OPTIMISING TEXTUAL ANALYSIS IN HIGHER EDUCATION STUDIES THROUGH COMPUTER-ASSISTED QUALITATIVE DATA ANALYSIS (CAQDAS) WITH ATLAS.TI

Ludovica Mastrobattista[1*] [ID]**, María Muñoz-Rico[2]** [ID]**, José Antonio Cordón-García[2]** [ID]

[1]Grupo de Investigación Reconocido (GIR) E-LECTRA:
Edición electrónica y Lecto-escritura Digital (Spain)

[2]Universidad de Salamanca (Spain)

Corresponding author: l.mastrobattista@usal.es
ricom@usal.es, jcordon@usal.es

Abstract

The main objective of this article is to highlight the importance of training in digital tools at the university level to foster the development of innovative and efficient data analysis from a scientific perspective. In an increasingly digitised world, the acquisition of digital skills has become a fundamental requirement for success in various disciplines, especially in conducting academic studies and research. The implementation of Computer-Aided Qualitative Data Analysis (CAQDAS) software, such as the ATLAS.ti platform, for text analysis not only enriches the educational experience but also prepares students to excel in an ever-evolving digital environment and raise the quality of their research. We present here a practical example of textual analysis in ATLAS.ti that can serve as a reference guide for similar studies based on content analysis of interviews. Various qualitative and quantitative data analysis options and techniques are explored that allow researchers to identify patterns, trends and relationships in the texts analysed, which contributes to a deeper understanding of the topics under study by transcending traditional methods of text analysis.

To cite this article:

----

1. Introduction

Digital technologies in higher education institutions encompass the use and implementation of tools such as software, hardware, and online resources to enhance and enrich teaching, learning, research, and management in institutions such as universities. These tools may include online learning platforms, data analysis software, and digital educational resources, among others, to take advantage of their innovative

developments to improve the quality and efficiency of academic studies and work (Esteve-Mon, Postigo-Fuentes & Castañeda, 2023).

In the 21st century, education systems are characterised by a transformation driven by the influence of the use of Information and Communication Technologies (ICT) in today's society, becoming an integral part of our daily lives. In this context, digital skills become essential for success in a wide variety of fields. The teaching of these tools in the university environment plays a crucial role in preparing students to perform in a constantly evolving digital environment (Battershill & Ross, 2022). In this sense, the acquisition of such competencies not only enhances the educational experience but also provides students with the necessary skills to excel in a digital and globalised world, where ICT is at the core of communication, work, and research (Kapaniaris & Dimitriou, 2023). Digital platforms also play a crucial role in promoting effective educational environments. Since the 1990s, these tools emerged as innovations aimed at enriching the teaching and learning process. A study carried out by De Pablos and his team in 2019, which examines the contributions of educational research to the evolution of university teaching in Spain, shows the impact of changes in the academic environment over the last two decades, both in terms of technological advances and pedagogical approaches (De Pablos, Colás, López-Gracia, & García-Lázaro, 2019). From an educational perspective, the technological development of digital tools and their implementation in education has focused on simplifying multimodal learning. Platforms are becoming systems that provide the necessary tools for collaborative learning by creating spaces for interaction between teachers and students, fostering effective cooperation to achieve optimal results. In this context, educational institutions, and in particular universities, play a key role in providing technological resources that act as a gateway to the field of scientific research, ensuring stimulating, engaging and interactive learning experiences for students (Reyna-Mendoza, 2023).

The purpose of this article is to highlight the importance of integrating the teaching of digital tools in higher education to foster the development of innovative data analysis from a scientific perspective. To illustrate this approach, a concrete example of the use of ATLAS.ti as a Computer Aided Qualitative Data Analysis (CAQDAS) tool is presented, aimed at creating a comprehensive methodology for data collection and analysis. This example relates directly to a specific case study focusing on the textual analysis of semi-structured interviews. This article aims to provide a detailed guide to enable students to effectively apply ATLAS.ti in their academic work, through the exposition of the qualitative analysis developed for a case study on reading preferences in an academic environment. The intention is to promote a practical and applied approach to this tool, effectively integrating theory with practice in the teaching and learning process on the use of digital tools in the classroom. In this sense, the goal is not only to inform about the use of ATLAS.ti, but also to cultivate practical skills and encourage the meaningful integration of this tool in the academic training of university students.

1.1. The Use of Computer Aided Qualitative Data Analysis Software (CAQDAS) as a Digital Tool for Academic Studies

Apart from these considerations, Computer Assisted Qualitative Data Analysis Software (CAQDAS) is of paramount importance in university teaching and research. These are specific ICT applications in the field of qualitative research which facilitate the process of qualitative data analysis, improving research performance and accuracy. Such tools are valuable for categorising, labelling, and sorting large amounts of data during the analysis process of a study (Guetterman & James, 2023). QDA programs support researchers in the analysis of qualitative data by aiding their intellectual work and improving their research results. These programs do not perform analyses in an automated way but provide users with highly efficient tools to systematise and categorise datasets, which makes the process less time-consuming and allows them to delve deeper into concepts and phenomena that are otherwise unavailable (Hart & Achterman, 2017). Incorporating computer-assisted qualitative data analysis software into a research paper increases the quality of the study in terms of the consistency and rigour of the analytical procedures, as well as saving the researcher time in the data analysis process (San Martín-Cantero, 2014).

1.2. Technology for Qualitative Data Analysis: ATLAS.ti in Academic Work

One such programme is ATLAS.ti, designed by Thomas Muhr as part of a research project carried out at the Technical University of Berlin from 1989 to 1992. ATLAS.ti was developed to handle a large amount of research data collected to analyse the impact of the Chernobyl nuclear accident in 1986 (Soratto, Pires & Friese, 2020). Furthermore, the programme is based on the assumptions of *Grounded Theory* theorised by Charles Wright Mills in his work "The Sociological Imagination" (Mills, 2000), as a conceptual framework to guide empirical research to explain social phenomena and situations through general patterns and principles. The name ATLAS.ti derives from the German acronym *Archiv für Technik, Lebenswelt und Alltagssprache* and stands for "Archive for Technology, the World of Life and Everyday Language", while ".ti" refers to "text interpretation" (Muñoz-Justicia & Sahagún-Padilla, 2011).

The program has functions that support both the management of the research and the objectivity, reliability and validity of the data in the qualitative analysis process (Sabariego-Puig, Vilà-Baños & Sandín-Esteban, 2014). In addition, it is software for conceptual work that provides spaces for each step of theoretical coding, including open, axial and selective coding (San Martín-Cantero, 2014). In fact, data coding is one of the main functions provided by the software, which involves highlighting quotations and assigning codes to them to facilitate information gathering and searching. The other hermeneutic units provided by the program are quotations, relations, annotations, networks and families or groups elaborated in the course of the project (Muñoz-Justicia & Sahagún-Padilla, 2011). Functions for the creation of categories integrating codes and sub-codes are also provided. Therefore, ATLAS.ti facilitates the organisation of the analysis by segmenting quotations, conceptualising, recording reflections, categorising and relating processes through mappings, diagrams or hierarchical and relational schemes that contribute to the construction of theories in research that go beyond the descriptive levels (San Martín-Cantero, 2014). In a certain way, it can be affirmed that the use of software for the analysis of qualitative research, such as ATLAS.ti, makes it possible to emulate the operations of textual deconstruction, giving the data highly consolidated levels of depth and correlation, based, moreover, on the rigour of the procedure (Rahaman & Haider, 2021; Al-Hail, Zguir & Koç, 2023).

Among the data analysis options, ATLAS.ti includes the examination of occurrence and co-occurrence of codes, which makes it possible to discover the frequency of a factor in the corpus under analysis, as well as to identify associations between concepts and their role in the construction of the phenomenon under study (Esteve-Mon et al., 2023). It should be noted that the analysis of occurrence and co-occurrence among the data can be explored both quantitatively and qualitatively, by reviewing the quotations linked to the codes or factors under study in order to understand the meaning of the associations. This is fundamental in qualitative research to understand the concepts that give shape and meaning to observable phenomena (Contreras, 2011).

ATLAS.ti is a highly regarded and widely used computer software in qualitative research because of its many benefits for researchers and university students. It allows and facilitates the organisation of large amounts of qualitative data, such as interview transcripts, documents, field notes, and other research materials also in audio-visual format. In addition, the platform helps to identify patterns and relationships in the study corpus, which can be of great value to researchers in understanding the information through thematic-conceptual coding of the data (Giraldo de López, Camargo-Toribio, Ortiz-Ordaz & Martínez-Gil, 2019). Among the advantages that ATLAS.ti offers its users is time savings; in fact, the program helps researchers to develop a faster and more accurate analysis of data, allowing them to devote more time to other important research tasks or to consider more sources in the study. The software also allows researchers to collaborate and share data, notes, and analysis, encouraging teamwork (Smit, 2021).

ATLAS.ti has several analysis tools, or hermeneutic units, that allow researchers to explore data in diverse and creative ways. In this sense, the computer-based qualitative data analysis tool adapts to the expectations of its users in terms of pragmatism in its analytical functionalities and the quality of the results. Overall, ATLAS.ti is a useful and versatile tool that allows researchers to analyse qualitative data

more effectively from a research study, which helps to improve the quality of the work and the findings obtained.

It should be noted that the use of computer tools in qualitative analysis carries the risk of relying too much on technology and neglecting methodological rigour. Although these tools facilitate and streamline the analysis process, they do not automatically guarantee the quality of the work. Consequently, it is imperative that the researcher critically evaluates the results generated by the software. To mitigate these risks, the researcher must combine the use of software tools with a thorough understanding of methodological principles and continuous monitoring of the quality of the analysis. In addition, detailed documentation of each phase of the analysis in ATLAS.ti is essential to ensure transparency and replicability of the study (Muñoz-Justicia & Sahagún-Padilla, 2011). In this sense, continuous training and expert supervision are key elements to minimise the risks associated with the use of IT tools in qualitative research.

2. Methodology

The following is a practical example of the application of ATLAS.ti as a digital tool for computer-assisted qualitative data analysis for the study of research work carried out on reading preferences in academic environments, specifically in the context of the University of Salamanca (Spain). From this perspective, the ATLAS.ti platform was used to analyse the data collected from semi-structured interviews with a group of students and teachers to investigate readers' perceptions of digital reading compared to analogue reading.

2.1. Objectives of the Case Study

The objective of the research consisted of identifying the existence of factors that influence disaffection towards digital reading, previously arising from a Systematic Literature Review (SLR) carried out to delve deeper into the subject and to know the state of the question, considering the most relevant studies published in the last twenty years about digital reading in the academic environment (Mastrobattista & Merchán-Sánchez-Jara, 2022).

Concerning data visualisation, ATLAS.ti offers several options that allow the findings of the analysis to be represented graphically, which facilitates the effective communication of results. Finally, in terms of data security and privacy, the platform offers options for protecting and backing up data.

2.2. Study Population

The interviews were conducted with a representative group of students and lecturers at the University of Salamanca. The sample included 25 participants belonging to different areas of study and with different levels of academic qualifications. The diversity of the sampling allowed us to obtain a comprehensive view of the experiences and perceptions of readers about their reading habits and preferences for reading formats and/or media, both in academic settings and in their free time.

2.3. Semi-Structured Interview

To carry out the research, a semi-structured interview was used as a data collection tool. The pilot interview script consisted of a series of open-ended questions, carefully formulated from a neutral perspective, to minimise any bias or influence on the participants' responses. The questions aimed to obtain relevant information, in line with the objectives of the study, with a specific focus on identifying factors contributing to disinterest in digital reading.

2.4. Content Analysis of Interviews with ATLAS.ti

The phases that characterised the qualitative analysis process using the textual analysis programme ATLAS.ti are described below. The aim is to present a practical example of the implementation of this

practice in the platform, which can serve as a reference for similar research based on the content analysis of interviews.

The corpus analysis process was divided into four well-defined phases: corpus organisation, preparatory analysis, creation of hermeneutic units and in-depth analysis (see Figure 1).
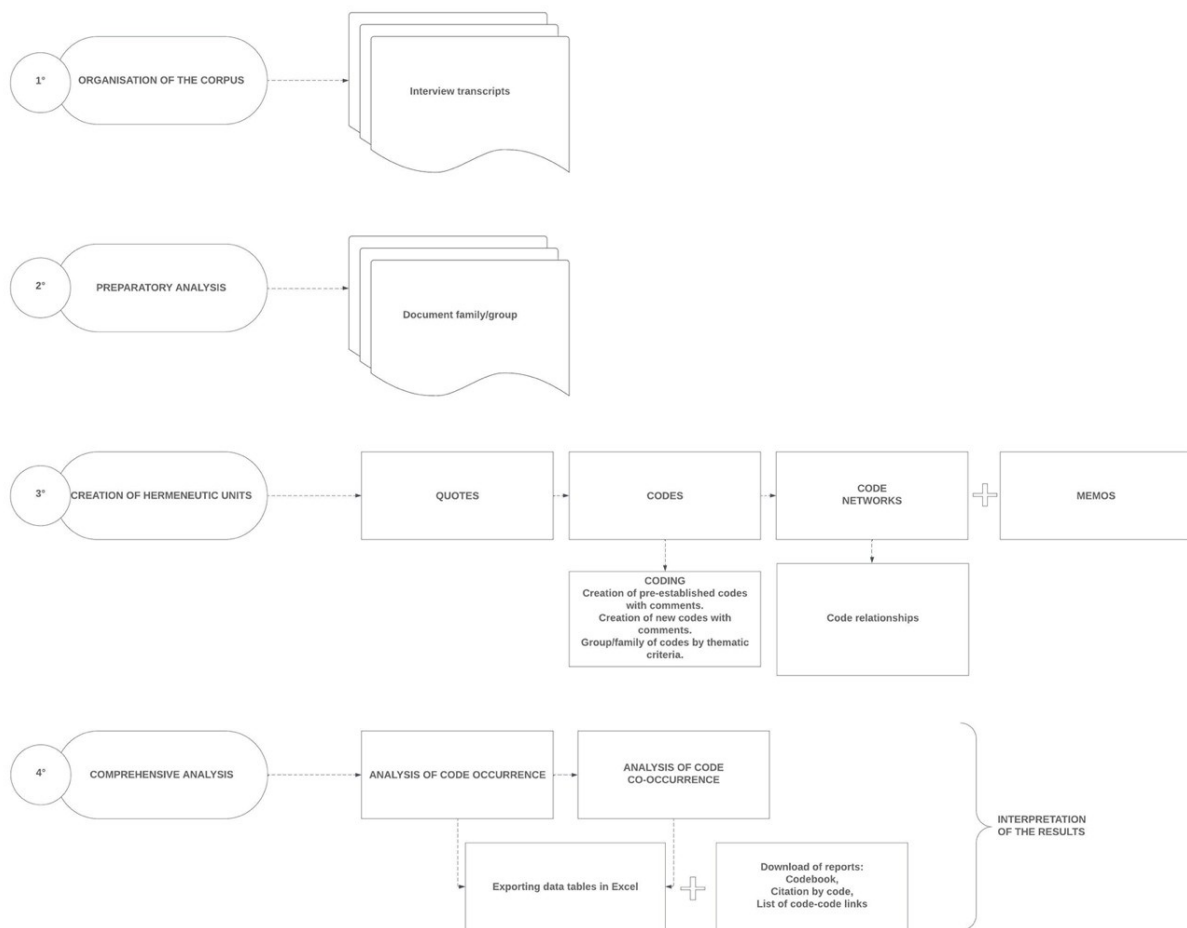

Figure 1. Phases for interview analysis in ATLAS.ti

During the first phase, the interview transcripts were entered into the software in text file format (docx.).

In the preparatory analysis, groups or families of key documents were created in the phase of analysis of occurrence and co-occurrence of codes to measure the frequency of the variables in question according to the profile of the interviewees. Therefore, the documents were grouped according to the academic branches and fields of study to which the participants belonged.

In the third phase, we proceeded with the creation of the hermeneutic units provided by the analysis program. First, quotations were created, i.e. fragments of the primary documents to be highlighted from the text and analysed. Each quotation was assigned a code or label as the main element of the analysis. A comment was added to each code to comprehensively explain its meaning. The coding of the factors of disaffection towards digital reading identified in the interviews was carried out in two ways: first, codes were created for the factors that emerged in the SLR in order to ascertain their existence in the discussions with the interviewees; second, new codes were created as they emerged from the interviews based on the experiences of the readers. In addition, these codes were categorised according to precise thematic criteria through the choice of code group or code family. Code networks were created to visualise the highlighted categories graphically, to establish relationships between them and to point out axial codings (or

sub-codes). When necessary, notes of some phenomena or aspects relevant to the analysis were taken in the "memo" section provided by the application.

Once all the documents had been analysed and coded, the fourth and final phase of analysis was carried out, during which the occurrence and co-occurrence tables developed automatically by the programme were visualised. The occurrence analysis made it possible to highlight the codes or factors and contexts that were mentioned by the interviewees according to their level of frequency in all the interviews considered in the study. On the other hand, co-occurrence analysis pinpointed the codes that co-occur qualitatively and quantitatively in the same quote, to infer theories about their relationships. These tables are customisable, i.e. the researcher can choose which codes to display and in which documents or groups of documents. This option makes it possible to infer theories about the characteristics of the study sample concerning the factors mentioned and to go deeper into them. In addition, the tables can be exported to Excel files to, for example, create graphs.

Finally, ATLAS.ti allows the researcher to compile all the data entered during the project development in reports. The "Codebook", for instance, compiles all the codes with the comments that were written during their creation phase, to create a vocabulary of the coding carried out. Other useful reports for the writing of the qualitative analysis are the report of citations per code and the code-code links. The former compiles all the citations created by the code, or the codes associated with them, while the code-code links report represents the textual version of the code network, pointing out the relationships established between the concepts highlighted in the study.

3. Results

The use of computer-assisted qualitative data analysis software for the analysis of interviews allowed coding the content of the colloquiums into units and re-organising the analysis material by thematic framework. From this perspective, the platform facilitated the process of content analysis of the information provided in the interviews for the analysis of occurrence and co-occurrences of words mentioned in the text, which highlighted the presence of certain factors that still discourage many readers from reading in digital format.

The use of ATLAS.ti as a tool for the qualitative analysis of the interviews provided several significant advantages, such as the coding and organisation of the content of the colloquia into units of information, which facilitates the identification and reorganisation of emerging themes and patterns in the data. In addition, the platform offers the ability to perform more agile and accurate content analysis of texts by identifying thematic patterns, linking data, and generating visualisations that help to better understand the results of the interviews in an aggregated rather than individual and decontextualised way. This not only saves time but also improves the quality of the analysis and the researchers' ability to draw meaningful conclusions from the data collected.

In light of this information, the results of the qualitative analysis of the 25 interviews in ATLAS.ti revealed a subdivision into 9 groups of documents, 45 subject codes and 7 categories of factors related to respondents' reading preferences and disaffection towards digital reading.

The subdivision of the analysed documents was based on the academic title (Bachelor, Master, and PhD students, as well as Teaching and Research Staff) and the area of study (Arts and Humanities, Social and Legal Sciences, Sciences, Health Sciences, Engineering and Architecture) of the respondents. This allowed for a more detailed analysis of the frequency or occurrence of certain factors according to the specific reading profile of each group.

The text coding process resulted in 45 codes organised into 7 families or groups of codes based on thematic areas representing the main categories of reasons for disaffection with digital reading (Table 1).

For a clearer visual representation of the identified groups, 7 networks of codes were created, and various degrees of relationships were established between them, according to their subordination to some shared

factor within the same network of factors related to disaffection towards digital reading. The degrees of linkage were selected from a list of options provided by the platform, such as "is a", "is property of", "no name", "is associated with", "is part of", "contradicts", "is cause of". The choice of the level of linkage between codes allowed for a more detailed categorisation within the same family or category, and a deeper theoretical explanation of the full ontology of factors of disaffection towards digital reading expressed by the interviewees (Figure 2).

The collection and organisation of the material analysed, together with the tools provided by the platform for coding, made it possible to carry out a quantitative analysis of the frequency level of the factors studied and mentioned by the sample interviewed. This quantitative analysis was carried out through the automatic generation of numerical data frequency tables by the program and their export in Excel. This facilitated a more precise understanding of the prevalence of certain factors or codes in the research, which in turn was reflected in the category or group to which they belonged. Within the framework of this study, the code most widely cited by respondents as an influential factor in their disaffection towards digital reading was the one related to sensory experience, which belongs to the Aesthetics category. This code was mentioned a total of 44 times in the readers' quotations (Figure 2).

	Groups	Codes	Frequency
C o d i n g a n d C a t e g o r i s a t i o n	Aesthetic Category	Sensory	44
	Aesthetic Category	Emotional	25
	Aesthetic Category	Personal biography	8
	Aesthetic Category	Artistic	16
	Aesthetic Category	Collecting	25
	Aesthetic Category	Social imaginary	5
	Cognitive Category	Retention	38
	Cognitive Category	Comprehension	16
	Cognitive Category	Concentration	31
	Physiological-Psychological Category	Eye fatigue	22
	Physiological-Psychological Category	Mental fatigue	2
	Physiological-Psychological Category	Fear	5
	Pragmatic Category	Ergonomics	5
	Pragmatic Category	Literacy	14
	Pragmatic Category	Literacy by getting out of the "comfort zone"	5
	Pragmatic Category	Permeability	16
	Pragmatic Category	Usability	14
	Pragmatic Category	Intervention and manipulation of text	35
	Pragmatic Category	Localisation and organisation	9
	Accessibility Category	Devices and accompanying tools	9
	Accessibility Category	Visualisation	18
	Accessibility Category	Interoperability	21
	Accessibility Category	Lack of standardisation	11
	Accessibility Category	Volatility	2
	Accessibility Category	External dependencies of the reading device	7
	Accessibility Category	Battery	2
	Accessibility Category	Internet connection	2
	Accessibility Category	Loan	11
	Accessibility Category	Price	5
	Accessibility Category	Fragility	4
	Nature of digital text Category	Navigation	1
	Nature of digital text Category	Hypertextuality	4
	Nature of digital text Category	Multilinearity	3
	Nature of digital text Category	Multitasking	14
	Nature of digital text Category	Overinformation	1
	Nature of digital text Category	Disinformation	3
	Nature of digital text Category	Text length	6
	Nature of digital text Category	Length vs. time	7
	Nature of digital text Category	Multimedia	1
	Socio-cultural factors Category	Imitation by gregariousness	9
	Socio-cultural factors Category	Disconnection from the digital environment	8
	Socio-cultural factors Category	Covid-19	6
	Socio-cultural factors Category	Environment	5
	Socio-cultural factors Category	Predisposition to reading	5
	Socio-cultural factors Category	Predisposition to technology	4
	7 groups	45 codes	

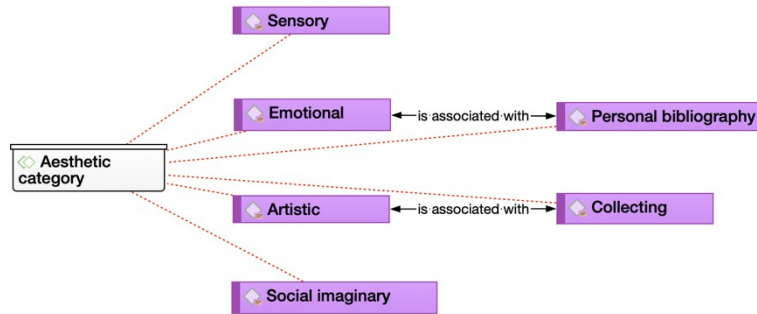Table 1. Coding, categorisation, and frequency of codes in ATLAS.ti

Figure 2. Example of coding network in the Aesthetics category

	Arts and Humanities	Sciences	Health Sciences	Social and Legal Sciences	Engineering and Architecture	Bachelor's Degree Students	Master's Degree Students	PhD Students	Teaching and Research Staff
● *Sensory*	12	1	4	17	10	12	4	11	17

Table 2. Code-document analysis of the Sensory code

Using the document-code analysis option, it was possible to examine the frequency of the Sensory code - which, as previously mentioned, was the most recurrent factor cited by respondents - in the document groups created at the beginning of the study in ATLAS.ti. This analysis option allowed us to identify which of the readers were most influenced by this factor. The results of the document-code table revealed that this influence was particularly significant in the group of Teaching and Research Staff, more specifically, among those working in the area of Social and Legal Sciences (Table 2).

Furthermore, the analysis of the code co-occurrence tables revealed the presence of closely related categories, as factors belonging to different categories were mentioned in the same quote from the text. In other words, respondents expressed the presence of two or more factors from different theoretical frameworks influencing their perception of digital reading. This allowed us to observe the relationships between the thematic categories and their high level of interconnectedness, which, in a sense, challenges the separation into distinct categories, as the factors often overlap and influence each other. The table below (Table 3) has been generated from the calculation of code co-occurrences, automatically provided by the ATLAS.ti platform, with recalibration of quotations where multiple related codes appear. As a result of this analysis, it is highlighted that the categories Cognitive and Nature of digital text were the most frequently related by respondents as thematic motifs influencing their preference for digital reading.

This example illustrates how the analysis function provided by the ATLAS.ti platform allowed us to explore and deepen different aspects by simplifying and counting the data. Specifically, after coding and analysing the co-occurrence of codes using the analysis tool integrated into the program, we were able not only to simplify the information but also to discover hidden patterns and relationships in our data. By counting the groups or categories to which the codes belonged, as presented in the co-occurrence table, we uncovered significant connections and trends in the information we collected, i.e. the level of connection between the categories of factors related to the reading preferences of the sample under study.

	Aesthetic	Cognitive	Physiological-Psychological	Pragmatic	Accessibility	Nature of digital text	Socio-cultural factors
Aesthetic		21	2	10	8	4	2
Cognitive	21		2	14	6	23	2
Physiological-Psychological	2	2			2	1	
Pragmatic	10	14			21	5	4
Accessibility	8	6	2	21		3	1
Nature of digital text	4	23	1	5	3		2
Socio-cultural factors	2	2		4	1	2	

Table 3. Co-occurrence of categories

It should be noted that ATLAS.ti does not fully automate the qualitative data analysis process but acts as a valuable support tool for researchers. The coding rules and analysis approach are defined and adjusted by the researcher according to the specific objectives of the research under study. The platform provides several tools and resources that facilitate the classification, organisation, and exploration of the collected data, allowing researchers to visualise patterns, trends, and relationships in the texts in a more accessible and effective way. In addition, the platform's query and search tools simplify the identification of key themes, concepts, and connections within the research material.

In short, ATLAS.ti enriches the qualitative analysis process by providing an efficient and well-structured environment for dealing with qualitative data, which simplifies informed decision-making and the generation of meaningful research findings. Researchers using this platform can successfully conduct text content analysis, avoiding the time investment required by traditional textual analysis methods, which rely on a more thorough approach to each document, while at the same time elevating the quality and scope of the research.

4. Conclusions

Training in the use of the ATLAS.ti textual analysis platform in academic settings can bring multiple benefits to students and future researchers by preparing them for scientific research and providing them with valuable technical skills. Through learning ATLAS.ti, students can acquire essential skills in handling specialised software and using advanced digital tools, which in turn improves the quality and accuracy of their academic papers and research studies.

In contrast to the traditional approach to text analysis, in which researchers perform a thorough manual examination of documents, ATLAS.ti automates several tasks. Users still need to identify relevant text fragments, but the platform streamlines the coding process by enabling computer-assisted coding. This saves time in comparison to the manual process and ensures greater consistency in code assignment, reducing the influence of individual biases and improving the quality and reliability of the results. In addition, ATLAS.ti facilitates optimal data organisation and management, i.e. researchers can easily access documents, text fragments and codes, which speeds up the process and prevents the loss of valuable information.

In accordance with the research objectives, the results derived from the content analysis of the interviews processed through ATLAS.ti confirmed the existence of the factors previously identified in the Systematic Literature Review (SLR) conducted by Mastrobattista and Merchán-Sanchéz-Jara (2022) to analyse the conditioning factors underlying the reader's attitude and detachment towards digital reading in the academic environment. In this context, the findings emerging from the coding of the interviewees' quotations and their respective frequency support the theories of other experts and are consistent with the results of their research –carried out over the last twenty years– on the preferences of reading formats and media expressed by readers from other universities. Furthermore, the results of the qualitative analysis revealed the presence of new and complementary factors to the previous ones, expanding the initial 3 macro-categories and 9 sub-categories highlighted in the SLR to a total of 7 thematic categories and 45 related codes. In other words, through the qualitative data analysis programme Atlas.ti, a thematic and conceptual categorisation of the data was achieved, allowing for a deeper understanding of the phenomenon in question. During the analysis, significant patterns and relationships were identified in the interviews, and the frequency tables and co-occurrence of codes provided by the program allowed us to highlight elements relevant to the development of the study that might otherwise have remained hidden. One of the most relevant aspects highlighted in the qualitative analysis is that the sensory aesthetic factor is the one that most influences the reader's detachment from digital reading. This finding underlines the theory that the tactile experience is revealed as a determining factor in reading practice, which is incomparable with the virtual nature of digital books and texts (Baron, 2021).

In this context, the use of ATLAS.ti for the coding of the interviews allowed us to carry out a systematic observation and joint analysis of factors that influence the reader's attitude towards digital

reading. In our case, we incorporated these factors into specific categories and related them to other factors based on shared thematic criteria and to certain patterns, principles and also effects involved in the reading process. In addition, we evaluated their frequencies and their incidence in relation to other variables under study, which allowed us to derive theories on the subject of digital reading and to raise new research questions.

The approach proposed in this article points to the idea that the introduction of IT tools in the classroom can stimulate innovative approaches in the work of university students. The qualitative analysis of the proposed case study demonstrates how the use of advanced ATLAS.ti functionalities can generate new perspectives in the field of academic research, as well as improve students' digital competencies.

In summary, the teaching of ATLAS.ti as a computer-based tool for qualitative research can significantly contribute to the development of analytical skills and advantageous data analysis techniques in students, by enabling them to identify patterns, relationships, and themes in a textual corpus, such as through the qualitative analysis of interviews. This not only improves their research readiness but also encourages the use of technology in academic settings, which in turn improves the quality of their academic papers and future research. Finally, ATLAS.ti has become a fundamental ally in the processes of training and analytical application, opening up new perspectives and approaches in qualitative research.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

References

Al-Hail, M., Zguir, M.F., & Koç, M. (2023). University students' and educators' perceptions on the use of digital and social media platforms: A sentiment analysis and a multi-country review. *iScience,* 26 (8), 107322. https://doi.org/10.1016/j.isci.2023.107322

Baron, N.S. (2021). *How we read now: Strategic choices for print, screen and audio.* New York: Oxford University Press. https://doi.org/10.1093/oso/9780190084097.001.0001

Battershill, C., & Ross, S. (2022). *Using Digital Humanities in the Classroom* (2nd ed.). Bloomsbury Academy. https://doi.org/10.5040/9781350180932

Contreras, R.B. (2011). Examining the Context in Qualitative Analysis: The Role of the Co-Occurrence Tool in ATLAS.ti. *ATLAS.ti Newsletter,* 2(August), 5-6.

De Pablos, J.M., Colás, M.P., López-Gracia, A., & García-Lázaro, I. (2019). Los usos de las plataformas digitales en la enseñanza universitaria. Perspectivas desde la investigación educativa. *REDU. Revista de Docencia Universitaria,* 17(1), 61. https://doi.org/10.4995/redu.2019.11177

Esteve-Mon, F.M., Postigo-Fuentes, A.Y., & Castañeda, L. (2023). A strategic approach of the crucial elements for the implementation of digital tools and processes in higher education. *Higher Education Quarterly,* 77(3), 558-573. https://doi.org/10.1111/hequ.12411

Giraldo de López, M., Camargo-Toribio, I.A., Ortiz-Ordaz, F., & Martínez-Gil, L. (2019). Methodological perspective using data-based theory and ATLAS.ti to explain the culture towards work in higher education institutions. *CISCI 2019 - Décima Octava Conferencia Iberoamericana en Sistemas, Cibernética e Informática, Décimo Sexto Simposium Iberoamericano en Educación, Cibernética e Informática - Memorias* (2, 59-64).

Guetterman, T.C., & James, T.G. (2023). A software feature for mixed methods analysis: The MAXQDA Interactive Quote Matrix. *Methods in Psychology,* 8, 100116. https://doi.org/10.1016/j.metip.2023.100116

Hart, T., & Achterman, P. (2017). Qualitative Analysis Software. *The International Encyclopedia of Communication Research Methods,* 1-12. https://doi.org/10.1002/9781118901731.iecrm0194

Kapaniaris, A., & Dimitriou, A. (2023). Digital humanities and digital narrative. *Research on E-Learning and ICT in Education* (183-194). Springer. https://doi.org/10.1007/978-3-031-34291-2_11

Mastrobattista, L., & Merchán-Sánchez-Jara, J. (2022). Identificación y análisis de factores de desapego de la Lectura Digital en el entorno académico: una revisión crítica de la literatura. *El Profesional de La Información,* 31(2). https://doi.org/10.3145/epi.2022.mar.07

Mills, C.W. (2000). *The sociological imagination.* Oxford University Press.

Muñoz-Justicia, J., & Sahagún-Padilla, M.Á. (2011). Análisis Cualitativo Asistido Por Ordenador Con ATLAS.Ti. In Izquierdo, C., & Perinat, A. (Eds.), *Investigar en Psicología de la Educación. Nuevas Perspectivas Conceptuales y Metodológicas* (299-363).

Rahaman, V., & Haider, A. (2021). Deconstructive Big Data Analytics: Literary Texts Analysis Through Atlas.ti Software. In Sharma, S., Rahaman, V., & Sinha, G.R. (Eds.), *Big Data Analytics in Cognitive Social Media and Literary Texts: Theory and Praxis* (47-63). https://doi.org/10.1007/978-981-16-4729-1_3

Reyna-Mendoza, D.N. (2023). Herramientas digitales en entornos educativos de formación universitaria. *Una Revisión sistemática. Revista de Climatología,* 23, 318-327. https://doi.org/10.59427/rcli/2023/v23cs.318-327

Sabariego-Puig, M., Vilà-Baños, R., & Sandín-Esteban, M.P. (2014). El análisis cualitativo de datos con ATLAS.ti. *REIRE. Revista d'Innovació i Recerca en Educació,* 7(2), 119-133. https://doi.org/10.1344/reire2014.7.2728

San Martín-Cantero, D. (2014). Teoría fundamentada y Atlas.ti: recursos metodológicos para la investigación educativa (Grounded Theory and Atlas. ti: Methodological Resources for Educational Research). *Revista Electrónica de Investigación Educativa,* 16(1), 104-122.

Smit, B. (2021). Introduction to ATLAS.ti for mixed analysis. In Anthony, J., Onwuegbuzie, & Johnson, R.B. (Eds.), *The Routledge Reviewer's Guide to Mixed Methods Analysis* (331-341), Routledge. https://doi.org/10.4324/9780203729434

Soratto, J., Pires, D.E.P. de, & Friese, S. (2020). Thematic content analysis using ATLAS.ti software: Potentialities for researchs in health. *Revista Brasileira de Enfermagem,* 73(3), e20190250. https://doi.org/10.1590/0034-7167-2019-0250