The Canadian Journal of Information and Library Science
La Revue canadienne des sciences de l'information et de bibliothéconomie

Exploring and Depicting Information Pathologies
A Case Study of Information Technology Anxiety and Information Overload

Paulo Vicente

Volume 47, numéro 2, 2024

Bobcatsss 2024 Special Issue
Numéro spécial Bobcatsss 2024

URI : https://id.erudit.org/iderudit/1115999ar
DOI : https://doi.org/10.5206/cjils-rcsib.v47i2.17683

Aller au sommaire du numéro

Éditeur(s)

Canadian Association for Information Science - Association canadienne des sciences de l'information

ISSN

1195-096X (imprimé)
1920-7239 (numérique)

Découvrir la revue

Citer cet article

Vicente, P. (2024). Exploring and Depicting Information Pathologies: A Case Study of Information Technology Anxiety and Information Overload. *The Canadian Journal of Information and Library Science / La Revue canadienne des sciences de l'information et de bibliothéconomie*, *47*(2), 99–107. https://doi.org/10.5206/cjils-rcsib.v47i2.17683

Résumé de l'article

This study addresses two information pathologies: information technology anxiety (ITA) and information overload (IO). This research aims to determine the level of both ITA and IO amongst the undergraduate students of Information Science of the Faculty of Arts and Humanities of the University of Coimbra, Portugal, and to ascertain how both phenomena correlate with students' gender, age, number of enrolments in the degree and average frequency of use of the university's libraries throughout the academic year. Concerning the research methodology, we opted for exploratory and descriptive research with a quantitative approach and adopted the case study and questionnaire survey methods. Both descriptive and inferential statistics were used as methods of data analysis. The findings, concerning 39\% of the population under study (N = 88; n = 34), reveal a considerably low prevalence of ITA but a substantial occurrence of IO. Both ITA and IO correlate positively with the female gender. Students aged 19 and 24 years are the least likely to manifest both ITA and IO; in turn, students aged 22 years are the most likely to simultaneously show ITA and IO. Both phenomena tend to increase as students progress through the degree. Last, a higher frequency of use of the university's libraries is associated with a higher level of ITA and IO. Our findings emphasize the high incidence of IO in university students and the need for increased skills in all dimensions of the human-information-technology relationship/system, particularly in the information filtering and management areas.

The Canadian journal of information and library science - La Revue canadienne des sciences de l'information et de bibliothéconomie (CJILS-RCSIB)
Vol. 47, No. 2 (2024) - Bobcatsss 2024 conference special issue
DOI: 10.5206/cjils-rcsib.v47i2.17683
Conference paper

Exploring and Depicting Information Pathologies: A Case Study of Information Technology Anxiety and Information Overload

Paulo Vicente [1]
[1]University of Coimbra, Centre for Interdisciplinary Studies, Faculty of Arts and Humanities, Portugal

This study addresses two information pathologies: information technology anxiety (ITA) and information overload (IO). This research aims to determine the level of both ITA and IO amongst the undergraduate students of Information Science of the Faculty of Arts and Humanities of the University of Coimbra, Portugal, and to ascertain how both phenomena correlate with students' gender, age, number of enrolments in the degree and average frequency of use of the university's libraries throughout the academic year. Concerning the research methodology, we opted for exploratory and descriptive research with a quantitative approach and adopted the case study and questionnaire survey methods. Both descriptive and inferential statistics were used as methods of data analysis. The findings, concerning 39% of the population under study (N = 88; n = 34), reveal a considerably low prevalence of ITA but a substantial occurrence of IO. Both ITA and IO correlate positively with the female gender. Students aged 19 and 24 years are the least likely to manifest both ITA and IO; in turn, students aged 22 years are the most likely to simultaneously show ITA and IO. Both phenomena tend to increase as students progress through the degree. Last, a higher frequency of use of the university's libraries is associated with a higher level of ITA and IO. Our findings emphasize the high incidence of IO in university students and the need for increased skills in all dimensions of the human-information-technology relationship/system, particularly in the information filtering and management areas.

Keywords: information pathology, information technology anxiety, information overload, information behaviour, academic libraries, education in information science

Introduction

Technology and information are fundamental pillars of the twenty-first-century global society. In today's world, human life is deeply intertwined with technology, as exemplified by the notion that "people shape technology and . . . technology shapes people" (Johnson & Wetmore, 2021, Introduction, para. 11). Subsequently, technology—especially information technology—has substantially contributed to the widespread availability and proliferation of digital information. This type of information is notably hard to destroy, leading to its increased use and, consequently, accumulation (Whitworth, 2009). Given the surplus of information, "it is essential for us to filter information if we are to make our way through the world" (Whitworth, 2009, p. 7). Consequently, maintaining a close and healthy relationship with information technology and developing information management competencies are crucial aspects for the survival of individuals, organizations and society.

However, human relationships with information technology and information are not always characterized by positive and empowering emotions; they can also evoke feelings of anxiety and/or overwhelm. This study examines two information pathologies: information technology anxiety (ITA) and information overload (IO). It uses a case study approach, focusing on undergraduate students of Information Science at the Faculty of Arts and Humanities of the University of Coimbra (FLUC).

If Baron (2002) rightly points out that "technology-anxious people are one of the reasons librarians exist—they need help finding [and managing] information, and that is what we do" (144), we infer that librarians inherently have expertise in both information technology and information management. This leads us to the following question: What is the level of ITA and IO in future librarians?

Theoretical Framework

Information Technology Anxiety

Information technology has seamlessly integrated into everyday life at both the personal and societal levels, substantially influencing organizations as well. It has undoubtedly affected various aspects of human life (Wilson et al. 2023) and even led to changes in habits (López-Bonilla & López-Bonilla, 2012).

Correspondence concerning this article should be addressed to Paulo Vicente: pvicente@student.uc.pt

However, despite the enhancement in quality of life, attitudes towards these technologies vary widely, ranging from fascination to phobia. One of these attitudes, known as information technology anxiety, is marked by a negative perception and a reluctance to use information technology. It is associated with a lack of understanding of information technology's benefits and low confidence and self-efficacy in using it (Wilson, 2018).

Wilson et al. (2023) define ITA as "the potential apprehension people feel when considering using or actually using information and communication technologies" (188). Building on this definition, the authors developed the Abbreviated Technology Anxiety Scale (ATAS), a tool designed to measure ITA in research on this topic, particularly within the social sciences.

Pfaffinger et al. (2020) also developed a scale to measure a phenomenon closely related to ITA, specifically digitization anxiety. This anxiety is defined as "feelings of tension and discomfort with respect to the emergence of new technologies and the integration of those technologies in all aspects of daily life, which changes the way information is presented and processed and thus how people communicate, work and live" (Pfaffinger et al. 2020, 26), surfacing at the individual and societal levels, in addition to the organizational level.

In their study, López-Bonilla and López-Bonilla (2012) recognized the impact of information technology on the current educational system and observed that empirical research on the anxiety–technology relationship has primarily focused on computers, neglecting other types of information technology. In addition, they developed a measurement scale for ITA by targeting university students.

Given the interplay between ITA, information-seeking anxiety, and library anxiety, some studies have sought to explore the correlations between these phenomena, particularly within a university context (Gardijan, 2023; Jiao & Onwuegbuzie, 2004; Yang & Khan, 2023). In their research, Jiao and Onwuegbuzie (2004) focused on an ethnic group of students, namely a group of African American graduate students. They found that the level of ITA (related to computers) predicts the level of library anxiety in the context of information seeking.

Gardijan (2023) developed a measurement scale for library anxiety with six dimensions associated with this phenomenon, including those related to technological barriers and information technology equipment usage. The author applied this scale to Croatian students and observed that anxiety is precisely more pronounced when using information technology equipment. Yang and Khan (2023) found that ITA significantly and negatively impacts information seeking among university students.

Consequently, the referenced studies have underscored the contemporary relatedness between information seeking and information technology usage and highlighted that "technology has the promise of making our lives more efficient and effective . . . However, we often neglect that this widespread adoption comes at a cost to the very users who wield the technology to improve their quality of life. ICT [information and communication technology] can cause anxiety among the very users who try to make their lives more efficient and effective" (Wilson et al., 2023, p. 185).

Information Overload

The increasing number of scientific publications on the topic of information overload (IO) throughout the twenty-first century reflects the keen interest of the scientific community in this phenomenon. A search on the Web of Science using the compound term 'information overload' in titles, abstracts or keywords reveals that the bibliographic records related to this topic in 2001 were 46; by 2022, this number had risen to 419. Among the total retrieved bibliographic records, approximately 69% primarily pertain to scientific publications in Computer Science and Engineering, while only 9.4% are related to Information Science.

However, despite the current attention given to the topic, IO is neither a modern phenomenon nor unique to the information age or the age of access (Bawden & Robinson, 2020; Gross, 2012; Rifkin, 2000; Rosenberg, 2003). Bawden and Robinson (2020) suggest that humanity's inundation with information is nearly as old as recorded information. In a similar vein, Gross (2012) notes that "over the course of history waves of information production have impacted individuals and society" (178), reaching back to Classical Antiquity and the Modern Age. It is precisely in a text discussing IO during the Modern Age that Rosenberg (2003) comments on the strangeness of the enduring and current "persistence of the rhetoric of novelty that accompanies so old a phenomenon" (2). Nonetheless, a more present-day sub-variety or component of IO exists, e.g., email overload (Terra, 2017).

However, while IO was once considered a concern primarily among the more educated segments of society, it has, since the second half of the twentieth century, become a widespread issue affecting the majority of society (Bawden & Robinson, 2020). This shift has transformed it into an information pathology and a significant problem in the twenty-first century (Gross, 2012).

Despite the extensive scientific research on the topic, no consensus has been reached, and a clear definition of IO has not been given (Belabbes et al., 2023). Furthermore, no single term has been used uniformly to describe it. The concepts of 'information obesity' (Whitworth, 2009) and 'communication overload' (Batista & Marques, 2017) in the scientific literature convey the same meanings usually attributed to the polysemic term 'information overload.'

In an attempt to mitigate ambiguity, as well as terminological and conceptual confusion, Belabbes et al. (2023) analyzed a corpus of 161 scientific publications on information overload within the Computer Science and Information Science

fields. From this analysis, they proposed a definition of IO, which we have adopted in this work: "Information overload is a negative psychological state in which individuals feel that they are receiving too much information, which hinders their ability to carry out their tasks. IO [information overload] manifests itself through emotional and cognitive challenges and is most likely to happen through intrinsic and extrinsic information characteristics, poorly defined information needs, their working environment, brain ability and cognition, or the information environment. The emotional and cognitive manifestations result in both internal and external consequences. The internal consequences limit the ability of individuals to learn and inhibit their creativity. The external consequences impact the working environment of individuals" (pp. 12–13).

Given the significant impact of IO on learning, some studies have explored this phenomenon within the context of higher education (Al-Kumaim et al., 2021; Chen et al., 2012; Fuertes et al., 2020; Williamson et al., 2012). Williamson et al. (2012) developed a scale for measuring IO and applied it to a cohort comprising Information Science and Psychology students and academic librarians. They found a positive correlation between IO and female gender, age, and academic year and a negative correlation with perceived life satisfaction. Fuertes et al. (2020) employed the Williamson et al. (2012) IO scale in a study with students pursuing a bachelor's degree and found that a positive attitude towards reading was associated with lower levels of IO.

Al-Kumaim et al. (2021) focused on exploring IO among doctoral students, aiming to understand its causes, effects and potential solutions within this specific community. The study highlights that both the interaction with information technology interfaces during information seeking and the inadequate communication with supervisors contribute to IO. This emphasizes the technological and social dimensions as key factors in the origins of IO.

Chen et al. (2012) explored the impact of IO on knowledge construction and student participation in online discussions within computer-mediated communication, particularly focusing on the aforementioned dimensions. They concluded that the computer-mediated communication system's interface primarily influenced the students' perception of IO. In summary, these investigations highlight the symbiotic relationship between technology and the human and social dimensions that define IO. Therefore, mitigating IO will naturally require a collaborative approach encompassing both dimensions.

Objectives and Methodology

The following research questions guided this research:

1. What is the level of self-perceived ITA among students enrolled in the Information Science bachelor's degree program at FLUC?
2. What is the level of self-perceived IO among students enrolled in the Information Science bachelor's degree program at FLUC?
3. Does ITA vary by students' gender, age and progression through the Information Science bachelor's degree program at FLUC?
4. Does IO vary by students' gender, age and progression through the Information Science bachelor's degree program at FLUC?
5. Does the use of university libraries impact ITA and IO?

The primary goal of this study is to ascertain the current state of ITA and IO among students enrolled in the Information Science bachelor's degree program (LCI) at FLUC. To achieve the overarching objective of this study, we have set the following specific objectives: (i) to assess the level of ITA among the target population; (ii) to evaluate the level of IO within the study population; (iii) to determine whether a statistically significant correlation exists between ITA, IO, and students' gender, age, year of study, and frequency of use (both in-person and remote) of the University of Coimbra's libraries.

In methodological terms, we conducted exploratory and descriptive research using a quantitative approach, employing a questionnaire survey method in a case study format. The questionnaire was developed using the ITA measurement scale by Wilson et al. (2023) and the IO measurement scale by Williamson et al. (2012), as adapted by Fuertes et al. (2019). It included additional questions to gather data on students' gender, age, number of enrolments in the LCI and average frequency of use of the University of Coimbra's libraries, in-person and remotely, over an academic year.

The questionnaire was emailed to the 88 students enrolled in the 2022/2023 academic year in the LCI at FLUC. Additionally, it was directly administered to students attending some of the LCI lessons during the week of 8–12 May 2023. The online data collection tool was available from 8 May to 11 June 2023. Thirty-five responses were received, 34 valid and complete, representing a sample size of 39% of the population. One response was deemed invalid because the respondent claimed not to be a student of the LCI at FLUC. The collected data were processed and analyzed using IBM SPSS Statistics software, employing descriptive and inferential statistical techniques, including the parametric chi-square test.

Context of the Case Study

This case study was set in the Faculty of Arts and Humanities of the University of Coimbra (FLUC), Portugal. Higher education in what is now known as 'Information Science' at FLUC began in 1935. This was initiated by establishing the

librarian-archivist course at FLUC, authorized by Portuguese Decree-Law No. 26:026 on 7 November 1935 (Borges and de Siqueira, 2020).

Currently, the University of Coimbra is the only institution in Portugal that offers all three levels of higher education (the bachelor's, master's and PhD degrees) in Information Science. These programs have been continuously running since the 2015/2016 academic year in the Information Section of the Department of Philosophy, Communication and Information at the Faculty of Arts and Humanities.

Concerning the bachelor's degree, this cycle of studies primarily aims to enable students to

- learn the theoretical and methodological principles of selection, organization, representation, retrieval, access and preservation of information to make it available and functional in a sustained way for different user profiles and scenarios; this requires an interdisciplinary approach that promotes dialogue between different fields;
- understand the wealth, plurality and complexity of the current informational contexts and their relations, as well as the necessity of knowing how to function appropriately and flexibly with distinct systems in a collaborative and interdisciplinary environment;
- demonstrate proficiency in using, assessing and applying techniques, norms and tools for the selection, organization, preservation, access, dissemination and exchange of information. (Universidade de Coimbra, n.d., General Objectives of the Course)

Therefore, the LCI at FLUC aims to train information professionals endowed with deep and robust competencies in information management. However, today, efficient and effective information management cannot be disentangled from a thorough mastery of information technologies. This necessity and inseparability of competencies in both information management and information technology are highlighted by the Euroguide LIS: Competencies and aptitudes for European information professionals (European Council of Information Associations, 2004). In this handbook, the areas of competence inherent to information professionals are enumerated and elaborated upon, with the first two sections precisely corresponding to the spheres of information and technology. In the field of technology, it is recommended, among other things, that information professionals can "plan and realize the deployment of a complex information system . . . originate and develop a complex, computer-based information system" (European Council of Information Associations, 2004, p. 35) and define user interfaces for these systems that are optimally suited to the users' needs, which implies a mastery of information technologies.

The LCI curriculum features four elective subjects within the scientific field of Information and Communication Technologies: Digital Publishing Systems, Digital Metadata Standards and Applications, Integrated Systems for Libraries and Archives, and Information and Communication Technologies (University of Coimbra, n.d.). However, as these subjects are non-compulsory, students can complete their academic journey in the LCI at FLUC without ever engaging with the content of these specific subjects.

However, human-computer interaction, in the context of searching, retrieving, processing, storing, producing, consuming, and/or communicating information, is a common aspect of every student's daily life, playing a crucial role in fostering student engagement and academic success among university students (Schindler et al., 2017).

In the university context, libraries embody the core and intersection of information and technology. At FLUC, this resource centre is embodied by the Library and Documentation Services (SBD) and, naturally, the General Library of the University of Coimbra (BGUC). This case study focuses on the relationship between LCI students at FLUC and the phenomena of ITA and IO.

Results and Discussion

The study's sample population consists of 34 students, representing 39% of the total population of LCI students at FLUC. The sample includes 24 women (70.6%), 6 men (17.6%), and 3 non-binary individuals (8.8%), with one respondent preferring not to disclose their gender (Figure 1). Half of the participants (50%) are first-year students, 23.5% are second-year students, another 23.5% are third-year students, and 2.9% are enrolled in their fourth year in the LCI at the FLUC (Figure 2). The participants' ages range from 19 to 49, with an average age of 21.

Table 1 summarizes the responses related to ITA, and Table 2 pertains to IO. Figure 3 and Figure 4 present, respectively, the results concerning the frequency of in-person and remote use of the University of Coimbra's libraries throughout the academic year.

Level of information technology anxiety

The survey reveals that the student respondents do not exhibit significant ITA overall. This conclusion is drawn from the fact that, in the aggregate responses to the 11 statements designed to measure this phenomenon, the options 'strongly disagree' and 'disagree' collectively constitute over 50% of responses.

Students exhibited a lower ITA primarily in response to the statements 'I am reluctant to learn new features of technology' and 'technology does not improve my quality of life.'

Such data indicate that students recognize the benefits of IT in enhancing their quality of life, especially within their roles as students. Furthermore, they do not view the need to learn unfamiliar IT features as an obstacle or hindrance, which appears to benefit their academic success. This perspective is supported by Schindler et al. (2017).

Conversely, the statements 'I am often annoyed when using technology' and 'I am not a technology person' were the ones in which students expressed a higher level of ITA. In fact, for both statements, over one-fifth of respondents selected 'agree' or 'strongly agree.' The first statement shows evidence of technostress—a phenomenon distinct from ITA where users experience irritation and frustration with information technology usage (Sarabadani et al., 2020). The second statement suggests an aversion to information technology, which, according to the definition of ITA by Wilson (2018), indicates that at least one-fifth of the students have a pronounced occurrence of ITA.

Figure 1

FLUC LCI students' gender.

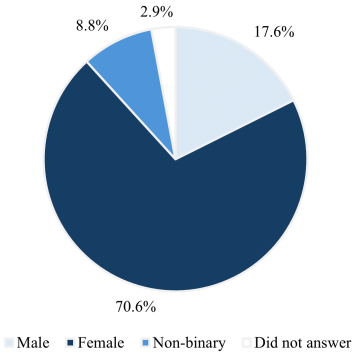


Figure 2

FLUC LCI students' enrolment years.

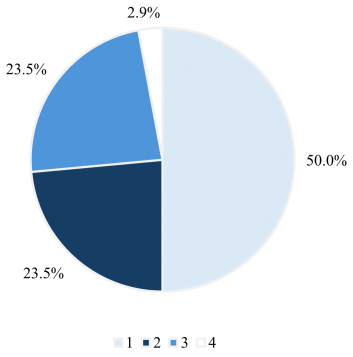


Figure 3

FLUC LCI students' frequency of in-person use of the University of Coimbra's libraries throughout the academic year.

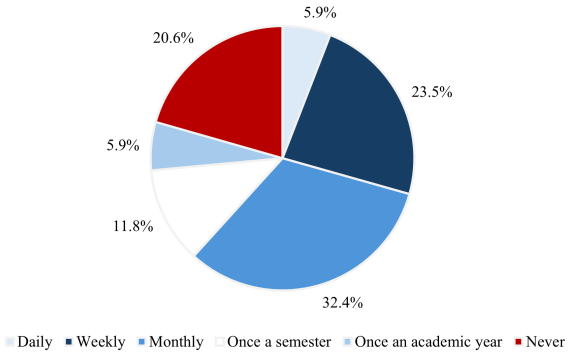
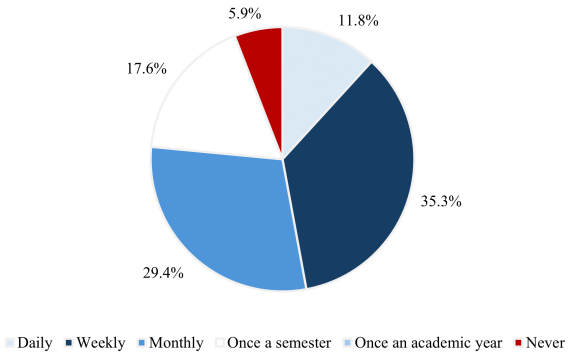


Figure 4

FLUC LCI students' frequency of remote use of the University of Coimbra's libraries throughout the academic year.



Level of informational overload

Compared to ITA, IO appears to be more significant among the studied sample population. For half of the statements (1, 2, 3, 4, 9, 11, and 14), more than 50% of responses were either 'agree' or 'totally agree'. Moreover, in the other half, the combined 'totally disagree' and 'disagree' responses never reached 50%.

The statements 'there is so much information available on topics of interest to me that I have trouble choosing what is important and what is not' and 'it seems like the volume of information available is increasing exponentially in a relatively short period of time' were the ones in which the highest level of IO was found. The first statement suggests that students struggle to evaluate information within the context of their daily academic lives—a critical competence for academic achievement and success in various life dimensions (Whitworth 2009). The second statement implies that students are aware of the rapid expansion of contemporary information.

Table 1

Perceptions of FLUC LCI students regarding their ITA (SD – strongly disagree; D – disagree; NAND – neither agree nor disagree; A – agree; SA – strongly agree).

	SD	D	NAND	A	SA
I am not a technology person	26.5%	35.3%	17.6%	14.7%	5.9%
I am reluctant to learn new features of technology	35.3%	44.1%	14.7%	2.9%	2.9%
I am uncomfortable using technology	29.4%	44.1%	17.6%	2.9%	5.9%
Technology does not improve my quality of life	41.2%	29.4%	20.6%	5.9%	2.9%
I feel out of control using technology	26.5%	47.1%	20.6%	0.0%	5.9%
I feel uneasy using technology	26.5%	41.2%	14.7%	8.8%	8.8%
I feel technology complicates simple tasks	32.4%	44.1%	8.8%	11.8%	2.9%
Keeping up with the newest technology is impossible	26.5%	38.2%	26.5%	2.9%	5.9%
I am inefficient with technology	20.6%	41.2%	17.6%	17.6%	2.9%
Using technology makes me nervous	29.4%	38.2%	17.6%	8.8%	5.9%
I am often annoyed when using technology	23.5%	38.2%	14.7%	14.7%	8.8%

Table 2

Perceptions of FLUC LCI students regarding their IO (SD – strongly disagree; D – disagree; NAND – neither agree nor disagree; A – agree; SA – strongly agree).

	SD	D	NAND	A	SA
1. There is so much information available on topics of interest to me that I have trouble choosing what is important and what's not	2.9%	8.8%	26.5%	47.1%	14.7%
2. It is sometimes hard for me to concentrate because of all the information I have to assimilate	2.9%	23.5%	11.8%	38.2%	23.5%
3. I regularly feel overwhelmed by too much information these days	5.9%	17.6%	20.6%	38.2%	17.6%
4. I have to process so much information that it frequently takes me too long to get things done in a timely manner	5.9%	20.6%	20.6%	35.3%	17.6%
5. I have to manage so much information in my daily life that it takes me a long time to complete even simple tasks	11.8%	29.4%	17.6%	29.4%	11.8%
6. I am stressed out by the sheer volume of information I have to manage on a daily basis	11.8%	11.8%	32.4%	32.4%	11.8%
7. I feel overwhelmed learning a new subject or topic because there is so much information	14.7%	14.7%	26.5%	26.5%	17.6%
8. I have so much information to manage daily that it is hard for me to prioritise tasks	14.7%	26.5%	20.6%	20.6%	17.6%
9. When I search for information on a topic of interest to me, I usually get too much rather than too little information	8.8%	23.5%	11.8%	35.3%	20.6%
10. I sometimes feel numb and incapable of action because of all the information I have to process on a daily basis	11.8%	32.4%	20.6%	26.5%	8.8%
11. I feel like my attention span is becoming shorter and shorter because of information overload	2.9%	26.5%	14.7%	35.3%	20.6%
12. I feel like I can't keep up with all the new developments in my area of expertise	5.9%	20.6%	35.3%	26.5%	11.8%
13. I regularly feel pressed for time because of all the information I have to deal with	11.8%	26.5%	17.6%	32.4%	11.8%
14. It seems like the volume of information available is increasing exponentially in a relatively short period of time	5.9%	11.8%	8.8%	41.2%	32.4%

Conversely, the statements in which students expressed a lower degree of IO included, 'I sometimes feel numb and incapable of action because of all the information I have to process on a daily basis,' 'I have to manage so much information in my daily life that it takes me a long time to complete even simple tasks,' and 'I have so much information to manage on a daily basis that it is hard for me to prioritize tasks.' Therefore, the IO perceived by students appears to have a minimal impact on their ability to carry out daily academic activities.

The relationship between information technology anxiety and gender, age, and progression through the bachelor's degree program

Regarding the relationship between ITA and gender, the responses indicate that the female gender is more associated with a higher level of ITA. In contrast, non-binary individuals are associated with a lower level of ITA.

Regarding the relationship between ITA and student age, our findings primarily indicate that 19-year-old student respondents tend to exhibit a low level of ITA, often choosing 'strongly disagree' in response to statements on the used scale. Respondents over 24 also demonstrate a low ITA level, more frequently opting for 'disagree' in response to the statements. Conversely, student respondents aged 22 show the highest level of ITA as they tend to answer 'agree' to the statements on the ITA measurement scale more often than statistically expected.

Finally, regarding the relationship between ITA and progression through the bachelor's degree program, we can conclude that ITA tends to increase with the number of enrolments of the student respondents in the LCI of the FLUC.

The relationship between information overload and gender, age, and progression through the bachelor's degree program

In the case of IO, the phenomenon is similar to ITA in terms of its relationship with gender. Specifically, the female gender is more commonly associated with a higher level of IO, whereas non-binary individuals tend to exhibit a lower level of IO. Regarding the correlation between the female gender and IO, the findings align with the study by Williamson et al. (2012), which also identified such a correlation.

Concerning the relationship between IO and student age, we observed that respondents aged 19 and those older than 24 exhibit the lowest level of IO as they tend to answer 'disagree' to statements on the IO measurement scale more frequently than statistically expected. Conversely, students aged 20 and 22 demonstrate a higher level of IO, generally responding 'agree' to the statements on the used scale. We were thus able to conclude that the student respondents aged 19 and over 24 exhibit the fewest signs of IO and ITA.

Finally, regarding the relationship between IO and progression through the bachelor's degree program, we found that the prevalence of this phenomenon tends to increase as students progress through the degree. These results align with the findings of the study by Williamson et al. (2012), which also observed this correlation. The authors of that study commented that such findings could be "understandable from a lifespan developmental perspective: Individuals have greater demands as they progress in academic settings [...] Many of these demands are information-related, as students must undertake increasingly complex assignments [...] thus experiencing higher levels of information overload" (Williamson et al., 2012, p. 2).

The impact of university libraries on information technology anxiety and information overload

Regarding the link between how frequently FLUC LCI students use the University of Coimbra libraries' resources, collections, services, and/or spaces and their responses on the ITA and IO scales, we have primarily observed the following:

- Students who use the university's libraries in person daily are more likely to agree with the statements on the ITA measurement scale than statistically expected;
- Students remotely accessing the libraries weekly often completely agree with the statements on the ITA measurement scale;
- Students who visit the university's libraries in person only once a semester show a strong statistical correlation with choosing 'strongly disagree' for statements on the IO measurement scale;
- Students who use the libraries in person daily tend to disagree with the statements on the IO measurement scale;
- Students who never access the university's libraries remotely are inclined to strongly disagree with the statements on the IO measurement scale;
- Students who remotely access the libraries daily generally agree with the statements on the IO measurement scale.

In summary, the data indicate that, as a general rule, regular use of the University of Coimbra libraries' resources, collections, services, and/or spaces by the FLUC LCI students is associated with a higher level of both ITA and IO.

Conclusions

Despite the scientific community's contemporary interest in the phenomena of ITA and IO, related empirical research within Information Science is scarce, and in the Portuguese

context, it seems to be non-existent. This case study aims to address a gap—albeit through a preliminary approach—in Portuguese empirical scientific research within the field of Information Science, specifically in the area of Information Systems.

Concerning the limitations of our study, it is important to emphasize that it relies exclusively on the statistical analysis and interpretation of data gathered through a questionnaire survey. Our goal is to further develop this research, grounded in a phenomenological approach, by incorporating the collection, analysis, and interpretation of both the experiences related to ITA and IO among the population under study, namely LCI students at the FLUC, and the perceptions of librarians from the Library and Documentation Services (SBD) of the FLUC and the General Library of the University of Coimbra (BGUC) regarding these phenomena among students who use the aforementioned information services. This additional survey will be conducted through semi-structured interviews.

It should also be emphasized that the research and methodology used can be replicated, for example, with the student population of the Information Science bachelor's degree program at the Faculty of Arts and Humanities of the University of Porto, Portugal, and a national comparative study can be conducted.

In summary, our research allows us to conclude that ITA is not particularly prevalent in the sample of the population being studied; conversely, IO is more significantly represented.

Contrary to the initial hypothesis, a more regular use of the University of Coimbra's libraries by students from the LCI of the FLUC is associated with a higher level of both ITA and IO. This aspect should be further explored and discussed, grounded in a phenomenological approach, in light of the students' lived experiences and the perceptions of the academic librarians and teaching staff. Given that, in the university sphere, libraries serve as the core and intersection between information and technology, what are the underlying reasons for this? Finally, we recall once again the words of Baron (2002), who states that "technology anxious people are one of the reasons librarians exist–they need help finding [and managing] information, and that is what we [librarians] do" (p. 144).

References

Al-Kumaim, N. H., Hassan, S. H., Shabbir, M. S., Almazroi, A. A., & Al-Rejal, H. M. A. (2021). Exploring the inescapable suffering among postgraduate researchers: Information overload perceptions and implications for future research. *International Journal of Information and Communication Technology Education, 17*(1), 19–41. http://doi.org/10.4018/IJICTE.2021010102

Baron, S. (2002). Problem or challenge? Serving library customers that technology left behind. *The Reference Librarian, 36*(75–76), 129–147. *https://doi.org/10.1300/J120v36n75*$_1$3

Batista, J. C. L., & Marques, R. P. F. (2017). An overview on information and communication overload. In J. C. L. Batista & R. P. F. Marques (Eds.), *Information and communication overload in the Digital Age* (pp. 1–19). 10.4018/978-1-5225-2061-0.ch001

Bawden, D., & Robinson, L. (2020). Information Overload: An introduction. In *Oxford Research Encyclopedia of Politics*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190228637.013.1360

Belabbes, M. A., Ruthven, I., Moshfeghi, Y., & Pennington, D. R. (2023). Information overload: A concept analysis. *Journal of Documentation, 79*(1), 144–159. https://doi.org/10.1108/JD-06-2021-0118

Borges, L. C., & de Siqueira, M. N. (2020). Percursos da Ciência da Informação em Portugal e no Brasil. In M. B. Marques & L. E. Gomes (Eds.), *Ciência da Informação: Visões e tendências* (pp. 89–113). Imprensa da Universidade de Coimbra. https://doi.org/10.14195/978-989-26-1896-8_7

Chen, C-Y, Pedersen, S., & Murphy, K. L. (2012). The influence of perceived information overload on student participation and knowledge construction in computer-mediated communication. *Instructional Science, 40*(2), 325–349. 10.1007/s11251-011-9179-0

European Council of Information Associations (2004). *Euroguide LIS: Competencies and aptitudes for European information professionals* (Vol. 1). ADBS Éditions.

Fuertes, M. C. M., Jose, B. M. D., Singh, M. A. A. N., Rubio, P. E. P., & de Guzman, A. B. (2020). The moderating effects of information overload and academic procrastination on the information avoidance behavior among Filipino undergraduate thesis writers. *Journal of Librarianship and Information Science, 52*(3), 694–712. https://doi.org/10.1177/0961000619871608

Gardijan, N. (2023). Library anxiety among Croatian students: construction, validation and application of Croatian-Library Anxiety Scale (CRO-LAS). *The Journal of Academic Librarianship, 49*(3). https://doi.org/10.1016/j.acalib.2023.102687

Gross, J. (2012). 10 - keeping up to date and being competent. In J. Gross (Ed.), *Building your library career with web 2.0* (pp. 177–193). Chandos Publishing. https://doi.org/10.1016/B978-1-84334-651-7.50010-8

Jiao, Q. G., & Onwuegbuzie, A. J. (2017). The impact of information technology on library anxiety: the role of computer attitudes. *Information Technology and Libraries, 23*(4), 138–144. https://doi.org/10.6017/ital.v23i4.9655

Johnson, D. G., & Wetmore, J. M. (Eds.) (2021). *Technology and society: Building our sociotechnical future* (2nd ed.). The MIT Press.

López-Bonilla, J. M., & López-Bonilla, L. M. (2012). Validation of an information technology anxiety scale in under-

graduates. *British Journal of Educational Technology, 43*(2), E56–E58. https://doi.org/10.1111/j.1467-8535.2011.01256.x

Pfaffinger, K. F., Reif, J. A. M., Spieß, E., & Berger, R. (2020). Anxiety in a digitalised work environment. *Gruppe. Interaktion. Organisation. Zeitschrift für Angewandte Organisationspsychologie, 51*, 25–35. https://doi.org/10.1007/s11612-020-00502-4

Rifkin, J. (2000). The age of access: The new culture of hypercapitalism where all of life is a paid-for experience. *The Putnam Publishing Group.*

Rosenberg, D. (2003). Early Modern information overload. *Journal of the History of Ideas, 64*(1), 1–9. http://doi.org/10.1353/jhi.2003.0017

Sarabadani, J., Compeau, D., & Carter, M. (2020). An investigation of IT users' emotional responses to technostress creators. In T. X. Bui (Ed.), *Proceedings of the 53rd Hawaii international conference on system sciences* (pp. 6113–6122). 10.24251/HICSS.2020.748

Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer-based technology and student engagement: a critical review of the literature. *International Journal of Educational Technology in Higher Education, 14,* 1–28. https://doi.org/10.1186/s41239-017-0063-0

Terra, A. L. (2017). Email overload: framing the concept and solving the problem – a literature review. In J. C. L. Batista & R. P. F. Marques (Eds.), *Information and communication overload in the Digital Age* (pp. 20–43). https://doi.org/10.4018/978-1-5225-2061-0.ch002

Universidade de Coimbra (n.d.). *Bachelor´s Degree in Information Science.* https://apps.uc.pt/courses/en/course/5543

Whitworth, A. (2009). *Information obesity.* Chandos Publishing.

Williamson, J., Eaker, C., & Lounsbury, J. (2012). The Information Overload Scale. *Proceedings of the American Society for Information Science and Technology, 49*(1), 1–3. https://doi.org/10.1002/meet.14504901254

Wilson, M. L. (2018). *The relationship between teacher education courses and the technology integration attitudes, beliefs, and knowledge of preservice teachers: a systematic review and meta-analysis series* [Doctoral dissertation, University of Florida]. University of Florida Digital Collections. https://ufdc.ufl.edu/UFE0052041/00001/pdf

Wilson, M. L., Huggins-Manley, A. C., Ritzhaupt, A. D, & Ruggles, K. (2023). Development of the Abbreviated Technology Anxiety Scale (ATAS). *Behavior Research Methods, 55,* 185–199. https://doi.org/10.3758/s13428-022-01820-9

Yang, X., & Khan, A. U. (2023). Validity and reliability of factors causing information-seeking anxiety during information-seeking behaviors. *Collection and Curation, 42*(4), 128–136. https://doi.org/10.1108/CC-11-2022-0040