

Article

Bibliographic management and sustainable research training in higher education: Evidence from library science students

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Abstract: Bibliographic management and information literacy are recognised as key components of sustainable research training in higher education. However, in the Library Science programme at the Technical University of Manabí, there was evidence of weaknesses in citation practices, limited use of reference management software, and low visibility of the role of librarians in academic processes. This study used a qualitative descriptive exploratory approach. Purposive sampling was used to select 18 of the 50 students that made up the population. To investigate experiences with information access, citation standards management, bibliographic management software use, plagiarism comprehension, and librarian perceptions, semi-structured interviews were conducted. The ATLAS.ti software was used to analyse the data. Academic research, library services, and information ethics were three central thematic dimensions emerging from the qualitative analysis. Students voiced concerns about plagiarism, citation standards limitations, and their limited knowledge of tools such as Mendeley and Zotero. Furthermore, they perceived librarians mainly as technical support staff in research training. The study concludes that bibliographic management strengthens sustainable research training by promoting ethical information use, academic integrity, and more systematic research practices in higher education.

Keywords: bibliographic management; information ethics; librarianship; higher education; research training

1. Introduction

Bibliographic management has become an essential component of research training in higher education because it supports the systematic organisation, citation and ethical use of academic sources. Its relevance goes beyond the technical handling of references, as it contributes to the development of information literacy, academic integrity and more sustainable research practices among university students. In this sense, sustainable research training requires students not only to access scholarly information, but also to evaluate it critically, organise it coherently and use it responsibly in academic production. This issue is particularly relevant in Library Science programmes, where future professionals are expected to mediate access to information and promote responsible academic practices.

In various international contexts, bibliographic management and information literacy have become fundamental pillars of university education. In Europe, initiatives developed in Finland and Sweden, the integration of information literacy into curricula resulted in earlier student exposure to citation standards, reduced plagiarism reports, and improved coherence in undergraduate theses [1]. These

outcomes have been reported in institutional assessments and studies focusing on undergraduate academic writing quality.

In Canada and Australia, university libraries evolved into spaces for pedagogical innovation, where librarians ceased to be passive mediators and became active participants in students' research training [2]. These experiences showed that bibliographic management, if integrated with teaching, is not an independent technical resource, but a transversal practice that enhances research culture and autonomy in academic terms within higher education. In this research, bibliographic management is described as the group of ethical, technical, and educational practices that have to do with how to organize, cite, and use scholarly information responsibly. Information literacy is distinguished as a transversal competence that unites the search, critical evaluation and ethical use of information. The term "contribution" is used to describe the educational impact of these practices on the development of research skills, from the perspective and experience of students [3,4].

In Latin America, although progress has been made, the picture remains uneven. Brazil consolidated programmes in public universities that linked librarians with teachers in the teaching of information skills, which had a direct impact on the quality of theses and publications. University digital repositories in Mexico were connected to reference management training programs, though the effectiveness of these connections varied by institution and region [5–8]. Colombia raised academic visibility through open access repositories, while Chile converted its libraries into research support centres that provided individualised guidance [9]. In Chile, 'individualised guidance' refers to personalised research support sessions provided by librarians, including one-to-one consultations on database use, citation management and thesis structuring [10]. Nevertheless, there are still restrictions because of inconsistent training, gaps in technology, and a lack of institutional understanding of the importance of librarianship in research [11,12].

In Ecuador, progress has been more fragmented and lacks continuity. Some universities have implemented institutional repositories and promoted the use of managers such as Zotero or Mendeley, but information literacy is usually developed through isolated workshops that are not linked to the curriculum [13]. As a result, research training is limited by a lack of knowledge about systematic information searching, the correct use of citation standards, and the consistent organisation of references. This situation is most evident at the Technical University of Manabí in Portoviejo. Although the institution has an academic library and a digital repository, there are no studies analysing how bibliographic management affects students' research training. The lack of integration between librarians, lecturers and students causes serious deficiencies in teaching.

The problem addressed in this study lies in the limited integration of bibliographic management into research training processes [13]. Although the university has an academic library and digital repository, students still face difficulties in systematic information searching, citation practices, the use of reference management tools and the ethical handling of academic sources. These limitations may weaken academic integrity, reduce the quality of research products and restrict the development of sustainable research competencies in Library Science education.

Based on this problem, the study was guided by the following research question: How does bibliographic management contribute to sustainable research training among Library Science students?

This question reflects the need to investigate an academic gap and examine how experiences documented in other contexts can serve as a reference for understanding and improving the local situation.

Therefore, this article aimed to analyse the contribution of bibliographic management to sustainable research training among Library Science students at the Technical University of Manabí. Specifically, the study examined students' experiences regarding information ethics, the pedagogical role of librarians and the use of bibliographic management tools in academic production.

2. Literature review

2.1. Bibliographic management as a component of research training

Research training in higher education can be understood as a gradual process through which students develop competencies to search, evaluate, organize, and communicate academic information in a rigorous manner [14–16]. Within this process, bibliographic management is configured as a structural component that allows the articulation of technical skills, ethical criteria, and coherent academic practices. Various studies indicate that the absence of systematic bibliographic management negatively affects the quality of student scientific production, especially in university contexts in the process of research consolidation [13,14,17,18].

Likewise, bibliographic management is conceived not only as an instrumental skill, but as a transversal academic practice that contributes to the development of intellectual autonomy and the appropriation of international scientific standards [14]. Along these lines, the correct way of managing references, the use of citation rules, and the organization of sources are directly related to the clarity of arguments and methodological coherence of academic works [19]. In this way, bibliographic management is considered in the literature as a key component in the development of new researchers in universities [20,21].

2.2. Information ethics and the responsible use of sources

In addition to information literacy, another fundamental theoretical basis for understanding the link between bibliographic management and research training is information ethics [13,22,23]. This perspective assumes that the use of scholarly information is guided by principles of intellectual honesty, acknowledgment of authorship, responsibility in attributing ideas, and clarity in the elaboration of knowledge [24–26]. In this line, plagiarism is not only considered as a normative or disciplinary infraction, but also as a reflection of gaps in training regarding the understanding of the ethical value of academic references and essays.

When students do not master the citation rules or fully understand the need to record the sources consulted, conditions are created that may lead to errors, omissions, or inappropriate appropriation of information [27–29]. Therefore, the teaching of bibliographic management must necessarily be linked to training in information ethics,

since both dimensions converge in the construction of responsible and sustainable research practices within the university [30].

In addition, information ethics explains that the quality of research training does not depend exclusively on access to databases or the use of digital tools, but also on the consolidation of stable academic values. Among them, integrity is highlighted, respect for the intellectual production of others and responsibility in the communication of knowledge [31,32]. Consequently, bibliographic management is assumed as a space for ethical training, in which students learn not only to cite correctly, but also to understand why reference constitutes an essential condition of legitimacy in scientific research. From this position, the weakness in the ethical use of sources directly affects the solidity of the research culture and limits the academic maturity of future professionals [33].

2.3. The pedagogical mediation of the librarian in higher education

Another relevant framework for the analysis corresponds to the perspective of the librarian's pedagogical mediation, linked to contemporary approaches of integrated librarianship. This perspective maintains that the librarian moves beyond an exclusively technical or administrative place within the institution and assumes a more visible formative function within the educational process [31,34]. In this transformation, this role is related to the teaching of informational skills, guidance in the use of databases, advice on citation standards and accompaniment in the management of bibliographic managers. In this way, the librarian is conceived as a mediator between information resources and the investigative learning of students [12].

From this perspective, the university library is no longer understood only as a space for conservation and documentary access to become an environment for learning, methodological support and academic training. When the librarian is integrated into the curriculum and articulated with subjects related to research, their contribution strengthens the construction of skills to search, evaluate and use information in a more rigorous way [13,35]. On the other hand, when this integration does not exist, students tend to develop fragmented, informal or autonomous learning in processes that require specialised support. This situation is especially relevant in relation to bibliographic management, since the correct use of tools, norms and documentary criteria is difficult to consolidate without expert and sustained mediation [36].

Likewise, the librarian's pedagogical mediation makes it possible to understand that research training is not the exclusive responsibility of the methodology teacher or the student considered individually [37,38]. On the contrary, it is built through a network of institutional support in which the librarian can play a strategic role. Their participation favours not only access to information, but also the appropriation of more rigorous, ethical, and autonomous academic practices [39,40]. Consequently, the scarce visibility of the librarian within formative research processes not only represents an organizational limitation, but also a pedagogical weakness that affects the consolidation of research competencies in higher education [37].

2.4. Theoretical articulation between bibliographic management and research training

The integration of these three approaches allows the construction of a more solid understanding of the problem studied. On the one hand, information literacy explains the competency-based dimension of interaction with academic sources and the strategic use of information. Information ethics, on the other hand, provides the normative and educational foundation that allows citation and referencing to be understood as responsible acts in the academic field [41]. The librarian's pedagogical mediation provides a didactic and institutional basis for understanding how these skills and values can be taught, supported and reinforced over the course of the university career [25,42–44].

Based on the theoretical contexts, it can be argued that bibliographic management is not a secondary or merely technical professional practice [11,37]. On the contrary, it is configured as a structural dimension of research training, because it articulates search skills, evaluation criteria, ethical principles, and institutional support necessary to produce academic knowledge with greater rigor. From this position, student perceptions of citation difficulties, lack of knowledge of managers, and limited interaction with the librarian are not interpreted as isolated events, but as expressions of a broader training problem that compromises the quality of the research processes in the analysed career.

For this reason, the literature review justified the need to study bibliographic management from an integrative perspective, capable of linking competencies, ethics and pedagogical mediation in the same interpretative framework [20,25,34]. This theoretical articulation supports the logic of the study and prepares the way towards methodology, where the experiences, perceptions and meanings constructed by the students around these dimensions are explored [39]. Thus, the research is based on a coherent conceptual basis to examine how bibliographic management contributes to, limits, or conditions research training in the selected university context [45].

3. Materials and methods

3.1. Research approach

The study adopted a qualitative descriptive-exploratory approach with a non-experimental, cross-sectional design. No variables were manipulated; rather, the experiences, perceptions, and meanings constructed by students around bibliographic management and its relationship to research training in a specific educational context were comprehensively analysed. From this perspective, the analytical categories were not defined as independent or dependent variables but as interpretive dimensions emerging from the participants' discourse.

3.2. Population and sample

The population was made up of a total of 50 students of the Library Science degree programme of the Technical University of Manabí. From this group, a purposive sample of 18 participants was chosen. Participants were selected using purposive sampling, which is typical of qualitative studies. The selection process was

designed to include students who presented characteristics relevant to the analysis of the phenomenon under investigation. Students enrolled in the seventh and eighth semesters of the degree programme were selected. The selection criteria were that students had completed methodological courses and were involved in research training processes. This allowed them to contribute meaningful experiences regarding the use of bibliographic management in their academic careers. The sample size was small, but it is considered adequate for a qualitative study, whose purpose is not statistical generalisation, but rather an in-depth understanding of the participants' perceptions and experiences. However, the sample size is recognised as a limitation of the study.

3.3. Techniques and instruments

The main technique used to collect information was the semi-structured interview [44]. This instrument included open-ended questions that addressed aspects such as access to information, the use of bibliographic managers, the application of citation standards, ethics in the handling of references, and the perception of the role of the librarian in research training, as shown in **Table 1**. The semi-structured interview guide was not distributed as a self-administered questionnaire. Instead, the interviews were conducted face to face at the university facilities, with the prior authorisation of the participants and their informed consent. Each interview was audio recorded and subsequently transcribed verbatim for qualitative analysis.

The interview guide was organised according to the central dimensions of the study: Access to academic information, citation practices, use of bibliographic management tools, understanding of plagiarism and perception of the librarian's role in research training. This organisation made it possible to maintain coherence between the research question, the data collection instrument and the subsequent coding process. The questions were formulated in an open manner to allow participants to describe their experiences without restricting their responses to predefined categories.

3.4. Data analysis

The analysis of the information was carried out exclusively from the empirical information obtained through semi-structured interviews applied to the students. The data analysis was carried out using a qualitative hermeneutic approach, focusing on the interpretation of the meanings attributed by students to their research training experiences. This approach allowed us to understand the participants' discourses, perceptions and assessments in relation to bibliographic management, going beyond a superficial description of the data.

The empirical material, consisting of transcripts of semi-structured interviews, was analysed using a systematic process [24,38]. The process involved open coding, categorisation and the construction of interpretative axes, supported by ATLAS.ti version 25 software. This software was used because it facilitates the systematic organisation of interview transcripts, the coding of significant text fragments, the grouping of codes into thematic categories and the traceability between empirical evidence and interpretative findings. Based on this procedure, patterns of meaning, conceptual relationships and thematic nuclei were identified, leading to a comprehensive interpretation of the phenomenon studied.

To ensure methodological rigour, the analysis considered qualitative validity criteria, such as the internal coherence of the analytical process, the use of analytical memos, the constant review of emerging categories, and the traceability between empirical data and constructed interpretations. This process allowed for the development of a theoretical interpretation that represents the current situation of research training among Library Science students at the Technical University of Manabí. The fieldwork was carried out during the second semester of the 2025 academic year, at the facilities of the Technical University of Manabí, in the city of Portoviejo, Ecuador.

The analysis was conducted in successive stages. First, the transcripts were read several times to identify significant units of meaning. Second, initial codes were assigned to fragments related to students' difficulties, practices and perceptions. Third, these codes were grouped into broader categories according to their thematic affinity. Finally, the categories were interpreted in relation to the objective of the study and the theoretical dimensions developed in the literature review. This procedure strengthened the coherence between the empirical material and the analytical results.

Table 1. Questions asked to library science students at the technical University of Manabí.

No.	Item
1	How do you usually get academic information, and what obstacles do you encounter?
2	To what extent have you worked with bibliographic managers such as Mendeley or Zotero?
3	How well-prepared do you feel to follow citation rules and include references in your academic writing?
4	Describe academic plagiarism and the measures you take to prevent it.
5	How, in your opinion, can librarians assist students in honing their research techniques?
6	What actions do you think are necessary to improve bibliographic management and research at the Technical University of Manabí?

3.5. Ethical considerations

Prior to participation in the study, all interviewed students provided informed consent. Confidentiality and anonymity were ensured by assigning codes to participants (E1–E18), and the information collected was used exclusively for research purposes. The study had the institutional endorsement of the Vice-Dean of Research of the Faculty of Humanistic and Social Sciences of the UTM. The commission supervised compliance with ethical principles related to voluntary participation, confidentiality of information and responsible use of data for exclusively academic purposes.

4. Results and discussion

The qualitative findings derived from the interviews conducted with students (E1–E18) allowed us to identify recurring patterns in their perceptions and experiences regarding bibliographic management and research training. The results were organised through a coding process that moved from initial codes to broader thematic categories,

as shown in **Figure 1**. In this figure, the central axis represents bibliographic management as a cross-cutting component of university research training. The three surrounding thematic dimensions represent the main categories constructed from the participants' discourse: information ethics, the role of the librarian in research training and bibliographic management in academic production.

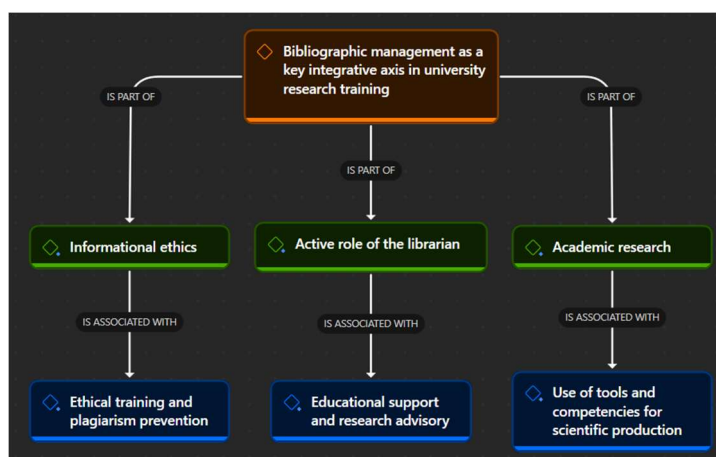


Figure 1. Interpretative scheme of the emerging thematic dimensions based on qualitative analysis.

The results corresponding to each of the thematic dimensions identified are presented below. Each dimension is presented with direct descriptions of student discourse and interpretative explanations derived from the coding process. The findings showed that students' experiences were concentrated around three recurring thematic nuclei: uncertainty about the ethical use of academic information, limited pedagogical interaction with librarians and fragmented use of bibliographic management tools. These nuclei made it possible to understand bibliographic management not only as a technical activity, but also as a formative process linked to academic integrity, institutional support and the quality of student research production.

4.1. Information ethics

One of the dimensions identified was information ethics. Students reported difficulties in correctly applying citation rules. Some participants expressed uncertainty in identifying academic plagiarism practices (E2, E3). Others pointed out a lack of knowledge about the limits of legitimate use of academic sources (E4, E10). These perceptions were associated with limited previous training experiences in information ethics.

These findings suggest that information ethics was not perceived by students only as a formal requirement related to citation rules, but as an area in which they still needed clearer academic guidance. The participants' references to plagiarism, source use and citation difficulties showed that ethical academic writing was associated with uncertainty and insecurity. This thematic nucleus shows that students' difficulties with citation practices were connected to broader weaknesses in academic integrity training. The interviews suggested that plagiarism prevention was understood mainly as a formal requirement, while the ethical meaning of recognising authorship and documenting sources was less consolidated. Therefore, information ethics emerged as

a key condition for strengthening sustainable research training, because it supports responsible academic writing and reduces the risk of inappropriate use of information.

4.2. Role of the librarian in research training

Some students recognised the librarian as a source of support in searching for and accessing academic information (E7, E9). However, other participants indicated that they had little interaction with library staff during their training. Several students pointed out that this support is not systematically integrated into research courses.

This dimension revealed a gap between the potential pedagogical role of librarians and the way students experienced their participation in research training. Although the librarian was recognised as useful for locating information, their role was not consistently associated with guidance in citation, bibliographic organisation or academic writing. This result shows that students tended to identify library support with access to resources rather than with systematic research training. Therefore, the librarian's contribution appeared as occasional support instead of a structured component of the curriculum.

This finding suggests that the limited visibility of librarians reduced their potential contribution to students' research training. Although students recognised their usefulness for accessing information, the interviews showed that their pedagogical role was not sufficiently integrated into citation guidance, bibliographic organisation or the development of research skills. This indicates that strengthening the academic role of librarians could improve the connection between library services, information literacy and sustainable research training.

4.3. Bibliographic management and academic production

The third dimension was linked to bibliographic management and academic production. Students mentioned the use of bibliographic management tools as necessary for organising references. On the other hand, several participants acknowledged limitations in the use of these tools (E14, E15). These limitations were associated with fragmented training and the absence of guided practice in the curriculum. Some students indicated that learning how to use management tools occurred independently.

The students' discourse also showed that bibliographic management tools were recognised as useful but not fully incorporated into their academic routines. In this sense, the use of Mendeley or Zotero appeared more as an isolated skill than as part of a broader research process. This finding is relevant because the organisation of references affects the coherence of academic writing, the traceability of consulted sources and the quality of research products. Consequently, weaknesses in the use of these tools may limit students' capacity to prepare more rigorous academic texts.

This finding indicates that bibliographic management tools were not yet fully consolidated as part of students' academic routines. Although participants recognised their usefulness, their use appeared to depend mainly on individual initiative rather than systematic curricular guidance. As a result, bibliographic management was associated not only with the organisation of references, but also with the quality, coherence and traceability of academic production. This reinforces the need to

integrate guided practice with tools such as Mendeley or Zotero into research training processes.

5. Discussion

The results of this study allowed us to interpret bibliographic management as a structural component of research training in Library Science students. The dimensions identified show a direct relationship between information ethics, citation skills, and institutional support. These findings confirmed that research training depends on both technical skills and systematic pedagogical processes.

The insecurity expressed by students in the use of citation standards and in the identification of plagiarism coincided with previous research that highlighted information ethics as a central axis of academic quality. Likewise, it was pointed out that the critical evaluation of information constitutes an essential skill for academic learning and responsible scientific production [46].

From this perspective, the difficulties identified could be interpreted as the result of fragmented training in information ethics. Several studies have defined this skill as a key competency for the 21st century, linked to the responsible use of information in academic and professional contexts [12,19]. The absence of systematic training limits the consolidation of ethical practices in educational research processes.

A probable reason for this finding is that citation and plagiarism prevention are often addressed as isolated technical requirements rather than as continuous components of research training. When students receive fragmented guidance, they may learn to apply citation formats mechanically without fully understanding the ethical purpose of acknowledging authorship and documenting sources. This may explain why uncertainty about plagiarism persisted even among students who had already participated in methodological courses.

About the role of the librarian, the results showed that their pedagogical function was not very visible within the educational process [28,47]. This situation coincides with studies that identify weak integration of librarians in university research training, especially in Latin American contexts [48,49]. This contrasts with research conducted in European contexts, which describes librarians as active pedagogical mediators in the development of research skills.

When the role of the librarian is articulated with the curriculum, their contribution to research-based learning is strengthened and takes on a more visible pedagogical character. Complementarily, the university library is perceived as a space for collaborative learning and the development of academic skills. The distance between these approaches and the experience reported by students suggests limited institutional integration of librarians in the context analysed.

This finding may be explained by the persistence of a traditional view of the academic library as a service unit rather than as a pedagogical space. When librarians are not formally included in research courses, students tend to associate their role with access to materials instead of research guidance, citation support or academic writing processes. This institutional separation may reduce the formative potential of the library and limit the development of integrated research competencies.

The limitations observed in the use of citation standards and bibliographic managers have also been documented in previous studies. It has been pointed out that the lack of systematic training in citation standards leads to less rigorous academic practices and errors in scientific writing [5]. Likewise, the need to integrate citation as a central part of information literacy in order to improve the quality of academic production has been highlighted [50].

Similarly, other research has shown that university students resort to informal strategies to manage references when they do not receive structured training in the use of bibliographic tools [51]. Therefore, in line with other studies, it can be concluded that there is mostly autonomous learning in the use of managers such as Zotero or Mendeley [30].

This finding may be related to the absence of guided and repeated practice with reference management software throughout the curriculum. When tools such as Mendeley or Zotero are introduced only occasionally, students may recognise their usefulness but fail to incorporate them into their regular academic writing routines. Consequently, bibliographic management remains an isolated technical skill rather than a sustained academic practice connected to source organisation, citation accuracy and research quality.

On the other hand, difficulties in accessing specialised databases directly influence the development of research skills. Previous studies have identified that this problem is common in universities in the Andean region, where limited access to academic resources conditions the quality of educational research [52].

5.1. Research implications and future research scope

The findings of this study have practical and academic implications for research training in Library Science programmes. From a practical perspective, universities should strengthen the integration of bibliographic management into the curriculum through continuous training in citation practices, ethical use of information and guided use of reference management tools. The results also suggest the need to recognise librarians as pedagogical mediators who can support students in information searching, citation guidance, academic writing and the development of research competencies.

From an academic perspective, the study contributes to understanding bibliographic management as a formative process rather than as a merely technical activity. Future research could expand the sample to other academic programmes and universities in Ecuador or Latin America in order to compare institutional experiences. Further studies could also use mixed or longitudinal designs to examine how systematic training in Mendeley, Zotero or similar tools influences academic writing quality, plagiarism prevention and sustainable research training over time.

6. Conclusion

The objective of this study was to analyse the contribution of bibliographic management to the research training of Library Science students at the Technical University of Manabí, from a qualitative perspective. The findings led to the conclusion that research training emerges from the interaction between multiple formative components. Information ethics, the use of citation standards, bibliographic

management, and the pedagogical role of the librarian are closely interconnected. According to the qualitative analysis, students had doubts about academic plagiarism, showed limitations in terms of the implementation of citation standards, and made errors when using bibliographic managers. These weaknesses are not only the result of individual factors, but also of the lack of systematic integration of information literacy into the curriculum. The findings also indicate that librarians are seen primarily as technical facilitators, rather than as pedagogical mediators actively involved in the development of research. This limited visibility restricts their potential contribution to the development of research skills in higher education.

The study's limitations include the small sample size and its confinement to a single institutional context, which prevents statistical generalisations from being made. Nevertheless, the results provide relevant interpretative evidence on training dynamics that have been little explored in Library Science programmes in Latin American contexts. These findings indicate that the consolidation of research training depends on the pedagogical articulation between information ethics, the systematic teaching of academic citation, the guided use of bibliographic managers and the active mediation of librarians within the educational process. Future research could extend the analysis to other academic programmes and explore curricular models that integrate bibliographic management in a cross-cutting manner as a core component of research training.

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