INFORMATION SERVICE TO ENHANCE THE MANAGEMENT OF TECHNOLOGICAL RISK INFORMATION

SERVICIO INFORMATIVO PARA POTENCIAR LA GESTIÓN DE INFORMACIÓN DEL RIESGO TECNOLÓGICO

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ABSTRACT

An information service on technological risk was designed for students in the Metallurgy and Materials Engineering program to enhance their professional training. Theoretical methods such as historical-logical, analysis-synthesis, and systemic structural-functional were used; and empirical methods included unstructured interviews, scientific observation, and document analysis. For its development, the methodology proposed by Castillo Echevarría was applied, which combines various models from different authors and is structured in ten logical steps. It strengthens the technoscientific culture of future professionals and helps to elevate the role of information professionals linked to the educational processes of the current Cuban university.

KEYWORDS: information services; technological risk; digital libraries; bibliographic managers; professional training

RESUMEN

Se diseñó un servicio de información sobre riesgo tecnológico para estudiantes de la carrera Ingeniería en Metalurgia y Materiales que favorezca su formación profesional. Se utilizaron métodos del nivel teórico como el histórico lógico, el análisis-síntesis y el sistémico estructural funcional; del nivel empírico, la entrevista no estructurada, la observación científica y el análisis documental. Para su desarrollo, se aplicó la metodología propuesta por Castillo Echevarría, que combina varios modelos de diferentes autores y se estructura en diez pasos lógicos. Fortalece la cultura tecnocientífica del futuro profesional y contribuye a enaltecer el papel del profesional de la información vinculado a los procesos educativos de la universidad cubana actual.

PALABRAS CLAVE: servicios de información; riesgo tecnológico; bibliotecas digitales; gestores bibliográficos; formación profesional

INTRODUCTION

Risk Management is a topic of importance and social demand that must be integrated into educational processes through the recognition of disasters as social contextualized problems within our development models. In this framework, education and pedagogical processes, specifically, face the challenge of moving beyond the emphasis on preparation for emergency response and transitioning towards promoting more comprehensive educational actions that address prevention, mitigation, reconstruction and rehabilitation. Thus, in recent years, significant advances have been made in regulations, policies, strategies, and programs, promoting the incorporation of Risk Management into educational curricula (Andina, 2009).

Disaster prevention and response is a responsibility that concerns to all individuals and institutions in society. This required change in attitude must be realized through educational action, as it is the educational process that transforms individuals internally and manages to influence their perception of reality, their understanding, interpretation and reaction to it. Therefore, the educational system has the

commitment to train people capable of preventing and facing adverse circumstances, such as emergencies or disasters (CAPRADE, 2005). This means that universities must train individuals not only with solid professional preparation but also with civic, cultural, social, environmental, and especially ethical formation (Camacho & Camacho, 2016).

According to Becerra and Bermúdez (2020), cited by Montaño and Chaparro (2023), nowadays, university libraries have continuously refined their service approach, driven by the influence of technological changes and scientific development processes; they play a fundamental role in the current educational context, acting as spaces that enrich the learning process. They are essential places for fostering students' intellectual autonomy. Therefore, it is necessary the transformation of these libraries, to meet the new demands of the academic environment, and to improve the quality of learning. In this sense, it becomes imperative to optimize information services and restructure them according to this new paradigm (Dulzaides, Molina, & Rojas, 2009).

In this context, the University of Moa lays the scientific and ethical foundations so that future professionals in engineering careers, particularly in the Metallurgy and Materials, are trained to confront situations that may generate danger or risk. For this reason, special attention is given to this thematic axis within the content of their subject. This research sets the following general objective: to design an information service about technological risk for students of Metallurgy and Materials Engineering to enhance their professional training.

MATERIALS AND METHODS

Theoretical-level methods such as historical-logical, analysis-synthesis, and systemic-structural-functional were used. Empirical methods included unstructured interviews, scientific observation, and document analysis.

The methodology of Castillo Echevarría (2009) was employed, resulting from a fusion of different models. From this analysis, the design of a digital information service was conceived, based on a digital library specialized in Technological Risk and supported by the Mendeley bibliographic manager.

RESULTS

For the design of the information service, ten steps were conceived:

Step 1. Identification and characterization of information users

This research considers all students, professors, and researchers of the Metallurgy and Materials Engineering as potential users of the service, they are internal users.

Although the service is directly conceived for the student community of this career, the beneficiaries and users of the service may also include:

- ✓ Professors of this career
- ✓ Users from entities that use and store hazardous chemicals
- ✓ Users of the Disaster Risk Management Center in Moa
- ✓ Decision-makers of Civil Defense in Moa
- ✓ The mining community in general

The mission of the service is to provide digital bibliographies that support the knowledge system in Metallurgy and Materials Engineering career, where topics related to technological risk are incorporated, with an intensive use of information technologies, specifically bibliographic managers, to satisfy the formative and informational needs of the students, support the teaching-learning processes, favor scientific research and develop informational competencies in handling and using information.

Step 2. Identification of information needs in user

To design an information service on Technological Risk for the Metallurgy and Materials Engineering career, the Study Plan E was analyzed to identify all disciplines that contribute to the research objective and to understand their thematic content on technological risks.

This analysis made it possible to identify the informational needs that the service must cover. Information related to:

- ✓ Legal framework established by Cuba to address disasters of technological origin.
- ✓ Hazard identification.
- ✓ Assessment of technological risks in industrial facilities.
- ✓ Classification, storage, and handling of hazardous substances.
- ✓ Prevention of toxic substance leaks.
- ✓ Disaster reduction plans.
- ✓ Standards for the use and disposal of chemical reagents.
- ✓ Industrial safety of metallurgical facilities and technologies.
- ✓ Occupational and industrial safety standards.
- ✓ Risks of metallurgical and materials technologies.

Step 3. Definition of information service

The information service designed is named: Information Service based on the Digital Library of Technological Risk, supported by the Mendeley Bibliographic Manager.

It is designed to support the teaching-learning process in the Metallurgy and Materials Engineering career, offers full-time information and specialized bibliographies on technological risk, and has the following objectives:

- ✓ Cover the spectrum of formative and informational needs of users in the Metallurgy and Materials Engineering career regarding to technological risk.
- ✓ Manage a greater quantity of bibliographic and reference information from Cuba and the local area.
- ✓ Strengthen informational competencies regarding to bibliographic techniques, use, and management of bibliographic managers.

Main characteristics describing the information service

- ✓ It is a virtual environment service supported by a bibliographic manager.
- ✓ Saves users time during information search and working with bibliographic citations.
- ✓ Facilitates the management of bibliographic references.
- ✓ Allows information to be socialized more easily among service users.
- ✓ The service can be offered from the university library by library specialists.
- ✓ The user can store the basic product offered by the service on a USB device.

Products offered for the development of the service

To develop the service, the main product offered is the Specialized Digital Library on the theme of technological risk, supported by the Mendeley bibliographic manager.

In addition to offering the requests and needs submitted to the service, other products that can be generated by the library:

- ✓ Thematic bibliographic compilations.
- ✓ Recommended thematic reading lists.

- ✓ Indexes of researchers working on the theme at the international, national, and local levels.
- ✓ Indexes of periodicals with a core focus on technological risk research.
- ✓ Bibliometric studies of specific information flows about the topic.
- ✓ Annotated bibliographies.

Step 4. Definition of personnel, materials, and equipment

Several individuals are involved in the design and implementation of an information service, each one with well-defined functions.

The design defined the work of:

Person developing the service design (1 Information Professional).

- ✓ Person managing, processing, and updating the information in the Digital Library (1 Information Professional from the University Library).
- ✓ Person offering the service and keeping track of satisfied and unsatisfied queries, in addition to training users in the use and management of bibliographic managers (1 Information Professional from the University Library).
- ✓ Person updating the digital library and ensuring its operability from the library's web portal (1 Technician from the University Library).
- ✓ Facilitators and evaluators of information for the collection (Specialists and professors from the Metallurgy and Materials career).
- ✓ Collaborator in processing information in English (1 Professor from the language department of the University of Moa).

The individuals ensuring the quality and functioning of the information service must have the following characteristics:

- ✓ Ease in oral and written expression.
- ✓ Skills in using Bibliographic Managers.
- ✓ Knowledge of the informational needs of Metallurgy and Materials Engineering students regarding risk.
- ✓ Social commitment to the service's mission.
- ✓ Motivation and vocation for the professional practice that permeates the service.
- ✓ Professional ethics.

Materials and equipment

The service will be offered in a virtual environment from the university library's web portal; however, the user can also access the service within the physical space of the university library's technical room by requesting it from the designated staff.

Equipment needed to develop the service:

- ✓ Computer with internet connection.
- ✓ Installer for the bibliographic manager.
- ✓ Information storage devices.
- ✓ Server to store all information backing the digital collection.
- ✓ Furniture and office supplies.

Step 5. Detailed design of the information service

To establish an information service that favors bibliographic management related to technological risk, it is first necessary to carry out good planning that considers all aspects contributing to achieving the goal of the service being designed. The aim is to implement a service that essentially satisfies the informational and formative needs of Metallurgy and Materials students, once they receive classes on topics

related to technological risk and are assigned tasks and activities requiring the search for scientific information related to this subject.

The service, from the university library, will be of momentousness and must locate and offer information relevant to the users' informational needs with the highest possible professionalism and quality. Based on the terms of use established for each document, information available on the internet was used for organizing the service. The Mendeley bibliographic manager was used for storing and organizing the bibliographies.

Step 6. Establishment of elements to control

Elements necessary for fulfilling the service's purpose can be controlled:

- ✓ Fulfillment of proposed objectives in the service design and the basic product to improve and encourage its use by users.
- ✓ User registration and control are important for statistics and understanding the degree of satisfaction.
- ✓ Development of other products incorporating added values that enhance the quality of the service.
- ✓ Feedback from users and periodic evaluation of the service by specialists will determine its effectiveness, adequacy, performance, and improvement needs.

Step 7. Service promotion

The promotion of the service aims to encourage the use of the digital library specialized in technological risk, supported by the Mendeley bibliographic manager. This contributes to strengthening the technoscientific culture of future professional, while also helping to elevate the role of the information professional linked to the educational processes of the current Cuban university.

Thus, it is determined that the channels to be used for promoting the service will be:

- ✓ University Library portal.
- ✓ Library's social media page.
- ✓ Journals of the Moa University Press.
- ✓ Informative meetings in the Metallurgy and Materials department.
- ✓ Informative meetings at the Center for Environmental Studies.

Step 8. Determination of feedback channels

Feedback is one of the fundamental elements of any service planning, it is the aspect that allows knowing the information provided by users about their experiences with the information service, which will help measure its success. Feedback is vital, as it provides a more complete perspective on the product's objectivity and identifies the main areas for improvement.

Feedback channels:

- ✓ Contacts with specialists and professors of the career.
- ✓ Contacts with direct users of the service.
- ✓ Direct satisfaction surveys about the service for specialists and students who are actual users of the service.

Step 9. Service implementation

To put the service into practice, the developed digital library will be presented for consideration by the career's specialists. They will be given a form to record their considerations about the product. Once their assessment is received, it will be implemented and published in the previously referenced spaces.

Step 10. Service evaluation

Evaluation processes convey the idea of the completion of a stage or a cycle and are often associated with the conclusion of a process. One of the most important functions of evaluation is its central instrumental role as support, it emphasizes feedback for planning processes and decision-making, assesses the service's execution and evaluates the performance of each actor involved.

One of the tests is based on the systematic search for evidence, increases knowledge and understanding of the service and its informational content, and through feedback, guides decision-making towards service improvement. As a greater understanding of the present components is enabled, it is feasible to direct actions towards improvement in terms of effectiveness, efficiency, efficacy, relevance, and/or viability of the proposed actions. Matching with these ideas, the following variables with their indicators were considered for declaration:

Elements of economic feasibility

Costs-benefits: The service developed to promote information regarding technological risk management is highly significant as it potentially contributes to raising the culture of risk perception and prevention, will contribute to the safety, well-being, quality of life of people, and to sustainable development. Its social impact will favor the comprehensive training of future professionals in metallurgy and materials and the increase in levels of informational literacy.

The service is not intended for commercialization, and the investment levels have been facilitated at no cost. The information and specialized collaboration were obtained thanks to the selfless contribution of professionals from the University of Moa.

Service sustainability: aims to determine the extent to which the service can last over time.

Elements of the service design and the informational product that materializes it

Topics of interest: aims to verify if it aligns with the user's informational needs. In this case, if the digital library contains the necessary information.

Technology used: aims to verify that its use is feasible within the institution.

Training of personnel providing and receiving the service: aims to verify that the specialists managing and facilitating the library service and the Metallurgy students are trained in the technology used.

Elements of user need satisfaction for whom the service was designed

Needs covered: aims to verify if the user's actual needs are met.

Intermediary personnel: aims to determine if the user is satisfied with the attention provided by the specialist.

Number of records responding to the queries made: aims to verify the product's scope in satisfying, to some extent, the query formulated by the user.

Time saved: aims to verify the extent to which the service saves effort for the user.

CONCLUSIONS

The study of the theoretical, methodological, and conceptual foundations supporting the research made it possible to determine the basis for designing the information service based on a digital library specialized in technological risk, which serves as a complement to the library's information system at the University of Moa. The established design offers the possibility to socialize and generate knowledge and information accessible to students, professors, and researchers of the career and the mining community in general. The research results facilitate support for teaching and offer an integrated way to manage scientific information and provide information literacy to students in training, in line with the demands that current society places on the future Metallurgical Engineer, who operates in a technological environment liable to the occurrence of technological disasters.

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