic classification, considered the first conception of faceted classification. Furthermore, classifying documents using the UDC system allows detailed subject analysis and coding, generating notations that thoroughly code subjects and other elements in a particular way.

The citation order (horizontal or internal, or standard citation) refers to the order in which the system elements are placed to form a notation. The standard of citation order is optional. So, the possibility of changing the citation order is a mechanism that allows changing the logic of the organization of the information resource in a collection, since the archive order (or vertical order, from general to specific) established in the system is mandatory.

One point to consider is that the representation of very specific subjects, with a lot of detail, can result in a very long notation. In a way, this is a limitation. As a result, materials on the same subject may be separated in the collection. Therefore, at the time of classification, care must be taken so that there is parsimony in the use of details to maintain a tight group of documents with similar subjects, authors, and other elements.

5.0 The Bachelor of Library Science at UFMG

In Brazil, the field of Library Science, or Librarianship, as it is also called, is part of the broader area of Applied Social Sci-

ences. It has interdisciplinary characteristics insofar as it borrows contents from other areas of knowledge to build its disciplines. It closely relates to Information Science, Linguistics, Literature and Arts, and Exact and Earth Sciences. The profession of a librarian is regulated by Law No. 4.084/1962, Decree No. 56.725/1965, and Law No. 9.674/1998.

The teaching of Library Science is offered at undergraduate level in the country, and there are 55 courses, of which 12 are distance learning, and 43 are face-to-face courses. The Bachelor´s degree in Library Science offered at the School of Information Science (ECI) of the Federal University of Minas Gerais (UFMG) was created in 1950. It is offered in the face-to-face modality, and can receive annually 120 new students.

The course curriculum is in accordance with the guidelines of the Resolution CNE/CES No. 19/2002, and presents essential elements, such as issues of culture, education, social and technological innovation, discussing with students the development of skills in specialized applications and the construction of public policies. Its theoretical and methodological framework meets the diversity of audiences, contexts, and topics, seeking to broaden the student's view of the world and the role of information in the current context. In this way, the student learns to manage information storage, organization, and dissemination, considering society's social and cultural issues.

Thus, the program aims to "train librarians capable of acting critically, reflectively, technically and scientifically in the mediation of information with a view to its democratization, access, use, and appropriation of information resources by diverse audiences" (PPC 2020). In particular, it aims to train graduates who consider the equal integration of the technical and social, and ethical aspects of information, promoting a moral and humanistic debate on the production, appropriation, use, and dissemination of information, ensuring respect for political, ethnic, and social diversity.

5.1 The discipline "Classification Systems: UDC" offered at the ECI/UFMG

The discipline "Classification Systems: UDC" is offered by the Information Organization Department to students in their sixth semester, considering that the course lasts four years, divided into eight semesters. The discipline is compulsory. It has sixty hours of lectures (or four credits) in all semesters, in three different shifts: in the first semester, there is only one class in the morning shift, and in the second semester, there are two classes, one in the afternoon and one in the evening shift. Each class averages 30 students, amounting to about 90 students per year.

The subject menu includes the following topics: "Bibliographic classification systems: history, development. Universal Decimal Classification". The course aims to broaden the student's knowledge of the organization of recorded knowledge to facilitate the retrieval of information and documents and to introduce the study of using the bibliographic classification system UDC in different contexts. The programmatic content of the course includes the history of classifications, the fundamentals, characteristics, and functions of the UDC, ending with a project on its practical application.

In this course, the use and handling of the main tables, the common auxiliary tables, and the special auxiliary tables are studied from a practical perspective. The course uses the Second International Standard Portuguese Language Edition, published in 2007, translated using the Master Reference File (MRF) as a source, with updates recorded up to 2004. At the end of the course, students can work with UDC tables through practical exercises in content correction.

The course uses an online environment, the Moodle Virtual Learning Environment (VLE). The tagging exercises cover different topics that are analyzed and indexed by the students, who then indicate keywords that represent such topics. Students do assign UDC notations to encode the keywords. The course content is divided into seven learning cycles, as shown in Table 1.

In Unit 7, the Project Pedagogy strategy is applied, which allows students to integrate the technique of using the UDC system with the social and ethical aspects of information, fulfilling one of the objectives of our degree course. To this end, different thematic topics are worked on and modified each semester. An attempt is made to work with themes that show the students the challenge that librarians have in maintaining broad access of users to the information

Learning Cycle Units	Descriptions
Unit 1	Basic Concepts
Unit 2	Basic Classes (theoretical foundations; properties and functions)
Unit 3	Relational Auxiliary Tables (process)
Unit 4	Common Independent and Dependent Auxiliary Tables (process)
Unit 5	Special Auxiliary Tables (process)
Unit 6	Citation Order and Archive Order (conclusion)
Unit 7	Final Project (practical application of the UDC system)

Table 1: Course content in learning cycle units

resources of the library collections, seeking to aggregate a humanistic education and respect for political, ethnic, and social diversity.

A case study of one of the classes of the discipline is described in the methodology and results sections below.

6.0 Methodology

Hernandez (1998) and Moura (2010) present the application of the Project-based Pedagogy strategy method in four procedural steps, which are detailed below:

Step 1 - Problematic situation: The aim of the project is introduced to the students, who discuss their perceptions about the problematic situation presented; they express their doubts and knowledge about the problem, being encouraged by the teacher. It is up to the teacher to interpret the ideas, values, and contradictions to understand the students' view of the problematic situation towards reaching a consensus.

Step 2 - Development: Working groups are formed, and strategies are created to seek answers to solve the problematic situation. The proposed plan requires the socialization of knowledge and information sharing; this is done through debates and readings, among other strategies. The developmental stage requires the student to leave the disciplinary environment when seeking information elsewhere. These actions create an environment conducive to contrasting viewpoints and confronting conflicts and concerns. Ultimately, a consensual balance should reflect the content to be learned.

Step 3 - Application: The student is an active and transformative subject in promoting new knowledge. This promotion is done by applying the knowledge acquired during the execution of the project. The project consists of a punctual (temporary) effort using limited resources (defined in a plan). It comprises a set of activities intending to create a tangible artifact (product or service). The stage of application promotes an opportunity for the students to place themselves as protagonists in his living space.

Step 4 - Evaluation: the definition of evaluation criteria is a principle that the teacher uses as a reference to evaluate the project. It serves as one of the ways of monitoring the learning process. The aim is to verify the students' level of appropriation of knowledge and their level of development in constructing their knowledge. The criteria defined must be clear, precise, and negotiated with the students to clarify the rules. The evaluation criteria are directly related to the intentionality of the project. Value will be assigned according to the perceived alignment of the process with the proposed objectives and outcomes.

7.0 Results

The Project-based Pedagogy strategy was implemented in the first semester of 2022 with a sixth-period class in the morning shift, with a total of 35 students. The chosen topic for our case study was "The Dimensions of Ethics".

In the first step, the professor and the students discussed the problematic situation along with the objectives and goals of the project. First, the students were encouraged to discuss ethics in the work of librarians, and they compiled several elements on the topic. Next, the students voted to select an article on the issue. Finally, the chosen paper was discussed among the class, and working collaboratively the students created a concept map. This is an active teaching method that promotes a qualitative learning process and is also a formative assessment. Once the concept map was complete, students used the UDC system to assemble notations to encode the statements in the labels they had created, as shown in Figure 1.

Students analyzed the text and highlighted the content addressing the Ethical Practices of the Managing Librarian. The concept map provided information that made sense to the students. With this first exercise, students have become familiar with the topic because they were working with a subject that is part of the librarian's profession. Students could understand that their social relationships at work, colleagues, the institution, and the user community involve choices and attitudes, that is, ethical behavior. Thus, they could realize that ethics is a critical issue for librarians because they deal with confidential information and are responsible for providing equitable and unbiased access to information. Therefore, civic education for librarians should address ethical issues related to privacy, confidentiality, intellectual freedom, equal treatment of users and professionals, and guide the professional code of conduct.

Following this activity, still in the first step, the students proceeded to a bibliographic research on the different dimensions of ethics. They had one week to do the research using multidisciplinary databases, such as the Web of Science and Scopus. All the retrieved material was analyzed, and the class discussed the dimensions of ethics. In this activity, students could exchange ideas, discuss the ethical dimensions, and examine practical examples of the different dimensions of ethics. These discussions promoted critical reflection and the development of ethical reasoning skills enabling civic education.

Once the discussions were over, adjustments were made to the project in order to integrate the new knowledge learned. At this point, collaboratively and with the teacher's guidance, a set of four dimensions of ethics was established, as follows: metaethics, normative ethics, descriptive ethics, and applied ethics. Next, the students and the teacher defined the dimensions that would guide the rest of the project activities, delimiting the issues that fit into each dimension, as shown in figure 1.

Then, in the development of the 2nd step, the students in the class were divided into four groups. The preparation of proposals for the objectives, goals, problem situation, and s

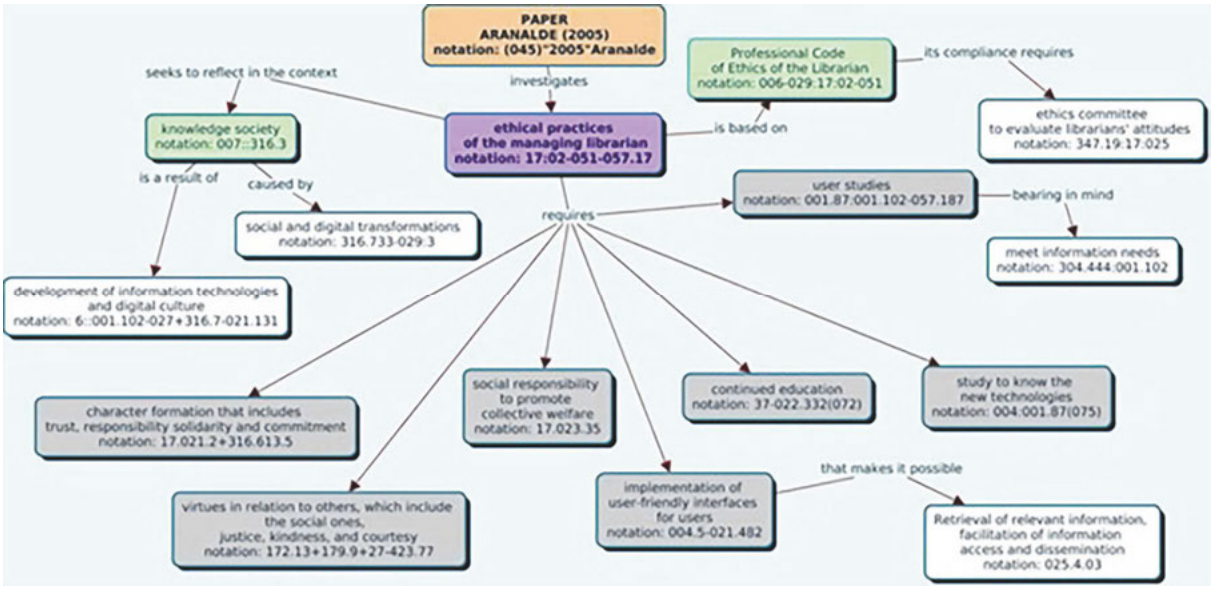

Figure 1: Student-generated concept map; selected article

olution to the problem began. Students were encouraged to share and exchange information among the groups. The consensus statements are shown in table 2.

With the definition of the objectives, goals, problem situation, and solution to the problem, the students moved on to the execution of the project in the third step.

In the application step (3rd step), the students are again encouraged to create a concept map to represent the problem situation and the proposed solution based on the following questions: What? How? Why? What for? Where? When? Who?, as shown in Figure 2.

Following the concept map construction activity, the groups should conduct a new bibliographic search (in the Web of Science and Scopus databases) on the dimension of ethics selected for each group. Each group had to choose ten documents related to the specific dimension they were working on and five articles dealing with ethics in general, totaling 15 documents for each group. All the documents found were recorded in a shared spreadsheet to avoid duplication of documents. The collection comprised 60 documents: 28 articles, 12 theses, 12 dissertations, and 8 e-books.

Still in the third step, each group should prepare the bibliographic references of the fifteen documents found and enter them in a new column in the shared spreadsheet. Once all the groups had entered their respective data in the spreadsheet, the students reviewed the list of 60 references in a collaborative effort according to the Brazilian Association of Technical Standards (ABNT) standards.

An activity called Database (DB) in a VLE Moodle to organize the collection of the 60 documents. The DB enabled the construction of a knowledge repository. It was created collaboratively in the virtual classroom, and the teacher and students could feed the DB. The records (documents) could have different fields containing different elements, such as files, links, dates, numbers, etc.

Each group classified its 15 documents according to the four criteria listed below:

1) A citation order establishing one appropriate order to the type of subject, the library, and the target audience's needs.

2) A detailed classification of the ten documents of the content of the particular dimension worked on by each group.

3) A more general classification of the remaining documents not dealing with the particular dimension worked on by each group.

4) A notation in the archive order according to the standard of the UDC system.

The first criterion, establishing the order of the UCD elements, was carried out by the students in a collaborative work among the groups to maintain cohesion and the coherence of the logic of the organization of the documents in the collection.

To assign notes to the documents in the collection, each student had to analyze each document and write a statement summarizing its content. Subsequently, the students registered that statement in a new column in the shared spreadsheet.

Then, each group had to find a notation for their statements using the UDC system. Finally, the groups defined the citation order for the documents, as shown in table 2.

Then, the students organized the notations in the citation order and inserted them into a new column in the shared worksheet.

Dimension	Definition
Metaethics	Metaethics (or analytic ethics) is a non-normative philosophical theory with the aim of providing justifications and reasons for the validity of moral judgments. It examines the nature of moral principles and theories. It is guided by the questions "What is good?" and "How can I distinguish right from wrong?" and seeks to understand the nature of ethical properties and judgments.
Normative ethics	Normative (or prescriptive) ethics is the branch of philosophical ethics that deals with questions of how one should act regarding ethical-moral behavior. It is guided by the questions "What should I do?" and "What is the best way to live well?" What it means to be ethical is defined according to each society; it means to have respect and to follow the codes of conduct of the environment in which one lives. The descriptive approach tries to explain how people make ethical decisions, focusing on the particular characteristics of individuals that influence how they think and the cognitive limitations that generally prevent them from making better decisions. Within this dimension, there are two bare strands: Teleological normative ethics, which emphasizes the good consequences of actions over their intentions (e.g., nationalism, egoism, and utilitarianism), and Deontological normative ethics, which holds that some acts are always right and others consistently wrong, regardless of their consequences (e.g., the Ten Commandments, the Universal Declaration of Human Rights, and others). Within the teleological school are the consequentialist view (based on the consequences of the action) and the virtue view (based on the moral or virtuous character of the individual). The proponents of teleological ethics are Aristotle, Socrates, Plato, Epicurus, Stuart Mill, Bentham, Hare, and Singer, among others, who believe the best action options offer the best results. Within the deontological stream, we have Kantian ethics (or the ethics of duty), which presents general guidelines for action since it will be moral if the rule of action can be taken as a universal rule, and moral intuitionism, which focuses on intuition rather than a reason to justify someone's beliefs.
Descriptive ethics	Descriptive (or comparative or empirical) ethics focuses on explaining and predicting the actual behavior of individuals, cultures, and societies. It is the study of people's beliefs about morality, a form of empirical research on the attitudes of individuals or groups. It describes a cultural group or individual's moral and behavioral actions and general rules. It is primarily the domain of psychology, anthropology, sociology, and management. The question guiding it is "What do people think is right?" It deals with the empirical capture of the ethical morality existing in an individual, group, or society, describing or comparing their ethical-moral attitudes and beliefs without regard to normative positions. It studies, for example, the choices of ordinary people that we observe, without the help of experts or advice, as they vote, buy, and decide why it is worth fighting. This question is a primary concern of sociology, political science, and economics. It has also been called ethno-ethics, a social science concerned with how people behave.
Applied ethics	Applied ethics is a branch of philosophy concerned with analyzing specific issues that affect people in their private or public lives. It focuses on building a moral model for better understanding and solving concrete social problems. It seeks to develop general criteria for discerning what is good, right, just, etc., through a social experience of the relationships in question. The question guiding it is "How can we gain moral knowledge and put it into practice?" The study of ethics requires a qualification (intellectual/practical) in a field of interest that deals with specific ethical/social issues. It covers a wide study area and may relate to family, school, professional, economic, social, political environment, etc. Examples of applied ethics: professional issues (e.g., Professional Code of Ethics), economic, animal, ecological, environmental, scientific, bioethical, etc. It deals with concrete problems of the individual and society to understand and take a position on the relationship between ends and means, seeking rational justifications to reach a sound and intersubjectively valid judgment on issues such as the use of animals in scientific experiments, the forms of appropriation of natural resources, the issue of stem cells, abortion, euthanasia, whether there is justification in breeding and killing animals for food, and the obligation to share our wealth with those living in extreme poverty in other countries, among others. Bioethics includes most of the studies in this dimension.

Table 2: Definitions for the ethical issue dimensions

Table 2 shows some examples of the notes prepared by the students of each group, referring to the four dimensions of ethics. The Portuguese version of the UDC system, published by IBICT in 2007, was used. Table 3 shows the legend for the notations.

At the end of the third step, each group presented its topic in the database in the VLE Moodle, talking about the whole process, giving general feedback about the project, and pointing out the difficulties, facilities, and learning during the process. In short, the feedback was mostly positive, as the students reported that it was important for their learning to combine theory and practice. They were able to better understand the application of the UDC system elements in coding the utterances and the importance of establishing a logical organization of a collection to maintain the cohesion and coherence of the documents provided. Students also reported that the topic they worked on was necessary for their personal development, adding knowledge they had not yet fully mastered. In terms of difficulties, all students highlighted the complexity of the UDC system,

Proposals	Description
Project Objectives	To understand the structure of the UDC and to get familiarized with the system's terminology and notations. To encourage active participation, independent inquiry, and practical application of UDC usage and ethics concepts.
Project Goals	To develop classification skills using the UDC. To understand the organization of the UDC concerning the ethics theme. To practice using the UDC to classify materials on ethical topics. To deepen knowledge of various ethical issues.
Project Problem-Situation	The institution is a specialized library that will serve an audience of specialists of a non-governmental Ethics Committee, acting in various contexts of contemporary society, needing information for decision-making scattered in the literature. The librarians of this institution, responsible for the mediation of information on ethics, have the task of organizing a collection of documents that deal with the dimensions of ethics.
Project Problem Solution	The students will select a set of documents for building a collection in a library covering the four dimensions of ethics. The documents will be classified using the UDC system. If necessary, some documents will have a very detailed notation. The collection should consist of articles, reports, digital books, theses, and dissertations, either national or translated. There must be at least ten documents with specific content for each of the four dimensions of the ethics theme, as shown in Table 2. The collection must be available by July 2022 and be digitally accessible to members of the Committee.

Table 3: Project proposals prepared jointly by teacher and students

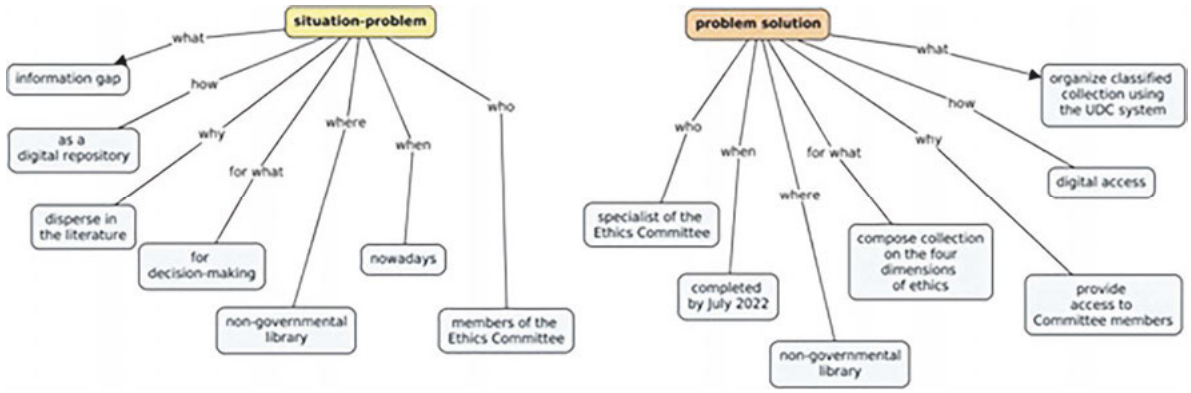

Figure 2: Student-generated concept map; problem situation and solution

which allows for different ways of classifying a topic. They said that this fact makes the librarian's job very difficult and that they have to be very responsible in the choices they make so as not to harm the users. They also confirmed the need for an updated procedures manual to record the decisions made to support the classification activities.

After delivering and presenting the results, we moved on to the evaluation step (4th step), in which a formative evaluation process was conducted. In this type of evaluation, we can have a global view of the project because it considers the students and their learning in an integral way. The three previous steps and also after the presentation of the project by the students. Thus, I analyzed the student's performance over time and gave feedback, indicating what needed improvement and what kind of knowledge they still needed to learn. Through formative assessment, I adjusted the pedagogical action so that the students could be aware of their mistakes and have time to correct them. This is considered a formative evaluation because the qualitative character prevails over the quantitative one. Moreover, it is a social-historical-cultural vision of knowledge which recognizes the relevance of the active participation of individuals in constructing their learning. The evaluation criteria were discussed with the students beforehand.

Evaluation influences pedagogical practice to the extent that it makes the teacher reflect on the student's learning. Through evaluation, it is possible to establish an interaction between teacher and students and adjust teaching and learning. The teacher's pedagogical updating is essential for evaluation to improve learning and promote intervention when necessary.

Dimension of ethics	Citation order
Metaethics	Auxiliary of form + main subject of ethics class + details
Normative Ethics	Auxiliary of form + main subject of origin of norm + details
Descriptive Ethics	Auxiliary of form + main subject of origin of behavior + details
Applied Ethics	Auxiliary of form + main subject of the origin of the action in question + details

Table 4: Citation order developed by the students

Dimension	Vocabulary term	Notation
Metaethics	The rational foundations of ethical systems.	(02-028.27)17.0:00-021.431:141.132
	The theoretical study of the arguments about induced abortion.	(045)17.022.1:173.4:613.888.151.1
	The genesis of religious conceptions of euthanasia.	(045)17.03:2-18:179.7
Normative Ethics	Duties to God in Christian doctrine.	(043.3)2-18:27-42817.022.1
	Constitutional rights are guaranteed in the guidelines of the Statute of the Elderly.	(045)342.57:340.13-053.9:172.1
	Land law on urban settlements in Kant's ethics of duty.	(045)349.4:711.4:17.023.2
Descriptive ethics	The behavior of librarians in reference services in school libraries.	(043.3)025.5:024.3:027.8:17.021.1(815.1)
	Behavior of the Family Health Program doctors in caring for patients.	(045)616-082:614.39:17.021.1:174
	Analysis of the behavior of human resources managers in public organizations.	(045)658.310.8-051: 658.115:17.021.1
Applied ethics	Bioethical issues in stem cell research.	(02-028.27)608.1:575:612.6.05:17.023.33
	The use of animals in scientific experiments in the field of biology.	(043.2)616-092.9::001.891.5:17.023.33
	Arguments for raising oxen for slaughter (feed).	(043.2)637.512:636.2.053: 179.3

Table 5: Examples of notations developed by the groups by dimension, using the established citation order

8.0 Conclusions

This paper presented the organization of knowledge about "ethics" in its various dimensions by using the UDC system as a tool for an undergraduate discipline in a Bachelor of Library Science course. A Project-based Pedagogy strategy was applied to classify a collection of documents in a library for a specialized audience. This activity made it possible to implement the practical learning of that classification tool while introducing students to essential concepts in knowledge organization. In this aspect, the construction of the concept map enabled students to visualize subject knowledge systematically and dynamically. Moreover, since the group created it, it allowed the sharing of impressions and cognitive interaction between the existing and the new learned knowledge of everyone involved in the task.

The activity also made it possible for students to develop a critical view of the theme worked on, contributing to the formation of citizens and ethical professionals. For example, when encouraged to discuss the topic of ethics and its dimensions, students realized that some ethical virtues, according to Aristotle, come from instruction, such as wisdom, intelligence, and discernment, and that others come from the force of habit, such as courage, moderation, liberality, kindness, impartiality, honesty, and truthfulness. In addition, students were encouraged to think critically about the differences between professional and personal relationships and the importance and influence of these relationships on their own ethical decisions, and how other people may be affected by them.

During the presentation of the projects, in the final stage of the evaluation process, the students stated that the need to classify the items of the collection in a very detailed way allowed them to clarify some doubts about the elements of the UDC system, thus consolidating the knowledge acquired in the use of that classification tool.

With project activities, it is possible to establish the social function of the classificatory act to represent the content of a document, as it presupposes ethical attitudes and behaviors in the sense of care for the public served by the information unit. In addition, it is necessary to responsibly meet the information needs of the target audience.

Finally, as an educator of human resources, the professor brings transformation to society. Therefore, he or she must have a researcher's nature, even to reflect on his or her practice. Teaching and research are two inseparable elements. The teaching profession is more complex today due to the social, economic, and political context, which is changing under the influence of the technological revolution. This revolution affects the way we interact socially and the way

Legend	
00-021.431	Rational foundations of knowledge.
27-428	Christian moral obligations (duties)
2-18	Doctrinal anthropology (religion)
024.3	Profession of librarian.
025.5	Reference service.
027.8	School library
174	Professional ethics.
179.3	Ethics in relation to animals. Animal rights. Including cruelty to animals.
340.13-053.9	Legal statute of the elderly.
349.4	Land law
342.57	Human rights in constitutional law
616-092.9	Animal experimentation.
616-082	Medical Care.
614.39	Public health national services.
711.4	Urban planning.
636.2.053	Calves. Steers. Withers.
17.021.1	Behavior. Conduct. Actions. Omissions.
17.022.1	Moral value judgment. Moral standards, values. Including Values of life, happiness. Normative judgments.
17.023.33	Biological purposes. Including Life. Higher development.
608.1:575:612.612.05	Bioethics and human genetics.
637.512	Slaughter of animals.
658.115	Public, state, and nationalized corporations.
658.310.8-051	Personnel management and administration.
(02-028.27)	Digital Book
(043.2)	Thesis
(043.3)	Dissertation
(045)	Article

Table 6: Legend of the notations in Table 3.

we learn. The idea of lifelong learning has never been truer. Therefore, it is necessary to problematize educational action, which includes knowledge, techniques, and teaching strategies. We need more than the knowledge we acquire in our initial training for our professional lives as professors. This idea strengthens our understanding of the teaching-learning process as a mechanism for emancipatory and autonomous education in the Kantian sense, that is, our critical capacity to act morally and ethically.

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