

Diagnosis of Students' Learning Difficulties during Performing Manual Indexing at Constantine Librarianship Institute.

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Abstract:

The study aimed to diagnose the difficulties with manual indexing among second-year students at the Library Science Institute. Three stages were identified to gauge the hardship level of indexing-related activities inside the classroom: cognitive indicators, psychological factors, and time management. The researcher utilized the questionnaire instrument and applied a probability random sample size of 56 participants to give the results more credibility.

The analysis revealed that 82.10% of the students' difficulties were related to weak grasping of the theoretical concepts (73.20%, 69.60%, and 60.70%), and they needed more clarification regarding applying manual indexing rules and standards. The others, 51.80%, 46.40%, and 44.60%, have psychic factors that hinder them from performing manual indexing effectively at a constant pace. However, most (96.40%, 87.50%, and 87.50%) consider the allocated time for comprehending and completing indexing activities sufficient.

Keywords: Manual Indexing; Learning Difficulties; librarianship; Students; Constantine.

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1. INTRODUCTION

Documentation systems, whether in traditional or digital environments, have used various documentation languages to make accessing information sources easier. This goal has been pursued through different eras, from Callimachus to Dewey, and now with documentarians in the semantic web environment. Despite the different periods of development, the common goal is to find effective ways to organize, arrange, and retrieve information. However, this can only be achieved through mental activities and technical processes that require a high level of concentration and understanding of the document's content, especially manual indexing.

Manual indexing is managing and processing information resources in libraries and information centers. It involves selecting indexing terms by identifying essential concepts within documents and extracting them to create hard copies and electronic research tools. This process establishes a system of rapid information retrieval for library users. Although significant advancements have been made in automated indexing systems, manual indexing is still indispensable because of human expertise.

This intellectual process involves using human expertise to categorize documents accurately. This study strives to diagnose the reasons that affect students' learning processes at the library science and information centers department and find solutions to overcome their weaknesses.



2. Statement of the Problem and Research Questions:

2.1 Statement of the Problem:

This study highlights the significance of teaching documentary analysis, including manual indexing, to second-year students at the Library Science Institute in Constantine. This module is essential for learning indexing procedures that involve the need for critical cognitive thinking in managing information. Additionally, the study examines university students' challenges while learning this intellectual process.

It was observed that second-year students needed help carrying out manual indexing activities. Consequently, a diagnostic investigation was initiated to determine the type of difficulties, and the research's central question is: What obstacles do second-year students at the Institute of Library and Documentation Science encounter?

2.2 Research Questions:

This status quo developed the following sub-questions:

- What are the cognitive challenges faced by librarianship students during manual indexing?
- What psychological barriers hinder students from performing manual indexing effectively?
- How do time constraints impact students' ability to complete manual indexing tasks?
- What solutions can enhance undergraduate students'

abilities in manual indexing?

- How can indexing practices be improved to align with students' cognitive and psychological needs?

3. Objectives and Importance of the Study:

3.1 Objectives of the Study:

The study has the following precise aims:

- To demonstrate and define the obstacles that hinder manual indexing from the learners' point of view.
- To suggest solutions for enhancing undergraduate students' abilities while performing manual indexing.
- To identify the crucial features of the manual indexing process that students should know.
- To understand the significance of indexing in retrieving information and promoting scientific research.

3.2 Importance of the Study:

The study's importance is highlighted when teaching students the steps of content analysis, which is essential for developing the skill of creating a set of descriptors to represent the content of documents. Additionally, students should be aware that the manual indexing process involves converting hard copies of information sources (such as journals and books) into specific descriptors.

It is also important to emphasize to students the significance of indexing in increasing research efficiency and facilitating easy

retrieval of references. Lastly, suggestions and practical pedagogical solutions should be provided to improve the process of teaching manual indexing and avoid the challenges that students encounter in the classroom.

4. Methodology and Procedures:

4.1 Hypotheses of the study

Careful hypotheses were prepared to address the specific research questions. Hypotheses are plausible answers to research questions, explaining the investigated phenomenon following prior knowledge and theories.

They predict the relationship between an independent variable and its effect on a dependent variable. First, identify the variables by observing a phenomenon. Hypotheses must be formulated as testable conclusions for the research process. (Kranz, Baur, & Moller, 2023, p.325)

- 2nd-year students at the Department of Library and Information Centers encounter hardships while executing manual indexing due to their cognition deficiency of indexing concepts.
- 2nd-year students at the Department of Library and Information Centers confront challenges while rehearsing manual indexing due to weak self-confidence.
- 2nd-year students at the Department of Library and Information Centers face problems while working on manual indexing due to a deficiency of time.

4.2 Research Approach

The study employed a descriptive research method to accurately reflect its focus on identifying patterns and opinions, which “examines a population's characteristics and identifies issues within a unit, organization, event, or condition through observation.” (Siedlecki, 2020)

4.3 Study Limitation and Sample Size:

The study was conducted in the second semester of the academic year among Algerian undergraduate students at the Institute of Library and Documentation Science in Constantine. We applied a purposive sample as the selection of participants is deliberate and based on second-year students. A sample size of 56 participants represented a 40.87% return rate of the total of the study population, estimated at 137.

4.4 Instrument of collecting data

The study used a questionnaire to collect data from second-year Algerian undergraduates at the Constantine Librarianship Institute, which increased the credibility of the results.

5. Previous Studies:

Previous studies help researchers avoid redundancy, explore new variables, and make novel contributions. A search mentioned a scarcity of studies on the current study topic as follows:

His paper titled "**Indexing: Concepts and Theory**" (Hjorland, 2018) provides a detailed overview of indexing. The paper discusses manual and automated indexing methods and proposes a typology of rational, cognitive, empirical, historical, and pragmatic theories. The author also emphasizes the subjectivity of the indexer, particularly their social, cultural, and paradigmatic background, and examines the available tools for indexing, such as languages and their nature. Finally, he concludes that Jesse Shira's social epistemology, proposed in 1951, provides the most compelling theoretical framework for indexing.

We used Hjorland's study to inform our research on the theoretical background, especially regarding the subjectivity of the indexer, their social and cultural background, and the available indexing tools, including languages and their characteristics. Although there were differences in the methodology, as our study focused on conducting a field diagnosis, the goal was to identify the challenges students face in indexing in a classroom at the library and information centers department.

In a second research study, "**Subject Analysis: The Critical First Stage in Indexing**" (Chu & O'Brien, 1993), selected library and information science student indexers from California University and Loughborough University to analyze three short articles for primary, secondary, and general topics. The study found that five factors influence the ease and accuracy of subject analysis: academic discipline, objectivity, complexity of the

subject matter, presence of bibliographic apparatus, and clarity of the text. Clear writing and an informative bibliographic framework can aid in analyzing the text, while humanities texts and compound writing can make analysis more difficult. Social science and science texts are easily indexed, while humanities texts require more work.

The study helped improve the analysis process and discuss the field study results. It enabled us to identify the factors that influenced the manual indexing process for library science students and highlighted the differences between the American and Algerian environments. We noticed a similarity between Chu and O'Brien's study and our current subject regarding the population variable. Both studies selected library and information science students to analyze short essays on humanities and social sciences topics. However, our study differs in that we examined three variables that needed to be addressed in the previous research: awareness indicators, psychological factors, and time management.

- **Critical Review:**

This subsection highlights the differences between the challenges identified in our study and those identified in other literature. Our research focused on students' psychological, cognitive, and challenges during manual indexing, seeking to understand their perspectives. In contrast, Birger Hjørland's work explored manual and automated indexing methods, classifying them based on social, cultural, and contextual factors theories. Additionally, Chu and O'Brien identified five key factors

influencing subject analysis: academic discipline, objectivity, complexity, availability of bibliographic apparatus, and text clarity.

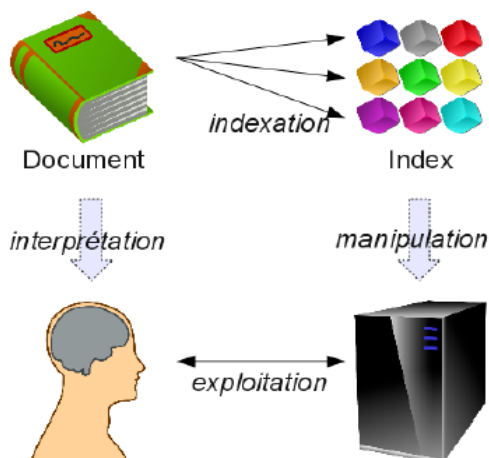
6. Theoretical Background:

Documentary language refers to the controlled language that human minds use to interpret a document's content and produce a new set of identifiers like descriptors, subject headings, and controlled vocabulary. This concise vocabulary is derived from different referential sources, such as a thesaurus, classification system, and subject heading lists. (Reitz, 2013, p.9) The ODLIS dictionary provided the following definition: "It is a system of subject headings and descriptors selected to facilitate information retrieval in a catalogue or index, including lead-in vocabulary and syntax rules." Its primary function is to assist the indexers in achieving their targets and creating new indexes.

6.1 Definition of Manual Indexing

Different suggestions have been made for defining manual indexing (Hjorland, 2018, p. 906) defined it as "the process of analyzing knowledge records and expressing content in the language of an indexing system." In his point of view (Sensuse, 2004, p. 22) manual indexing is "the procedure for assigning important keywords by skilled subject matter specialists, requiring human intelligence."

Fig.1. Indexing Principle



Source: Crozat, 2016

The definitions above indicate that manual indexing requires indexers to choose keywords from the intellectual context, requiring cognitive focus. It is an intelligent analysis operation based on relationships between descriptors and key entries in an organized file.

6.2 Subject Indexing Process

Subject content analysis involves creating new concepts based on document information. It helps indexers understand the general subject matter of the documents. The next step is to interpret these concepts using indexing language systems such as subject heading lists, classification schemes, and thesaurus. During the revision stage, the indexer ensures that the descriptors

or subject headings cover all critical concepts within the document.

A helpful depiction of subject content analysis was used: "Analysis of information means deriving from a document a set of words that serves as a condensed representation of it. This representation may be used to identify the document, to provide access points for a literature search, to indicate its content, or as a substitute for the document." (Chu & O'Brien, 1993)

The subject indexing process consists of four main steps, as identified by (Khemiri & Sidhom, 2020, p. 4):

"Document analysis: The indexer needs global knowledge of the document. They consult the title, table of contents, summary, introduction, and conclusion to know the main subject.

The selective keywords: To identify the main concepts of a document, the indexer must answer questions that a user would ask when searching for information, such as who, what, where, and when.

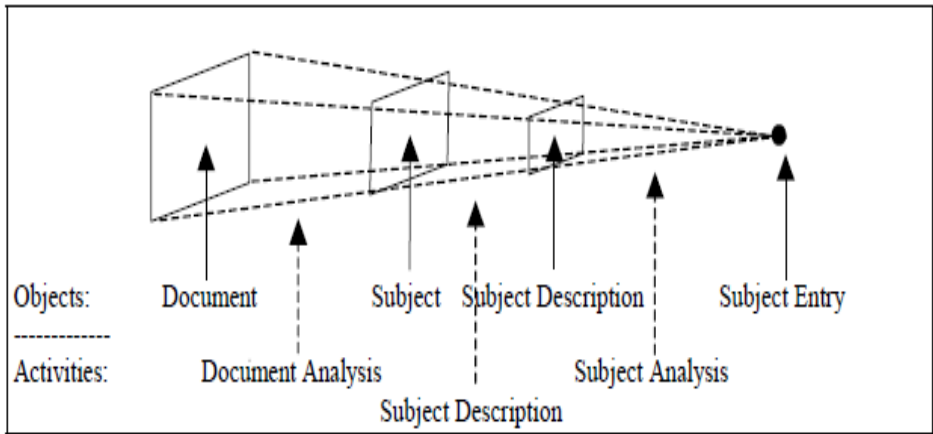
Transformation of concepts into descriptors: The indexer selects approved terms from a controlled vocabulary list for uniform document representation.

Evaluation: At this stage, the indexer has the claim to decide which descriptors are accepted to be the subject entries or rejected. Structured terminology is an effective way to guide users in analyzing documents that may interest them. It involves

describing documents in codified terms that are clear and independent of the free-form terms.

When the indexer extracts words and phrases from the text of documents it is known as extractive or derivational mining. The figure below illustrates this process.

Fig.2. The Subject Indexing Process



Source: Mai, 2000

7. The analysis and discussion of the findings:

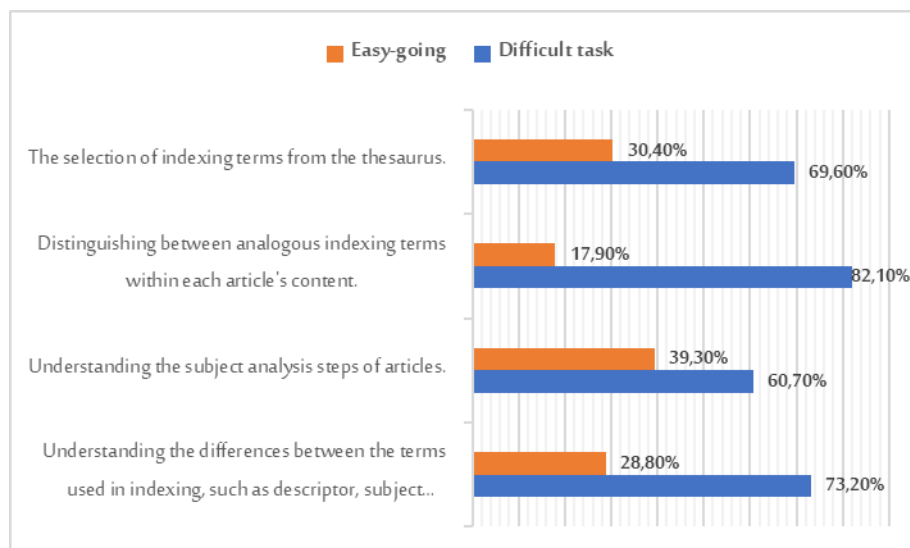
The data were analyzed with frequency distribution and descriptive statistics of simple percentages. The survey showed the cognitive and behavioral differences between 2nd-year students at the library and information centers department and their opinions about the time allocated during the learning of the indexing process. The survey results are as follows:

7.1 Cognitive Indicators

The information displayed in Figure 3 is quite interesting. It indicates that only 17.90% of the respondents could distinguish between similar indexing terms within each article. On the other hand, a majority of students 82.10% required more explanations and exercises to understand the dissimilarities between the indexing terms known as descriptors.

73.20% of students needed help understanding the differences between indexing terms like descriptor, subject header, and secondary entry. Meanwhile, 28.80% of the students could effectively differentiate between these concepts during article content analysis in the classroom. It was noted (Khemiri & Sidhom, 2020, p. 4) that selecting appropriate descriptors for each document depends on the indexer's knowledge and expertise. Indexers use a thesaurus containing a hierarchical dictionary of pre-established monolingual or multilingual standard terminologies to facilitate indexing.

Fig.3. The student's cognitive level during the subject indexing process.



Source: Prepared by the author

The sample was divided into two groups. The first group consisted of respondents 30.40% who could use the thesaurus effectively without facing challenges while selecting terms and could quickly extract descriptors during the article indexing process. On the other side, 69.60% of students needed help understanding the structure of the thesaurus as a system. Despite the explanations given in the classroom, they still required support searching and selecting terms through the system.

According to the Figure above, 60.70% of the study participants need assistance and pedagogical guidance to comprehend the steps involved in the thematic analysis of journal articles. On the contrary, 39.30% of the students confidently reported that they could easily understand and execute the steps of thematic analysis. They rely on the thesaurus system to help them extract descriptors to effectively organize and retrieve information

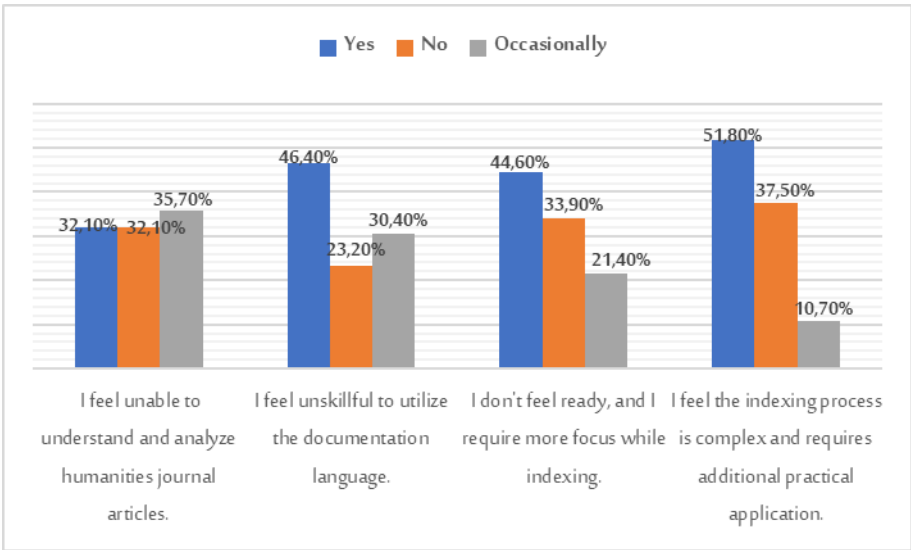
through mental activities and technical processes that demand high concentration from the learners while analyzing the content of the articles.

7.2 Psychological Factors

Many students want extra support sessions to enhance their self-confidence while learning the rules of manual indexing. This situation was observed in Figure 3 when most students admitted they could not complete the assigned indexing activities due to their scarcity of concentration and the cognitive overlap between natural and documentary language.

The details of these factors are illustrated in the following graph:

Fig.4. The student's psychological stress.



Source: Prepared by the author

In line with the graph provided, students' responses were categorized into three options based on their perspectives. 51.8% of participants found the indexing process complex and needed more practical application. Simultaneously, 37.50% of the sample differed from their colleagues because they considered indexing activities easy and enjoyable. Only 10.70% of students face situational challenges and sometimes repeat indexing activities to avoid mistakes.

Of many students, 46.40% and 23.20% need help with using documentation language when performing indexing, which makes them feel they require continuous assistance to improve in this area. Moreover, 30.40% of individuals need intermittent support.

In the classroom, most students (44.60%) expressed the demand for more preparation to comprehend the articles thematically and to pay more attention to reading them in depth. In distinction, only 33.90% of students were highly focused and ready to complete several activities on the indexing process, such as creating an author or subject index. A small group of 21.40% of students needed help maintaining attention, leading to a lack of interest in indexing exercises and performing their rules.

About 35.70% of students experience occasional difficulty understanding and analyzing journal articles in the humanities, while 32.10% face this issue regularly. According to Chu & O'Brien, library science students in the United States also need help to practice thematic indexing due to the complexity of the subject matter in the humanities compared to the social sciences. However, the remaining 32.10% of library science students at

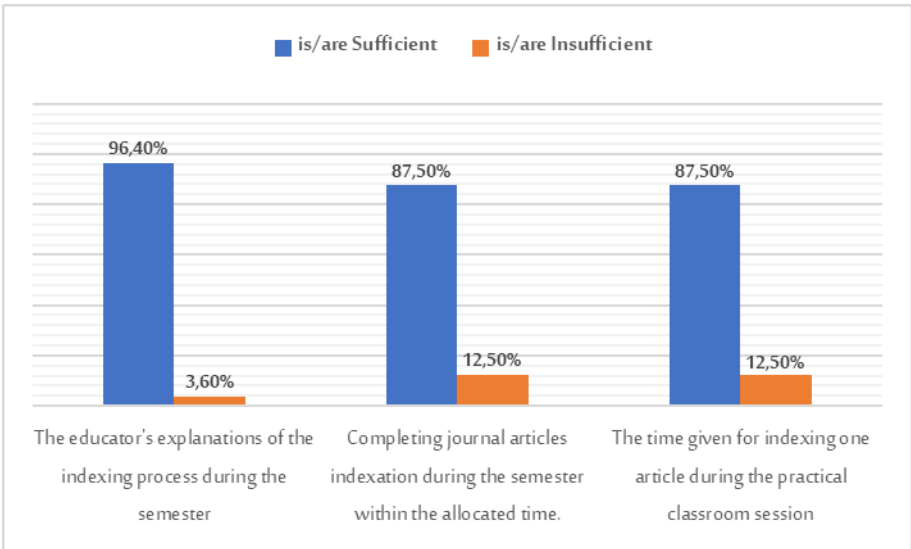
Constantine Institute are satisfied with their understanding of journal articles in the humanities.

After reviewing the explanations, it can be summed up that some students without learning difficulties possess high self-confidence, as depicted in Figure 4. This group of students can effectively understand and perform the subject indexing process throughout the semester, as shown in Figure 3.

7.3 Time Management

Students' opinions regarding learning time can differ significantly based on the available choices presented. The figure displays their views on the educator's explanations and time management of the indexing process.

Fig.5. The student's perspective of indexing time.



Source: Prepared by the author

The survey results indicate that 96.40% of the participants found the educator's explanations of the indexing process during the semester adequate. However, 3.60% of them reported needing help comprehending the theoretical concepts of indexing and implementing the process within the given timeframe.

According to the graph, 87.50% of respondents claimed they had enough time to index journal articles during the semester. However, the remaining 12.50% of students declared they needed more time to complete their journal article indexing process and prepare the required indexes.

Every student has unique characteristics that influence their manner and perception of time. After analyzing the results, it is clear that 87.50% of the students found the time allotted for indexing one article during the practical classroom session enough. However, 12.50% of the students felt overwhelmed by the article that needed to be indexed during the session.

After evaluating the feedback from participants, it was found that the majority did not view time as an obstacle. However, a few respondents suggested that more teaching hours should be dedicated to indexing journal articles during the semester. They emphasized the need to improve indexing practices to master this cognitive function.

8. Results based on hypotheses of the Study:

1) The obtained results revealed that **the first hypothesis** about the level of students' cognition during the subject indexing process was correct.

Following the survey outcomes, 82.10% of the students found it challenging to discriminate between analogous indexing terms. Also, 73.20% of them needed assistance to understand the terms used in the indexing process, such as descriptor, subject header, and secondary entry. Moreover, 69.60% found choosing indexing terms from the thesaurus hard. Lastly, 60.70% demand help comprehending the articles' subject analysis steps.

2) Figure 4 confirms **the second hypothesis**, with a combination of "yes" and "occasionally" options indicating various psychological pressures on students to learn the manual indexing process:

According to recent statistics, 76.80% of students require more skills to use documentation language effectively. Additionally, 67.80% need help comprehending and analyzing humanities journal articles. Meanwhile, 66% of students believe they still demand to be ready and more focused on indexing. Finally, 62.50% of respondents find the indexing process complex and needs additional practical application.

3) The majority of students reported that they had sufficient time to study and practice manual indexing, and surprisingly, the results of Figure 5 did not confirm **Hypothesis 3**.

As stated in the feedback from the students, 96.40% of them feel that the educator's explanations about the indexing process during the semester were adequate. Furthermore, 87.50% of the students consider the allocated time for completing the journal article indexing during the semester sufficient. Similarly, 87.50%

of the students believe that the time allocated for indexing one article during the practical classroom session is adequate.

9. CONCLUSION

Upon analyzing the data and considering the majority of students' opinions, it has been determined that the duration of the indexing course is appropriate, and the educator's explanations are clear. However, it has come to light that second-year students in the Department of Libraries and Information Centers need help with performing indexing tasks. These difficulties are attributed to subjective and psychological pressure, lack of self-confidence, and difficulty concentrating, which stem from the struggle to comprehend the theoretical concepts being taught.

To address these difficulties identified in this study, scientific and pedagogical procedures should be provided to help students adapt to indexing and documentary analysis classes at Constantine 2 University. The researcher gives the following suggestions:

- 1) Develop pedagogical tools, such as interactive thesaurus training sessions or workshops, to address cognitive challenges.
- 2) Students must be physically present throughout the semester to achieve good academic results.
- 3) Mind maps facilitate understanding and analyzing knowledge content to enhance cognitive abilities in analysis and synthesis.
- 4) Provided practical resources, such as accessible indexing tools and reference materials, to help students learn.

- 5) Motivation and engagement to make the indexing process interactive and engaging.
- 6) Enhancing students' collaboration and teamwork.

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